

Information System Certification

Effectiveness in Digital Environments



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Abstract

The use of information systems has become a fundamental part of people's everyday private and working life. While in most cases information systems ease the way we consume, produce or share information, products or services, the ubiquitous access to information systems brings along some serious issues not only for those using information systems, but also for those providing them. Particularly in digital and online contexts (e.g., e-commerce), on the one hand, consumers struggle to separate real and trustworthy information systems (and their providers) from those that are counterfeit and pose a threat (e.g., through fraudulent or deceptive tactics). On the other hand, genuine vendors of information systems face challenges, since they would like to convey a trustworthy and veracious picture in order to separate themselves from fake providers and to be successful in their respective markets. So called information asymmetries (i.e., the imbalance of available information between the one using and the one providing the information system) are at the center of these challenging situations.

The evolution of digital environments has brought up a variety of counter measures to reduce information asymmetries and hence simplify the provision and use of information systems. Among the most prominent and often used strategies, are information systems certifications (IS certifications). IS certifications are an attestation (in most cases from an independent third-party) of the information system, its vendor or related processes using a pre-defined set of evaluation criteria. Contemporary information systems research has a long history concerning IS certifications, especially in terms of proofing (or dis-proofing) their effectiveness (i.e., the degree to which certifications achieve their intended effects). Yet, extant literature has at best produced mixed results regarding IS certifications' true effectiveness. While some studies demonstrate IS certifications' effectiveness in various digital contexts, others exhibit contradicting results by setting out null or even negative IS certification effectiveness on the variable under investigation (e.g., trust or perceived assurance). The problem with such ambivalent research outcomes is not only the mismatch between vendor expectations and true value regarding IS certifications leading to decreasing adoption rates and therefore amplification of information asymmetries, but also the development of erroneous IS certifications that do not satisfy consumers' needs in the quest of reducing information asymmetries.

Against this backdrop, this thesis presents four research studies. Each study thereby comes up with a distinct rationale for the inconclusiveness of IS certifications' effectiveness research. The first study synthesizes extant information systems literature by presenting a structured literature review. The results of this literature review do not only allow to stand on common ground and to build further research on, they also show the multitude of levels of analyses and theories used to explain IS certification effect dynamics making it difficult to compare research results (rationale 1). The second study presents a consumer perspective by investigating the idiosyncrasies of consumers in making sense of IS certifications. While past studies have assumed that consumers' characteristics do not influence the way they perceive or process IS certifications, this study shows that consumers react differently to IS certifications based on their personality (rationale 2). The third study takes a vendor perspective and is concerned with identifying motivators as well as de-motivators for acquiring IS certifications. Understanding the main drivers of IS certification adoption yields important insights about vendors' intentions and goals and therefore IS certifications' effectiveness (rationale 3). The last study focuses on consumer-vendor relationships by simultaneously identifying and contrasting vendor intentions to acquire IS certifications and consumer perceptions of IS certifications. The results show a crucial mismatch between intentions and perceptions that constitutes the last central explanation for the mixed IS certifications' effectiveness results (rationale 4).

In a nutshell, this thesis provides various explanations for the ambivalence of IS certifications' effectiveness research outcomes in the information systems literature. Vendors of information systems aiming to acquire IS certifications might use the findings to deepen their understanding of the effectiveness mechanisms in order to improve their decision-making regarding IS certification adoption. Moreover, certification authorities (e.g., those, who design and issue IS certifications) can add value through this research by improving their certification design, for instance, to better target specific audiences, reduce unintended side effects and eventually increase certification adoption rates. Finally, consumers are able to utilize this thesis' findings to better understand and assess IS certifications and the underlying mechanism when encountered in digital environments. With this, consumers might be better equipped to identify red herrings and fraudulent providers of information systems ultimately

reducing information asymmetries resulting in improved usage of information systems in general.

Zusammenfassung

Die Nutzung von Informationssystemen ist zu einem wesentlichen Bestandteil des täglichen Privat- und Arbeitslebens vieler Menschen geworden. Während Informationssysteme in den meisten Fällen die Art und Weise erleichtern, wie wir Informationen, Produkte oder Dienstleistungen konsumieren, produzieren oder teilen, bringt der allgegenwärtige Zugriff von Informationssystemen ernstzunehmende Probleme mit sich. Dies trifft nicht nur auf diejenige zu, die Informationssysteme verwenden, sondern auch auf die diejenigen, die sie bereitstellen. Besonders in digitalen Kontexten (z. B. E-Commerce) haben Konsumenten einerseits Schwierigkeiten, echte und vertrauenswürdige Informationssysteme (und ihre Anbieter) von solchen zu unterscheiden, die betrügerische Absichten haben und eine Bedrohung darstellen (z. B. durch betrügerische oder irreführende Aktivitäten). Andererseits stehen echte bzw. vertrauenswürdige Anbieter von Informationssystemen vor Herausforderungen, da sie ein vertrauenswürdiges und wahrheitsgemäßes Bild vermitteln sowie in ihren jeweiligen Märkten erfolgreich sein möchten. Sogenannte Informationsasymmetrien (d. h. das Ungleichgewicht der verfügbaren Informationen zwischen denjenigen, die das Informationssystem verwenden und solchen, die es bereitstellen) stehen im Zentrum dieser herausfordernden Situationen.

Die Evolution digitaler Umgebungen hat eine Reihe von Gegenmaßnahmen zur Verringerung von Informationsasymmetrien und damit zur Vereinfachung der Bereitstellung und Nutzung von Informationssystemen hervorgebracht. Zu den bekanntesten und am häufigsten verwendeten Strategien zählen Zertifizierungen von Informationssystemen (IS-Zertifizierungen). Eine IS-Zertifizierung ist ein Nachweis (in den meisten Fällen von einem unabhängigen Dritten) darüber, dass das Informationssystem, der Anbieter oder die zugrundeliegenden Prozesse einem Standard in Form von vordefinierten Bewertungskriterien genügen. Die gegenwärtige Forschung zu Informationssystemen blickt in Bezug auf IS-Zertifizierungen auf eine lange Geschichte zurück, insbesondere im Hinblick auf den Nachweis (oder die Wiederlegung) ihrer Wirksamkeit (d. h. der Grad, in dem Zertifizierungen ihre beabsichtigten Wirkungen erzielen). Die vorhandene Literatur hat jedoch bestenfalls gemischte Ergebnisse hinsichtlich der tatsächlichen Wirksamkeit von IS-Zertifizierungen erbracht. Während einige Studien die Wirksamkeit von IS-

Zertifizierungen in verschiedenen digitalen Kontexten belegen, zeigen andere widersprüchliche Ergebnisse, indem sie für die untersuchte Variable (z. B. Vertrauen oder wahrgenommene Sicherheit) keine oder sogar eine negative Wirksamkeit von IS-Zertifizierungen angeben. Das Problem mit solch ambivalenten Forschungsergebnissen ist nicht nur die Nichtübereinstimmung zwischen den Erwartungen der Anbieter und dem tatsächlichen Mehrwert einer IS-Zertifizierung, was zu einer verringerten Adoptionsrate und damit zu einer Verstärkung von Informationsasymmetrien führt, sondern auch die Entwicklung von fehlerhaften IS-Zertifizierungen, die nicht die Bedürfnisse der Konsumenten decken, die nach einer Reduzierung von Informationsasymmetrien streben.

Vor diesem Hintergrund werden in dieser Arbeit vier Forschungsstudien vorgestellt. Jede Studie liefert dabei eine Begründung für die Unschlüssigkeit der Wirksamkeitsforschung zu IS-Zertifizierungen. Die erste Studie synthetisiert vorhandene Literatur zu IS-Zertifikaten und deren Implementierung in Informationssystemen, indem sie eine strukturierte Literaturanalyse präsentiert. Die Ergebnisse dieser Literaturrecherche erlauben es nicht nur, weitere Forschung auf einem gemeinsamen Verständnis zu entwickeln, sondern zeigen auch die Vielzahl von Analyseebenen und Theorien, die zur Erklärung der Dynamik von IS-Zertifizierungseffekten verwendet werden. Eben diese wechselnden Analyseebenen und Theorien machen den Vergleich von Forschungsergebnissen zu Zertifizierungswirksamkeit schwierig, was unweigerlich zu Unterschieden in der Wirksamkeitsforschung von IS-Zertifikaten führt (Begründung 1). Die zweite Studie nimmt eine Verbraucherperspektive ein, indem sie die Eigenheiten von Verbrauchern im Hinblick auf IS-Zertifizierungen untersucht. Während frühere Studien davon ausgegangen sind, dass unterschiedliche Eigenschaften des Verbrauchers keine Rolle bei der Wahrnehmung von IS-Zertifizierungen spielen, zeigt diese Studie, dass Verbraucher basierend auf ihren Persönlichkeitseigenschaften unterschiedlich auf IS-Zertifikate reagieren (Begründung 2). Die dritte Studie nimmt eine Anbieterperspektive ein und befasst sich mit der Identifizierung von Motivatoren sowie De-Motivatoren für den Erwerb von IS-Zertifizierungen. Das Verständnis der Haupttreiber für die (Nicht-)Einführung von IS-Zertifizierungen liefert wichtige Erkenntnisse über die Absichten und Ziele der Anbieter und damit über die Wirksamkeit der IS-Zertifizierung (Begründung 3). Die letzte Studie konzentriert sich auf die Beziehungen zwischen

Verbrauchern und Anbietern von Informationssystemen, indem gleichzeitig die Absichten von Anbietern zum Erwerb von IS-Zertifizierungen und die Wahrnehmung von IS-Zertifizierungen durch Verbraucher ermittelt und gegenübergestellt werden. Die Resultate zeigen eine entscheidende Diskrepanz zwischen Absichten und Wahrnehmungen, die die letzte zentrale Erklärung für die gemischten Ergebnisse der IS-Zertifizierung darstellt (Begründung 4).

Zusammengefasst liefert diese Forschungsarbeit verschiedene Erklärungen für die Ambivalenz der Forschungsergebnisse zur Wirksamkeit von IS-Zertifizierungen in der Informationssystem-Literatur. Anbieter von Informationssystemen, die IS-Zertifizierungen erwerben, könnten die Ergebnisse nutzen, um ihr Verständnis über die Wirkungszusammenhänge zu vertiefen und ihre Entscheidungsfindung hinsichtlich der Einführung von IS-Zertifizierungen zu verbessern. Darüber hinaus können Zertifizierungsstellen (d. h. diejenigen, die IS-Zertifizierungen entwickeln und ausstellen) durch diese Forschung einen Mehrwert schaffen, indem sie beispielsweise ihr Zertifizierungsdesign verbessern, um bestimmte Zielgruppen besser anzusprechen, unbeabsichtigte Nebenwirkungen zu reduzieren und schließlich die Akzeptanzraten für IS-Zertifizierungen zu erhöhen. Schließlich können Verbraucher die Ergebnisse dieser Arbeit nutzen, um IS-Zertifizierungen und deren zugrunde liegenden Mechanismus in digitalen Umgebungen besser zu verstehen und zu bewerten. Damit sind Verbraucher in der Lage, betrügerische Anbieter von Informationssystemen zu identifizieren, Informationsasymmetrien zu verringern und letztendlich ihre Nutzung von Informationssystemen im Allgemeinen zu verbessern.

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List of Abbreviations

ANOVA	Analysis of Variance
CMV	Common Method Variance
CPA	Certified Public Accountants
DFG	Deutsche Forschungsgemeinschaft
ELM	Elaboration Likelihood Model of Persuasion
FFM	Five Factor Model of Personality
GDPR	General Data Protection Regulation
IS	Information System
SET	Social Exchange Theory
TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action

1. Introduction

1.1 Motivation and Research Question

Digitization has fundamentally changed individuals' lives. The underlying basis for this rapid change is the rise and ample development of information systems (IS). With the start of the dot.com era, IS has increasingly become an integral part – especially through digital and online environments – of our everyday life permeating almost all private and business-related occupations. Individuals use information systems to buy travel tickets, listen to music, to transfer money or book accommodations from strangers posted on a so-called sharing economy platform. The ubiquitous access and use of IS is associated with a drawback: consumers often struggle to discern trustworthy, genuine from fake or unreliable IS. Information asymmetries, an imbalance of availability or extent of information to perform an action (e.g., decision to use or buy) between the consumer and the provider of an IS are at the heart of this problem. This imbalance does not only often result in consumers refraining from using certain IS and therefore abstain from buying products or using services on IS platforms, but potential consumers are also prone to fraud and deception originating from malicious acting providers (e.g., fake online shops) or independent individuals (e.g., hackers). Such inconsistencies have become a real issue during recent years which can be witnessed by unexpected data breach incidences of major brands like Apple, Facebook or Adobe. Especially because industries like electronic retailing (i.e., e-commerce) are rapidly growing areas, forecasting a turnover of more than 2.5 trillion Euros by 2023 (Statista 2019). As a consequence, organizations that seek to sustainably attract consumers, need to ensure and signal adherence to certain privacy and security standards in order to become a trustworthy transaction partner.

Over the past years, vendors have developed and utilized a multiplicity of strategies to overcome aforementioned information asymmetries in online contexts, mitigate potential risk in electronic markets and hence to provide a safe ground for transactions. In general, these information asymmetry reducing approaches can be clustered in three distinct categories: first-party assurances (e.g., vendor quality statements), second-party assurances (e.g., consumer reviews) and third-party assurances (e.g., IS certification or web assurance seals) (Mavlanova et al. 2016; Özpolat et al. 2013). IS

certifications are among the most important measures in digital contexts, not only for practitioners, but also as a focus in scientific studies. Such certifications provide independent attestations of an online or e-commerce vendor's (e-vendor) information systems and information systems-related operations to a pre-defined set of assurance criteria and requirements (Lansing et al. 2018). Despite steadily increasing adoption rates and diversification of IS certifications ("*Certified Privacy*" for web shops, "*CSA STAR*" for cloud services, and management standards for security "*ISO 27001 – Information security management systems*") the true effectiveness of such certifications towards receivers (e.g., consumers) has yet to be determined. That is to understand the way, receivers of IS certifications perceive and process this information and how this will change or impact their behavior towards an IS or IS providers. Surprisingly, while some researchers have shown a positive effect of IS certifications (Clemons et al. 2016; Ke et al. 2016), others contradict these findings (Aiken et al. 2014; Lowry et al. 2012), leaving a gap in research where overall empirical evidence regarding IS certifications' effectiveness (i.e., the degree to which certifications achieve their intended effects) remains inconclusive (Lansing et al. 2018). Due to the complexity and possibility of this effectiveness contradiction to emerge from various directions, a multi-perspective investigation is needed and presented in this thesis to shed light on the phenomenon. To assess the effectiveness of IS certifications and therefore to resolve the effectiveness inconsistencies, one needs to establish a common ground for comparison first. It can be assumed that the multitude of levels of analyses and theories used to explain and predict the effectiveness of IS certifications have led to a mixed empirical situation of evidence (Sturm et al. 2014; Williams and Grimes 2010). Therefore, structurally analyzing and synthesizing what has been researched so far in the area of IS certifications' effectiveness, provides the groundwork to move the scientific discussion on IS certifications forward.

Second, anecdotal evidence shows that consumers do not perceive and react uniformly to the presence of IS certifications (Odom et al. 2002), due to individual differences like personality traits. Psychologists largely acknowledge that individuals' motivation and behavior is strongly influenced by their personality (Costa and McCrae 1980; Jarvenpaa et al. 1999). A common framework that has been utilized in scientific studies is the *Five Factor Model of Personality* (FFM), comprising the personality dimensions: openness, conscientiousness, extraversion, agreeableness and neuroticism (Goldberg 1990). For

instance, neuroticism is defined as a lack of emotional stability that describes distrustful and fearful individuals. Moreover, openness outlines personalities that are curious and willing to explore new things. Such personality traits have been shown to influence individuals' sense-making of ambiguity reducing signals (Jach and Smillie 2019), which leads to the assumption that they serve as essential decision filters that influence the effectiveness of IS certifications (Benlian and Hess 2010; Picazo-Vela et al. 2010).

Third, previous research (e.g., Gopal and Gao 2009) is not clear regarding the main drivers of online vendors to acquire IS certifications, especially because they are voluntarily and not legally required. Consequently, online vendors might acquire IS certifications, for instance, with the goal to adhere to legal norms and guidelines. However, at the same time the acquisition and presentation potentially may also trigger a perception of excessive persuasion among consumers. In contrast, research is left behind in providing explanations for vendors' refusal of acquiring IS certifications, which provides valuable insights in terms of boundary conditions for IS certification acquisition and therefore informs IS certifications' effectiveness research in a broader context.

Eventually, extant research has surprisingly investigated IS certifications' effectiveness in a unilateral manner only. Meaning, simple consumer-vendor (or vice-versa) relationships have been evaluated to elaborate on IS certifications' effectiveness. This is especially interesting, since the development of certifications is a result of continuous negotiations, adoptions, and settlement of different perceptions and stakeholders (Backhouse et al. 2006). Yet, without a deepened and multi-dimensional understanding (e.g., by incorporating more stakeholders of the certification ecosystem, such as certification authorities) of how vendors' intentions sync with consumer perceptions, our understanding of IS certifications' effectiveness remains fragmented.

There are obviously more perspectives that can provide explanations for the ambivalent and inconsistent effectiveness of IS certifications in digital environments. However, without taking the four perspectives outlined above the inconclusiveness of IS certifications' effectiveness will remain unsolved. For instance, certification authorities will face the risk of developing certifications that, on the one hand, do not match vendors' intentions on what should be conveyed to consumers, and on the other, are out of sync with what consumers truly perceive when perceiving IS certifications in online context. Eventually, IS certification adoption rates will inevitably decrease. This

thesis hence strives to address an important and intriguing gap in scientific literature by aiming to answer the following research question:

RQ: *How do IS certification ecosystem stakeholders influence IS certifications' effectiveness?*

In order to answer this research question, four research papers have been published in four different IS outlets that utilize a variety of scientific and methodical approaches. These papers are also included in this thesis. The following section discusses the structure of this thesis in detail.

1.2 Thesis Structure and Synopsis

This thesis is structured in seven chapters. Following the introduction in chapter 1, the global research context is presented in chapter 2. The chapter concludes with the positioning of this thesis. The chapters 3 to 6 contain the peer-reviewed articles in a slightly revised manner to comply with the overall thesis' layout. All articles of this thesis are conducted as part of a project funded by the *Deutsche Forschungsgemeinschaft (DFG)* called "Eine dekompositionelle Analyse von IT-Zertifikaten in elektronischen Märkten und ihren Wirkungen auf Kunden- und Plattformanbieterwahrnehmungen" (project number: 327130595; grand award numbers: BE 4308/3-1 and BE 4308/3-2). Table 1 provides an overview of the published research articles. Article 1 (chapter 3) presents a literature review to elucidate the ambivalence of IS certifications' effectiveness by outlining that previous literature has no common ground to compare empirical effectiveness studies. Article 2 (chapter 4) elaborates on diverging consumer perceptions of IS certifications depending on their personality as one potential explanation for prevailing IS certifications' effectiveness inconsistencies. Articles 3 and 4 (chapter 5 and 6) mainly focus on the vendor (as well as certification authority) side of IS certifications by investigating the (de-)motivators to acquire IS certifications and how these motivations and intentions match (or don't match) with consumers' perceptions of IS certifications. Therefore, this thesis provides different lenses to explain the inconclusive findings regarding IS certification effectiveness in previous literature. Chapter 7 concludes this thesis by providing a summary of the central theoretical and practical contributions as well as giving an outlook on future research.

No.	Author(s)	Title	Outlet	VHB- Jourqual 3	Publication Status	Year
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1	Löbbers, J., Siegfried, N.	Toward a Unified View of IS Certification: A Structured Literature Review on Theoretical Lenses	Proceedings of the 26th European Conference on Information Systems (ECIS 2018), Portsmouth, UK	B	Published	2018
2	Löbbers, J., Benlian, A.	The Effectiveness of IS Certification in E-commerce: Does Personality Matter?	Journal of Decision Systems, 28(3)	B	Published	2019
3	Lins, S., Kromat, T., Löbbers, J., Benlian, A., Sunyaev, A.	Why Don't You Join In? A Typology of Information System Certification Adopters	Decision Sciences, forthcoming	B	Published	2020
4	Löbbers, J., Lins, S., Kromat, T., Sunyaev, A., Benlian, A.	A Multi- Perspective Lens on Web Assurance Seals: Contrasting Vendors' Intended and Consumer's Perceived Effects	Electronic Commerce Research	C	Published	2020

Table 1: Article overview of this dissertation thesis

In the following, the four articles are summarized and their main contributions are positioned within the context of the overall research question. The summaries of the articles are written in a first-person plural perspective (i.e., *we*) to reflect that these studies were conducted with co-authors and, therefore, also express their opinions.

Article 1 (Chapter 3):

Löbbers, J., Siegfried, N., (2018) “*Toward a Unified View of IS Certification: a Structured Literature Review on Theoretical Lenses.*” In: Proceedings of the 26th European Conference on Information Systems (ECIS 2018), Portsmouth, UK; **VHB: B**

In order to provide a more comprehensive view on IS certifications and their effectiveness in digital and online settings, a common ground to build future research on is necessary. We therefore conduct a structured literature review to establish a base of the so far in research developed IS certification effectiveness' knowledge. By reviewing more than 3100 scientific articles, we aimed at diving deeper in three different areas of interest. First, identifying the applied theories used to explain the dynamics of IS certifications. Second, the comparison of these theories to explain and predict IS certification effectiveness. And Third, the identification of strengths and shortcomings of the different theories utilized. Our results indicate a very fragmented and diverse picture, both in terms of outcomes (i.e., are IS certifications effective or not) and regarding the applied theories. From our analysis we derived different recommendations for future research. We suggest that some theories are well suited (e.g., signaling theory) to explain the mechanisms of IS certifications. However, research needs to control for missing antecedents and avoid fragmentary use of theories. Furthermore, we encourage research to refrain from assuming that a single theory can serve as a silver bullet in explaining the rather complex dynamics of IS certifications' effectiveness. Yet, we suggest that a blended theoretical model might be most effective in understanding and predicting IS certifications' effectiveness. Nevertheless, this first article provides the groundwork for our future studies in uncovering the complex interdependencies as well as various starting points to disentangle IS certifications and their effectiveness dynamics.

Article 2 (Chapter 4):

Löbbers, J. & Benlian, A., (2019) "*The Effectiveness of IS Certification in E-commerce: Does Personality Matter?*" In: *Journal of Decision Systems*, 28(3); **VHB: B**

Since understanding IS certifications from a methodological perspective is not sufficient in determining their general effectiveness, the second study focuses on a behavioral investigation to explain how different receivers (i.e., characterized through different manifestations of their personality) react to IS certifications in online environments. What becomes evident from our literature reviews is the fact, that some IS certification research argues for IS certifications' effectiveness (e.g., by increasing purchase intentions). However, other studies contradict these findings by revealing null or even

negative effects. We therefore argue that receivers' personality traits, which influence their cognitive processes and hence their IS certification perception, are a major lever to explain overall IS certifications' effectiveness. Drawing on psychological literature and the theory of planned behavior, we utilize a vignette-based online experiment (N = 145) to show how consumers' personality traits (i.e., openness, neuroticism, and conscientiousness) shape the effectiveness of IS certifications.

Article 3 (Chapter 5):

Lins, S., Kromat, T., Löbbers, J., Benlian, A., Sunyaev, A., (2020) "*Why Don't You Join In? A Typology of Information System Certification Adopters*" In: Decision Sciences, forthcoming; **VHB: B**

This third article yet provides another view on the IS certifications' effectiveness inconclusiveness by appending the vendor perspective to the puzzle. We analyze and categorize different motivators and de-motivators of IS certification adoption to get a grip on the competing (theoretical) viewpoints for why organizations adopt IS certifications. To enhance our understanding regarding the (de-)motivational aspects for online vendors to adopt IS certifications, we conduct a literature review combined with a ranking-type Delphi study with two unique panels comprising certified online vendors (N=15) and certification authorities (N=24). As a result, we come up with a rank order list of 24 motivators and 17 de-motivators impacting online vendors' intentions to adopt IS certifications. Reflecting our findings in the light of competing theoretical perspectives, enabled us to derive a typology of certification adopters comprising functionalists, institutionalists and signalers. Providing this conceptual typology allows us to move forward in alleviating the inconsistent findings in IS literature by defining boundary conditions for IS certifications effectiveness

Article 4 (Chapter 6):

Löbbers, J., Lins, S., Kromat, T., Sunyaev, A., Benlian, A., (2020) "*A Multi-Perspective Lens on Web Assurance Seals: Contrasting Vendors' Intended and Consumer's Perceived Effects*" In: Electronic Commerce Research; **VHB: C**

While the studies in Article 2 and 3 focus on taking either the consumer perspective or vendor perspective, we complement this view by adding the third IS certification

authority perspective and by conflating all views in this study. In their essence, IS certifications are a product of negotiations, adoptions and settlements among various groups of interests (e.g., IS certification authorities, online vendors, online consumers or governmental institutions). Yet, previous research has to the best of our knowledge only used a unilateral research perspective while studying IS certifications and their effectiveness. Since this contradicts the nature of IS certifications in general, we provide a multi-perspective view on IS certifications by applying a ranking-type Delphi study with three distinct, yet mutually adjuvant expert panels (N=60) to compare online vendors' intentions to acquire IS certifications and perceived effects by online consumers. We are able to show a strong imbalance between consumers' perceptions and vendors' intentions of IS certifications, which is one of the reasons why IS certifications fail to be as effective as expected by online vendors for instance. Another rationale for their sometimes questionable effectiveness is the fact, that unintended side effects, such as skepticism, can occur when displaying IS certifications to consumers.

In addition to the publications summarized above, the following articles, which are not part of this dissertation, were also published during my time as a PhD candidate:

Siegfried, N., Löbbers, J., Benlian, A., (2020) *“The Trust-Building Nature of Identity Verification in the Sharing Economy: An Online Experiment.”*
In: 15th International Conference on Wirtschaftsinformatik (WI 2020), Potsdam, Germany. **VHB: C**

Siegfried, N., Löbbers, J., Benlian, A., Sunyaev, A., (2019) *“Seeing Service Certification “Eye to Eye” - The Role of Perceptual Congruence Between Customers and Providers in IS Certification.”*
In: Proceedings of the 26th European Conference on Information Systems (ECIS 2018), Portsmouth, UK. **VHB: B**

The next section will outline the global research context that is central to this thesis.

2. Research Context

This section provides the theoretical background for this thesis. It starts with an introduction to digital environments in order to frame the context, before IS certifications and related literature are discussed in detail. The literature review points out the identified research gap. Finally, the last section positions this thesis within IS research while providing a short overview of the relevance the work at hand has.

2.1 Digital Environments

With the turn of the millennium and especially the rise of the dot.com bubble, digital and online environments have emerged as a substantial part of our everyday private and business life. At the heart of these environments are information systems acting as multi-sided platforms that enable related stakeholders (e.g., consumers, vendors, governmental institutions, etc.) to conduct the activities the platform is designed for. In general terms, a platform can be defined as “a set of stable components that supports variety and evaluability in a system by constraining the linkages among the other components” (Baldwin and Woodard 2009, p. 19). More recently, the term *platform* has adopted a more general meaning by describing different types of IS-facilitated interactions, such as those on online marketplaces, social media, online services, or even gaming consoles (Tiwana et al. 2010). Hence, a multiplicity of platforms with different application foci defines a new normal of how individuals use, consume, share or produce (among other things) information, services or products. Besides enabling individuals to easily access (e.g., news platforms) or share information (electronic mail and messaging services, social media), we use digital and online environments to buy or exchange products or services (e.g., Amazon or eBay), transfer money (transferwise.com), book accommodations (e.g., booking.com) or transportation tickets and even share homes (e.g., Airbnb), cars (e.g., Uber) or specialized equipment.

What all these application areas in digital environments have in common, is their novel approach to information and communication compared to offline environments (e.g., shopping in a brick and mortar store). Platform providers and especially those who try sell their products and services on platforms (i.e., vendors) are in need of innovative information and communication strategies due to non-physical nature of online and digital environments (e.g., consumers can not immediately assess product features and

quality through touching or smelling). Central to these strategies is the use, presentation or framing of informational signals and cues often facilitated through technical innovations (e.g., recommender systems) (Adam et al. 2020b; Klumpe et al. 2018; Scholz et al. 2017). While the shift from offline to online information and communication signals provides fertile ground for novel approaches such as digital nudging to flourish (Koch and Benlian 2017; Schneider et al. 2019), it also poses a significant threat. Since the lack of physical contact on platforms makes it hard for consumers to evaluate product or service quality and hence to decide on consuming, using or purchasing the product or service of interest, they become increasingly dependent on the information provided by or through the platform. Such a dependence can result in information asymmetries as the sender of the informational signal or cue is able to control its dimensions and extent (Mavlanova et al. 2012).

2.2 Information Economics and Signaling

For several decades, theoretical decision-making models were based on the assumption that perfect information exists (i.e., all parties of a transaction possess the same amount and quality of information), where information asymmetries do not occur and hence are negligible (Stiglitz 2002). However, to create more realistic settings and improve reliability of research outcomes, one has to consider that “different people know different things” (Stiglitz 2002, p. 469). Therefore, information asymmetries occur when one party of the transaction has more pertinent information than the other (e.g., the owner/seller of a car knows more about its quality than a potential buyer) (Akerlof 1970). As a result, information asymmetries lead to two distinct types of information problems: first, adverse selection (hidden information) resulting from sub-optimal decision-making (e.g., buying a car of average or low quality) due to a buyers’ limited access to information as well as uncertainty about the claims that the selling party proposes (Eisenhardt 1989). Second, moral hazard (hidden action) occurs when the selling party chooses an unobservable level of effort or intention in order to increase his benefit on the transaction (e.g., intentionally lowering the quality of the car post-hoc) (Elitzur and Gavius 2003). In digital and online contexts such information problems are often of increased magnitude due to the power of the selling party (e.g., vendor) to solely control the flow, density and timing of information toward the consumer or

buyer, allowing him to overvalue the true quality of a product or service (Mavlanova et al. 2012).

In situation of asymmetric information, potential consumers of a product or service are therefore in demand for informational signals or cues that allow them to distinguish high quality vendors, products or services from those of low quality (Gregg and Walczak 2008). Hence, to overcome information problems, consumers often need to rely on signals that are provided either by the provider of the product/service or by the platform on which the transaction is conducted on in order to assess product or service quality (Shapiro 1982).

Signaling theory (Spence 1973) is primarily focused on providing explanations for information asymmetry mechanisms between two parties (e.g., vendor and consumer) and proposes that information problems can be bridged by signals (e.g., IS certifications) in making otherwise hidden information and hidden actions observable (Connelly et al. 2011; Rao et al. 1999). In signaling theory terms, a signaler (e.g., vendor) holds information an outsider (e.g., consumer) would find useful in order to overcome an information problem and hence support his/her decision-making. For instance, a vendor (as signaler) might use IS certifications (as signals) to demonstrate adherence to privacy standards regarding the protection of consumers' personal data (Lins and Sunyaev 2017). A signal is a cue that aims to convey information for outsiders about unobservable qualities of the signaler (Rao et al. 1999). Signals are computer-mediated representations of information that signalers (i.e., vendors) use to convey certain characteristics (e.g., trustworthiness, credibility, reliability or security levels, among others) (Aiken et al. 2014). Receivers (e.g., consumers) who lack information about the signaler, perceive, interpret and draw conclusions from the signal. For a signal to be effective, the signaler (e.g., vendor) who has invested in acquiring the signal (e.g., IS certification), hopes to benefit by actions (e.g., increased trustworthiness or purchase intention toward vendor) from the receiver (e.g., consumer) that can be ascribed to the signal (Connelly et al. 2011; Lins and Sunyaev 2017).

Previous research has evaluated different types of information that serve as signals. For instance, website quality (e.g., Mavlanova et al. 2012), consumer and user feedback (e.g., Cheung et al. 2014) as well as recommendation systems (e.g., Scholz et al. 2017). Besides, past IS research has increasingly examined IS certifications (or web assurance seals) in serving as credible and reliable information signals in consumer decision-

making processes. Yet, mixed and inconclusive research outcomes regarding IS certifications' effectiveness are the result of those efforts (cf. section 2.4).

2.3 IS Certifications

A common strategy for honest, high-quality vendors to reduce consumers' security, privacy, and reliability uncertainty (e.g., originating from hidden information or hidden actions) and therefore reduce information asymmetries, is the adoption of IS certifications. IS certifications are defined as a voluntary process conducted by an independent third-party that evaluates a company's products, services, and/or internal processes against a predefined set of evaluation criteria, which formally verifies that a certain standard is met (ISO/IEC 2004). Such certifications and their associated processes are conducted across various application domains such as to demonstrate adherence to international standards (e.g., ISO) or to prove that institutions comply with certain product ethics and values (e.g., fair trade). In this thesis, the focus is on certifications within the IS domain and more specifically in online and digital environments (i.e., IS certifications).

In terms of signaling theory, IS certifications can serve as credible and reliable signals for different reasons (Bergh et al. 2014; Lansing et al. 2019; Lins and Sunyaev 2017). First, obtaining IS certifications is usually difficult and costly due to the underlying audit process that needs to be passed. Thus, it is not easy for low-quality vendors to imitate this effort since the investment may not be compensated through future expected profits. Second, vendors failing to meet associated IS certification requirements are expected to scarify their reputation to current consumers, significantly reducing their chances of future business transactions as well as losing profits from potential consumers due to negative word-of-mouth dynamics. Third, the probability for low-quality vendors to not meet IS certifications' requirements and therefore to fail the auditing process is higher than for high-quality vendors, resulting in higher penalty costs and negative word-of-mouth for the same IS certification compared to high-quality vendors. Under the assumption that the cost differences cannot be balanced by potential gains from cheating (e.g., sending fake IS certification signals), high-quality vendors can adopt IS certifications that low-quality vendors cannot without lowering profitability expectations.

2.3.1 Types of IS Certifications

In digital contexts, the fundamental aim for IS certifications is to provide a third-party view on secure and proper online transactions by disclosing legal and technological safeguards to consumers. By reducing consumers' concerns about potential fraudulent actions originating from the vendor, vendors seek to increase confidence in the platform, product or service offered (Kim et al. 2016). To date, a great variety of IS certifications and web assurance seals exist (cf. Figure 1) in electronic markets that distinguish themselves by, for instance, the application area (e.g., cloud computing) or auditing process (e.g., on-site audit or document based self-audit).



Figure 1: Overview of exemplary IS certifications and web assurance seals

In terms of IS certifications' content, literature generally differentiates between three distinct types of certifications addressing different consumer concerns: (1) privacy, (2) security, and (3) business-integrity concerns (Wu et al. 2010). First, certifications targeting consumers' privacy concerns are used to alleviate consumers' perceived risks, for instance, in having (personal) data stored on domestic infrastructure. Second, certifications addressing consumers' security concerns (e.g., unencrypted data transmission) are used to assure that a vendor has adequate measures (e.g., firewalls) in place to prevent, for instance, security breaches. Finally, certifications targeting business integrity concerns (e.g., fair rules of return) are used to guarantee fair business practices and business transactions before, during, and after the online transaction. With easy access to information about how vendors react to and deal with consumers concerns, consumers are able to determine the vendors' qualities and forecast their future behavior with greater accuracy and confidence. Regardless of the specific type of IS certification, three different actors constitute the major stakeholders in the IS certification ecosystem.

2.3.2 The IS Certification Ecosystem

The IS certification ecosystem describes the interplay between different parties involved in the process of issuing, auditing, implementing, and utilizing IS certifications. First, the vendor who aims to adhere to the defined evaluation criteria and hence undergoes an audit conducted by the certification authority (or separate auditor) to acquire an IS certification. By acquiring the certification, vendors aim to achieve different goals, such as signal higher quality, adherence to international compliance standards or to improve internal processes (Kim et al. 2016; Marimon and Casadesús 2017). Second, the consumer who perceives and interprets the IS certification in order to incorporate the informational cue into his/her decision-making process. Obviously, consumers do not perceive such cues in isolation, but in consideration of other environmental signals, such as other product or service-related information (e.g., textual or visual product descriptions, consumer ratings and recommendations, etc.) or decision-making related influences, such as personal opinions, biases, heuristics, or personality-related characteristics. Third, certification authorities are independent intermediaries that do not only develop and issue certifications, but also perform (depending on the process and certification) the auditing process to assess a vendors' capabilities in terms of their platform, product and services. As such mediators, certification authorities are able to perform various oversight functions that allow them deter, punish or remedy inappropriate behavior or actions originating from the vendor (Kimery and McCord 2008). In particular, certification authorities are, among other things, responsible for assessing the vendors' systems and internal processes on the backdrop of privacy, security and business-integrity requirements (Lansing et al. 2018; Windhorst and Sunyaev 2013). They also serve as trusted parties for consumers in providing verified information, for instance, about the vendor or the certification itself. Figure 2 shows the three aforementioned stakeholders and their distinct connections with each other.

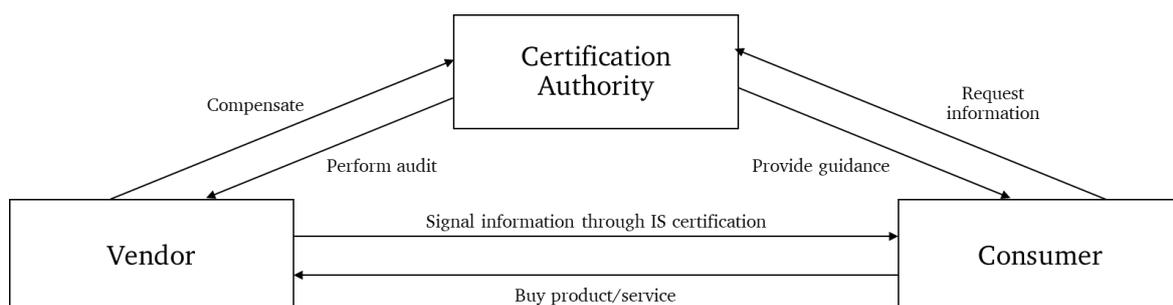


Figure 2: Overview of the certification ecosystem and its focal stakeholders

However, in some cases issuing and auditing the certification are separate and distinct tasks, performed by a certification authority (i.e., issuing a certification) and an independent auditor (i.e., assessing the vendors capabilities against a set of requirements), ending up with four different focal stakeholders within the certification ecosystem. However, central to this thesis research are the stakeholders presented in Figure 2, which is why the auditor is left out.

2.4 The Inconclusiveness of IS Certification Research

IS certifications in online environments, such as e-commerce, represent affirmations of internal, unobservable vendor or system owner processes or services (Kim and Benbasat 2009). The nature of online transactions makes it impossible for consumers to utilize typical product related information cues (e.g., physical product quality, appearance of vendor) on which they often rely to come up with proper product or vendor assessments. Hence, to reduce information asymmetries and overall transaction uncertainty, consumers emphasize the use of digital substitutes such as IS certifications and web assurance seals. Two aims are generally central to IS certifications, especially in online environments: first, reducing consumers' perceived risk by increasing integrity of information provided, and second, ensuring safe and duly online transactions through legal or technological safeguards (McKnight et al. 2004). Although IS certification adoption rates are steadily increasing, the current state of literature indicates a situation of contradiction regarding the effectiveness of IS certifications.

To better understand and structure contemporary research regarding IS certifications and especially their effectiveness, a review of extent literature was performed. The aims of this review are threefold: first, to create common ground (i.e., synthesizing extent literature), second, to identify a research gap worth pursuing, and third, building a research agenda for future research (Schryen et al. 2017; Wagner et al. 2020). An initial set of IS journals as well as major IS conferences (e.g., International Conference on Information Systems) were assessed to ensure the consideration of the most recent research publications (Vom Brocke et al. 2015). However, since IS certifications have not only been of interest in IS research, the search was extended to neighboring fields (e.g., marketing and computer science) (Webster and Watson 2002). Additionally,

using a wider set of keywords (e.g., cert*) within the initial set of IS (and related) research streams reduces the risk of unintentionally excluding publications that may be of interest, leading to a sound foundation of research publications. An overview of the most important publications is given in Table 2.

Example Study	Dependent Variable			Context	Sample	Theoretical Foundation
	T	PI	PA			
Lee and Turban (2001)	o			Online Shopping	Students	Trust Theory
Hassanein and Head (2002)		o		Online shopping	Internet Users	Trust Theory
Mauldin and Arunachalam (2002)		o		Online shopping: MP3 players, cameras	Students	Theory of Planned Behavior
Hu et al. (2002)		M		Online shopping: books, suits	Students	Elaboration Likelihood Model
Gefen et al. (2003)	+			Online shopping: books, CDs	Students	Technology Acceptance Model; Trust Theory
Kaplan and Nieschwietz (2003a)	+	+		Online shopping: clothes	Students	Trust Theory
Nöteberg et al. (2003)		+		Online shopping	Unspecified	Trust Theory
Wakefield et al. (2004)	+	o		Online shopping / e-commerce	Unspecified	Trust Theory
McKnight et al. (2004)	o			Service information: legal advice	Students	Trust Theory
Rifon et al. (2005)	+		o	Online shopping: music	Students	Social Cognitive Theory
Yang et al. (2006)			+	Online shopping: web cameras	Students	Elaboration Likelihood Model
Hui et al. (2007)		o		Product information: mobile computing	Students	Choice Theory
Kim (2008b)		M		Online shopping	Students	Trust Theory
Kim et al. (2008c)	o			Online shopping	Students	No explicit theory

Fisher and Chu (2009)	o		Online shopping: textbooks	Students	Theory of Reasoned Action / Theory of Planned Behavior
Wu et al. (2010)	M		Online shopping	Students	Cue Consistency / Cue Utilization Theory
Kim and Kim (2011)	+	+	Online shopping: running shorts	Students	No explicit theory
Lowry et al. (2012)		o	Online booking: travelling	Students	Elaboration Likelihood Model
Chang et al. (2013)	+		Online shopping: books	Internet Users	Social Exchange Theory
Aiken et al. (2014)		o	Online commerce	Students	Signaling Theory; Trust Theory
van Baal (2015)		o	Online retail	Internet Users	Signaling Theory
Mavlanova et al. (2016)	+		Online shopping: medicine	Students	Signaling Theory
Mousavizadeh et al. (2016)	+		Online shopping	Students	No explicit theory

T = trust; PI = purchase intention; PA = perceived assurance;
 + = positive significant effect; o = no (significant) effect, M = under some conditions an effect was observed

Table 2: Overview of literature review results

To start with, the initial review reveals that previous work was focused on assessing the effectiveness of IS certification mainly in three different dimensions: (1) trust (e.g., Mavlanova et al. 2016), (2) perceived assurance (e.g., Lowry et al. 2012), and (3) purchase intention (e.g., Clemons et al. 2016). Trust in digital and commerce contexts is usually specified as consumers' perceived trustworthiness toward the e-vendor's actions and characteristics (Yang et al. 2006) and is recognized as the prerequisite for commercial relationships and transactions (e.g., between customers and e-vendors) (Berry 1995). These vendor characteristics are defined by its competence (ability of the vendor to do what the consumer needs), benevolence (vendor's caring and motivation to act in the consumer's interests), and integrity (vendor's honesty and promise-keeping) (McKnight et al. 2002b). Purchase intention acts as a predictor of actual purchase behavior (Venkatesh and Davis 2000) and is therefore often applied in this scientific stream. Scholars utilize intention constructs to forecast how IS certifications

can influence customers' actual purchase behavior. Perceived assurance is a construct that aims to measure one or more of consumers' online concerns. In general, these are privacy, security and integrity concerns (Wu et al. 2010).

Furthermore, analyzing the identified studies shows that IS certification effectiveness research is far from being an established research domain. The identified scholarly inquiries made use of various theoretical approaches (e.g., signaling theory, trust theory or social exchange theory), some are even without any theoretical foundation, suggesting that IS certifications' effectiveness is still in its infancy of being understood. Finally and most important, the review of literature (cf. Table 2) exposes that past research findings regarding the effectiveness of IS certifications are largely inconclusive, with some studies demonstrating a positive influence of IS certifications on consumer trust (Ke et al. 2016), purchase intention (Clemons et al. 2016) or perceived assurance (Kim and Kim 2011), while others have disproved such positive effects by identifying null or sometimes even negative effects on trust (Kim et al. 2008c), purchase intention (Aiken et al. 2014), or perceived assurance (Lowry et al. 2012). In line with the knowledge dimensions for IS research proposed by Schryen et al. (2015), the literature review therefore represents a critical assessment of already existing insights from IS certification research (i.e., domain knowledge), by showing, among the aforementioned findings, an ambivalence in effectiveness outcomes that needs to be further specified and assessed (i.e., tacit knowledge). At the same time, this contradiction is the basis for the development of a research agenda that is presented in the following section.

2.5 Thesis Positioning

To shed light on the inconclusiveness of IS certification effectiveness research, four distinct perspectives along the conceptual building blocks of the IS certification ecosystem outline the basis for this thesis (see Figure 3).

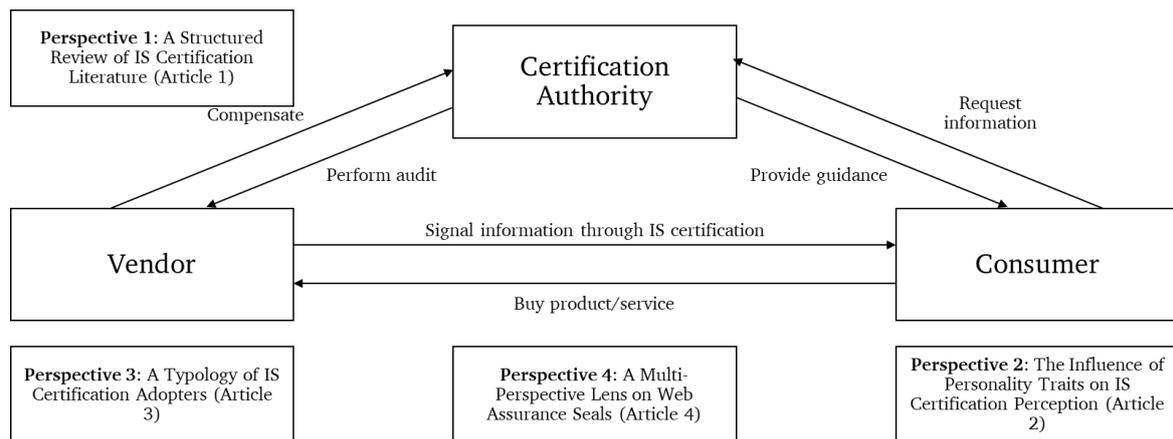


Figure 3: Positioning of research articles

Perspective 1: Creating common ground (Article 1)

To establish common ground that allows to assess the effectiveness of IS certifications, scholars need to understand how previous literature has conducted empirical certification research. Different levels of analyses, varying theories and dependent variables used to research the effectiveness of IS certifications may have led to situations of mixed empirical results as can be seen in the initial review presented in the previous section. Hence, an in-depth analysis of past research in the area of IS certifications' effectiveness provides a fundament to move the scientific discussion on IS certifications forward. The first article therefore presents a more fine-grained review of the literature to more globally assess the current state of research.

Perspective 2: Understanding the consumer side (Article 2)

IS research from related digital contexts has shown that individuals (e.g., consumers) do not react uniformly to the same information signal (Nguyen et al. 2018; Thies et al. 2016). Surprisingly, previous IS certification literature researching IS certifications' effectiveness has largely assumed that individuals' characteristics do not play a role when perceiving and processing IS certifications. Yet, the reasons for individuals to react differently to certain information signals is mostly resulting from certain characteristics that are inherent to these individuals, such as personality traits. A human's personality reflects its unique combination of thoughts, traits and actions. Peoples' behaviors, beliefs, perceptions or attitudes are strongly determined by one's personality (Barrick and Mount 1991; Costa and McCrae 1980; Jarvenpaa et al. 1999), which substantially alters consumers' decision-making, especially in virtual contexts (Costa and McCrae 1980; Jach and Smillie 2019; Pavlou et al. 2007). For instance,

previous research found out that neuroticism and conscientiousness influence the way and purpose one uses the internet (Butt and Phillips 2008). Hence, it can be assumed that personality traits serve as important filters in the process of evaluating IS certifications and seals (Benlian and Hess 2010; Picazo-Vela et al. 2010), wherefore they can be considered as a valuable lens in assessing the ambivalence of IS certifications' effectiveness in extant research. The second article demonstrates how openness, neuroticism, and conscientiousness influence IS certifications' effectiveness.

Perspective 3: Understanding the vendor side (Article 3)

While previous research provides to some extent an understanding of the main drivers or motivators to acquire IS certifications, it lacks in giving explanations for vendors' refusal of acquiring IS certifications. Without an in-depth understanding about vendors' motivations or de-motivations to acquire IS certifications, it remains open if they can convey information as intended by the vendor. For instance, a certification or seal focusing on assessing privacy related vendor processes, most likely fails to transport information about product warranties (e.g., money-back guarantees). Therefore, understanding vendors' intentions regarding the projected effects of IS certifications is essential in evaluating how effective they truly are. Researching vendor motivations and de-motivations to acquire IS certifications is done in the third article and provides another perspective on explaining the prevalent effectiveness' inconclusiveness.

Perspective 4: Understanding consumer-vendor interactions (Article 4)

Finally, prior research has surprisingly rarely considered other certification effects (besides, trust, perceived assurance and purchase intention) on consumers so far. Therefore, it seems reasonable to assess if consumers' perceptions and reactions to IS certifications are more diverse than previous literature assumes. Related IS literature that assesses allied information signals (e.g., first or second party information signals) in online contexts has for instance evaluated consumers' attitude towards a website, product or vendor uncertainty, perceived usefulness and helpfulness or even deceptiveness (Dimoka et al. 2012; McCoy et al. 2009; Román 2010). By considering a wider variety and diversity of potential certification effects on consumers, research might be better equipped to comprehensively judge and understand the true effectiveness of certifications in general. Moreover, the hitherto used way of IS certification research that only considers a unilateral perspective (e.g., either consumer or vendor perspective) when assessing certifications' effectiveness, is disrupted. In

combining consumer, vendor and certification authority perspectives in one research endeavor, the last article is able to show an important mismatch between vendors' intention in showing IS certifications and consumers' perception when recognizing IS certifications. This mismatch and the limited set of contemplated outcome variables constitutes another cause for the mixed IS certifications' effectiveness findings which is presented in the fourth article.

To summarize, the increasing digitization in various parts of our lives brings along tremendous possibilities, both in work and private environments. Especially the internet significantly eases the way we consume, utilize, share or create information, (digital) products and services. However, with the newly gained opportunities, a lot of challenges and risks, especially for consumers (e.g., online fraud in form of fake web shops) arise that honest vendors and system owners need to counteract in order to stay competitive in their respective markets. A commonly known and widespread strategy to regain consumers' confidence and trust and hence to gain a competitive edge, is the use of IS certifications or web assurance seals. Despite their pervasive use especially in e-commerce, IS certifications' true effectiveness remains questionable, not only among practitioners but also within research. In this ambiguous situation, research has not acknowledged, whether IS certifications are able to achieve aspired effects as intended. This ambiguity offers a problem domain suitable to be addressed by the research articles included in this thesis. In doing so, the thesis at hand contributes to research and practice alike. It provides different rationales for how the inconclusiveness of IS certifications emerged, but more important, it lays out a foundation for future research better understand IS certification effectiveness and therefore contributes to moving the scientific discussion on IS certifications forward.

3. A Structured Review of IS Certification Literature

Title: Toward a Unified View of IS Certification: A Structured Literature Review on Theoretical Lenses

Authors: Julian Löbbers, Technische Universität Darmstadt, Germany
Nils Siegfried, Technische Universität Darmstadt, Germany

Published in: European Conference on Information Systems (ECIS 2018),
Portsmouth, UK

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

3.1 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 (Lansing and Sunyaev 2013; Lowry et al. 2012; Mavlanova et al. 2016). 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.

3.2 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, 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.

3.3 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 (Schryen et al. 2015; Schryen et al. 2017; Vom Brocke et al. 2009). 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, IEEEExplore, AISel, and ACM Digital Library.

3.3.1 Literature Review 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.

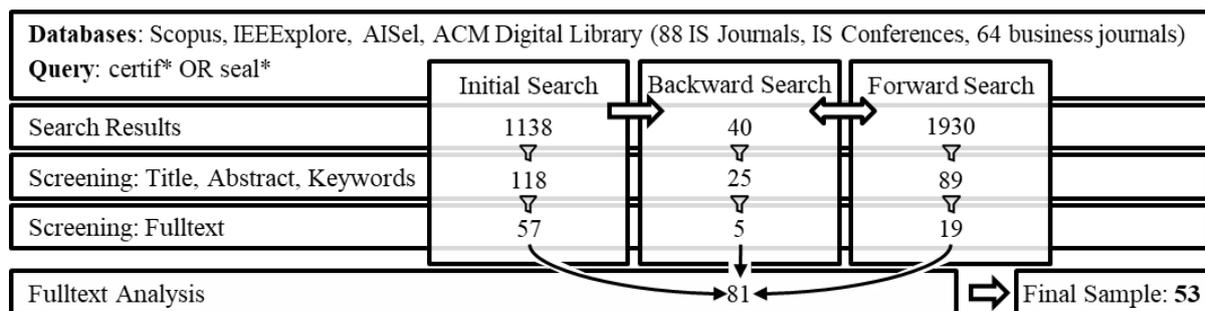


Figure 4: Literature Review Process

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 4 provides a visual overview on the selection process.

3.3.2 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 has 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 3, 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.

3.4 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”. Five studies used more than one theory (“Multi-theory approach”). Table 4 provides an overview of the theory distribution across analyzed studies.

3.4.1 Theories

3.4.1.1 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	E-Commerce	Perceived trustworthiness	No
Aiken et al. (2014)	Signaling; Trust Transfer	E-Commerce	Purchase intention	Yes
Bahmanziari et al. (2009)	Trust	E-Commerce	Purchase intention; Trust	No
Belanger et al. (2002)	Trust	E-Commerce	Purchase intention; Willingness to disclose information	No
Chang et al. (2013)	Signaling	E-Commerce	Trust in online vendor	No
Chang et al. (2012)	Social Exchange	E-Commerce	Purchase intention	Yes
Clemons et al. (2016)	Trust	E-Commerce	Willingness to purchase	No
Faja and Trimi (2006)	No explicit theory	E-Commerce	Willingness to disclose information; Willingness to purchase	No
Fisher and Chu (2009)	TRA / TPB; Trust	E-Commerce	Purchase Intention	No
Goethals et al. (2009)	Trust	E-Commerce	Trust	No
Hassanein and Head (2002)	Trust	E-Commerce	Purchase decision	Yes
Houston and Taylor (1999)	No explicit theory	E-Commerce	Purchase intention; Product quality; [...]	No
Hu et al. (2010)	Cue Utilization; Cue Consistency	E-Commerce	Initial online trust	Yes
Hu et al. (2002)	ELM	E-Commerce	Willingness to purchase	Yes

Hui et al. (2007)	Contemporary Choice Theory	E-Commerce	Information disclosure	No
Jiang et al. (2008)	Social Exchange; Trust Transfer	E-Commerce	Trust transfer	Yes
Kaplan and Nieschwietz (2003a)	Trust	E-Commerce	Willingness to purchase; perceived risk; perceived product quality	Yes
Kaplan and Nieschwietz (2003b)	Trust	E-Commerce	Purchase intention	No
Ke et al. (2016)	Trust	E-Commerce	Purchase intention	No
Kim (2008)	Trust	E-Commerce	Willingness to use	No
Kim et al. (2008)	No explicit theory	E-Commerce	Purchase behavior	No
Kim et al. (2015)	No explicit theory	E-Commerce	Transaction intention	No
Kim and Tadisina (2010)	No explicit theory	E-Commerce	Initial trust	No
Kim and Kim (2011)	No explicit theory	E-Commerce	Initial trust; Perceived privacy empowerment	Yes
Kimery and McCord (2002)	Social Exchange; TRA / TPB	E-Commerce	Purchase intention	Yes
Kovar et al. (2000)	ELM	E-Commerce	Purchase intention	Yes
Lala et al. (2002)	No explicit theory	E-Commerce	Purchase intention	Yes
Larose and Rifon (2007)	Social Cognitive Theory	E-Commerce	Information disclosure intention; Purchase intention; Trust; [...]	No
Lee et al. (2004)	TAM; TRA / TPB	E-Commerce	Purchase intention	No

Lowry et al. (2012)	ELM	E-Commerce	Behavioral intention toward website	No
Mascha et al. (2011)	No explicit theory	E-Commerce	Purchase intention	No
Mauldin and Arunachalam (2002)	TRA / TPB	E-Commerce	Purchase intention	No
Mavlanova et al. (2016)	Signaling	E-Commerce	Purchase intention	No
Miyazaki and Krishnamurthy (2002)	Valence Framework	E-Commerce	Perceived risk; Information disclosure; [...]	Yes
Mousavizadeh et al. (2016)	Trust	E-Commerce	Purchase intention	No
Nikitkov (2006)	No explicit theory	E-Commerce	Purchase behavior	Yes
Noteberg et al. (2003)	No explicit theory	E-Commerce	Purchase intention; Privacy concerns; Transaction integrity concerns	No
Özpolat et al. (2013)	Trust	E-Commerce	Purchase conversion	Yes
Özpolat and Jank (2015)	Prospect Theory	E-Commerce	Likelihood of shopping cart completion	Yes
Park et al. (2010)	TRA / TPB	E-Commerce	Satisfaction; Repeat purchase intention	Yes
Pennington et al. (2003)	Trust	E-Commerce	Purchase intention	No
Peterson et al. (2007)	No explicit theory	E-Commerce	Information disclosure	No
Rifon et al. (2005)	No explicit theory	E-Commerce	Information disclosure; Trust; Estimates of information practices; [...]	Yes
Wakefield and Whitten (2008)	Trust	E-Commerce	Purchase intention	No
Sha (2009)	Social Contract Theory	E-Commerce	Customer trusting intentions	No

Shareef et al. (2008)	No explicit theory	E-Commerce	Trust formation; Purchase intention; Buying Satisfaction	No
Utz et al. (2012)	No explicit theory	E-Commerce	Perceived trustworthiness	No
van Baal (2015)	Signaling	E-Commerce	Purchase intention	Yes
Wang et al. (2004)	Trust Transfer	E-Commerce	Bookmarking intention; Willingness to disclose information	No
West (2015)	No explicit theory	E-Commerce	Trust	Yes
Wu et al. (2010)	ELM	E-Commerce	Purchase intention	No
Yang et al. (2006)	No explicit theory	E-Commerce	Trust	No
Zhang (2005)	No explicit theory	E-Commerce	Willingness to purchase	Yes

Table 3: Concept matrix of structure literature review

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 4: Theory distribution across identified studies

3.4.1.2 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.

3.4.1.3 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.

3.4.1.4 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. (2000a) 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).

3.4.1.5 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. (2002a) 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. 2002a; 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.

3.4.1.6 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).

3.4.1.7 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. 2011, p. 405)) or practice (“one web site exhibiting the WebTrust seal reports that, after displaying the seal, sales increased” (Houston and Taylor 1999, 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. 2016, p. 1122) while also claiming that they “would help create greater trust” (Clemons et al. 2016, 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”.

3.4.2 Discussing Theoretical Lenses

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

3.4.2.1 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. 2008c; 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 2008b). 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, and 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. 2000a) 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.

3.4.2.2 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. 2011) 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. 2011). 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.

3.5 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 (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.

3.6 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. 2000b; 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. 2005, 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 certifications. 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).

3.7 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).

3.8 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.

4. The Influence of Personality Traits on IS Certification Perception

Title: The Effectiveness of IS Certification in E-Commerce: Does Personality Matter?

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Abstract

IS certifications are frequently utilized on e-commerce websites to increase trustworthiness towards e-commerce vendors. However, existing research is inconsistent regarding the true effectiveness of IS certifications in e-commerce. While some studies show that IS certificates have a positive influence (e.g., on trust), others contradict these findings by revealing null or even negative effects. In order to shed light on resolving these inconsistencies, we argue that e-commerce consumers' personality traits, which influence their cognitive processes and hence IS certification perceptions, are a major cause for these heterogeneous findings. Drawing on IS certification research, psychological literature, and the theory of planned behavior, we utilize a vignette-based online experiment (N = 145) to show how consumers' personality traits (i.e., openness, neuroticism, and conscientiousness) shape the effectiveness of IS certifications. More broadly, we disentangle the inconsistent findings that have plagued previous IS certification research and thus provide a basis for moving future research forward.

Keywords: IS Certifications; Personality Traits; Theory of Planned Behavior

4.1 Introduction

IS certifications are among the most important measures for e-commerce vendors (e-vendors) to increase consumers' trustworthiness toward their offerings (Utz et al. 2012) and hence to alleviate consumers' concerns about potential fraud and deceptions (Mousavizadeh et al. 2016). In this regard, IS (Information Systems) certifications are defined as third-party evaluations of an e-vendor's products, services or internal processes conducted by a certification authority¹, which confirm compliance to a pre-defined set of criteria (ISO/IEC 2004). Such certifications experience a steadily increasing adoption rate, as more and more e-vendors as well as their products and services become certified. A major reason for this is that e-vendors have recognized that consumers are faced with increasing threats in e-commerce contexts (e.g., unauthorized storing and transmitting of personal data) (Özpolat and Jank 2015). The number of organizations certified according to the ISO/IEC 27001 standard increased by almost 20% to over 39,000 in 2017 compared to 2016 (ISO 2018). Particularly, certifications like 'Certified Privacy' (by TrustArc) or 'Norton Secured' within the e-commerce context have gained much attention by practitioners and scholars alike (Özpolat et al. 2013), as e-commerce itself continues to inexorably grow. With 2.3 trillion U.S. Dollars in sales in 2017, e-commerce as an economic sector is predicted to account for 17.5% of the retail sales worldwide in 2021 (eMarketer 2018).

Previous research on IS certifications in e-commerce has demonstrated that IS certifications affect consumers' assurance perceptions by strengthening the reliability of information provided by the e-vendor (Kim and Kim 2011). Such assurance perceptions (e.g., reduced likelihood of risk occurrences) in turn have an impact on e-commerce consumers' purchase intentions (Lowry et al. 2012; Pavlou et al. 2007). However, empirical evidence remains inconclusive about the true effectiveness of IS certifications (Lansing et al. 2018; van Baal 2015). IS certification effectiveness refers to the degree to which certifications achieve the intended effects as perceived by consumers (i.e., in particular, perceived assurance) (Lins and Sunyaev 2017). In the current state of research, some scholars have found positive effects of IS certifications on consumer trust (Ke et al. 2016), purchase intention (Clemons et al. 2016) or perceived assurance (Kim

¹ We refer to certification authority as the entity that conducts the certification assessment and awards the certificate to the e-vendor in case of adherence to the defined criteria.

and Kim 2011), while others have disproved such positive effects by identifying null or sometimes even negative effects on trust (Kim et al. 2008c), purchase intention (Aiken et al. 2014), or perceived assurance (Lowry et al. 2012). Scholars have therefore recently tried to explain – what we term – the IS certification effectiveness paradox by referring to perceptual contingency factors (e.g., consumers’ understanding of IS certifications) (Lowry et al. 2012), contextual contingency factors (e.g., consumers’ decision involvement) (Kim and Kim 2011) or the multitude of theories used to explain IS certification effect mechanisms (Löbbers and Siegfried 2018).

However, to our surprise, what has been missing so far is to investigate crucial individual differences of consumers, in particular their personality traits, in affecting how IS certifications shape consumer perceptions or trust, even though anecdotal evidence shows that not all consumers react uniformly to IS certifications (Odom et al. 2002). Yet, we argue that e-commerce consumers’ personality traits play a conspicuous role regarding IS certification effectiveness. Psychologists largely acknowledge that individuals’ motivations and behaviors (e.g., purchase decisions) are sharply influenced by personality (traits) (Costa and McCrae 1980). In such decision processes, consumers weigh the risks and benefits of (online) purchasing (Pavlou et al. 2007). The consideration and weighing of different evaluation criteria (e.g., textual product information or visual depictions) for such risk-benefits-calculi is affected by personality and hence, leads to diverse purchase outcomes (Jarvenpaa et al. 1999). Three personality traits out of five from the Five Factor Model of Personality (FFM) (Goldberg 1990) have been found to be of particular relevance in interactions between humans and electronic services (Butt and Phillips 2008) and hence for shaping online consumers’ perceptions, trust and behavioral intentions: neuroticism, openness and conscientiousness. While neuroticism is defined as a lack of emotional stability that describes fearful, sad and distrustful individuals, openness outlines a psychological state of curiosity and willingness to explore describing people that hold unconventional values and tend to device novel ideas. Conscientiousness represents the characteristic to be self-disciplined and reliable. Conscientious individuals are organized, plan actively and carry out tasks as defined (Costa and McCrae 1992; McCrae and John 1992). Neuroticism, openness and conscientiousness have also been shown to be influential personality traits for making sense of and interpreting different ambiguity-reducing signals and cues presented in individuals’ decision-making environment (Jach and

Smillie 2019; Lommen et al. 2010) such that it stands to reason that they serve as important sense-making filters affecting the effectiveness of IS certification (Benlian and Hess 2011; Bosnjak et al. 2007; Picazo-Vela et al. 2010). Therefore, without knowledge about how consumers process IS certifications, certification authorities face the risk of developing IS certifications that are out of sync with e-vendors' aims resulting in the rejection of IS certifications by consumers. Against this backdrop of current research, which leaves an important and intriguing gap in the extant IS certification literature to be addressed, we strive to answer the following research question:

RQ: *How do consumers' neuroticism, openness and conscientiousness moderate the indirect effect of IS certifications on their purchase intention via perceived assurance?*

To test the abovementioned research question, we used a vignette-based online experiment with 145 participants recruited from a professional market research platform called Prolific.ac (Palan and Schitter 2018). Based on personality psychological literature and the theory of planned behavior, we extend previous IS certification research by shedding light on a novel moderated mediation mechanism that specifically considers the moderating role of personality traits which to date have not been taken into account in previous IS certification research. Beyond confirming a significant positive indirect effect of IS certifications on purchase intentions via perceived assurance, we provide empirical evidence for the moderating effect of consumers' personality traits on IS certification effectiveness. That is, we demonstrate that neuroticism and openness are two crucial boundary conditions for IS certification effectiveness: IS certification effectiveness is strongest for consumers exhibiting low neuroticism and for consumers with high openness, while the positive effect of IS certification is nullified for consumers with high neuroticism and low openness. Conscientiousness did not affect IS certifications' indirect effect on purchase intention. Responding to recent calls for research into the effectiveness of IS certifications (Lansing et al. 2018), our contribution to the body of knowledge is multifarious. First, we demonstrate that IS certifications do not uniformly impact consumer decisions in the same manner but that their effectiveness depends on consumers' personality traits that differentially shape consumers' interpretations and sense-making of IS certifications. Second, since previous research has presented inconclusive findings regarding IS certification effectiveness, our study adds to this stream of research by, at least partially, reconciling the heterogeneity in previous findings. In particular, we show

that the assumption of a uniform processing of IS certifications across individuals is too narrow and may produce diverging results. We therefore show that IS certification effectiveness research is yet not saturated and provide a basis for this stream of research to move forward. Finally, we offer some practical insights that should encourage managers to refrain from using IS certifications as a silver bullet, and instead adopt IS certifications by carefully considering the personality-dependence of IS certification effectiveness.

4.2 Theoretical Background

4.2.1 IS Certification

Certification is defined as a process that evaluates a company's products, services, and/or internal processes against a predefined set of evaluation criteria, which formally verifies that a certain standard is met (ISO/IEC 2004). Certification processes are used across various application domains such as the certification of a car mechanic's qualification (Biglaiser 1993) or an institution's compliance with ecological management standards (Albuquerque et al. 2007). In the paper at hand, we focus on IS certifications in the IS domain, and specifically in online contexts. Prior research in this stream has investigated IS certifications in contexts such as digital services (e.g., cloud computing) (Benlian et al. 2018; Lins and Sunyaev 2017) or e-commerce (Aiken et al. 2014; Kim and Kim 2011). Herein, the focus is on the latter, as we investigate the effectiveness of IS certifications (also called: web assurance seals or online trust marks) when placed on an e-vendor's e-commerce website. Popular examples of IS certifications in e-commerce are, for instance, "Certified Privacy" issued by TrustArc or "Norton Secured" by Symantec.

IS certifications in electronic markets (e.g., e-commerce) constitute positive declarations on certain aspects of the internal process or service that would otherwise be unobservable for the e-commerce consumer (Kim and Benbasat 2009). The virtual nature of online interactions strips away the typical cues (e.g., product quality, appearance of vendor) on which consumers often rely to assess vendors and their products. In the absence of these cues, to reduce information asymmetries and transaction uncertainty, consumers put more weight on other cues, such as IS certifications. Central to IS certifications are three structural elements that describe

them: (1) certification content (i.e., the assurances pledged), (2) certification source (i.e., the instances that audits and issues the certificate), and (3) certification process (i.e., the rigor and frequency of the auditing process) (Lansing et al; Lansing et al. 2018). Within e-commerce, the aim of IS certifications is usually twofold: first, reducing consumers' perceived risks, and second, ensuring safe and duly online transactions through legal or technological safeguards (McKnight et al. 2004). For this reason, previous research has studied IS certifications by primarily focusing on a limited set of dependent variables, among others, purchase intention (Clemons et al. 2016) and perceived assurance (e.g. Kim and Kim 2011; Lowry et al. 2012). First, purchase intention acts as a predictor of actual purchase behavior (Venkatesh and Davis 2000) and is therefore often applied in this research stream (Clemons et al. 2016; Ke et al. 2016). Scholars draw on intention constructs to forecast how IS certifications can influence consumers' actual purchase behavior. Second, perceived assurance is a construct that aims to measure one or more of consumers' online concerns most often reflected in privacy, security and integrity concerns (Wu et al. 2010). Table 5 provides an overview of research in e-commerce, exhibiting the dependent variables, the theories and the moderator variables used in the studies.

Author(s)	Dependent variables			Theory	Moderator
	T	PI	PA		
Aiken et al. (2014)		o		Signaling; Trust	Internet Trust
Clemons et al. (2016)		+		Trust	National differences
Kim et al. (2008c)		o		No explicit theory	None
Kim and Kim (2011)		+	+	No explicit theory	Involvement, trust disposition, self-efficacy
Lowry et al. (2012)			-	Elaboration Likelihood Model	Understanding of seal, sense of seal assurance
Mavlanova et al. (2016)		+		Signaling	None
Mousavizadeh et al. (2016)			+	No explicit theory	None
Özpolat and Jank (2015)			+	Trust	Number of trust seals, shopping cart value, vendors' sales volume, consumers' experience with vendor

van Baal (2015)	o	Signaling	Dissemination of seal
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T = Trust; PI = Purchase Intention; PA = Perceived Assurance; + = positive significant effect; o = no (significant) effect; - = negative effect (not significant)

Table 5: Literature review on IS certifications in e-commerce

What becomes evident from the review of literature is the fact that the findings on the effects of IS certifications are somewhat inconclusive, with some studies demonstrating a positive relationship between IS certification and focal dependent variables, while others have found no relationship. Moreover, the consideration of personality traits for consumers assessing IS certifications is conspicuously missing in previous research, although according to previous research (Costa and McCrae 1980; Pavlou et al. 2007), personality traits can substantially alter consumer decision-making, particularly in virtual contexts. In our study, we aim to address this oversight in previous research and point to the need to further investigate the role of online consumers' personality traits for IS certification effectiveness.

4.2.2 Personality Traits in the Five Factor Model of Personality

A growing stream of research has been dedicated to study the influence of human personality on IS as well as on related disciplines. Various scholars have called for conducting research on the impact of personality traits to conceptualize theory but also to enable practitioners improving their decision-making or allowing them to better target potential consumers (Devaraj et al. 2008; Nguyen et al. 2018). A human's personality reflects its unique combination of thoughts, traits and actions. Peoples' behaviors, beliefs, perceptions or attitudes are partially determined by one's personality (Barrick and Mount 1991). Hence, it may be reasonable to integrate such ubiquitous facets into IS related research. As such, in recent years, IS scholars strived to enrich the body of knowledge by incorporating humans' personality traits into their research. They found, among other things, a significant influence of neuroticism and conscientiousness on internet usage (Butt and Phillips 2008; McElroy et al. 2007). More recently, scholars investigated how personality (i.e., openness) influences preferences for different types of online recommendations (Nguyen et al. 2018) or trust and the willingness to disclose information online (Bansal et al. 2016). Most interestingly, research also found that personality plays an important role when evaluating information to make a purchase or adoption decision (Patrakosol and Lee 2013). According to these findings, diverse

personalities value and process product information differently, which is mirrored in their purchasing behavior and decisions (Jahng et al. 2002).

Psychology scholars have come up with a variety of personality models and frameworks that aim to comprehensively conceptualize individuals' personality. However, in recent years, researchers have widely come to an initial consensus that most of the personality traits handled in literature can be assigned to one of the five dimensions of the FFM (John et al. 2010). The model is described as an "integrative personality taxonomy that offers a common nomenclature for scientists working in the field" (John and Naumann 2010, p. 48) and exhibits great potential for those willing to study the influence of personality traits on behavior (Epstein 2010). Although the FFM may not be the final thought of personality frameworks or models, its diffusion indicates its pioneering role. More than 3,000 studies have utilized the FFM, while all other studies combined register less than half this number (Barnett et al. 2015; John and Naumann 2010). Hence, research that "supported development of these models suggests that people differ on five general dimensions" (Chang et al. 2012, p. 408). The primary dimensions of the FFM (in alphabetical order) are agreeableness, conscientiousness, extraversion, neuroticism, and openness (Costa et al. 1991; Goldberg 1990). Previous research has shown that for non-human-centered interactions especially openness, neuroticism and conscientiousness play a crucial role in affecting consumer behavior in online contexts (e.g., Butt and Phillips 2008), and particularly in shaping consumers' online purchase decisions (Bosnjak et al. 2007; McElroy et al. 2007; Picazo-Vela et al. 2010). This is, while openness, neuroticism and conscientiousness describe rather generic characteristics of one's personality itself (e.g., ability of paying attention to details), agreeableness and extraversion outline properties of one's personality in interacting with human beings (e.g., someone's position among or interest in other individuals). Research supports this by showing that, for instance, extraverts prefer face-to-face interactions and hence spend less time on the internet (Landers and Lounsbury 2006). Given the unique role of openness, neuroticism and conscientiousness in making sense of and interpreting ambiguity-reducing signals (such as IS certifications) in online environments, we focus on these three constructs to explore their impact on IS certification effectiveness. Besides, the aforementioned personality traits (e.g., openness and neuroticism) play a rather contradictory role in defining one's personality

and in influencing internal trust building mechanisms, which renders them even more interesting to focus on.

Anxiety, self-consciousness, sadness or fearfulness are characteristics used to describe individuals scoring high on neuroticism (Bozionelos 2004; Judge et al. 1999). Moreover, these kind of individuals are often insecure, self-pitying and worried in contrast to being calm, secure and self-satisfied (McCrae and Costa Jr 2010). Neurotic individuals often lack emotional and psychological steadiness and can have complications managing stress, both in private as well as in their work lives (Judge et al. 1999; McElroy et al. 2007). Openness (or openness to experience) is determined as being open to novel things and situations or seeking for new experiences (Judge and Ilies 2002; McElroy et al. 2007). Such open-minded, imaginative and curious individuals exhibit intellectual intelligence, creativity and are able to come up with innovative approaches or ideas to problems (Costa et al. 1991). On the contrary, personalities demonstrating low openness show the tendency to be pragmatic (sometimes also dogmatic) and data-driven (McElroy et al. 2007). Lastly, personalities scoring high on conscientiousness show increased tendencies to be self-motivated and disciplined (McCrae and Costa Jr 2010). These individuals are considered to be well-organized, careful, ambitious and hard working as opposed to exhibiting disorganization, sloppiness or lack of reliability (Barrick and Mount 1991; McElroy et al. 2007). Conscientious individuals perform actions and plans very carefully whilst complying to standards and norms (McCrae and Costa Jr 2010).

Focal to psychological research are theories that predict certain behaviors (or intentions) based on individuals' characteristics (e.g., traits, beliefs, thoughts, or perceptions). A widespread theory, not only in psychology but also in the IS certification area (Löbbers and Siegfried 2018), is the theory of planned behavior (TPB). TPB will guide our research model and hypotheses development in the following.

4.2.3 Theory of Planned Behavior

Introduced in 1991, the TPB is a theoretical extension to the theory of reasoned action (TRA)² which was originally published in 1976 (Ajzen 1985, 1991). Both theories

² According to TRA, the proximal determinant of a behaviour is a behavioural intention, which, in turn, is determined by attitude and subjective norm. Acknowledging that most human behaviours are subject to obstacles, Ajzen Ajzen (1985) introduced TPB, which generalizes TRA by adding a third perception: perceived behavioural control.

describe the influence of various antecedents on an individual's intention and, hence, allow for predictions about actual behavior. Depending on the theory, intentions are influenced by two or three determinants. These are: (1) attitude, (2) subjective norm, and (3) perceived behavioral control. *Attitude* (or attitude towards a behavior) is described as the positive or negative feeling about performing a behavior and their respective favorability of consequences (Ajzen 1991; Eagly and Chaiken 1993). *Subjective norm* is outlined as the perception of an individual, who is about to perform a certain behavior, whether others think this behavior should be performed or not (Eagly and Chaiken 1993). Finally, *Perceived behavioral control* is defined as the "person's perception about the ease or difficulty of performing a given behavior" (Mauldin and Arunachalam 2002, p. 37).

In the context of TPB, IS certifications are hypothesized to influence either *attitudes* or *perceived behavioral control* and hence, intentions and behaviors. Researchers assert that, on the one hand, IS certifications influence consumers' attitude, which lessens the perceived likelihood of certain risk occurrences when purchasing online (Mauldin and Arunachalam 2002). On the other hand, IS certifications positively affect perceived behavioral control leading to increased consumers' assurance perceptions over e-vendors (Mousavizadeh et al. 2016). According to Ajzen 2002 (2002), *perceived behavioral control* should be understood as consumers' perceived control over conducting a certain behavior. As risks are inherently high in online environments and therefore situations and behaviors are difficult to control for a consumer, a demand for web assurances arises, because the e-vendors has incentives to misrepresent or withheld information necessary to make purchase decisions (Elliott 1998). The demand of web assurances can be satisfied by IS certifications resulting in more control for consumers over the provided information as well as a more positive evaluative attitudes about purchase intention (Mousavizadeh et al. 2016). Finally, for IS certification in particular (and e-commerce in general), subjective norms play a rather subordinate role in determining behavioral changes since consumers are usually not able to observe whether, or to what extent, other consumers factor IS certifications into their decision making. Due to these reasons, following previous IS certification research (Lowry et al. 2012), we capture the influence of IS certifications on *perceived behavioral control* and *attitude* through perceived assurance. In line with TBP, a positive influence of IS

certifications on perceived assurance is therefore likely to result in increasing behavioral intentions (e.g., intentions to purchase).

Collectively, the indirect effect of IS certifications on behavioral intentions via perceived assurance represents the core mediating mechanism (also referred to as IS certification effectiveness) that provides the theoretical foundation on which we will develop our research model and hypotheses. That is, we aim to explain why and how certain personality traits have a moderating impact on IS certification effectiveness.

4.3 Research Model and Hypotheses Development

Our research model, as depicted in Figure 5, includes IS certification as the independent variable, perceived assurance as the mediator variable, purchase intention as the dependent variable as well as neuroticism, openness and conscientiousness as moderator variables. The moderator variables are expected to conditionally influence the relationship between the independent variable (IS certification) and the mediator variable (perceived assurance). Hence, a (first-stage) moderated mediation model³ will be developed and tested in the following.

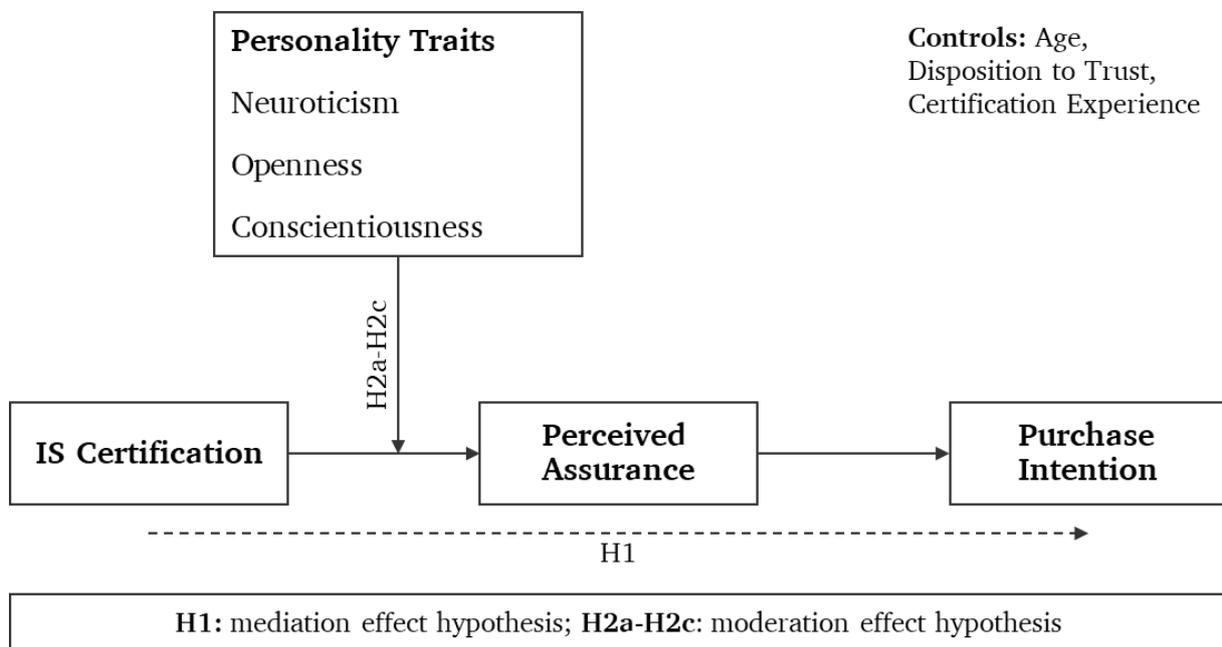


Figure 5: Research model [Influence of personality traits]

³ Moderated mediation, also known as conditional indirect effects, occurs when the effect of an independent variable A on an outcome variable C via a mediator variable B differs depending on levels of a moderator variable D. A first-stage moderated mediation model proposes that a moderator D alters the relationship between the independent variable A and the mediator B (Hayes 2018).

4.3.1 IS Certifications and their Influence on Purchase Intention

Participation in third-party certification programs has become a common strategy for e-vendors to increase trust among their consumers (Aiken et al. 2014; Özpölat and Jank 2015). Certification authorities are trustworthy institutions (e.g., Symantec or TrustArc) that permit e-vendors to display a web assurance seal on their website once they have fulfilled the evaluation criteria as defined in the certification process (Kaplan and Nieschwietz 2003a). Furthermore, through displaying such a seal, e-vendors commit to adhere to the standards (e.g., privacy, security, or data integrity) in the future (Kimery and McCord 2002). Following Mauldin and Arunachalam 2002 (2002), web assurance seals provide the consumer with increased reliability about the information provided by the e-vendor. In line with previous research (Kaplan and Nieschwietz 2003a; Kim and Kim 2011; Lowry et al. 2012; Yang et al. 2006), we argue that IS certifications have a positive effect on consumers' perceived assurance. Consumers exhibiting increased perceived assurances should be more likely to believe that the e-vendor is capable of providing products and services as promised. Previous research is consistent with this proposition (Lowry et al. 2012): increased assurance perceptions result in a higher likelihood of disclosing (personal) information for transactions (Dinev and Hart 2006; Hui et al. 2007), storing sensitive data electronically (Angst and Agarwal 2009) or purchasing products online (Pavlou et al. 2007). Furthermore, according to TPB, perceptions of proof of certification are likely to impact consumers' perceived behavioral control which in turn further strengthens consumers' intentions to purchase on a e-vendor website (Mousavizadeh et al. 2016). Putting together these arguments and acknowledging previous empirical findings, we therefore propose that:

H1: *Perceived assurance will mediate the positive effect of IS certification on purchase intention.*

4.3.2 Personality Traits as Moderators for IS Certification

Effectiveness

Behavioral psychologists widely agree that individuals' personality shape actual behaviors through cognitive processes that influence one's motivation to conduct certain actions (Costa and McCrae 1980). Decision making (e.g., a purchase decision) is one of such cognitive processes in which consumers weigh risks against benefits

before making a final decision (e.g., to buy a product or service via the Internet) (Patrakosol and Lee 2013). Moreover, different personalities value and process various evaluation criteria (e.g., textual product information or visual depictions) differently, which leads to diverse purchasing decision outcomes (Jahng et al. 2002). We therefore hypothesize that one's personality traits influence the proposed assurance-increasing effect of IS certifications.

First, previous research has shown that neurotic individuals generally tend to evince non-compliant behavior (e.g., compliance to paying taxes in defined time and liability) and are more comfortable in dealing with the resulting distress (Huels and Praveen Parboteeah 2019). Besides, researchers have found that people exhibiting neurotic characteristics have difficulties to accurately distinguish right (and safe) from wrong (or unsafe) information signals (Alalehto 2003). In online contexts, scholars could confirm the influence of neuroticism in individuals' decision-making behavior (Picazo-Vela et al. 2010). Empirical studies have also demonstrated that neuroticism is negatively associated with several positive outcomes such as intention to trust (Barrick and Mount 1991) as well as expected and perceived success (Seibert and Kraimer 2001). Thus, initial evidence in the literature suggests that individuals high on neuroticism may not only have difficulties to interpret IS certifications in e-commerce but they may also display indifference or even distrust towards IS certifications.

The TPB explicitly considers neuroticism as one personality trait that can affect individuals' beliefs about a behavior (Devaraj et al. 2008). Neurotics are inclined to demonstrate negative reactions to both, life and work situations (McElroy et al. 2007), which may generalize to beliefs about the functionality and reliability of technology in general (Benlian and Hess 2010). More specifically, as technology calls attention to the self and offers the potential to be monitored by others, neurotic individuals form negative beliefs about technology (Devaraj et al. 2008). In particular, for neurotics, IS certifications (as a technology subset) can be perceived as an additional source of uncertainty since non-observable elements of an IS certification (e.g., acquisition process or auditing process) are sometimes difficult to retrieve and understand for consumers (Moore 2005). Consumers exhibiting neurotic personality traits may thus be suspicious of being exploited by an e-vendor in terms of their privacy or security concerns. Since individuals high in neuroticism are expected to react anxious to making informed buying decisions in e-commerce contexts, even prominent and widespread IS

certifications can be perceived as complex or non-comprehensible, which may result in unintended or even opposing effects. That is, when seeing IS certifications, neurotics may purposefully decide to behave contrary to what e-vendors intend to communicate by showing IS certifications. Taken together, we argue that high neuroticism will negatively influence IS certification effectiveness by diminishing the effect of IS certification on perceived assurance. Accordingly, we propose:

H2a: *High levels of neuroticism will negatively moderate the relationship between IS certification and perceived assurance, such that it will weaken the indirect effect of IS certification on purchase intention.*

Second, personalities demonstrating high openness value change and are willing and intrinsically motivated to peruse novel opportunities (McCrae and Costa 1997). In contrast, individuals exhibiting low levels of openness prefer stability and well-trying environments. In addition, and relating to the TBP, these kinds of individuals usually hold positive attitudes and cognitions towards technology they are using, especially when this technology offers a high ease of customization (Benlian and Hess 2010). Openness has been subject to empirical research in online environments as well (Bosnjak et al. 2007; McElroy et al. 2007). For instance, previous research has shown that openness leads to utilization of a greater variety of system features (Amichai-Hamburger and Vinitzky 2010). As Internet platforms in general and e-commerce shops in particular offer wide-ranging opportunities to use and retrieve information (e.g., by means of IS certifications), consume content and buy or exchange products and services, we expect individuals with high levels of openness to use IS certifications (as a third-party information source) more heavily compared to personalities with lower levels of openness. At the same time, IS certifications increase the degree of flexibility for consumers described as having an open personality, since they are no longer exclusively dependent on the information provided by the e-vendor offering the product. In line with this, we expect that open individuals are more receptive to perceive and utilize additional information cues like IS certifications as facilitators for new and varied experiences (e.g., buying a new type of product never bought before from the Internet). Since IS certifications are a credible source of information that aim to support and secure people in their endeavors to purchase online, we propose the hypothesis:

H2b: *High levels of openness will positively moderate the relationship between IS certification and perceived assurance, such that it will strengthen the indirect effect of IS certification on purchase intention.*

In general, people demonstrating a conscientious behavior tend to act responsibly, meaning that they are more likely to obey to rules and norms induced by others (e.g., certification authority) compared to non-conscientious individuals (Alalehto 2003). This fact is evidenced across different research streams, all finding proof that integrity is a crucial ingredient of conscientious people, which also results in willingness to depend on others (Costa and McCrae 1992; Mayer et al. 1995). In the context of e-commerce, it may therefore be reasonable to assume that conscientious individuals show tendencies to utilize IS certifications as a set of rules to comply with. Further, in line with the TPB, conscientiousness individuals are intrinsically motivated to succeed. Hence, they will judiciously balance information available as well as external opinions in order to decide whether to perform an action or not. This influence of conscientiousness on subjective norms is bidirectional. While conscientious people will form stronger intentions when being supported by trusted others (e.g., a trusted third-party such as a certification authorities), they will also lower their intentions when such significant others think they should not use a certain technology (Devaraj et al. 2008). Thus, we argue that e-commerce consumers scoring high on conscientiousness are motivated to engage and process information provided by IS certifications and the trusted third-party issuing the certificate. Conscious people are described to be rather risk-averse shown in their tendency to stick to established norms or rules and will therefore try to prevent incorrect purchases or loss of product quality by relying on trusted third-party information (i.e., IS certifications). In a similar way, IS certifications support conscious individuals in drawing a comprehensive information picture regarding the product or service to be bought, further reducing possibilities of unexpected risk occurrences. As a result, we formulate the following hypothesis:

H2c: *High levels of conscientiousness will positively moderate the relationship between IS certification and perceived assurance, such that it will strengthen the indirect effect of IS certification on purchase intention.*

4.4 Research Model

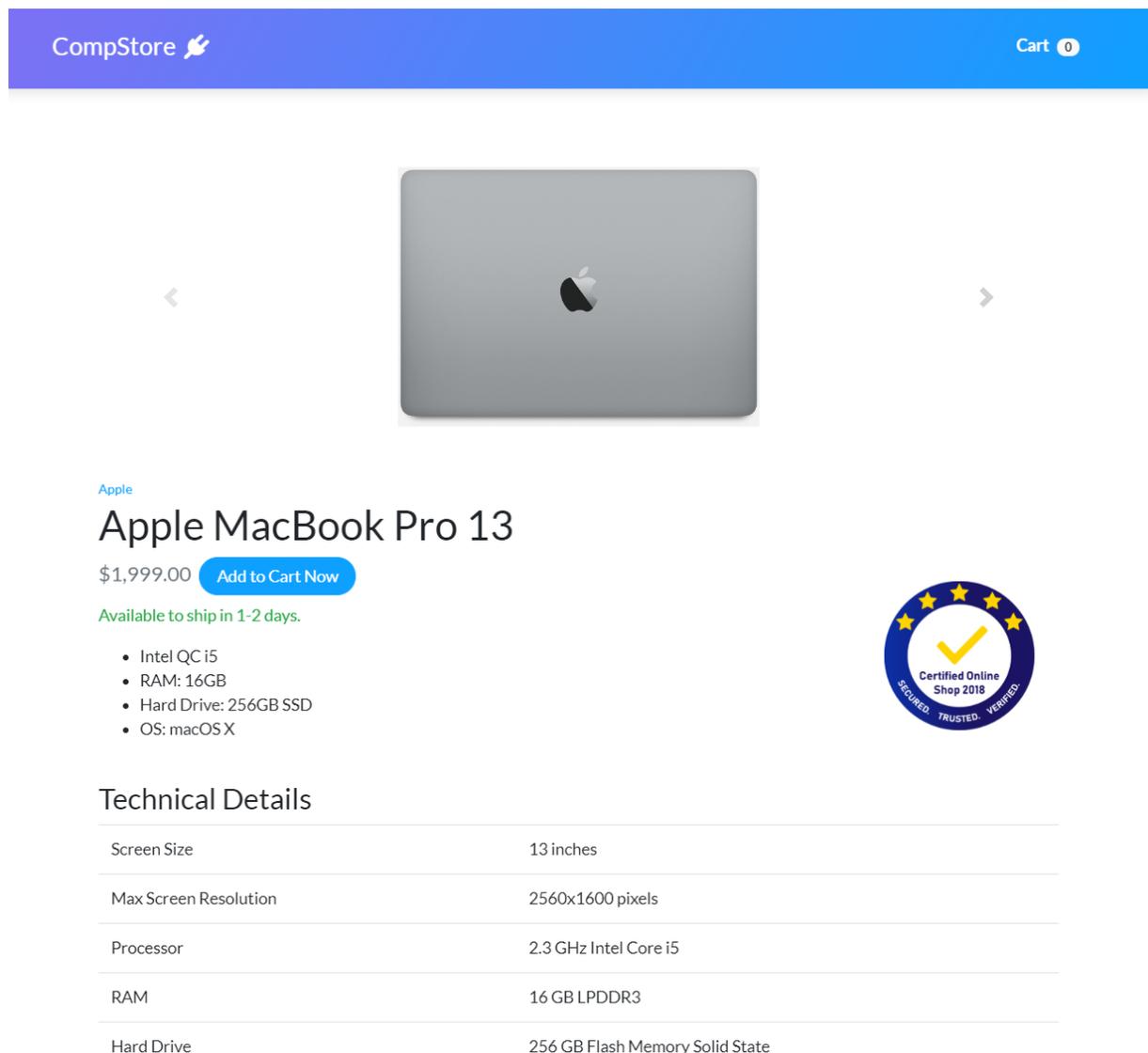
4.4.1 Experimental Design

To test our hypotheses, we conducted a vignette-based experiment using a between-subject design with two groups (IS certificate existent vs. non-existent). The treatments were manipulated based on a fictitious IS certification seal in the experimental e-commerce shop CompStore. We conducted a pretest with 42 participants (65% females, $M_{age} = 33.41$) to test for our treatments. Pretest results using a one-way ANOVA revealed that participants rated perceived risk (Kim et al. 2008c) to be significantly lower in the experimental condition with the IS certification seal ($M = 3.92$) than in the experimental condition without the IS certification seal ($M = 4.65$; $p < 0.01$), providing initial indication that the treatments are correctly executed. In our experiment, study participants interacted with the simulated website, which was integrated into our online survey to provide a high level of realism and ecological validity, and to increase generalizability. This approach has been widely used in previous online studies in IS research (Gefen et al. 2003; Vance et al. 2008). Further, we ensured comparability between our two treatment groups (IS certificate existent vs. non-existent) in keeping functionality and design constant across treatment groups. Additionally, a responsive web design was used, both for the fictitious website as well as for the survey to avoid restricting participants and to allow them to use their preferred device for online shopping activities. Taken together, we followed recommendations in the methodological literature that suggest improving realism in the stimulus presentation by increasing the level of immersion and similarity between the experimental and natural settings (Aguinis and Bradley 2014; Benlian et al. 2020b). By means of manipulation checks integrated into the survey, we controlled for successful recognition of treatments within the respective groups. Thus, useless data for the purpose of our study was filtered out already during the experiment. Again, a one-way ANOVA was used to test our manipulation showing that participants (59.6% females, $M_{age} = 35.22$) exposed to the IS certification seal rated perceived risk (Kaplan and Nieschwietz 2003a; Kim et al. 2008c) significantly lower ($M = 4.02$, $SD = 0.59$) compared to participants that were not exposed to the IS certification seal ($M = 4.77$, $SD = 0.68$; $p < 0.01$), finally confirming successful execution of treatments.

Additionally, we checked participants' attention by asking (multiple-choice question with three options) what kind of product was sold on CompStore's website. Again, in case participants failed to give a correct answer to this question, they were not able to complete the survey and hence did not appear in our final data set.

4.4.1.1 Procedures

The simulated website included three pictures of a computer (Apple MacBook Pro 13"), specifications (e.g., price, technical details, shipping information), as well as a short general statements about warranties and support (Figure 6).



CompStore  Cart **0**



Apple
Apple MacBook Pro 13
\$1,999.00 [Add to Cart Now](#)
Available to ship in 1-2 days.

- Intel QC i5
- RAM: 16GB
- Hard Drive: 256GB SSD
- OS: macOS X



Technical Details

Screen Size	13 inches
Max Screen Resolution	2560x1600 pixels
Processor	2.3 GHz Intel Core i5
RAM	16 GB LPDDR3
Hard Drive	256 GB Flash Memory Solid State

Figure 6: Display of the experimental condition

The only difference between the experimental conditions was the presence or absence of the fictitious IS certification seal. We created this seal in order to prevent our results from biases that could have occurred due to personal or work-related experiences

participants might have had with popular and well-known seals like BBBOnline or TRUSTe. Using fictitious seals to test the influence of certification or web assurance seals has been a viable method among researchers in the past (Kaplan and Nieschwietz 2003a; Wu et al. 2010) and has been shown to produce comparable results to using real-world seals (Aguinis and Bradley 2014; Moores 2005; Wogalter and Mayhorn 2008).

The experiment proceeded as follows: To start with, participants were provided with some initial background information for the experiment, information about the anonymity and confidentiality of submitted answers and instructions on how to perform the survey. Next, participants were asked general questions about their Internet usage behavior before answering questions about their personality. Subsequently, they were directed to the simulated CompStore website, which was seamlessly integrated into the survey tool. Afterwards, they were required to answer survey questions related to the experiment and follow-up questions and had to pass implemented manipulation checks. Eventually, socio-demographic questions represented the final step of the survey, before we debriefed and thanked the participants.

4.4.1.2 Sample

We cooperated with a professional market research platform called Prolific.ac (Palan and Schitter 2018) to obtain a heterogeneous subject pool to ensure generalizability. Previous research has validated Prolific's usability for research purposes by highlighting the increased diversity of participants (e.g. in terms of location, ethnicity, etc.) and pointing out the subject pool's suitability with respect to common experimental tasks (Peer et al. 2017). We incentivized participants by receiving £1 for conducting a survey that lasted on average 6.42 Minutes. Using G*Power 3.1 (Faul et al. 2009) (two groups, small effect size ($f^2=0.09$), α -level=0.05, power level=0.80) we predicted a minimum sample size of 101. In total we invited 200 participants. While 26 subjects did not successfully pass attention filter checks, we excluded another 21 participants since they failed to complete the entire survey. An additional set of eight subjects was omitted due to rushing through the survey (i.e., needed less than 3 minutes to complete the survey). As a result, we used a sample of 145 subjects for our statistical analysis.

4.4.2 Variable Measurement and Validation

All variables were measured using multi item-based constructs on a 7-point Likert scale ranging from 1 = “strongly disagree” to 7 = “strongly agree (see Table 9 for all constructs and their measurements). All variables were adapted from previous IS or psychology research. We measured perceived assurance (Wu et al. 2010), purchase intention (Jarvenpaa et al. 1999), neuroticism (Smith and Ellingson 2002), openness (Brown et al. 2002), conscientiousness (Venkatesh et al. 2011), disposition to trust (Gefen 2000) and certification expertise (adapted from Kollmann et al. (2009)). The focal study constructs are listed in Table 6 with construct definitions and further descriptions.

Focal Study Variables	Definition	Description
Neuroticism	An individual's missing psychological adjustment and emotional stability.	Low self-esteem, irrational, pessimistic attitudes, worried vs. calm.
Openness	An individual's curiosity and willingness to explore new ideas.	Interest to novelty, curiosity, variety of experience, imaginative vs. down-to-earth.
Conscientiousness	An individual's tendency to exhibit reliability or self-discipline and strong-willingness.	Long-term plans, organized support network, self-disciplined vs. weak-willed.
Perceived Assurance	An individual's perceived assurance of an e-vendors' website/online shop based on the structural assurances provided (e.g., IS certifications).	A form of institution-based trust in the e-commerce vendor.
Purchase Intention	An individual's intention or willingness to purchase, for instance, a product or service	A consumers' purchase intention depends on different external as well as internal factors either originating from the consumers themselves, the e-vendor's website or other sources.

Table 6: Definitions and descriptions of focal study constructs (Costa and McCrae 1992; Jarvenpaa et al. 1999; Wu et al. 2010).

In order to assess psychometrics properties of the measurement model results, we analyzed internal consistency, convergent validity and discriminant validity. Loadings of measurement items on their respective construct were above the threshold of 0.70 (Hair et al. 2016) and significant ($p < 0.05$). Only one item exhibited a cross-loading

greater than 0.4, which was subsequently removed. However, all remaining constructs' square roots of the AVE exhibit consistently larger values than respective inter-construct correlation coefficients, indicating that we met the requirements for discriminant validity (Hair et al. 2018). Eventually, internal consistency of constructs thoroughly exceeds the proposed threshold of 0.70, suggesting acceptable reliability (Fornell and Larcker 1981). As all variables showed adequate internal consistency, we averaged the items of each construct to form composite scores for further statistical analysis.

Since all items were measured using the same method, we accounted for common method variance (CMV) using Harman's one factor test (Podsakoff et al. 2003). Further, an exploratory factor analysis was conducted on all variables. Results indicated that no single factor was observed, and no single factor accounted for the majority of covariance in the variables. Besides, using a correlation marker technique the highest variable from the factor analysis was entered as an additional independent variable (Richardson et al. 2009). The added variable did not create significant changes in the variance explained of dependent variables⁴. Therefore, CMV is unlikely to have significantly influenced our results.

4.5 Analysis and Results

To test our hypotheses, we conducted mediation and moderated mediation (also called conditional indirect effect) analyses based on PROCESS Macro 3.3 for SPSS by Hayes 2018 (2018) using Model 4 (mediation) and Model 7 (moderated mediation). PROCESS is based on ordinary least squares regressions and uses the bootstrapping technique to test for the significance of the indirect effects. While Structural Equation Modelling (SEM) is known for its flexibility in model specification and increased reliability in the measurement of latent constructs, recent methodological literature that examined the benefits and challenges of PROCESS compared to SEM have shown that results produced by both analysis techniques "will be substantively identical" (Hayes et al. 2017, p. 80). Consistent with these findings, we tested our data using PLS-SEM and the results did not differ substantively from those produced using the PROCESS macro. Hence, we are confident that our results are robust to different analytical methods.

⁴ Correlations with the marker variable can be obtained from the authors upon request.

4.5.1 Descriptive Statistics

The mean age of the participants was 35.22 years ranging between 18 and 75 years. In terms of gender distribution, our data set consisted of 87 females and 58 males. In Table 7 further descriptive statistics are shown.

Construct	M	StD	Description
Age	35.22	11.14	
Gender	1.40	0.49	
Certification Expertise	3.43	1.93	
Disposition to Trust	4.41	1.15	
Education			No diploma: 3.4%; High school degree: 25.3%; Bachelor degree: 46.6%; Master degree: 18.5%; PhD degree: 1.4%; Other: 4.8%

Table 7: Descriptive statistics of the research sample

To test for non-response bias, we compared data from early and late-respondents (Armstrong and Overton 1977). Results from t-Tests conducted on socio-demographics using the 50 first and last responses exhibited no statistical significance ($p > 0.05$) rendering it unlikely that non-response bias was an issue within the data set used. Moreover, using several one-way ANOVAs, we could confirm that randomization of the two experimental conditions was successful. Complementary metrics of our statistical analysis can be taken from Table 8.

	M	StD	α	1	2	3	4	5
1 Perceived Assurance	4.26	1.22	0.93	0.91				
2 Neuroticism	3.97	1.14	0.69	0.07	0.73			
3 Openness	4.70	1.20	0.82	-0.01	0.09	0.80		
4 Conscientiousness	5.19	1.07	0.88	0.29	-0.06	0.19	0.85	
5 Purchase Intention	3.69	1.53	0.92	0.55*	0.00	0.09	0.11	0.93

* $p < 0.01$

Table 8: Internal consistency, discriminant validity and construct correlations

4.5.2 Mediation Analysis

In H1, we argued that the presence of IS certifications have a positive effect on purchase intention via perceived assurance. We applied the bootstrapping technique using 10,000 samples and a 95% bias-corrected confidence interval to examine this mediation model and test our hypothesis.

To begin with, we tested the main effect of IS certification on purchase intention including the mediating and all control variables as independent variables using a simple linear regression analysis. We found no significant direct effect ($c = -0.294, p > 0.05$). Next, we added perceived assurance as a mediator to the model. Again, we included all other variables as covariates into the model. Again, no direct significant effect of IS certification on purchase intention could be confirmed ($c' = -0.285, p > 0.05$). However, a highly significant direct effect of IS certification on perceived assurance ($a = 0.885, p < 0.001$) as well as a highly significant direct effect of perceived assurance on purchase intention ($b = 0.735, p < 0.001$) was confirmed. Moreover, analysis results suggest a significant indirect effect of IS certification on purchase intention via perceived assurance (*indirect effect* = 0.651; *standard error* = 0.167; 95% *bias-corrected confidence interval* (CI) = [0.340; 0.997]), in support of our mediation hypothesis H1. Because the direct effect of IS certification on purchase intention remained insignificant after entering perceived assurance as mediator, our findings suggest a case of full mediation (Baron and Kenny 1986). Results are summarized and depicted in Figure 7.

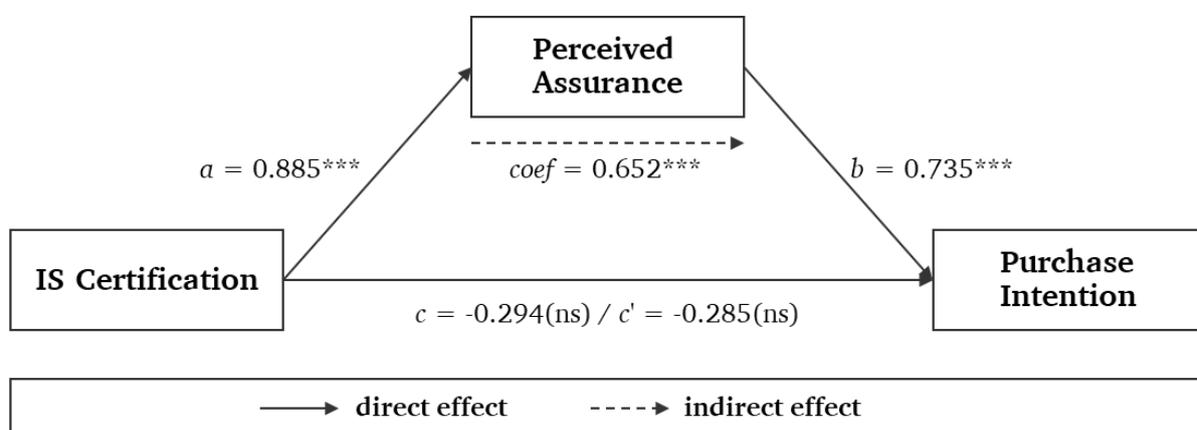
*** $p < 0.001$; ns = non-significant

Figure 7: Mediation and moderated mediation analysis results

Notably, while the direct effect of IS certification on purchase intention remains negative (though insignificant), the indirect effect (via perceived assurance) is positive, suggesting the need for a differentiated view on IS certification effectiveness.

4.5.3 Moderated Mediation Analysis

We further propose that the indirect effect of IS certification on purchase intention via perceived assurance is moderated by consumers' personality traits. We draw on a moderated mediation model (Hayes (2018), Model 7) again using the bootstrapping technique with 10,000 samples and bias-corrected confidence intervals of 95% to test for potential conditional indirect effects of neuroticism, openness, and conscientiousness. We proceeded as follows: We conducted two distinct multiple regression models for each moderator. The first model incorporated IS certification, the respective personality traits, the interaction term (IS certification x personality trait) and all controls as independent variables as well as perceived assurance as the dependent variable. In the second model, we included perceived assurance, all moderating variables as well as all controls as independent variables while setting purchase intention as the dependent variable (Hayes 2018).

First, our results show a negative statistically significant interaction effect of IS certification and neuroticism ($b = -0.373$; $p < 0.05$) on perceived assurance. Further investigation additionally demonstrates a conditional indirect effect of IS certification on purchase intention via perceived assurance for e-commerce consumers' exhibiting low levels of neuroticism (indirect effect = 0.670; standard error = 0.167; 95% CI = [0.363; 1.021]), supporting our hypothesis H2a. We further conducted simple slopes analyses (see Figure 8) with neuroticism as moderator at 2 SD and 1 SD below the mean, at the mean, as well as 1 SD and 2 SD above the mean. As can be seen, neuroticism moderates the effect of IS certification on perceived assurance such that the less neurotic e-commerce consumers are, the stronger is the effect of IS certification on perceived assurance. By contrast, IS certification has no significant effects on perceived assurance for consumers with high levels of neuroticism.

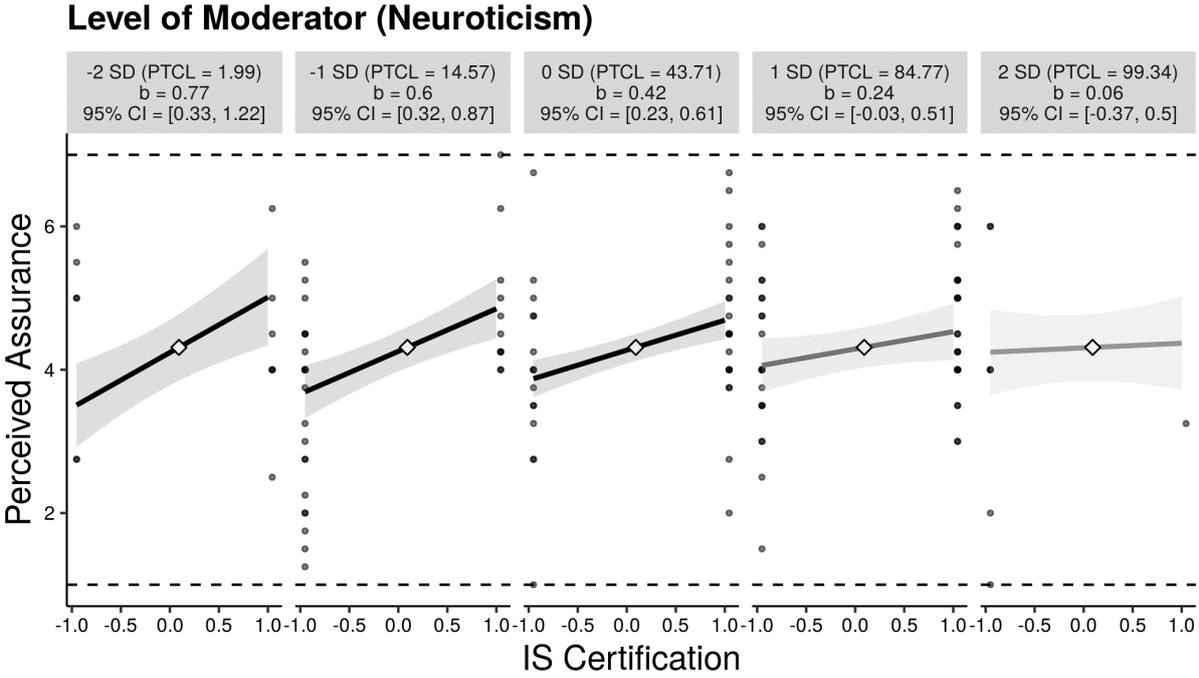


Figure 8: Simple slope analysis for neuroticism

Second, our analysis further reveals a positive statistically significant interaction effect of IS certification and openness ($b = 0.365; p < 0.05$) on perceived assurance. Again, additional analysis unveiled a conditional indirect effect of IS certification on purchase intention via perceived assurance for e-commerce consumers showing high levels of openness (*indirect effect* = 0.656; *standard error* = 0.162; *95% CI* = [0.353; 0.995]), supporting H2b. Yet again, conducting simple slope analyses, Figure 9 depicts the influence of the moderator (openness) at different levels (from -2 SD to +2 SD) on the effect of IS certification on perceived assurance. As such, openness moderates the effect in a way that the more open an e-commerce consumer’s personality is, the greater is the effect of IS certification on perceived assurance. However, at lower levels of openness, the relationship between IS certification and perceived assurance becomes insignificant.

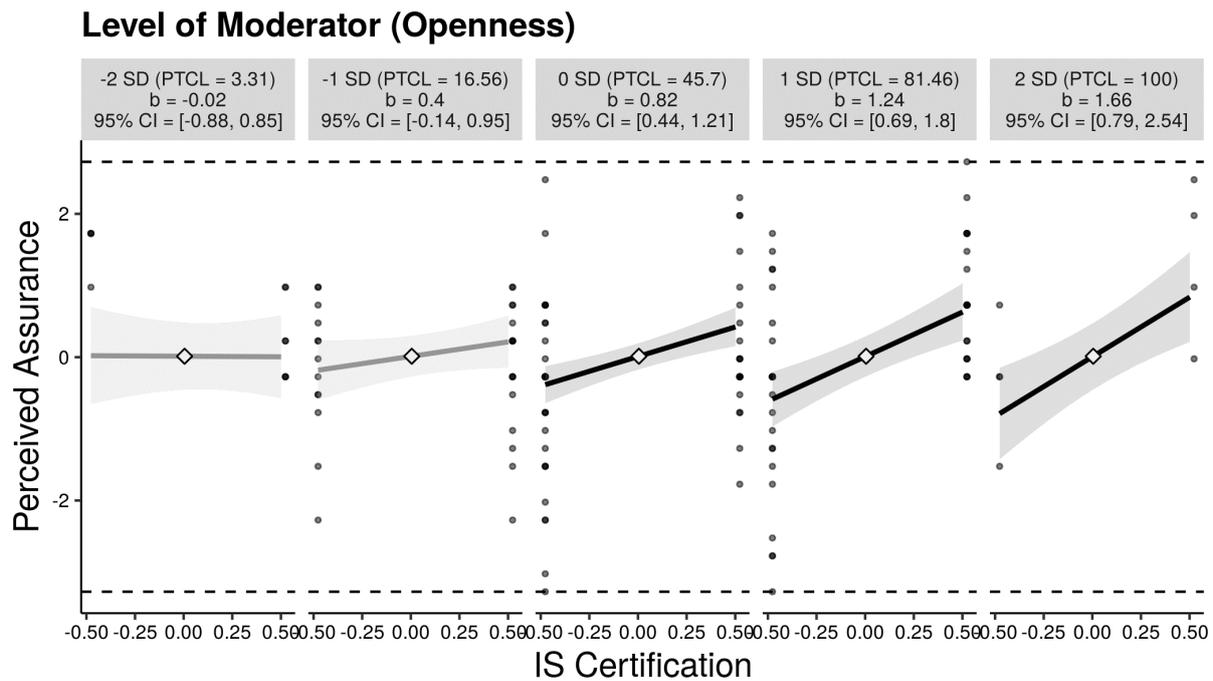


Figure 9: Simple slope analysis for openness

Lastly, no statistically significant interaction effect was found for IS certification and conscientiousness ($b = -0.076$; $p > 0.05$). Therefore, H2c had to be rejected.

4.6 Discussion

By answering calls to further investigate the effectiveness of IS certifications in online contexts (Kim et al. 2016), this study's aim was twofold: first, we aimed to enrich our understanding of IS certification effectiveness considering the differential effects of personality traits. We focused our investigation on three personality traits, namely neuroticism, openness, and conscientiousness, which are particularly influential in the sense-making of ambiguity-reducing signals and examined their influence for assessing IS certification effectiveness. Our results disclosed important boundary conditions for IS certification effectiveness. First, we showed that for e-commerce consumers exhibiting low to mean levels of neuroticism, IS certifications have a positive and significant impact on perceived assurance. However, for consumers exhibiting high levels of neuroticism, IS certifications fail to produce a positive effect on perceived assurance. That being said, IS certifications are adequate measures to mitigate the concerns of e-commerce consumers who have low self-esteem, are rather pessimistic or somewhat worried, at least to a certain extent. However, it becomes also clear that the power of IS certifications may be limited, as our results indicate that very pessimistic

and irrational e-commerce consumers will not perceive increased assurances through IS certifications.

Second, while for e-commerce consumers with mean to high levels of openness, the effect of IS certifications on perceived assurance is positive and significant, this effect is nullified for consumers with low levels of openness. Interestingly, the effect of IS certifications on perceived assurance becomes even slightly negative for e-commerce consumers exhibiting very low levels of openness (cf. Figure 9). This indicates that rather close-minded personalities react defensively to the effects of IS certifications. By contrast, e-commerce consumers that are curious and have interest in novelty are more receptive to the influence of IS certifications compared to their counter-parts.

Interestingly, although we proposed that the positive indirect effect of IS certification on purchase intention is strengthened by conscientiousness, we did not find such a moderating effect in our results. One speculative explanation for this null finding is that highly conscientious (and hence careful) individuals may not trust the assurances made by IS certification (due to self-initiated background checks) and question the promises made by e-vendors that they are able to comply and deliver as promised by the IS certification. Future research is encouraged to unravel whether and how conscientiousness has an impact on IS certification effectiveness.

4.6.1 Implications for Research and Practice

Our findings provide several important theoretical and practical contributions. First, to the best of our knowledge, this study is the first to empirically investigate the moderating role of individuals' personality traits for IS certification effectiveness. Our results demonstrate that IS certification effectiveness depends consumers' personality traits that differentially shape consumers' interpretations and sense-making of IS certifications. While previous research has assumed that consumers react uniformly to IS certifications, we demonstrate that "not all consumers are created equal" and differ in their interpretations of IS certification signals in online contexts. Personality traits may thereby serve as sense-making filters that amplify or attenuate the effectiveness of IS certification.

By providing this expanded theoretical account of IS certification effectiveness, we clarify disparate past findings in the extant literature on the relationship between IS certification and the most relevant outcomes. More specifically, taking into account

consumers' personality may partially explain the divergent outcomes of previous IS certification effectiveness studies that have generally assumed that all individuals will perceive and make sense of IS certifications in a similar manner, which seems to be unsubstantiated and too narrow. In our study, we showed that attention to personality factors can bring more clarity to the mixed and often equivocal findings that have characterized previous research. More broadly, our study's results are consistent with recent findings from other streams of IS research that focus on the interplay of IS and personality psychology (Nguyen et al. 2018; Srivastava et al. 2015) asserting that personality traits play a crucial role in shaping the adoption and usage of IS.

Our results also have important implications for practice. First, we provide a more nuanced view on IS certifications and their effects that should be of value to e-vendors. Our findings indicate that e-vendors should abstain from using IS certifications as a universal silver bullet, as IS certification effectiveness depends on consumers' personality traits. Online shops that are able to gather insights about their focal consumers' personality (e.g., by means of behavioral web tracking techniques) may use our findings in a way to improve their certification adoption decisions and corresponding communication strategies. In this regard, they may adopt more suitable IS certifications and conduct more targeted IS certification promotion campaigns (depending on consumers' personality) as to further increase consumers' behavioral intentions (e.g., adding items to shopping carts culminating in purchase actions) toward the online shop. Second, on the flip side, our research also sends a cautionary message to e-commerce consumers. Since our study has shown that IS certification effectiveness depends on personality traits, consumers should be cautious about personalized IS certification design and promotion practices being misused by e-vendors as a red herring to push the boundaries of profit maximization. As such, our study may sensitize consumers to critically evaluate the value and promises of IS certifications and not blindly trust them.

4.6.2 Limitations and Future Research

Notwithstanding the aforementioned theoretical and practical contributions of this study, our findings are contingent upon two major limitations. First, we used self-reported constructs to measure the variables under investigation. Additionally, we measured independent as well as dependent variables using self-reports within a single

survey. Hence, CMV may undermine the reliability and generalizability of our study results. However, following the statistical procedures we conducted, we believe to have minimized the influence of CMV on our results. Further, CMV is more likely to be present in overly simple relationship models. That is, were participants might infer the overall researchers' goal perused with the survey. As we proposed and tested a more sophisticated model (i.e., moderated mediation model), we are confident to have minimized CMV related issues (Chang et al. 2010; Siemsen et al. 2010). Beyond that, CMV is not of concern when testing interaction effects. In fact, CMV can render it more difficult to statistically prove interaction effects, which would lead to a more conservative perspective when interpreting our results (Siemsen et al. 2010). The second limitation of this study is the experimental environment providing only a simulated and hypothetical online shop as well as fictitious IS certification seals. In line with this, we were only able to measure purchase intentions but no actual purchase behaviors. Although this approach is widely accepted and used in IS research and beyond, we strongly encourage scholars to exploit field experiments or experience-sampling studies (Fisher and To 2012) to provide further meaningful insights as well as to strengthen external validity of our findings.

Going forward, we encourage future research to study the moderating effects of the remaining FFM personality traits (agreeableness and extraversion) on IS certification effectiveness that we neglected because we focused our study on the three personality traits most pertinent in e-commerce interactions. Researching such traits will provide a more comprehensive and conclusive picture of the individuals' role in IS certification effectiveness. Moreover, we also point out the need for future research into the role of personality traits for shaping the effects of IS certifications on dependent variables other than perceived assurance and purchase intentions, such as perceived risk, privacy concerns or perceived deception.

4.7 Conclusion

The increasing demand and supply of digital products and services has transformed the e-commerce sector to one of, if not the most important distribution channel for contemporary enterprises conducting business in the Business-to-Consumer area. With the growing relevance of e-commerce, consumers and e-vendors alike face serious problems resulting from information asymmetries. Previous research in IS certification

literature has yielded paradoxical findings due to the inconsistent results regarding IS certification effectiveness. The paper at hand has examined IS certification effectiveness in a novel way, that is, by considering consumers' personality traits. By uncovering a conditional indirect effect of IS certifications on consumers' behavioral intention, which is shaped by personality traits, we contribute a foundation for reconciling the hitherto mixed findings in the previous IS certification literature and hence provide a basis for IS certification research to move forward. Our findings imply that IS certification effectiveness research is yet not saturated, requiring further investigations as to more holistically guide e-vendors and certification authorities in acquisition and design decisions respectively.

4.8 Appendix

Dependent Construct	Loadings	Cronbach's α	AVE	CR
Purchase Intention (Jarvenpaa et al. 1999)		0.916	0.859	0.948
I would intend to purchase a computer from CompStore.	0.944			
It would be likely to purchase a computer from CompStore.	0.957			
The probability that I buy a computer from CompStore is low. (reverse-coded)	0.873			
Mediating Construct				
Perceived Assurance (Wu et al. 2010)		0.932	0.834	0.952
CompStore provides assurances for complete and accurate business transactions.	0.920			
CompStore makes effort to protect customers' private information.	0.903			
CompStore commits to ensure the security of data transaction.	0.850			
Moderating Constructs				
Neuroticism (reverse-coded) (Smith and Ellingson 2002)		0.810	0.883	0.814
I am seldom tense or anxious.	0.731			
I am a happy person.	0.752			
I rarely feel guilty about some of the things I have done.	0.737			
I am a very self-confident person.	0.742			

Openness (Brown et al. 2002)	0.815	0.888	0.898
I frequently feel highly creative.	0.735		
I am generally imaginative.	0.757		
I generally appreciate art.	0.704		
I generally find novel solutions.	0.800		
I am generally more original than others.	0.710		
Conscientiousness (Venkatesh et al. 2011)	0.881	0.921	0.868
I keep my belongings clean and neat.	0.745		
I am pretty good about pacing myself so as to get things done on time.	0.683		
I am a very methodical person.	0.744		
I try to perform all tasks assigned to me conscientiously.	0.740		
Control Construct			
Disposition to trust (Gefen 2000)	0.811	0.733	0.891
I generally trust other people.	0.817		
I tend to count upon other people.	0.756		
I feel that people are generally reliable.	0.830		
Certification expertise (Kollmann et al. 2009)			
How would you rate your knowledge about IS certifications?	-		
Perceived Risk (Wu et al. 2010)	0.913	0.851	0.945
There is too much uncertainty associated with shopping from CompStore.	0.883		
Purchasing from CompStore is risky.	0.882		
It feels safe completing commercial transactions with CompStore. (reverse-coded)	0.787		

Table 9: Variables and items measurement

5. A Typology of IS Certification Adopters

Title: Why Don't You Join In? A Typology of Information System Certification Adopters

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Abstract

While the importance of IS certifications to demonstrate compliance with security and personal data protection requirements is constantly increasing, competing (theoretical) viewpoints exist that outline the rationales for organizations to adopt certifications. The results of these competing perspectives are inconclusive research findings in the certification adoption literature. While organizations may use certifications to signal quality to consumers, others mainly adopt certifications to improve internal processes or create institutional legitimacy. To enhance our understanding of the motivation for online vendors to adopt IS certifications, we conduct a literature review and a ranking-type Delphi study with two unique panels comprising certified online vendors (N=15) and certification authorities (N=24). As a result, we provide a rank-order list of 24 motivators and 17 demotivators impacting online vendors' intentions to adopt IS certifications. We reveal that certain motives are context-independent, whereas other motives are specific for electronic markets (e.g., signal data protection). We also provide rich descriptions of potential demotivators, thereby increasing our understanding of the boundary conditions for IS certification adoption. Comparing our findings to three competing theoretical perspectives enabled us to derive a typology of distinctive certification adopters: functionalists, institutionalists and signalers. In developing this typology, our findings constitute a first step toward alleviating the inconclusive findings in the academic literature as well as highlighting differences in motivating and inhibiting factors that impact vendors' adoption intentions.

Keywords: IS Certifications, Adoption, Motivators, Demotivators, Typology, Delphi Study

5.1 Introduction

Over the past few years, online vendors have developed multiple strategies to reduce consumers' uncertainty surrounding system usage and to mitigate related risks in electronic markets. These strategies include, among others, a way of providing consumers with guarantees of a system's qualities, embedding and exposing consumer reviews of such qualities, or developing trustworthy brands (Mavlanova et al. 2016; Özpolat et al. 2013). Another common strategy is to use information system (IS) certifications that represent neutral third-party attestations about systems and related management operations. Such attestations verify the conformity of system features and operations to pre-specified certification requirements (Lansing et al. 2018). The variety of IS certifications has increased over time as systems have diversified and risks in electronic markets have increased (Lins et al. 2018). Well-known IS certifications currently include "Certified Privacy" for web-shops, "CSA STAR" for cloud services, or "ISO/IEC 27001" for management standards for security. Similarly, the recent EU General Data Protection Regulation (GDPR) has claimed that novel data protection certifications will serve as the primary means of signaling compliance with the requirements of GDPR.

Online vendors are likely to benefit from presenting well-established IS certifications on their website or system interface. Certifications increase consumers' trust in a vendor because they provide consumers with immediate assurance information relevant for their system use, including assurances of system security (e.g., absence of malicious programs/malware) and privacy (e.g., appropriate usage of personal data), as well as the integrity of management operations (e.g., reliable system administration) (Hu et al. 2010; Kim et al. 2008d). Consequently, it appears reasonable that online vendors would adopt IS certifications to achieve such benefits. However, there are three competing theoretical viewpoints for why organizations may adopt certifications, namely, the resource-based view, institutional theory, and signaling theory, because adopting certifications is voluntary and not legally required. While some organizations use certifications to signal quality to consumers, others mainly adopt certifications to improve internal processes or to create institutional legitimacy (Gopal and Gao 2009; Heras-Saizarbitoria and Boiral 2013). For example, organizations adopt the ISO 9001 quality management certification to realize internal benefits, such as product

improvement and cost minimization (Djofack and Camacho 2017), whereas other organizations are more driven by competitive pressure (Beck and Walgenbach 2005). Given these inconsistent views, it remains unclear what motivates online vendors to adopt IS certifications. Without a deeper understanding of the rationale for IS certification adoption, certification initiatives are prone to be rejected by online vendors. Moreover, online vendors may adopt certifications that are detached from their actual motivations, resulting in false communication to their consumers. In addition, prior research has mainly studied the causes motivating organizations to adopt certifications but has neglected to control for demotivators that prevent organizations from seeking a certification, such as its high cost (e.g., Quazi et al. 2001). To enhance our understanding of the motivating and inhibiting factors for online vendors to adopt IS certifications, we analyze online vendors' intentions to adopt IS certifications in electronic markets using three competing theoretical viewpoints. In doing so, we strive to answer the following research question (RQ):

RQ: *What motivates and demotivates online vendors to adopt IS certifications?*

We applied a two-step research approach to answer this research question. First, we conducted a literature review to reveal and better understand prevalent inconclusive research findings stemming from three competing theoretical perspectives. Second, we performed a Delphi study comprising an online vendor and certification authority panel to pursue three goals: (1) to empirically validate whether motivators and demotivators derived from various literature streams are applicable and relevant in electronic markets; (2) to identify and describe further motivators and demotivators that might be specific for electronic markets; and (3) to rank identified motivators and demotivators to increase our understanding of their relative importance in electronic markets. The complementary features of the literature review and the two-panel Delphi study allowed us to provide a comprehensive ranked-order list of 24 motivators (e.g., *increase consumers' trust*) and 17 demotivators (e.g., *restricted flexibility*) impacting online vendors' intentions to adopt IS certifications. Reflecting our findings in light of the three competing theoretical perspectives enabled us to derive a typology of certification adopters comprising functionalists, institutionalists and signalers.

Our study has several implications for research and practice. By synthesizing the existing literature and conducting a Delphi study, we not only validate 16 motives discussed in prior research but also identify 21 novel motives that have not been

discussed before. We also reveal that certain motives are context-independent (e.g., *increase in sales and profit*), whereas other motives are specific for electronic markets (e.g., *signal data protection*). Unlike prior research on certifications, which is mainly centered on the motivating factors for adopting these certifications, we harness certification authorities' knowledge to gather more detailed information on potential demotivators. We thereby increase our understanding of the boundary conditions for IS certification adoption, in particular, the circumstances under which vendors will struggle to adopt IS certifications. Finally, we provide a more nuanced analysis of certification adoption using the resource-based view, institutional theory and signaling theory than has been seen in the literature to date. Specifically, because these theories provide strikingly different predictions of certification adoption, we explore these differences in greater detail to advance the current literature by deriving a typology of certification adopters with a thorough discussion of motivators and opposing demotivators. Thus, our study is also a first step toward resolving the inconclusive findings in the academic literature regarding motives for certification adoption by differentiating certain motives and making sense of particular adopter types and their respective adoption rationales.

5.2 Research Background

5.2.1 IS Certifications in Electronic Markets

A common strategy to reduce consumers' uncertainty about security, privacy, and reliability and to signal trustworthiness is the adoption of IS certifications, which is particularly important for small and medium-sized online vendors (Mavlanova et al. 2016; Sunyaev and Schneider 2013). An IS certification is defined as a voluntary assessment of an online vendor's IS and related management processes performed by an independent third party based on requirement catalogs, standards or regulations (Lansing et al. 2018). Upon successful completion of the certification process, online vendors are permitted to display an assurance seal as a graphical representation of the IS certification on their websites or system interfaces.





Figure 10: Example IS certifications and their respective seals for electronic markets

While a wide variety of IS certifications have already been proposed in electronic markets (see examples in Figure 10), one can generally differentiate three types of IS certifications addressing (1) privacy, (2) security, and (3) business-integrity concerns of consumers (Hu et al. 2010). First, certifications addressing consumers' privacy concerns are used to alleviate consumers' perceived risks in terms of, for example, inappropriate usage of personal data. Second, certifications addressing consumers' security concerns (e.g., unauthorized access, malicious programs or malware) are used to reassure consumers that an online vendor uses, for example, intrusion detection software, firewalls, or antivirus and anti-spyware. Finally, certifications addressing business integrity concerns guarantee fair business practices and business transactions before, during, and after the online transaction.

5.2.2 Inconsistent Research on Vendors' Intentions to Adopt Certifications

Related research on IS certifications and web seals has been constantly increasing in recent decades and can be divided into three major streams (Table 10): (1) developing, designing and innovating certifications and underlying attestation processes; (2) analyzing certifications' impact on consumers; or (3) understanding vendors' rationales for adopting certifications and materializing anticipated benefits. First, various scholars have examined the development of trustworthy certifications (e.g., for cloud services (Lynn et al. 2016)), the structural elements of certifications (Lansing et al. 2018), and the increase of certification reliability by performing continuous compliance attestations (Lins et al. 2018; Lins et al. 2019), among others. Second, research taking a consumer perspective seeks to explain how IS certifications affect consumers, why these effects occur and how to predict the effect of certifications on consumers (Kim et al. 2008d; Kim and Kim 2011; Lansing et al. 2019; Löbbers and Benlian 2019). Consumer-related studies have primarily focused on three effects of IS certifications, namely, increasing consumers' trust perceptions, purchase intentions, and perceived assurance (Löbbers et

al. 2020). Finally, research taking a vendor perspective – which this study aims to contribute to – analyzes the motivations of organizations to adopt certifications and whether organizations can utilize the benefits of adoption, such as improved performance or increased sales (e.g., Djofack and Camacho 2017; Naveh and Marcus 2004).

Research subject	Research focus	Example research avenues
Certification	How to develop, design and innovate certifications and underlying attestation processes.	<ul style="list-style-type: none"> • Communicating content of a cloud trust label to signal trustworthiness (Lynn et al. 2016) • Structural elements of IS certifications impact consumer perceptions (Lansing et al. 2018) • Design guidelines to automate the attestation process (Lins et al. 2019)
Consumer	How IS certifications affect consumers and why these effects occur and how to predict the effect of certifications on consumers.	<ul style="list-style-type: none"> • Educational intervention influence the awareness and perceived importance of assurance seal services (Kim et al. 2008d) • Consumers' cultural characteristics impact the effectiveness of web assurance seal services (Kim et al. 2016) • Presence of the assurance seal increases the likelihood of purchase conversion (Löbbers and Benlian 2019; Özpolat et al. 2013)
Vendor	What motivates organizations to adopt certifications and whether organizations can achieve the benefits of adoption.	<ul style="list-style-type: none"> • Analyzing certification diffusion processes, motivations, and benefits of adoption (Heras-Saizarbitoria and Boiral 2013) • More cost-effective firms and export-oriented firms are more likely to seek out and acquire certification (Gopal and Gao 2009) • Motivators and demotivators impacting online vendors to adopt IS certifications (this study)

Table 10: Literature streams on IS certifications (gray-filled cells indicate this study's focus)

At present, researchers have not reached a clear consensus on the main driving forces behind the adoption of certifications (Djofack and Camacho 2017; Heras-Saizarbitoria and Boiral 2013; Prajogo 2011). However, there is an agreement to group those motivations into external and internal driving forces (Table 11). Internal driving forces refer to when certifications are adopted autonomously and organizations benefit through their implementation, such as minimization of costs associated with improved internal efficiency. On the other hand, external driving forces refer to the implementation of the certification in response to certain external pressures (e.g., from competitors, consumers, or the government) or incentives, such as perception enhancement of the organization (e.g., image improvements). The classification of

internal and external factors originates from three different theoretical perspectives that are commonly used to understand certification adoption motivation (Heras-Saizarbitoria and Boiral 2013; Lansing et al. 2018), namely, the *resource-based view* (Barney 1991) to understand internal factors and *institutional theory* (DiMaggio and Powell 1983) and *signaling theory* (Spence 1973) to explain external factors.

Forces	Theoretical perspective	Main assertions to adopt certifications	Example motivators
Internal	Resource-based view	Internalize the best practices and standards underlying certifications to achieve internal improvements.	<ul style="list-style-type: none"> • Performance improvements (Martínez-Costa et al. 2008) • Dominant top management or employees (Beck and Walgenbach 2005) • Realize the company's strategy for pursuing quality (Prajogo 2011)
External	Institutional theory	Conform to external pressure to achieve legitimacy.	<ul style="list-style-type: none"> • Match competitors' actions (Djofack and Camacho 2017) • Meet consumer demands (Llopis and José Tarí 2003) • Comply with government policies or regulations (Marimon and Casadesús 2017)
	Signaling theory	Communicate information about unobservable characteristics and actions to reduce information asymmetry.	<ul style="list-style-type: none"> • Increase in sales and profit (Gopal and Gao 2009) • Use certifications as marketing tool (Sampaio et al. 2010)

Table 11: Three competing theoretical perspectives on motivators to adopt certifications

The *resource-based view* grounds organizational success in the resources and capabilities that are controlled by the organization and may become a source of competitive advantage (Barney 1991; Grant 1991). Prior certification research taking this perspective argues that organizations can mature in their implementation of, for example, the ISO 9001 quality management certification by taking the best practices contained in the certification and making changes in organizational quality practices (e.g., Martínez-Costa et al. 2008). In contrast, a key argument in *institutional theory* is that organizations adopt institutionalized structural elements, such as IS certifications, to ensure their survival rather than to improve performance (Beck and Walgenbach 2005; DiMaggio and Powell 1983). Finally, *signaling theory* is fundamentally concerned with reducing information asymmetries between two or more parties (i.e., the consumer and online vendor) by sending signals to intentionally communicate the imperceptible qualities of a signaler (Spence 1973). Prior certification research taking a signaling

perspective proposes that certifications may act as a market signal of superior quality and thereby, for instance, increase sales (e.g., Gopal and Gao 2009; Terlaak and King 2006).

Given these competing theoretical perspectives, prior research has debated whether the motives of certification adoption are more internally or externally driven (Djofack and Camacho 2017). For example, the institutional theory approach has been criticized on the basis that organizations are dynamic and evolving, and therefore, they can respond in different ways, according to their internal resources and capacities (Heras-Saizarbitoria and Boiral 2013). Additionally, it remains unclear whether these motives are applicable in electronic markets because extant research analyzes only certifications that are based on ISO standards, such as ISO 9001 for quality and ISO 14001 for environmental management systems (Heras-Saizarbitoria and Boiral 2013). In contrast to ISO standards, IS certifications are regarded as a bundle of signals, comprising diverse assurances, such as security, privacy, availability, consumer-friendliness of contracts, and legal compliance, relevant for electronic markets (Lansing et al. 2019). Finally, only a few studies have sought answers to the question of what hinders companies from adopting certifications (e.g., Kammoun and Aouni 2013). Understanding such demotivators provides deeper insights into the circumstances under which certain theoretical assumptions might apply.

5.3 Research Approach

We apply a two-step research approach. First, we conduct a literature review to better understand and resolve prevalent inconclusive research findings stemming from the three competing theoretical perspectives. Second, we perform a Delphi study to empirically validate whether the findings of the literature review are applicable and relevant in electronic markets.

5.3.1 Literature Review

Our descriptive literature review was comprehensively guided by recommendations from IS research (e.g., Vom Brocke et al. 2015; Webster and Watson 2002). For the identification of studies addressing certifications in various literature streams, we searched scientific databases that we deemed representative, as they cover a wide range of journal articles as well as conference articles from IS research and the social sciences

(i.e., marketing and psychology). We applied a keyword search that resulted in 694 potentially relevant articles. After filtering for relevant articles, we performed a forward and backward search to ensure that the seminal articles were included in our literature set. Figure 11 illustrates our literature selection process, which resulted in 60 relevant articles that were subsequently coded by adapting the process of Lacity et al. (2009). The literature analysis process resulted in a list of 13 motivators and seven demotivators. The online supplementary material provides the details of our literature selection and analysis processes as well as a concept matrix summarizing the coding for each article.

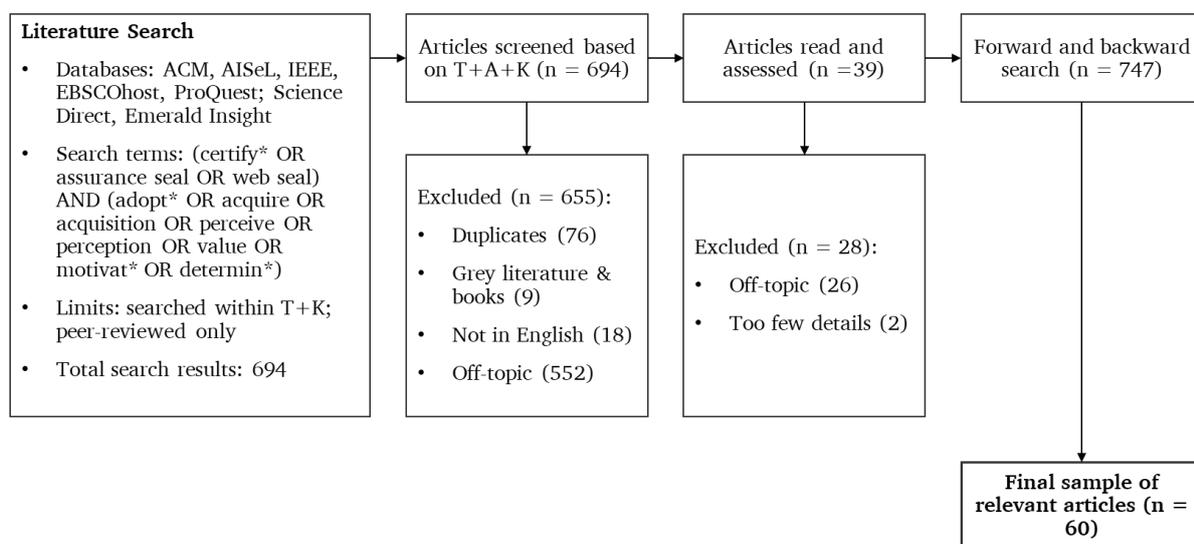


Figure 11: Illustration of the literature selection process

5.3.2 Delphi Study

While our literature review revealed motivators and demotivators from diverse contexts (e.g., environmental certification and tourism marketing), we aimed to empirically validate that these motivators and demotivators are applicable and relevant to electronic markets. For this purpose, we performed a Delphi study comprising two unique panels, one that includes certified online vendors and another that includes certification authorities. We followed the Delphi procedure outlined by Schmidt (1997) to brainstorm, select, and rank online vendors' motivators and demotivators when adopting IS certifications. The online supplementary material provides further details on the Delphi process.

5.3.2.1 Panel selection

We invited online vendors and certification authority experts to participate in our Delphi study because the Delphi approach as a group decision mechanism requires qualified individuals with a good understanding of the topic of interest (Okoli and Pawlowski 2004). In particular, we invited small and medium-sized online vendors because they heavily depend upon IS certifications, as these certifications can help them mitigate consumers' concerns (e.g., consumers worry whether personal data are handled correctly) (Mavlanova et al. 2016; Özpolat et al. 2013). In addition, we reached out to certification authority professionals involved in IS certifications' issuance and attestation processes. Certification authorities also advise online vendors in weighting IS certifications' intended benefits and costs; hence, further insights into the decision-making process of both certified and noncertified online vendors can be gained by including certification authority experts in our study.

Although there is no consensus among researchers regarding the panel size for Delphi studies, Okoli and Pawlowski (2004) recommended a group of ten to 18 experts. We aimed at a minimum of 15 responses in our Delphi study and thus targeted an initial expert panel of approximately 20 members to account for dropouts during the study. Initially, we invited 47 panelists (21 for the online vendor panel and 26 for the certification authority panel), of which 15 (for the online vendor panel) and 24 (for the certification authority panel) accepted our invitations, a number that is consistent with other Delphi studies in IS research (e.g., Singh et al. 2009). The demographic data are summarized in Table 12.

Characteristic	Online vendor Panel (n=15)	Certification Authority Panel (n=24)
Age, years	Mean: 44.15 [min.: 23; max.: 66]	Mean: 41.95 [min.: 23; max.: 71]
Gender of panelists	73% male, 20% female, 7% no answer	63% male, 29% female, 8% no answer
Educational qualifications of panelists	A-Levels (degree): 7%; Degree from University of Applied Science: 33%; Degree from (Technical) University: 20%; Vocational training: 33%; Other (e.g., technical school): 7%	A-Levels (degree): 17%; Degree from University of Applied Science: 17%; Degree from (Technical) University: 42%; Vocational training: 4%; Other: 8%; No answer: 13%
Work experience	Mean: 19.63 years [min.: 2; max.: 35]	Mean: 18.31 years [min.: 1; max.: 45]
Organization size	number of employees < 10: 66.67%; 10 – 49: 26.67%; 50 – 150: 0%; 150 – 250: 6.67%; > 250: 0%	number of employees < 10: 12.50%; 10 – 49: 33.33%; 50 – 150: 16.67%; 150 – 250: 8.33%; > 250: 20.83%; No answer: 8.33%

Products offered	Cars & Bicycles: 7%; Clothes: 13%; Computer & Electronics: 13%; Cosmetics: 7%; Food: 13%; Other (e.g., luxury food, flower dispatch): 87%	Not applicable
Number of IS certifications adopted/handled	Mean: 1.27 [min.: 1; max.: 3] Trusted Shops: 67%; TÜV SÜD safer-shopping: 7%; EHI-certified shops: 20%; Internet Privacy Standards (IPS): 20%; Other (e.g., ISO certifications): 13%	Mean: 1.5 [min.: 0; max.: 4] Trusted Shops: 21%; TÜV SÜD Safer Shopping: 13%; EHI-certified shops: 54%; Internet Privacy Standards (IPS): 8%; ISO/IEC 27001: 21%; Other (e.g., ISO certifications): 33%
Stage(s) of IS certification process involved	Mean: 4.27 [min.: 1; max.: 6] Selection of IS certifications: 80%; Selection of a certification authority: 67%; Registration, application: 73%; Audit of internal documents: 80%; Certification audit: 73%; Recertification: 40%; Other: 13%	Mean: 4.54 [min.: 1; max.: 6] Advisory and initiation: 88%; Preaudit: 75%; Audit of internal documents: 75%; Certification audit: 67%; Monitoring audit (yearly): 75%; Recertification: 71%; Other: 4%

Table 12: Demographic data for the online vendor and certification authority panels

5.3.2.2 Data Collection and Analysis Methods

Brainstorming phase. The first phase involved brainstorming to compare the panelists' responses with our prior literature review findings and to extend our list of motivators and demotivators. We presented the panelists with an online survey comprising a brief overview of the whole Delphi process as well as information about the purpose of the current brainstorming phase. Following this introduction, we asked the panelists to independently name and describe at least three (up to ten) reasons explaining what motivates organizations to adopt IS certifications to identify motivators and what hinders organizations from adopting IS certifications to identify demotivators. By the end of the brainstorming phase, the 15 online vendors had provided a list of 45 motivators and 29 demotivators, whereas the 24 certification authorities had provided a list of 32 motivators and 28 demotivators. Each panelist provided between three and eight motivators as well as between three and four demotivators.

Two authors aggregated and grouped identical answers and similar ones through content analysis. In particular, we open-coded motivators and demotivators by analyzing the responses of our panelists. For each motivator, we coded a name and description. If a new motivator fit with an existing motivator, we assigned it accordingly; otherwise, a new motivator was created. We tried to use the same motivators for both the online vendor and certification authority panels. If ambiguities occurred regarding the exclusive assignment of a new motivator to an existing motivator, the two researchers assigned the new motivator to an existing motivator

according to the best of their knowledge. The same approach was applied to the demotivators. The aggregation process resulted in a list of 20 motivators and 16 demotivators. Following Schmidt (1997), we circulated the consolidated list to all the panelists, sought their feedback, and revised our mapping of the motivators and demotivators accordingly. Obtaining the consolidation approved by the panelists is an essential step in any Delphi study because otherwise one cannot be sure that the panelists' thoughts have been adequately captured and represented (Paré et al. 2013). We received feedback from one panelist, which led to an adjustment of our consolidated list in the form of mapping one response to a new motivator, namely, *signal integrity*. All the remaining panelists confirmed our aggregation. We then consolidated our findings by matching the literature review results to the data from our Delphi brainstorming phase to evaluate the applicability and relevance of the literature findings in electronic markets throughout the upcoming phases. The literature review and the Delphi brainstorming phase together resulted in a consolidated set of 24 motivators and 17 demotivators.

Furthermore, we applied theoretical coding to classify the motivators and demotivators under common themes. Theoretical coding enables us to create hierarchical classifications that allows us to move beyond mere description to a more abstract level of conceptualization. In particular, we reflected the identified motivators and demotivators based on the theoretical principles of the *resource-based view*, *institutional theory* and *signaling theory* that have been commonly applied by prior research (Heras-Saizarbitoria and Boiral 2013; Lansing et al. 2018). For example, the brainstorming phase reveals that online vendors are motivated to adopt certifications for *signal integrity* and *signal data protection*. Reflecting these findings from a signaling theory perspective shows that online vendors use certifications to signal information about the unobservable characteristics and actions of themselves (i.e., hidden information and action). We, therefore, grouped these motivators into the theoretical category 'convey hidden information and hidden actions'. By comparing our findings with these theoretical perspectives, we identified three types of certification adopters, namely, *functionalists*, *institutionalists*, and *signalers*.

Selection phase. In the selection phase, we narrowed the consolidated list into a more manageable set for the ranking phase. Following the suggestions provided by Schmidt (1997), we separated the panels into online vendors and certification authorities. Then,

we independently presented the consolidated set of motivators and demotivators to each panel in a random order and asked each panelist to select (not rank) his or her top ten motivators and demotivators to adopt IS certifications. Only 34 panelists (15 of the online vendor panel and 19 of the certification authority panel) participated in this selection phase. We then reviewed this selection of the top ten motivators and demotivators from each respondent and retained only those motivators and demotivators selected by the vast majority of the panel. Again, the extant literature does not provide any definite cutoff value but instead uses diverse thresholds ranging from as low as 30% (e.g., Piccinini et al. 2015) to as high as 70% (e.g., Singh et al. 2009). We experimented with different cutoff values (i.e., 40%, 45%, and 50%), with a cutoff value of 45% producing the most promising results. To this end, we chose a cut-off value of 45% for both panels, as this allowed us to include, for example, *ensure legal conformity*, which we considered to be a specific motivator for electronic markets. A set of nine motivators and ten demotivators that were chosen by the online vendor panel as well as another set of eight motivators and 11 demotivators that were chosen by the certification authority panel were used in the next phase. Because we deemed this a usable number of motivators and demotivators to be ranked (i.e., not too many motivators or demotivators), we did not perform a second selection phase.

Ranking Phase. We asked each panel independently to review the list and rank the items in order of priority (separately for both motivators and demotivators) and to provide a short explanation for their ranking of the items. We presented the selected motivators and demotivators in a random order and provided information on how many panelists selected a motivator or demotivator. Following Schmidt (1997), we used Kendall's coefficient of concordance (W) to measure the degree of consensus among the panelists. Moreover, we used the Friedman test to calculate the mean rank for each item (Friedman 1937). Of the 15 panelists of the online vendor panel, only 14 panelists participated in the first round of ranking, yielding a Kendall's W of 0.24 ($N = 14$; $\chi^2 = 26.933$; $p < 0.001$) for the motivators and 0.201 ($N = 14$; $\chi^2 = 25.309$; $p = 0.003$) for the demotivators, suggesting a weak level of consensus among the panelists. Of the initial 24 panelists of the certification authority panel, only 11 panelists completed round one of the ranking phases, reaching a Kendall's W of 0.193 ($N = 11$; $\chi^2 = 14.879$; $p = 0.038$) for the motivators and 0.26 ($N = 11$; $\chi^2 = 28.545$; $p < 0.001$) for the demotivators, suggesting a weak level of consensus among these panelists as well.

Against this background, we decided to conduct a second round of ranking. In the second round, six online vendors participated, yielding a Kendall's W of 0.756 ($N = 6$; $\chi^2 = 36.311$; $p = 0.01$) for the motivators and 0.327 ($N = 6$; $\chi^2 = 17.636$; $p = 0.040$) for the demotivators. On the one hand, this result suggested that a strong level of consensus had been reached among the motivators and, on the other hand, this result suggested that there was still little consensus among the demotivators. Only five certification authority experts participated in round two of the ranking phase, yielding a Kendall's W of 0.659 ($N = 5$; $\chi^2 = 23.067$; $p = 0.002$) for the motivators and 0.574 ($N = 5$; $\chi^2 = 28.691$; $p < 0.001$) for the demotivators. These ratios suggested that, in both cases, a moderate level of consensus had been reached. At this stage, we discussed whether we should conduct another round of ranking to obtain a greater level of panel consensus. In making such decisions, the trade-off between the feasibility (i.e., the indulgence of the panelists, the researcher's resources, and the additional time required) and the potential gain must be evaluated (Schmidt 1997). We felt that some fatigue had set in among our panel members (as reflected in the increased number of dropouts in both panels across this whole Delphi study). Since we had fulfilled one of the stopping rules suggested by Schmidt (1997) in the second round, we decided against a third round of ranking.

5.4 Typology of Certification Adopters

5.4.1 Functionalists

Adopters are considered functionalists when they adopt IS certifications in an autonomous way to leverage and implement IS certifications as an organizational resource to achieve organizational benefits (Table 13). In line with the resource-based view, either functionalists lack internal capabilities or strive for continuous improvement and therefore *internalize the certification's best practices* and *access certification authorities' expert knowledge*. In doing so, functionalists aim to *achieve benefits from thorough internalization*, such as cost savings or competitive advantages.

Objectives	Description	Motivators	Demotivators
Internalize certifications' best practices	Vendors internalize the best practices contained in the certification and make use of	Quality and productivity improvements,	Restricted flexibility, fear of failure

	attestation results to improve vendor's internal systems and processes.	increase IT security, ensure legal conformity	
Gain access to experts	Vendors gain access to experts, including support provided by certification authorities or independent auditors.	Gain access to experts	Depend on a certification authority, data confidentiality concerns
Achieve benefits from thorough internalization	Certifications help organizations to build their unique internal operational capabilities, which lead to increased performance and the achievement of diverse advantages.	Achieve competitive advantages, achieve cost savings, increase consumer satisfaction	Expenditures

Table 13: Objectives of functionalists and related motivators and demotivators

5.4.1.1 Internalize Certifications' Best Practices

Online vendors taking a functionalist role adopt IS certifications to internalize the structured approach and best practices contained in certifications and to make use of attestation results for internal improvements. Internalization refers to the process of absorbing both tacit and explicit information into the organization and translating it into knowledge, which is then applied with a purpose (Knight and Liesch 2002). In this regard, certifications provide guidelines that must be internalized into the organizations' internal operations and used as daily practices (Naveh and Marcus 2004). Our findings support this resource-based view, given that vendors adopt IS certifications for *Quality and Productivity Improvements*, such as increasing the efficiency and quality of internal processes (Sampaio et al. 2010): "*Checking and optimizing the ordering processes*" [online vendor]. Two specific areas of quality improvements were noted by the panelists: *Increasing IT Security* and *Ensuring Legal Conformity*. Regarding the former, the security of the IT infrastructure underlying an online vendor's business is assessed as part of a certification process. Identified security issues and vulnerabilities can be resolved by online vendors (where necessary): "*Certification also has the advantage that the certified company sometimes knows after the examination what it could improve itself, for example, concerning security measures*" [online vendor]. Regarding the latter, the IS certification process provides support for improving the conformity regarding the legal requirements an online vendor's business faces, particularly by reviewing online vendors' general terms and conditions as well as related legal texts. In doing so, IS certifications can note weaknesses in compliance with legal matters.

However, functionalists fear ***Restricted Flexibility*** when internalizing certifications because they have to adjust individual processes to meet best practices and standards (Kammoun and Aouni 2013). “*The certification requirements, which must be implemented, can restrict the scope of the day-to-day business as well as the flexibility of the employees*” [certification authority]. A restriction in flexibility may therefore hamper online vendors from making use of strategic resources, such as assets, capabilities, and organizational processes, that lead to competitive advantages (Barney 1991; Grant 1991). Finally, some online vendors may not even attempt to adopt IS certifications because they are afraid of not being able to internalize the certification requirements: “*Legal requirements, such as the right of revocation, which are required for completing the certification, are difficult to implement*” [certification authority]. We refer to this demotivator as ***Fear of Failure***, which results from challenging certification requirements.

5.4.1.2 Gain access to experts

Functionalists also adopt IS certifications to ***Gain Access to Experts***: “*The company wants to improve its processes/services through the (specialist) expertise of the certifier. In addition to possible certification results, [...], there are often also optional optimization hints and recommendations from the auditors*” [certification authority]. The resource-based view provides the rationale that online vendors are concerned not only with the deployment and exploitation of existing strategic resources but also with the investment and augmentation of resources to buttress and extend positions of competitive advantage (Grant 1991). This strategy is often referred to as ‘*filling resource gaps*’ and may lead to the external adoption of complementary resources. Certification authorities’ profound knowledge and experience in online vendors’ businesses and technological and organizational safeguards (Lansing et al. 2018) can thus be viewed as complementary resources that can be leveraged to improve existing resources: “*Through the view from the outside, problems may be pointed out which one does not perceive in the daily work by oneself*” [certification authority].

In contrast, relying on (external) certifications also has drawbacks. First, online vendors place themselves in a position where they are ***Depending on a Certification Authority***: “*Shop owners do not want to be dependent on the seal provider*” [online vendor]. Certification authorities might not only deter or punish inappropriate behavior by the

online vendor, such as imposing financial penalties, they also may have control over the advancement of *proprietary certification schemes and therefore have an (indirect) impact on organizational routines that are intended to be internalized by online vendors*. Second, one panelist also raised ***Data Confidentiality Concerns*** when disclosing internal information during the certification attestation. While a certification attestation covers, among other things, assessing the system documentation about its security and data protection measures, interviewing online vendor employees, or conducting on-site assessments (Lansing et al. 2018), certification authorities gain deep insights into online vendors' operations and their sources of competitive advantages, which can be misused by malicious employees of the certification authority

5.4.1.3 Achieve benefits from thorough internalization

Taking recourse to the resource-based view, a certification internalization process will produce a set of routines and procedures (tacit and explicit) for internal operations, which function as a unique factor that cannot be easily imitated by other organizations (Prajogo 2011). This inimitability is translated into improved performance and, consequently, a competitive advantage (Wernerfelt 1984). Hence, certifications help organizations build their unique internal operational capabilities, which may produce variability in performance against their competitors in the market, while the certification and its underlying standard are not unique (Prajogo 2011). Both prior research and the panelists emphasize that online vendors may increase their market competitiveness by internalizing IS certifications. Such a ***Competitive Advantage*** is supported by the increasing demand for certified systems in sensitive markets that, for instance, impose high security and privacy requirements.

In addition, the findings highlight that online vendors try to ***Achieve Cost Savings*** and ***Increase Consumer Satisfaction*** by internalizing certifications. For example, online vendors can increase consumer satisfaction by improving the usability of the system interface or adjusting the guarantees provided by the system (e.g., a money-back guarantee to give consumers a feeling of safety). Regarding cost savings, the findings are double-edged. On the one hand, the reviewed literature stresses cost savings stemming from the potential to increase the efficiency of internal processes and to reduce quality deficiency costs by internalizing best practices and standards (e.g., ISO 9001 quality management) (Heras-Saizarbitoria and Boiral 2013; Llopis and José Tarí

2003). On the other hand, a major demotivating factor that hampers the internalization of IS certifications is *Expenditure*. Functionalists perceive high efforts and resulting expenditures that are involved in the implementation of routines and procedures: “From my personal experience, it can be said that certifications are often accompanied by major software changes” [certification authority]. In particular, a certification requires an enormous effort in documentation (Lins et al. 2018). Nevertheless, prevalent expenditures involved in the internalization of certifications increase the inimitability of the certification and internalization process and thus enable performance improvements and a competitive advantage in the resource-based view (Wernerfelt 1984).

5.4.2 Institutionalists

Adopters are considered intuitionists when they adopt IS certifications to conform to institutional pressures and seek to achieve legitimacy, which is the acceptance of the organization by its environment (Mignerat and Rivard 2009), thereby ensuring their long-term survival. The environment is defined as organizations that constitute a recognized area of institutional life, including key suppliers, consumers, regulatory agencies, and other organizations that produce similar services or products (DiMaggio and Powell 1983, p. 148). It is a foundational assumption of institutional theory that demands manifest as *coercive*, *mimetic*, and *normative pressures* (DiMaggio and Powell 1983). Consequently, institutionalists adopt certifications to satisfy these pressures and ensure legitimacy (Table 14).

Objectives	Description	Motivators	Demotivators
Satisfy coercive pressures	Online vendors pursue certifications in response to the pressures posed by other parties to whom their businesses are largely dependent.	Regulatory, supplier or consumer pressures	Side effects
Satisfy mimetic pressures	Online vendors seek certifications to match their competitors' actions that seem to be successful.	Pressures from competitors, increase comparability	-
Satisfy normative pressures	Online vendors consider certifications necessary to fulfill norms and retain their reputation in the market.	Pressures from the public or industry associations, internal normative pressures	Resistance from employees, limited management commitment, lack of experience and knowledge in getting certified

Table 14: Objectives of institutionalists and related motivators and demotivators

5.4.2.1 Satisfy coercive pressures

Institutionalists pursue certifications in response to the coercive pressures posed by other parties to which their businesses are largely dependent on and that are powerful enough to directly reward compliance or sanction noncompliance (DiMaggio and Powell 1983). In line with prior IS research (cf. Mignerat and Rivard 2009), our findings show that coercive pressures most notably originate from consumers, suppliers, and governments. The literature and panelists view certifications as a means to satisfy regulatory requirements and demonstrate an organization's compliance with ***Regulatory Pressures*** (Djofack and Camacho 2017; Heras-Saizarbitoria and Boiral 2013): “As part of [our service], we as the provider are obliged to undergo a specified certification procedure every two years” [online vendor]. For example, organizations may adopt the ISO 14001 certification to be in compliance with environmental regulations (Quazi et al. 2001) or data protection certifications to prove GDPR compliance. Organizations typically strive for regulatory compliance to prevent legal sanctions (DiMaggio and Powell 1983). Moreover, ***Supplier*** or ***Consumer Pressure*** may push online vendors to adopt IS certifications (Llopis and José Tarí 2003). Adopting certifications and thereby showing compliance with suppliers and consumer pressures enables market access or expansion in international or domestic markets (Heras-Saizarbitoria and Boiral 2013; Kammoun and Aouni 2013): “Especially in B2B businesses, there are also consumers who only make contracts with vendors who are certified” [certification authority].

In contrast, panelists report negative ***Side Effects*** when satisfying coercive pressures: “It happens that the consumers misuse the certification and the assessments to put pressure on the vendor” [online vendor]. For example, while some IS certifications attach consumer reviews to the certification seal (e.g., the European *TrustedShops* certification), online vendors fear negative consumer responses that counteract the effects of certifications.

5.4.2.2 Satisfy mimetic pressure

Mimetic pressure is defined as the pressure that results from uncertainties regarding specific problem solving, the performance of specific activities or the achievement of distinct goals (DiMaggio and Powell 1983). Institutional theory argues that such uncertainties are powerful forces that encourage imitation: organizations may model

themselves on other organizations to enhance their legitimacy and demonstrate their performance compared to their peers. Research shows that such mimetic pressure typically stems from competitors and peers (Mignerat and Rivard 2009). Both prior research and the panelists highlight that vendors perceive ***Pressure from Competitors*** to adopt certifications (Prajogo 2011; Quazi et al. 2001; Sampaio et al. 2010). In particular, IS certifications are regarded as a common practice and a ‘*must-have*’ to ensure survival: “*Other providers already have seals, they belong to the state of the art*” [certification authority]. With an increasing number of organizations becoming certified, the certification process is only valued as an ‘*entry ticket*’ to compete and does not, on its own, lead to competitive success (Nair and Prajogo 2009). In this situation, the value of the certification as a differentiator diminishes: “*a quality label is a hygiene factor, the absence of which is regarded as a deficiency but the presence of which is not an advantage*” [online vendor]. Instead, institutionalists try to ***Increase Comparability*** in the environment when satisfying mimetic pressure by certification adoption and thus achieve legitimacy: “*Consumers can recognize seals and compare them with similar offers*” [certification authority].

5.4.2.3 Satisfy normative pressures

A third source that impacts online vendors’ decision to adopt IS certifications refers to normative pressures that stem from norms specified by institutions such as professional or industry associations (Mignerat and Rivard 2009). Normative pressure differs from coercive pressure insofar as institutions that exert normative pressure have no authority to directly enforce compliance and sanction noncompliance (DiMaggio and Powell 1983). Our literature review confirms that online vendors are driven by ***Pressure from the Public***, such as the rules defined by local communities (Zutshi and Sohal 2004), or ***Pressure from Industry Associations*** to ensure compliance with industry expectations (Prajogo 2011). Further, institutional theory stresses that norms also result from education and professional networks that span organizations (DiMaggio and Powell 1983). For example, to the extent that managers and employees are drawn from the same universities, they will tend to view problems similarly and to see the same policies and procedures normatively sanctioned and legitimated. To ensure compliance with employees’ normative values or practices prevalent in the general business environment, employees may exert pressure on their employing organization, which is

referred to as *Internal Normative Pressure* (Khalifa and Davison 2006). Our literature review reveals inconsistent views on internal pressure that results from employees and managers. On the one hand, online vendors may adopt certifications because the adoption decision is rooted in the inner conviction of the employees or top management. For example, employees may enforce pressure to help the environment and engage in eco-friendly behavior by internalizing an environmental management system, such as ISO 14001 (Zutshi and Sohal 2004), or foster a quality culture within an organization through implementation of ISO 9001 (Nair and Prajogo 2009). Likewise, certification adoption may be a genuine concern of top management to foster the company's strategy (Quazi et al. 2001).

On the other hand, *Resistance from Employees* might also emerge and hamper adoption (Zutshi and Sohal 2004). Resistance typically arises from inadequate training and support or employees' unwillingness to change their operating procedures. Additionally, panelists mentioned that *Limited Management Commitment* slows adoption. Particularly in cases where managers decide to focus on other short-term (e.g., seasonal business) or long-term goals (e.g., a new software system to be installed), IS certifications will probably not be adopted due to an almost exhausted budget. One reason for such a negative stance of the organization is a *Lack of Experience and Knowledge in Getting Certified*. While some online vendors underestimate the efforts and resources required throughout the certification process (Llopis and José Tarí 2003), other online vendors overestimate the amount of effort involved, particularly in meeting the certification requirements. Both under- and overestimation may result from limited knowledge about IS certifications and hamper certification adoption.

5.4.3 Signalers

Adopters are considered to be signalers when they adopt IS certifications to communicate information regarding their unobservable characteristics and actions. IS certifications are regarded as signals that consumers may find useful to consider when, for example, making a purchase decision. In general, signals must be costly (i.e., requiring significant time or effort to fake) to reliably separate reputable vendors from imposters, which is a central component of signaling theory referred to as the separating equilibrium (Spence 1973). Under such circumstances, high-quality vendors receive

benefits from sending signals, and low-quality vendors receive benefits from not sending signals (Connelly et al. 2011). Prior research has shown that certifications can act as reliable signals and create a separating equilibrium (Lansing et al. 2019; Terlaak and King 2006). Consequently, if a vendor already has high-quality attributes, it is useful to adopt IS certifications to *convey hidden information and actions* or *use them as a marketing tool*, thereby *encouraging consumers to interact* with the vendor (Table 15).

Objectives	Description	Motivators	Demotivators
Convey hidden information and hidden actions	Certifications can bridge informational problems by making otherwise hidden information about the vendor's qualities and hidden actions available.	Increase transparency, signal integrity, signal data protection, signal buyer protection, increase consumers' trust	No suitable certifications, only attest to minimum standards
Use certifications as a marketing tool	Online vendors exploit the certification's popularity and credibility to improve their public image.	Use as a marketing tool, achieve better web search ranking	Certification's lack of credibility and reliability, strong extant brand
Encourage consumers to interact with an online vendor	Vendor benefits from some consumer action (i.e., using the system) due to the certification.	Acquire more consumers, increase sales and profit	Not perceiving benefits, costs, already certified

Table 15: Objectives of signalers and related motivators and demotivators

5.4.3.1 *Convey hidden information and hidden actions*

According to the certification and signaling literature, signalers employ certifications to reduce information asymmetries between the vendor and the consumer (Terlaak and King 2006). Our findings confirm these assumptions, as vendors try to *Increase the Transparency* of their systems, order and payment processes, and products and services because certifications expose information about various characteristics of the vendor that consumers might value, hence providing an advantage over other vendors: *"processes [...] are transparent and easier to follow" [online vendor]*. In particular, signals can bridge informational problems by making otherwise hidden information and hidden actions observable (Connelly et al. 2011; Spence 1973). While hidden information is outlined as a situation in which a vendor has more information available regarding an imminent decision by the consumer, a hidden action is defined as the state in which a vendor chooses an unobservable level of effort, from the consumer's view, regarding the product and services offered. Our findings show that signalers adopt certifications

to render hidden information and to overcome hidden actions. First, vendors aspire to **Signal Integrity**: “By using a seal, we want to be reputable toward our consumers” [online vendor]. Certifications ensure a low level of fraud potential and recovery of consumers’ compromised assets in case something unexpected happens, which in turn, lowers consumers’ risk perception. Second, online vendors adopt IS certifications to **Signal Data Protection** by highlighting that they collect, process, and handle data confidentially as well as follow data protection regulations. The reason behind the adoption of these certifications is that “online vendors work with highly sensitive consumer data and thus have to show their consumers that they process data with great care” [online vendor]. Finally, vendors adopt certifications to **Signal Buyer Protection**, referring to secure shopping and payment processes: “The seal is designed to give website visitors a secure shopping experience” [certification authority]. Through reducing information asymmetries with IS certifications, vendors aim to **Increase Consumers’ Trust** in the system and the vendor: “when we sought certification, there were many skeptical consumers, who had problems to provide their credit card details. By using well-known certifications, we initiated countermeasures” [online vendor].

However, certification authority experts also raised concerns that signalers are hesitant to adopt in cases in which online vendors identify that there are **No Suitable Certifications** that help to resolve information problems: “With the multitude of so-called labels, seals, certification symbols, it is difficult to find the right supplier” [certification authority]. Likewise, online vendors’ imperceptible qualities might go beyond what is communicated by the signal because certifications **Only Attest to Minimum Standards** and typically do not consider online vendors’ specific circumstances: “Auditors do not address the unique characteristics and related benefits of the system itself but rather check generic certification requirements” [certification authority]. In such situations, signaling theory assumes that the signals may not correlate with an unobservable quality, referred to as a low signaling fit (Connelly et al. 2011), ultimately impeding adoption.

5.4.3.2 Use certifications as a marketing tool

In addition to conveying information to reduce information asymmetries, online vendors adopt IS certifications because they can be used as **Marketing Tools** (Llopis and José Tarí 2003; Sampaio et al. 2010). Online vendors can exploit a certification’s

popularity to improve their organization's public image. Certifications can thus be part of a larger marketing strategy. The reason behind this is that *"the public image of a certified company is always better"* [online vendor]. The signaling theory literature supports this assumption by arguing that the credibility of the endorser (i.e., the certification authority) will subsequently transfer to the signaler (Aiken et al. 2004). In addition, adopting certifications may help online vendors to ***Achieve a Better Web Search Ranking***, as presumed by one online vendor: *"appearance at the top of a Google search"* [online vendor]. While the specific search algorithms are opaque and constantly evolving, the online community dealing with search engine optimization remains uncertain whether embedding independent reviews and seals impacts search results.

The certification authorities further noted two threats for using certifications as effective marketing tools, leading signalers to hold back. First, a ***Certification's Lack of Credibility*** resulting from the poor reputation of, or consumer's limited familiarity with, the certification and respective authorities: *"Does 'EVERY' potential consumer know the seal, certificate, or provider of the certification? [...] Unknown seals offer no added value"* [certification authority]. Second, a ***Certification's Lack of Reliability*** can result from the certificate authorities' inability to maintain its assurances in the long run. The panelists explained that existing certifications represent only a retrospective view of the fulfillment of technical and organizational measures when the certifications are issued. Typically, certification authorities evaluate an online vendor's adherence to a certification's criteria during a comprehensive attestation, which is performed once. Throughout the validity period of one to three years, certification deviations or breaches may not be detected until long after their occurrences because certification authorities validate certification adherence via spot checks only during annual surveillance attestations (Lins et al. 2019). *"Certifications are snapshots, such as a technical inspection for a car [...] Everything was fine at the time of the attestation. However, as soon as you leave the test site, safety is over"* [online vendor]. This phenomenon is also referred to as signal erosion in signaling theory, as the degree to which the correlation between the signal and the quality in question declines over time, hence reducing the effectiveness of the signal (Connelly et al. 2011). Finally, if an online vendor already possesses a ***Strong Brand*** and good reputation in the market (e.g., Amazon), certifications as marketing tools are not necessary (Özpolat et al. 2013): *"Organizations with their strong*

brand do not need or want any external trademarks shown on their websites” [certification authority].

5.4.3.3 Encourage consumers to interact with an online vendor

In line with signaling theory, for an IS certification signal to be effective, the online vendor as a signaler benefits from some consumer action (i.e., using the system) that the consumer would not have made without perceiving the signal (Connelly et al. 2011). Signalers consider IS certifications to be an opportunity to ***Acquire More Consumers*** when embedding a web assurance seal (i.e., the graphical representation of IS certifications) on their websites and system interfaces. Online vendors hope that the presentation of such seals persuades consumers to buy from them because the seals show that the online vendors are audited by a certification authority and are therefore trustworthy. As one vendor stated, *“With the seal, we hope to convince consumers to buy from us”*. In this way, the participants also indicated that they expect an ***Increase in Sales and Profits*** following a certification’s adoption.

In contrast, our findings reveal that online vendors also face several challenges during the early process of decision-making (i.e., when deciding which IS certification and certification authority to choose) that inhibit online vendors from adopting IS certifications. First, organizations are unsure whether and how they can benefit from certifications, or they claim that there is not enough benefit to becoming certified (Llopis and José Tarí 2003). *“Certifications’ intended effects are not known in advance and cannot be easily measured” [certification authority]*. As a result, online vendors often decide to use their limited resources (e.g., financial and human resources) for other opportunities that are more promising ways to increase sales compared with adopting IS certifications. We refer to this demotivator as ***Not Perceiving Benefits***. Furthermore, online vendors face a trade-off between achieving benefits, such as a possible increase in sales, and the costs that are associated with IS certifications: *“The cost-benefit ratio is not right” [online vendor]*. Therefore, high ***Signaling Costs*** that result from the adoption (i.e., certification fees) and implementation of certifications (i.e., staff training and hiring of consultants) impede online vendors from adopting certifications. Signaling theory strongly emphasizes that signaling costs are required to ensure the effectiveness of an IS certification because it enables the differentiation of high- and low-quality vendors (i.e., creation of a separating equilibrium) (Spence 1973). Nevertheless, it is

important to note that when the costs are too high, the signal will fail to differentiate organizations in the market, and all organizations will choose not to certify (Terlaak and King 2006).

Second, some online vendors do not seek further IS certifications because they are *Already Certified* and thus see no benefit in showing additional web assurance seals on their websites. This demotivator, however, stands against findings in the signaling theory literature stating that using complementary signals might produce incremental improvements in consumers' perception because coexisting signals act as reinforcements (e.g., Yen 2006). Recent research on adopting multiple certifications provides the initial reasoning by showing that adopting more IS certifications does not necessarily benefit an organization because the benefits of additional certifications depend on *who* is certifying and *what* is certified (cf. Lanahan and Armanios 2018). A follow-on certification from a different certification authority may reveal additional information, thereby reducing information asymmetries, and bolster the external perception of the vendor's potential value. Conversely, more certifications from the same authority may not reveal additional information and thus may harm the organization.

5.4.4 Relative Importance of Motivators and Demotivators

The findings from the selection and ranking phases also provide insights into which certification adopter type is most prevalent in the context of electronic markets (Table 16).

Motivators related to the signaler and functionalist types were most often selected and highly ranked, whereas no motivator of the institutionalist type was selected by more than 45% of the panelists. The online vendor panel perceives *increasing consumers' trust* (mean rank = 1.33), *signal integrity* (2.83), and *increasing consumer satisfaction* (3.33) as the most important motivators as well as *use as a marketing tool* (6.67), *signal data protection* (7.83), and *increasing IT security* (8.67) as the least important motivators. For the certification authority panel, *increasing consumers' trust* (1.20), *acquiring consumers* (2.60), and *signal integrity* (3.00) are the most important motivators, whereas *increasing consumer satisfaction* (6.00) and *achieving competitive advantages* (7.00) are the least important motivators.

Regarding the demotivators, signalers and functionalists are also most often selected and highly ranked. Nevertheless, three demotivators assigned to the institutionalist type were perceived as highly important. From an online vendor perspective, the most important demotivators are *costs* (2.67), *expenditures* (3.00), and *no perceived benefits* (4.17). *Restricted flexibility* (6.67), *certification's lack of credibility* (7.50), and *fear of failure* (7.50) are the least important demotivators. For the certification authority panel, *expenditures* (2.20) and *costs* (2.20) are the two most important demotivators, and *limited manager commitment* (8.60) and *certification's lack of credibility* (8.60) are least important.

Adopter type	Motivators/ Demotivators	Selection rate		Rank round one		Rank round two		Final ranking	
		V	CA	V (#14)	CA (#11)	V (#6)	CA (#5)	V	CA
Motivators									
SIG	Increase consumers' trust	93%	58%	2.71	2.55	1.33	1.20	1	1
SIG	Signal integrity	100%	79%	3.79	4.00	2.83	3.00	2	3
FUNC	Increase consumer satisfaction	87%	53%	3.79	5.00	3.33	6.00	3	7
SIG	Acquire consumers	93%	53%	5.00	3.73	4.67	2.60	4	2
FUNC	Ensure legal conformity	67%	47%	5.36	4.36	4.67	5.40	5	4
SIG	Increase transparency	40%	63%	-	4.91	-	5.40	-	5
FUNC	Achieve competitive advantages	47%	84%	6.00	5.73	5.00	7.00	6	8
SIG	Use as marketing tool	67%	37%	5.57	-	6.67	-	7	-
SIG	Signal data protection	60%	68%	5.71	5.73	7.83	5.40	8	6
FUNC	Increase IT security	53%	32%	7.07	-	8.67	-	9	-
<i>Kendall's Coefficient W:</i>				0.240	0.193	0.756	0.659		
Demotivators									
SIG	Costs	100%	89%	2.79	3.64	2.67	2.20	1	2
FUNC	Expenditures	93%	89%	4.07	2.82	3.00	2.20	2	1
SIG	Not perceiving benefits	73%	89%	4.43	5.09	4.17	4.20	3	4
INST	Side effects	53%	47%	6.07	8.73	5.17	8.40	4	9
SIG	Already certified	73%	58%	5.71	5.82	5.67	3.40	5	3
FUNC	Depend on an authority	47%	32%	6.00	-	6.33	-	6	
INST	Lack of experience and knowledge	33%	58%	-	5.91	-	7.20	-	6
SIG	Strong brand	47%	53%	6.64	6.09	6.33	7.20	7	7
SIG	No suitable certifications	27%	47%	-	7.55	-	7.20	-	8

FUNC	Restricted flexibility	53%	58%	5.64	6.36	6.67	6.80	8	5
SIG	Certification's lack of credibility	73%	53%	6.29	7.00	7.50	8.60	9	11
INST	Limited management commitment	40%	47%	-	7.00	-	8.60	-	10
FUNC	Fear of failure	47%	37%	7.36	-	7.50	-	10	-
<i>Kendall's Coefficient W:</i>				0.201	0.260	0.327	0.574		
V = online vendor panel; CA = certification authority panel; FUNC = functionalists; INST = institutionalists; SIG = signalers									

Table 16: Results of the selection and ranking phase, showing motivators and demotivators that were selected by a minimum of 45% panelists

5.5 Discussion

5.5.1 Comparing the Results of the Literature Review and the Delphi Study

While we identified motivators and demotivators that were present in both the literature review and Delphi study, we provide a first indication that there is a set of motivators and demotivators impacting organizations' intentions when deciding to adopt a certification that are independent of the actual contexts, such as electronic markets or an environmental certification. For example, the motivators *increase in sales and profit, quality and productivity improvements* and *achieve competitive advantages*, as well as the demotivators *expenditures* and *costs*, seem to be independent of the context because these were often listed and discussed in the literature and our Delphi study. However, the findings of our study reveal differences in motives as well. In particular, we found motivators and demotivators that were not present in the prior literature and are specific for electronic markets, including *signal data protection* and *ensuring legal conformity*. These differences mainly relate to the actual content of the certification (i.e., what is certified), such as security and privacy requirements for systems. Furthermore, motivators and demotivators assigned to the institutionalist type are more strongly derived from related literature on the certification of management standards (i.e., ISO 9001 and 14001), including *pressures from public or industry associations* and *internal normative pressures*. In contrast, our findings reveal that the signaler and functionalist types are more prevalent in electronic markets compared to the institutionalist type.

Consequently, our findings also support our assumption that motives in electronic markets differ from those in related disciplines.

5.5.2 Comparing the Online Vendor and the Certification Authority

Panel

All of the motivators were identified by both panels except the motivator *increase in comparability*, which was solely identified in the certification authority panel. This agreement indicates a consensus among practitioners and shows that certification authorities know vendors' reasons for adopting IS certifications. Regarding the demotivators, online vendors only raised five demotivators compared with the certification authorities, who discussed 15 demotivators. While this imbalance might result from the composition of our online vendor panel, in which all online vendors are certified, using experts of certification authorities as a second panel in our study helped us to obtain a better understanding of potential demotivators. It should also be noted that the literature review yielded considerably more motivators than demotivators. This finding not only supports our assumption that previous research has more frequently examined motivators than demotivators but also strongly highlights the value of soliciting the knowledge of certification authorities to identify demotivators, which has been neglected in prior research when studying certification adoption.

Concerning the selections and rankings, online vendors tend to select motivators assigned to the signaler type more than the functionalist type of motivators. In contrast, certification authorities' selections are more dispersed across the signaler and functionalist types. On the one hand, both panels similarly rated several motivators and demotivators, such as *increasing consumers' trust*, *acquiring consumers*, *costs* and *expenditures*. On the other hand, it is interesting to note that there are differences in their perceptions. For example, the demotivator *side effects* were ranked higher by the online vendors (rank 4) than the certification authorities (rank 9), providing insights that some motives may have been underestimated by certification authorities and require future work on establishing countermeasures.

5.5.3 Comparing Types of Certification Adopters

Clustering our findings in light of the three competing theoretical perspectives reveals that motivators and demotivators are interdependent and can be assigned in favor of

certain adopter types, ultimately helping us to build up a typology of certification adopters. Whereas *signalers* already possess high-quality attributes and use IS certifications as a means to reduce information asymmetries, *functionalists*, in contrast, may lack the quality attributes or are striving for continuous improvement and therefore will thoroughly internalize best practices contained in certifications. Such internalization will then enable functionalists to achieve (long term) advantages, such as increased consumer satisfaction and competitive advantages, compared with signalers, who rely on the certification reputation in the market to achieve benefits, such as increased sales. *Institutionalists* also lack the required qualities but are solely seeking legitimacy through the adoption of IS certifications. In contrast to functionalists, institutionalists adopt a minimalist approach in implementing best practices and simply meet the requirements at the minimum level, often taking a shortcut approach in adopting the certification (Nair and Prajogo 2009). In his study, Boiral (2003, p. 732) found that organizations adopting the ISO 9001 standards from an institutionalist perspective “*integrated their quality system superficially so that the organization could pass the certification audit without posing serious questions that were seen to be unnecessary and undesirable*”. Hence, the motivation for seeking legitimacy can easily overshadow the purpose of building strategic organizational resources, such that organizations may not be able to fully benefit from the adoption of certifications (Beck and Walgenbach 2005; Prajogo 2011).

Despite these findings, it should be noted that the typology presented in this paper is analytical: the types are not always empirically distinct or mutually exclusive. The types, however, are able to describe the extremes of motives. The adopter types also share basic motives, such as *costs* for certifications or *limited management commitment*, which may commonly surface in the decision process about whether to adopt certifications. For example, *costs* are assigned to signalers but might also be considered by institutionalists. However, given mimetic pressure, institutionalists may inevitably have to accept the associated costs and adopt certifications, whereas signalers might choose another marketing strategy promising a better cost-benefit ratio. Likewise, the type might change over time; for instance, online vendors might follow a functionalist’s approach and internalize the best practices contained in the certification first and then use the acquired IS certifications to signal the improved quality and performance gained through internalization, following a signaler’s approach in the long run.

5.5.4 Implications for Research and Practice

With our study, we contribute to the research on IS certification taking a vendor perspective and investigating related research streams, as summarized in Table 17. First, we study the motives for IS certification adoption in electronic markets, which is an essential context in everyday life, whereas much of the existing work in certification pertains to the certification of management standards, such as ISO 9001 and ISO 14001 (Heras-Saizarbitoria and Boiral 2013). By synthesizing the existing literature and conducting a Delphi study, we not only validated 16 motives discussed in prior research but also identified 21 novel motives that have not been discussed before. However, we also reveal that certain motives are context-independent (e.g., *increase in sales and profit, quality and productivity improvements*), whereas other motives are specific for the electronic markets, such as *signal data protection and buyer protection*.

Previous research gaps	This study's findings	Implications for research
Extant research analyzes organizations' motivations to adopt certifications that are based on ISO standards (Heras-Saizarbitoria and Boiral 2013; Marimon and Casadesús 2017). It remained unclear whether motives are applicable and relevant in electronic markets.	A rank-order list of 24 motivators and 17 demotivators impacting online vendors' intentions to adopt IS certifications.	<p>We contribute to research by describing 21 novel motivators and demotivators that have been neglected by prior research.</p> <p>This finding also supports certification research by revealing the existence of context-independent (e.g., increase in sales and profit, quality and productivity improvements) and electronic market-specific motivators and demotivators (e.g., signal data protection and ensure legal conformity).</p> <p>Our discussion also provides a more nuanced view on potential certification effects, in particular, concerning trust taking a dual form and consumers' perceived assurances being more diverse.</p>
Prior research has largely studied benefits motivating organizations to adopt certifications (e.g., Gopal and Gao 2009) but has neglected to control for demotivators that prevent organizations from seeking a certification (e.g., Quazi et al. 2001).	Providing (rich) descriptions of 17 demotivators (i.e., restricted flexibility) by including certification authorities' knowledge.	This finding adds to certification research by delineating boundary conditions and deepening our understanding of the opposing factors that need to be considered when studying certification adoption.
Researchers do not have a clear consensus on the main driving forces behind the adoption of certifications (Djofack and Camacho 2017; Heras-Saizarbitoria and Boiral 2013; Prajogo 2011).	Development of a certification adopter typology, comprising <i>functionalists</i> , <i>institutionalists</i> and <i>signalers</i> ,	<p>This typology helps researchers to classify vendors according to their adoption motives, thereby seeking to resolve the inconclusive findings regarding motives for certification adoption in academic literature.</p> <p>We further contribute to research by separating external motives into signalers and</p>

based on the resource-based view, institutional theory and signaling theory.	institutionalists, providing more sophisticated explanations on certification adoption than before. <hr/> We also encourage certification research on developing and designing certifications and underlying attestation processes to consider which adopter type they want to address.
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Table 17: Summary of the main findings and their relation to existing certification research

Second, unlike prior research on certifications, which has addressed mainly the motivating factors for adopting certifications (e.g., Djofack and Camacho 2017; Quazi et al. 2001; Sampaio et al. 2010), we study both motivators and demotivators. In particular, we included certification authorities' knowledge to provide a differentiated view on potential demotivators that have been neglected by prior research. Although this inclusion makes the empirical data gathering more challenging, it adds significantly to our understanding of the opposing factors of certification adoption. Considering demotivators also helped us understand the peculiarities of adopter types and boundary conditions for adoption, namely, describing the circumstances in which individual adopter types will struggle when adopting IS certification, which is largely missing in related research.

Third, we provide a more nuanced analysis of certification adoption by incorporating different theoretical lenses (i.e., the resource-based view, institutional theory and signaling theory) than has been seen in the literature to date. The literature has mainly differentiated between the external and internal benefits of certification adoption guided by the resource-based view or institutional theory (e.g., Martínez-Costa et al. 2008; Sampaio et al. 2010). Specifically, while these theories provide strikingly different predictions for certification adoption, we explore these differences in greater detail compared to the previous literature by deriving a typology of certification adopters with a rich discussion on motivators and opposing demotivators. Our study is also a first step toward alleviating the inconclusive findings regarding motives for certification adoption in the academic literature by assigning certain motives to a particular adopter type. Surprisingly, only a few articles have even considered signaling theory as a useful lens for studying certifications from a vendor perspective (e.g., Gopal and Gao 2009; Terlaak and King 2006), whereas research taking a consumer perspective has long acknowledged the value of signaling theory in explaining

certification effectiveness (Mavlanova et al. 2016; Özpolat et al. 2013). Thus, we further contribute to research by separating external motives into signalers and institutionalists, providing more sophisticated explanations on certification adoption, as highlighted by the high ranking of signaler motives in the electronic markets.

While we took a vendor perspective and identified three major certification adopter types, our findings also inform related literature streams on IS certifications (Table 11). When comparing our findings against the backdrop of research taking a consumer perspective, we confirm that vendors intend to achieve certification effects, namely, increasing consumers' trust perceptions (e.g., Kim and Kim 2011), purchase intentions (e.g., Mousavizadeh et al. 2016), and perceived assurance (e.g., Lowry et al. 2012). Increasing consumers' trust was rated as most important by the online vendors and certification authorities (rank 1 certification authority and vendor panel), followed by the desire to acquire additional consumers by increasing their purchase intentions (rank 2 certification authority and rank 4 vendor panel). However, our findings emphasize that trust takes a dual form in the context of certifications. First, consumers' trust in online vendors is increased because information asymmetries are reduced, and certifications confirm vendors' integrity, competence, and benevolence. Second, the mechanism of trust transfer takes place to increase consumers' trust. Assuming that a certification authority is trustworthy, its certification can establish a cognitive association with a certified vendor, whereby a consumer's trust in a certification authority is transferred to a certified vendor (Doney et al. 1998). Although consumer-related studies on certification effectiveness acknowledge the potential occurrence of trust transference (e.g., Hu et al. 2010; Kim and Kim 2011), existing studies have neglected to test whether and how trust transference takes place in the context of certification. We thus recommend future certification research to consider the duality of trust when analyzing the effectiveness of certifications. This research also provides a more fine-grained view of increasing consumers' perceived assurance. Prior research has mostly operationalized perceived assurance concerning reducing the security and privacy concerns of consumers (Kim and Kim 2011; Lowry et al. 2012). Our findings confirm that vendors aim to increase IT security and legal compliance as well as to signal data protection, thereby fostering consumers' perceptions of assurance. However, our findings highlight that vendors are also acquiring IS certifications to increase transparency in general, to signal integrity and to increase consumer satisfaction,

among other reasons. Consequently, future research taking a consumer perspective might examine more effects that can result from IS certifications.

We also inform certification research on developing and designing certifications and the underlying attestation processes (Table 11). Certification authorities and related organizations developing a new certification should carefully consider which adopter type they want to address. If certifications want to address the needs of specific adopter types, such as certifications targeting functionalists, they should focus on providing best practices and implementation guidance for organizations to foster internalization. Other certifications may require thorough scrutiny to exclude certain adopter types. For example, research projects are developing new data protection certifications to prove compliance with the GDPR (e.g., the cloud data protection certification AUDITOR). However, if institutionalists internalize the underlying data protection practices only superficially (cf. Boiral 2003), consumers' sensitive data and data protection rights (e.g., right to be forgotten) might be at risk. As a consequence, thorough certification attestation processes are required to prevent such superficial internalization by institutionalists in the case of data protection certifications.

5.5.5 Limitations and Directions for Future Research

We are well aware that our study contains some limitations. First, the results of our Delphi study are based on a limited number of subjects. Although the Delphi methodology does not require the panel to be a representative sample in a statistical sense, given the nature and size of our panels, one must be cautious in generalizing our findings. Having said this, the sample is relatively diverse in terms of the panelists' backgrounds, ranging from managers to auditors, consultants, and lawyers, but at the same time, it is homogenous given that all the organizations are located in Germany. Future research should examine whether our findings are still valid in other cultural contexts. A second limitation relates to the low level of consensus among the experts in the online vendor panel after round two of the Delphi ranking phase for the demotivators. This level of consensus may reflect the various IS certifications that our panelists probably had in mind and the diverse organizational settings that each panelist represented. While another round of ranking might have resulted in a greater level of consensus, we felt that a non-negligible degree of panel fatigue had set in. Rather than risking further drop-offs in participation, we decided to stop at this point having already

reached a reasonable degree of confidence in the rankings, except for the demotivators in the online vendor panel (Schmidt 1997). Future research may therefore apply quantitative research methods to validate our qualitative findings. Finally, further research is required to examine how to prevent institutionalists' minimalist approach in adopting certifications to prevent adverse consequences, such as faked quality.

6. A Multi-Perspective Lens on Web Assurance Seals

Title: A Multi-Perspective Lens on Web Assurance Seals: Contrasting Vendors' Intended and Consumer's Perceived Effects

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Abstract

Web assurance seals are actions taken by e-commerce vendors to increase their trustworthiness and alleviate consumers' concerns. In their essence, web assurance seals are a product of negotiations, adoptions, and settlements among various groups of interests (e.g., seal authorities, vendors, consumers, or governmental institutions). However, previous research has hitherto used a unilateral research perspective when studying web assurance seals (i.e., either consumer- or vendor-centric), which has acted as a gridlock for web assurance seal literature development. Drawing on signaling theory, we use a ranking-type Delphi study with three distinct, yet mutually supportive expert panels (N=60) to compare vendors' intentions to acquire web assurance seals and perceived effects by consumers. Our results uncover a mismatch between consumers' perceptions and vendors' intentions of web assurance seals, unintended side effects as well as vendors' targeting other stakeholders than consumers, ultimately providing starting points for research to move forward.

Keywords: Web Assurance Seals, Delphi Study, Signaling Theory, E-Commerce

6.1 Introduction

Given the uncertainty of e-commerce transactions (e.g., unauthorized collecting, storing, and transmitting of consumers' data), third-party assessments such as web assurance seals have been considered as an important means for vendors to reduce consumers' concerns regarding privacy, security, or business-integrity (Hu et al. 2010). By web assurance seals, we refer to graphical cues embedded in vendors' online websites that independent third-parties grant as proof of endorsement after vendors completed a thorough and voluntary attestation process (Kim et al. 2008d). Web assurance seals become increasingly relevant for both vendors, as can be seen in the growing adoption rates (Adam et al. 2020a; Disterer 2012; ISO 2018), and consumers having more faith in certified websites (Statista Survey 2017a). Especially, seals such as '*Certified Privacy*' by TrustArc (formerly TRUSTe) or '*Norton Secured*' by Symantec have gained much attention among scholars and practitioners alike (Adam et al. 2020a; Özpolat et al. 2013; van Baal 2015). Likewise, the major European seal authority TrustedShops has currently issued more than 20,000 web seals to websites to strengthen these websites' trustworthiness (TrustedShops 2020). The EU's General Data Protection Regulation (GDPR) directive posits also that voluntary data protection seals will be used as the primary means of signaling compliance with GDPR requirements. A major cause is the inexorable growth of e-commerce as an economic segment and the increase of diversified and related consumer threats. With 2.3 trillion U.S. \$ in sales in 2017, e-commerce is estimated to account for over 17% of the retail sales worldwide in 2021 (eMarketer 2018).

Although web assurance seals' importance increases, selecting appropriate web assurance seals remains challenging because vendors nowadays face a wide variety of web assurance seals that aim to engender trust by assuring data security and protection in electronic markets (Lansing et al. 2018). While these web assurance seals differ from each other in their key characteristics, such as their *content* (e.g., proving compliance with security or data protection requirements) or their *process* (i.e., independent third-party audit or self-assessment by the vendor) (Lansing et al. 2018), vendors are concerned whether acquiring a specific web assurance seal leads to intended effects on consumers, such as increasing consumers' willingness to buy (Kim et al. 2016; Marimon and Casadesús 2017). These concerns are reinforced by studies highlighting

inconsistent findings of seal effectiveness (Adam et al. 2020a; Kim et al. 2016; Lansing et al. 2018; Löbbers and Benlian 2019; Löbbers and Siegfried 2018) and revealing that consumers struggle with grasping the meaning of web assurance seals when surfing online (Kim et al. 2008d). For example, a recent survey shows that only 19 percent of respondents knew what web assurance seals for online shops were (Statista Survey 2017). Vendors fear a potential mismatch between the web assurance seal effects as intended by vendors when acquiring a specific web assurance seal and as perceived by consumers. Vendors thus worry whether web assurance seals outweigh related expenses (i.e., costs for acquiring and complying with assurance requirements) if vendor's intentions and consumers' perceptions are out of sync.

Prior research has already analyzed vendor's intentions to acquire web assurance seals, such as signaling quality towards consumers (e.g., Gopal and Gao 2009), and web assurance seals' effects on consumers, including increasing trust and perceived assurance (e.g., Kim and Kim 2011). Although embodying valuable contributions, previous research findings limp in addressing the aforementioned imperative of syncing intentions and perceptions as they have applied a lopsided (and hence limited) view on web assurance seals. That is the analysis of web assurance seals from either a consumer (perceptions) or vendor (intentions) perspective only. We argue that research on web assurance seal effectiveness and practical relevance remains questionable as long as vendor intentions and consumer perceptions are out of sync, particularly because the emergence and development of web assurance seals are a result of continuous negotiations, adoptions, and settlements of interests and compromises from different stakeholder groups and perspectives (Backhouse et al. 2006). Hence, using a multi-perspective lens to study the phenomenon of interest is necessary to come up with novel insights about web assurance seals effectiveness and, most importantly, to deepen our understanding of what is perceived by consumers versus what was intended by vendors regarding web assurance seals. As long as a unilateral view is taken to study web assurance seals, our knowledge base will not be advanced as such approaches contradict the inherent nature of web assurance seals. As a result, seal authorities face the risk of developing web assurance seals that are out of sync with vendors' aims and consumers' needs, hence, leading to the refusal of vendors to acquire web assurance seals after all. Therefore, we strive to address this research gap by answering the following research questions (RQ):

RQ1: *What are the prevalent vendor intentions to acquire web assurance seals and consumer perceptions of web assurance seals?*

RQ2: *To what extent do vendor intentions and consumer perceptions match or differ?*

We conducted a ranking-type Delphi study using three distinct, yet mutually supportive panels with overall 60 participants, including consumers, vendors, and seal authorities. Incorporating these stakeholders into our study, we were able to create a unique data set enabling us to derive diverse effects of web assurance seals on consumers (i.e., those (outcome) variables that are expected to be influenced by web assurance seals) as well as intentions to acquire and use web assurance seals by vendors (i.e., those intention variables that are expected to be achieved when acquiring web assurance seals). Besides identifying 15 effects that consumers perceive when recognizing web assurance seals and 18 intentions of vendors to acquire web assurance seals, our analysis – guided by signaling theory – uncovered, first, a mismatch between consumers' perceptions and vendors' intentions of web assurance seals. Second, unintended side effects arise (i.e., skepticism of consumers when evaluating web assurance seals) and undermine the effectiveness of web assurance seals. Third, the fact that vendors do not only use web assurance seals to signal, for instance, integrity and therefore increase trustworthiness among consumers but also target other stakeholders such as competitors, legal authorities, or the market in general forestalling stakeholder-specific effectiveness.

Our research has several theoretical and practical contributions. First, to the best of our knowledge, this is the first study to utilize a multi-perspective investigation on web assurance seals in e-commerce. We not only contribute to research by revealing that the importance of effects and intentions identified in consumer and vendor panels differ but also by determining intentions where no counter-part effect could be identified and vice versa. For example, whereas vendors aim to increase trustworthiness, consumers perceive a far more diverse set of effects. These advancements expand our knowledge to allow for a more differentiated and nuanced analysis of web assurance seal effectiveness. Second, we validate that common vendor intentions of related research streams are applicable in electronic markets and reveal novel intentions that have not been discussed in related literature to date and are specific for electronic markets, such as *Signal data protection* and *Achieve legal conformity*. Third, we provide a more nuanced analysis of the effects of web assurance seals on consumers by identifying effects that have been overlooked in previous research (e.g., skepticism or apathy). We also refine

our understanding of prevalent effects (i.e., trust, perceived assurance, and purchase intention), enabling us to derive several recommendations for future research on web assurance seals. Finally, construing web assurance seals as informational signals, we propose a starting point to further develop signaling theory by highlighting the emergence of undermining side effects of signals and acknowledging that signals can have multiple receivers at the same time, which calls for a more fine-grained analysis of signal effectiveness in future research.

6.2 Theoretical Background

6.2.1 Web Assurance Seals in E-Commerce

A web assurance seal is defined as a graphical cue embedded in vendors' websites that targets consumers and is issued by an independent seal authority if an online vendor's information systems and processes comply with a pre-defined standard, requirement catalog, or regulation (Lansing et al. 2018). Web assurance seals involve three actors: seal authorities, online vendors, and consumers. Seal authorities are independent, neutral intermediaries between consumers and vendors that provide forms of oversight to deter or punish inappropriate behavior by the online vendor (Kimery and McCord 2006). The oversight covers, among other aspects: assessing vendors' system documentation about security and data protection measures, interviewing vendors' employees, or conducting on-site assessments to attest compliance. If vendors and their systems and processes adhere to specified requirements, the seal authority awards a formal testimonial, and the vendor is then permitted to present the seal in their communications to consumers and outside stakeholders. Consumers may be able to access detailed information on the seal authorities' attestation results and trust-assuring arguments by clicking on the seal.

While already a wide variety of web assurance seals have been proposed, there are three central structural elements of web assurance seals: (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 attestation process) (Lansing et al. 2018). Regarding the content, one generally differentiates three types of seals: addressing (1) privacy, (2) security, and (3) business-integrity concerns of consumers (Hu et al. 2010). First, seals addressing consumers' privacy concerns are used to alleviate consumers' perceived risks

in terms of, for example, inappropriate usage of personal data (Zhou 2015). Second, seals addressing consumers' security concerns (e.g., unauthorized access or malicious programs/malware) are used to reassure consumers that an online vendor uses, for example, intrusion detection software, firewalls, or antivirus/anti-spyware (Gao and Waechter 2017). Finally, seals addressing business-integrity concerns are used to guarantee fair business practices and business transactions before, during, and after the transaction (e.g., safeguarding a prompt delivery of goods) (Kim et al. 2016).

In electronic markets, web assurance seals reduce consumers' perceived risk and assure proper and safe online transactions by verifying and disclosing incorporated protections (either legal protections or technological safeguards) (Lee 2002; McKnight et al. 2004). Figure 12 illustrates the well-known web assurance seals in the context of electronic markets. With easy access to vendor information, consumers can determine the vendors' qualities and foresee vendor behavior with greater accuracy and confidence (Kimery and McCord 2008). Web assurance seals are particularly relevant for electronic markets because consumers mainly transact with unfamiliar online vendors and thus face a high degree of uncertainty (Pavlou and Gefen 2004; Zucker 1986). Consequently, web assurance seals are valued, in particular, by small- and medium-size online vendors because they lack a strong, confidence-building market position and a strong reputation (Kim et al. 2016; Sunyaev and Schneider 2013).



Figure 12: Example web assurance seals in the context of electronic markets

6.2.2 Related Research on Web Assurance Seals

Related research on web assurance seals is ever-increasing throughout the recent decades and can be divided into three major streams: (1) developing, designing and innovating seals and underlying attestation processes, (2) taking a vendor perspective, or (3) taking a consumer perspective. Regarding the former, various research has taken a look on how to develop trustworthy seals (i.e., for cloud services (Lynn et al. 2016)), on understanding seals' structural elements (Lansing et al. 2018) and classifying seal

criteria (Schneider et al. 2014), and on how to increase the reliability of seals by performing continuous compliance assessments (Lins et al. 2018; Lins et al. 2019), among others. In the following, we will discuss related research taking a vendor and consumer perspective in more detail.

6.2.2.1 Research Taking a Vendor Perspective

Research taking a vendor-related perspective analyzes rationales for organizations to acquire web assurance seals and whether organizations can harvest benefits of the acquisition and internalization (Table 18). Researchers do not have a clear consensus regarding the main driving forces behind the acquisition of web assurance seals, in particular, because the acquisition decision is voluntary and not legally required (Djofack and Camacho 2017; Heras-Saizarbitoria and Boiral 2013; Prajogo 2011). However, there is a consensus to group those intentions in *external* and *internal* factors. Internal intentions refer to when the seal is acquired autonomously, for the organizational benefits that can be derived from its implementation, such as minimization of costs associated with improved internal efficiency. Prior research taking an internal perspective argues that organizations can mature in their implementation of, for example, the ISO 9000 quality management standard underlying the seal by internalizing the actual practices contained in the standard and making changes in organizational quality practices (e.g., Martínez-Costa et al. 2008). On the other hand, external intentions refer to the implementation of the seal in response to certain external pressures (e.g., from competitors, consumers, or governments) or incentives such as an enhancement in the image of the organization. Thus, organizations acquire seals to ensure their survival in increasingly competitive markets, rather than to improve performance (Beck and Walgenbach 2005; DiMaggio and Powell 1983). Prior research taking an external perspective proposes that seals may act as a market signal of superior quality and thereby increase sales as well (e.g., Gopal and Gao 2009; Terlaak and King 2006).

Given these competing perspectives, prior research is debating whether vendors' intentions of seal acquisitions are more internally or externally driven (Djofack and Camacho 2017). For example, the external perspective has been criticized on the basis that organizations are dynamic and active and therefore, they can respond in different ways according to their internal resources and capacities (Heras-Saizarbitoria and

Boiral 2013). More importantly, it remains unclear whether these intentions are applicable and relevant in electronic markets because extant research analyzes only seals that are based on ISO standards, like ISO 9001 for quality, ISO 14001 for environmental or ISO 50001 for energy management systems (Heras-Saizarbitoria and Boiral 2013; Marimon and Casadesús 2017). In contrast, web assurance seals in electronic markets are considered as a bundle of signals, comprising diverse assurances, such as security, privacy, availability, consumer-friendliness of contracts, and legal compliance (Hu et al. 2010; Lansing et al. 2019). Hence, we are eager to understand vendors' intentions in electronic markets and discuss whether vendors are more internally or externally driven regarding web assurance seal acquisitions.

Focus	Main assertions	Example intentions
Internal	Internalize best practices and standards, underlying web assurance seals, to achieve internal improvements.	<ul style="list-style-type: none"> • Performance improvements (Heras-Saizarbitoria et al. 2011; Martínez-Costa et al. 2008; Nair and Prajogo 2009) • Dominant top management or employees (Beck and Walgenbach 2005; Kammoun and Aouni 2013; Llopis and José Tarí 2003) • Realize the company's strategy for pursuing quality (Prajogo 2011) • Improve efficiency and control in the operations (Prajogo et al. 2012) • Achieve cost savings (Djofack and Camacho 2017; Llopis and José Tarí 2003)
External	Conform to external pressures and/or communicate information about unobservable characteristics and actions of oneself to reduce information asymmetry and consumers' uncertainty.	<ul style="list-style-type: none"> • Match competitors' actions (Djofack and Camacho 2017; González-Benito and González-Benito 2005) • Meet customer demands (Llopis and José Tarí 2003; Prajogo 2011; Prajogo et al. 2012) • Comply with government policies or regulations (Marimon and Casadesús 2017; Prajogo et al. 2012; Sampaio et al. 2010) • Gain a competitive advantage (González-Benito and González-Benito 2005; Heras-Saizarbitoria et al. 2011; Terlaak and King 2006) • Increase sales and profit (Corbett et al. 2005; Disterer 2012; Gopal and Gao 2009; Kammoun and Aouni 2013) • Use seals as a marketing tool (Llopis and José Tarí 2003; Sampaio et al. 2010)

Table 18: Related research taking a vendor perspective

6.2.2.2 Research Taking a Consumer Perspective

A major research challenge with web assurance seals is to explain how they affect consumers, why these effects occur, and how to predict the effect of a seal on consumers (Table 19). In particular, studies have primarily focused on three effects: (1) trust, (2) purchase intention, and (3) perceived assurance. *Trust* is defined as consumers'

perceptions of a vendor's competence (the ability of the vendor to do what the consumer needs), benevolence (vendor's caring and motivation to act in the consumer's interests), and integrity (vendor's honesty and promise-keeping) (McKnight et al. 2002b). *Purchase intention* is understood as a predictor for actual purchase behavior (Venkatesh and Davis 2000). *Perceived assurance* refers to a consumer's perception of the likelihood that the vendor will try to protect consumer's confidential information collected during transactions and has applied security measures, such as authentication, encryption, and non-repudiation (Kim et al. 2008c).

However, empirical work exhibits inconsistent findings regarding the effectiveness of web assurance seals as our (example) overview in the e-commerce literature reveals (Table 19). On the one hand, studies assert that web assurance seals have a significant positive effect on consumers' trust (e.g., Hu et al. 2010; Mavlanova et al. 2016), purchase intention (e.g., Clemons et al. 2016; Nöteberg et al. 2003), and perceived assurance (e.g., Kim and Kim 2011; Yang et al. 2006). On the other hand, scholars could not confirm any positive significance on trust (e.g., Kim et al. 2008c; Lee and Turban 2001), purchase intention (e.g., Head and Hassanein 2002; van Baal 2015), and perceived assurance (e.g., Lowry et al. 2012; Rifon et al. 2005). These ambiguities proliferated calls for further research on web assurance seals (e.g., Adam et al. 2020a; Kim et al. 2016; Lansing et al. 2018; Löbbers and Siegfried 2018).

Example Studies	Dependent variables			Context	Sample	Theoretical Foundation
	T	PI	PA			
Lee and Turban 2001	o			Online Shopping	Students	Trust Theory
Head and Hassanein 2002		o		Online shopping	Internet Users	Trust Theory
Mauldin and Arunachalam 2002		o		Online shopping: MP3 players, cameras	Students	Theory of Planned Behavior
Hu et al. 2002		M		Online shopping: books, suits	Students	Elaboration Likelihood Model
Gefen et al. 2003	+			Online shopping: books, CDs	Students	Technology Acceptance

					Model; Trust Theory
Kaplan and Nieschwietz 2003a	+	+	Online shopping: clothes	Students	Trust Theory
Nöteberg et al. 2003		+	Online shopping	Unspecified	Trust Theory
Wakefield et al. (2004)	+	o	Online shopping / e-commerce	Unspecified	Trust Theory
McKnight et al. (2004)	o		Service information: legal advice	Students	Trust Theory
Rifon et al. 2005	+	o	Online shopping: music	Students	Social Cognitive Theory
Yang et al. 2006		+	Online shopping: web cameras	Students	Elaboration Likelihood Model
Hui et al. (2007)		o	Product information: mobile computing	Students	Choice Theory
Kim 2008a	M		Online shopping	Students	Trust Theory
Kim et al. (2008c)	o		Online shopping	Students	No explicit theory
Fisher and Chu 2009	o		Online shopping: textbooks	Students	Theories of Reasoned Action & Planned Behavior
Hu et al. 2010	M		Online shopping	Students	Cue Consistency / Cue Utilization Theory
Kim and Kim (2011)	+	+	Online shopping: running shorts	Students	No explicit theory
Lowry et al. (2012)		o	Online booking: traveling	Students	Elaboration Likelihood Model

Chang et al. 2013	+		Online shopping: books	Internet Users	Social Exchange Theory
Aiken et al. (2014)		o	Online commerce	Students	Signaling Theory; Trust Theory
Hoffmann et al. 2014b	+		Service selection	Internet users	Social Cognitive Theory
van Baal (2015)		o	Online retail	Internet Users	Signaling Theory
Clemons et al. (2016)		+	Online shopping	Unspecified	Trust Theory
Mavlanova et al. (2016)	+		Online shopping: medicine	Students	Signaling Theory
Mousavizadeh et al. (2016)		+	Online shopping	Students	No explicit theory
Löbbers and Benlian 2019		M	Online shopping: laptops	Internet Users	Theory of Planned Behavior, Five-factor model of personality
Adam et al. 2020a		M	Cloud service usage	Internet Users	Trust Theory

T = trust; PI = purchase intention; PA = perceived assurance;
+ = positive significant effect; o = no (significant) effect, M = under some conditions an effect was observed

Table 19: Related research taking a consumer perspective

One of the multiple reasons behind the ambiguity of research findings lies in the use of an exclusive set of seal's effects (i.e., what do consumers think and feel when being confronted with seals) and their isolated use in theory building. While only a small number of seal effects has been used in prior research over the last decades (namely trust, purchase intention, and perceived assurance), no solid foundation exists towards why these effects are the most salient to consumers. On the other hand, prior research has already shown that how consumers perceive seals depends on several factors, including perceptual contingency factors (e.g., understanding of seals (Lowry et al. 2012)), contextual contingency factors (e.g., structural elements of seals (Lansing et al. 2018)), and consumer characteristics (e.g., personality (Löbbers and Benlian 2019)).

In light of these factors, it is surprising that other effects of seals on consumers have not been analyzed or at least taken into consideration so far. It seems reasonable to assume that consumers' perceptions of and responses to the presence of web assurance seals might be highly diverse as well. When being able to more accurately and comprehensively capture seals' effects on consumers, researchers are empowered to develop a more fine-grained theory on seals' effectiveness and increase comparability of results.

6.2.3 Signaling Theory as Theoretical Foundation to Compare Intentions and Perceptions

While embodying valuable contributions, previous research has applied a lopsided (and hence limited) view on web assurance seals by focusing on web assurance seals from either a consumer (perceptions) or vendor (intentions) perspective only. To tackle prevalent issues in related research streams and the lopsided view, we are eager to understand to what extent do vendor intentions and consumer perceptions match or differ. We draw on signaling theory in guiding our scientific course because signaling theory has been recognized to provide strong explanations for the mechanisms of signaling itself as well as on the interplay of the central elements (i.e., signal, signaler, receiver, and signaling environment). Further, it is frequently applied in both web assurance seal research streams: to examine intentions of online vendors to acquire web assurance seals (e.g., Gopal and Gao 2009; Terlaak and King 2006), and analyze the value and effects of web assurance seals on consumers (e.g., Aiken et al. 2014; Mavlanova et al. 2016). Because a multi-perspective nature is inherent to signaling theory (i.e., considering the signaler and the receiver as essential building blocks), it provides an appropriate theoretical foundation to explain the mechanisms of web assurance seals and their effectiveness and to compare vendors' intentions and effects on consumers (Lansing et al. 2019; Lins and Sunyaev 2017).

Signaling theory is fundamentally concerned with reducing information asymmetries between two or more parties (i.e., the consumer and vendor) by performing actions to intentionally communicate positive, imperceptible qualities of a signaler (Gregg and Walczak 2010; Spence 2002). At the center of signaling theory is the *signaler* (e.g., vendor) who possesses the information, which is not accessible to external parties (e.g., consumer or competitors). However, such external parties may find it useful to consider

that information when, for example, making a purchase decision. The *signal* (e.g., web assurance seal) itself is an informational cue that conveys information credibility to the receiver (e.g., a potential consumer) (Rao et al. 1999). The *receiver* views and interprets a signal as well as derives inferences from it. Furthermore, the *signaling environment* affects the entire signaling process. The signaling environment can be distorted when the medium for transmitting the signal inherently reduced the signals' observability or when other receivers of the same signal change the relationship between the original signaler and receiver (Connelly et al. 2011).

From a signaling theory perspective, web assurance seals have to fulfill several requirements to act as reliable signals (Bergh et al. 2014; Lansing et al. 2019; Lins and Sunyaev 2017). First, most web assurance seals are costly and difficult to obtain, and thus, signals might not be easily imitated by low-quality vendors as the disproportional investment may not be justified by future profits. Further, because web assurance seals non-adherence represents a cost to the vendor due to associated penalties, the web assurance seals are themselves a bond against failures (i.e., cases of non-adherence). Second, a vendor that fails to fulfill web assurance seal requirements sacrifices its reputation with current consumers, eliminating any possibility of repeat business and loses other potential consumers due to negative word-of-mouth effects. Third, low-quality vendors are more likely to fail web assurance seal requirements than high-quality vendors. Thus, low-quality vendors will face higher penalty costs and negative word-of-mouth effects for the same web assurance seals than vendors of high quality. Assuming that this cost difference is not compensated by potential gains from cheating (i.e., sending a false/faked web assurance seal signal), high-quality vendors can acquire web assurance seals that low-quality vendors cannot without lowering their profitability. Based on these reasons, web assurance seals can act as reliable signals in consumer-vendor relationships from a signaling theory perspective.

6.3 Methodology

To answer our research questions, we used a ranking-type Delphi approach to first, assess web assurance seals' effects on consumers as well as the intentions of vendors to acquire web assurance seals, and second, to compare the two perspectives. A Delphi study is a systematic and iterative process to anonymously elicit a consensus view from a group of experts (MacCarthy and Atthirawong 2003). The Delphi method is typically

used to understand factors that may influence decision making on a specific issue, topic, or problem using controlled and repeated feedback loops (MacCarthy and Atthirawong 2003). For the paper at hand, a ranking-type Delphi method is deployed, applying the procedure outlined by Schmidt (1997) to brainstorm, select, and rank factors (Figure 13). We chose the ranking-type Delphi approach (over other approaches such as best-worst scaling) because it enables an iterative and controlled feedback consensus mechanism among a group of experts (Di Gangi et al. 2018; Kasi et al. 2008). Besides allowing to identify web assurance seals' effects on consumers as well as intentions to acquire web assurance seals, this type of Delphi approach also provides insights about the relative importance (or ranking) of these effects and intentions.

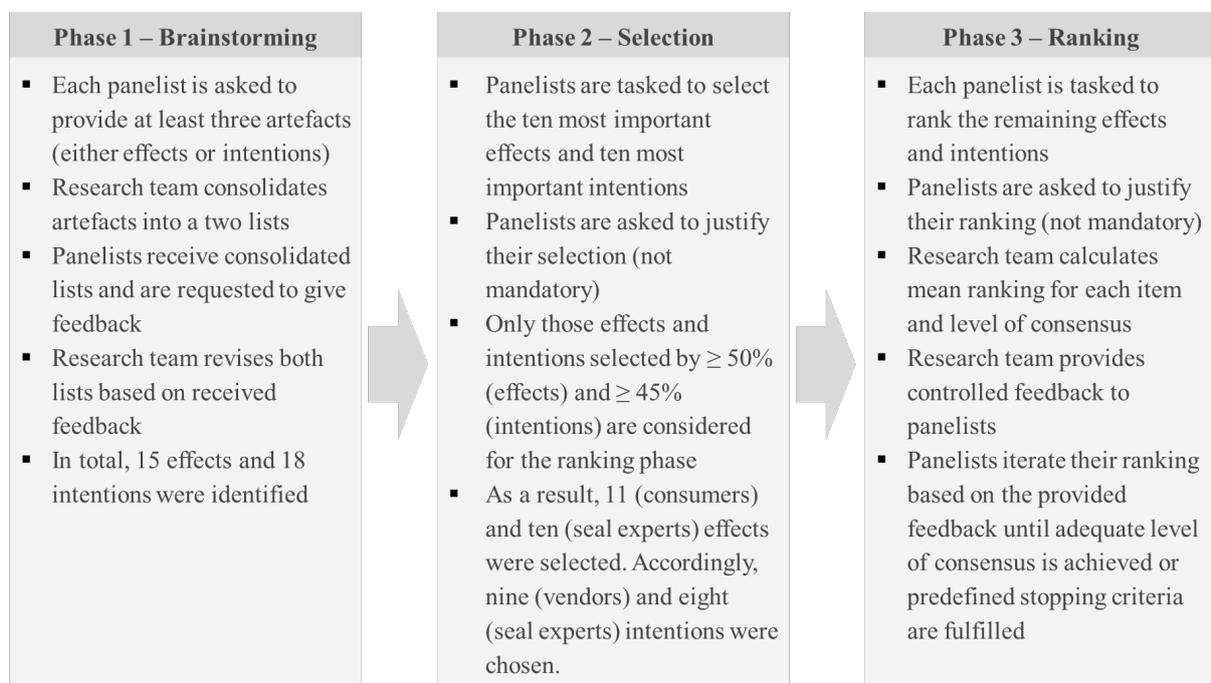


Figure 13: Overview of Delphi phases

6.3.1 Panel Selection

We utilized a multi-panel design (Di Gangi et al. 2018), with each panel designed to obtain unique perspectives on web assurance seals. We used three independent panels for our study to satisfy the multi-perspective nature of web assurance seals: an e-commerce consumer panel (representing consumers' perceived effects of web assurance seals) and a vendor panel consisting of e-commerce experts that operate online shops as a sales channel within their organization (representing the vendors' intentions to acquire web assurance seals). Additionally, we used a panel consisting of experts from independent authorities that issue web assurance seals. These seal authorities not only

advise online vendors in weighting seals' intended benefits and costs, but they also present and market their web assurance seals to consumers. For example, in Germany, representatives of diverse authorities teamed up in a non-profit board to advise consumers about reliable seals, given the increasing number of fake seals and malicious online vendors. Seal authorities thereby exhibit substantive knowledge about the needs and concerns of both actors: vendors and consumers. Hence, including seal authorities helped us to increase data reliability and validity as well as further substantiate our results with first-hand expert opinions (Di Gangi et al. 2018; Kasi et al. 2008), who's daily business centers around web assurance seals.

To acquire vendor and seal authority experts, we followed well-known instructions provided for selecting the right experts: we (1) defined minimum selection criteria, such as (a) having knowledge on web assurance seals, (b) having at least two years professional experience, (c) having at least one handled/acquired web assurance seal; (2) identified experts that meet the predefined criteria; (3) nominated the chosen experts and asked them to identify further potential participants; (4) ranked experts in priority of invitation based on qualification; and (5) invited experts according to established ranking (Paré et al. 2013). For the acquisition of the consumer panel, we used a snowball sampling approach, starting with the authors' network.

In general, it is claimed that more experts increase reliability (Murphy et al. 1998). A large number of experts, however, bears the risk of difficult managing but does not necessarily guarantee better results than the results gained from smaller groups of experts (Keeney et al. 2010). There is no consensus among researchers regarding the panel size for Delphi studies (Akins et al. 2005; Di Gangi et al. 2018), so that panel sizes can vary from small to large (Linstone and Turoff 1975). Against this background, we initially invited 67 panelists (21 for the consumer, 20 for the vendor panel, and 26 for the seal authority) of which 60 (21 consumers, 15 vendor experts, and 24 seal authority experts) followed our invitation (response rate: 89.55%). Our study had 60 panelists, a number that is at least consistent with other Delphi studies in IS research (e.g., Di Gangi et al. 2018; Kasi et al. 2008; Keil et al. 2002; Singh et al. 2009; Thiebes et al. 2017).

Overall, selected seal authority and vendor panelists are considered appropriate experts in case they exhibit good knowledge on web assurance seals and related assessment processes (Table 20), which we measured adapting a three-item construct (Flynn and

Goldsmith 1999). To ensure a high-quality panel of consumers, we determined whether subjects have sufficient online shopping experience (Table 20), measured by usage frequency, intensity, and duration (Venkatesh et al. 2008).

Characteristic	Seal Authority Panel (n=24)	Vendor Panel (n=15)	Consumer Panel (n=21)
Knowledge of web assurance seals and assessment processes	Mean: 7.19 (9-Point Likert scale)	Mean: 5.88 (9-Point Likert scale)	Not applicable
Number of employees	< 10: 12.5%; 10 – 49: 33.33%; 50 – 150: 16.66%; 150 – 250: 8.33%; > 250: 20.83%; No answer: 4.16%	< 10: 67%; 10 – 49: 26%; 50 – 150: 0%; 150 – 250: 6%; > 250: 0%; No answer: 0%	Not applicable
Highest educational qualification	A-Levels (degree): 16.66%; Degree from University of Applied Science: 16.66%; Degree from (Technical) University: 41.66%; Vocational training: 4.16%; Other: 20.83%	A-Levels (degree): 46%; Degree from University of Applied Science: 33%; Degree from (Technical) University: 21%; Vocational training: 0%; Other: 0%	A-Levels (degree): 33.33%; Degree from University of Applied Science: 14.29%; Degree from (Technical) University: 33.33%; Vocational training: 4.76%; Other: 9.52%
Age	Mean: 41.95 [min: 23; max: 71]	Mean: 44 [min: 23; max: 66]	Mean: 24.79 [min: 20; max: 31]
Amount of seals handled/acquired	Mean handled: 1.5 [min: 1; max: 4]	Mean acquired: 1.2 [min: 1; max: 3]	Not applicable
Product category	Not applicable	Cars & Bicycles: 7%; Clothes: 13%; Computer & Electronics: 13%; Cosmetics: 7%; Food: 13%; Other (e.g., luxury food): 87%	Not applicable
Duration of online shopping (per week)	Not applicable	Not applicable	< 1 hour: 23.80%; 1 – 2 hour(s): 52.38%; 2 – 5 hours: 19.04%; > 5 hours: 4.76%; Mean: 2.34 hours
Frequency of online shopping	Not applicable	Not applicable	Once per month: 9.52%; Several times per month: 47.62%; Once per week: 9.52%; Several times per week: 19.04%; Several times per day: 14.28%; Mean: 3.95
Intensity of online shopping	Not applicable	Not applicable	Mean: 4.19 (7-Point Likert scale)

Table 20: Characteristics and demographics of all panels

6.3.2 Data Collection and Analysis

6.3.2.1 *Brainstorming Phase*

We utilized an online survey platform and developed a custom-fit online questionnaire for each of the three Delphi phases. Questionnaires for each phase were pre-tested with seven academics testing survey functionalities, comprehension, and clarity of questions. Afterward, we sent the survey link to all chosen experts to start the brainstorming phase. To ensure panelists' participation throughout all phases as well as to guarantee high-quality answers, the online questionnaire was constructed as follows: we first introduced each panelist to the generic concept of a Delphi study. Second, we displayed brief information about the study's objectives and context and highlighted the main tasks we were asking the participants to complete. We then asked panelists to answer various questions about potential effects that web assurance seals have on consumers and/or about vendors' intentions to acquire web assurance seals (see the Appendix). Although all questions were deliberately formulated openly, pre-test results (in which we tested a variety of different questions and formulations) seemed to provide promising results.

We highlighted that we are conducting a research project, therefore we requested panelists to respond honestly, and emphasized that answers are kept confidential to decrease social desirability biases when responding. Besides, a major benefit of this questionnaire-based approach is that biases through the influence of other participants are inhibited because questions are answered independently and anonymously using the Internet (Okoli and Pawlowski 2004; Paré et al. 2013). To ensure anonymity, yet allow for insightful analysis across Delphi phases, we asked panelists to create an identification label on his/her own using highly truncated information about a relative's name and birthday. We also requested online vendors and seal authorities to respond based on their professional experiences and not on their online shopping behavior.

For all questions, we asked for an answer as well as for a short description explaining the given argument or rationale. Such descriptions are of great value for clarifying potential answer ambiguities (Okoli and Pawlowski 2004). Except for seven (one consumer, two vendors, and four seal authority experts), all panelists provided at least

three answers including descriptions (e.g., not leaving text boxes blank or filled with space characters).

At the end of the brainstorming phase, 60 panelists provided 289 answers regarding web assurance seal effects as well as intentions to acquire web assurance seals. All lists of answers were then consolidated and refined. We aggregated and grouped identical answers and similar ones through content analysis (Krippendorff 2008). In particular, we open-coded web assurance seal effects/intentions by analyzing the responses of panelists (Abraham et al. 2013; Corbin and Strauss 2015). For each answer, we coded a name and a description. If a new effect/intention fitted to an existing effect/intention, we assigned it accordingly; if otherwise, a new effect or intention was created. During this process, we avoided semantic ambiguities as suggested by Shaw and Gaines (1989). We tried to use the same effects and intentions across all three panels. In case ambiguities occurred regarding the exclusive assignment of a new answer to an existing effect/intention, researchers assigned the new answer to an existing effect/intention according to their best knowledge. Potential coding mistakes would then be corrected during the interim validation phase described in the next paragraph. Four of the authors independently coded the data and compared their results. Following Hayes and Krippendorff (2007) suggestions on selecting appropriate inter-coder reliability measures, we calculated Krippendorff's α . Compared to other measures (e.g., Scott's P_i), Krippendorff's α has major advantages: it is suitable to calculate agreement between two or more researchers, and it establishes a numerical scale within a continuum of two extremes, which is easily computable (Hayes and Krippendorff 2007). Calculating Krippendorff's α revealed an acceptable level of consensus among researchers ($\alpha=0.805$ for the consumer panel, $\alpha=0.762$ vendor panel, $\alpha=0.834$ for the seal authority panel) (cf. Neuendorf 2002). This consolidation process yielded a list of 14 web assurance seal effects and 17 intentions to acquire web assurance seals. It should be noted that we merged effects yielded by consumers and seal authority experts as well as intentions proposed by vendors and seal authority experts, respectively.

In most insightful Delphi studies, at this point, a validation interim phase is induced (e.g. Piccinini et al. 2015): the panelists are allowed to revise the outcome of the consolidation and grouping activity conducted by the researchers. The validation of the categorized list of factors has a twofold aim: first, to verify that the stated responses were correctly interpreted and categorized and second, to verify and refine the

categorization of factors (Okoli and Pawlowski 2004). After having received the feedback from five consumer panelists, we added an additional effect to the consumer effect list (i.e., *Induce interest*), resulting in 15 web assurance effects in total. Similarly, feedback given by one vendor resulted in a new intention (i.e., *Signal integrity*), leading to a final set of 18 intentions. The remaining panelists confirmed the correct coding of their responses.

Further, we applied selective coding to classify effects and intentions under common themes (Abraham et al. 2013; Corbin and Strauss 2015), and more importantly, to compare consumers' perceived effects and vendors' intentions. Selective coding enables us to create hierarchical classifications that allow moving beyond mere description to a more abstract level of conceptualization (Urquhart et al. 2010). We reflected the identified effects and intentions based on signaling theory principles and related signaling theory literature by applying selective coding. For example, the identified effects *Perceive vendor*, *website*, and *product quality* signal information about unobservable characteristics of the vendor (i.e., hidden information). Likewise, the intentions *Signal data protection* and *integrity* aim to communicate information about a vendor's privacy handling (i.e., hidden actions). We, therefore, grouped these effects and intentions into the theoretical category '*convey hidden information and hidden actions*'. Overall, and based on the signaling theory, we identified five theoretical categories, which will be discussed in the results section (see also Table 21).

6.3.2.2 Selection Phase

In the second Delphi phase, the selection phase, the resulted list from the previous brainstorming phase was randomized and subsequently sent to the panelists one week after completion of the first phase and with clear selection instructions. One central aim of this phase is to reduce the list of effects to a manageable size (Di Gangi et al. 2018; Okoli and Pawlowski 2004). Literature has proposed various thresholds with regards to the number of items that should be selected within this phase (i.e., between 10 (Okoli and Pawlowski 2004) and 20 items (Schmidt 1997)). Due to the rather small number of items (15 effects and 18 intentions), we decided to let participants choose exactly 10. Moreover, we asked for feedback on the selection offering a text box to enter comments. We applied a cut-off threshold greater than 50% (meaning those effects that were chosen by 50% or less of the participants were sorted out) for the consumer panel

and a 45%-threshold for the vendor and seal authority panel. It should be noted that we adopted the threshold for the vendor and seal authority panel to provide an equal amount of effects and intentions to be ranked in the respective panels. The selection phase yielded a set of 11 web assurance seal effects chosen by 21 consumer participants and ten web assurance seal effects chosen by 19 seal authority experts. Accordingly, 18 vendor experts chose nine and 19 seal authority experts selected eight intentions to acquire web assurance seals. Because we deemed this a bearable number of items to be ranked (i.e., not too many items), we did not perform a second selection phase.

6.3.2.3 Ranking Phase

In the ranking phase, we again transmitted the list of randomized items to the participants to rank them according to their order of importance. This step was performed one week after the completion of the second phase. Furthermore, we asked panelists to provide additional feedback elaborating on their importance selection (Singh et al. 2009). This not only allowed us to better understand their perspectives but also provided an initial understanding with regards to consensus making within the participating group. To determine the rank of web assurance seal effects as well as acquisition intentions, we used Friedman's Test (Friedman 1937). As done by other authors from the IS discipline (e.g., Di Gangi et al. 2018; Piccinini et al. 2015; Singh et al. 2009), we calculated Kendall's coefficient of concordance (W) to measure the degree of consensus. While the values of Kendall's W range from 0 (indicating low consensus) to 1 (indicating high consensus), consensus levels are considered weak at $W \leq 0.5$, moderate at $0.5 < W \leq 0.7$, and strong at $W > 0.7$ (Paré et al. 2013). Scholars (Paré et al. 2013; Singh et al. 2009) suggest to reiterate the ranking phase until at least a moderate consensus level ($W > 0.5$) is reached. However, according to Schmidt (1997), the statistical (in-)significance of Kendall's W does not suffice as a stopping criterion. Therefore, after each round of the ranking phase, researchers should examine and balance the trade-off between feasibility and potential gains from another round (Schmidt 1997). After the first ranking phase, participants only reached a low level of consensus. Web assurance seal effects from consumer panel: $W=0.276$; $N=21$; $\chi^2=57.93$; $p < 0.001$; web assurance seal effects from seal authority panel: $W=0.358$; $N=12$; $\chi^2=37.56$; $p < 0.001$; as well as intentions to acquire web assurance seals from vendor panel: $W=0.240$; $N=14$; $\chi^2=26.93$; $p < 0.01$; and from the seal authority panel:

$W=0.193$; $N=11$; $\chi^2=14.87$; $p < 0.05$. Due to this low level of consensus among the panelists, we conducted a second iteration of the ranking phase four weeks after the first ranking phase. We intentionally increased the time between the two ranking phases because panelists already expressed their concerns about participating in an additional ranking phase. However, after the second round, Kendall's W was increased to a moderate level of consensus ($W=0.510$; $N=14$; $\chi^2=71.39$; $p < 0.001$) among consumers and a high level of consensus ($W=0.753$; $N=5$; $\chi^2=33.87$; $p < 0.001$) among seal authority experts regarding web assurance seal effects. Further, vendor experts reached a high level of consensus concerning intentions to acquire web assurance seals ($W=0.765$; $N=6$; $\chi^2=36.31$; $p < 0.001$), while seal authority experts increased consensus in this regard to a moderate level ($W=0.659$; $N=5$; $\chi^2=23.06$; $p < 0.01$).

In this second iteration of the ranking phase, we provided the panelists with various information: (1) the mean rank of each item, (2) the panelists' ranking for each item of the previous iteration, (3) the current level of consensus, and (4) comments indicating why the other panelists ranked the item as they did (Okoli and Pawlowski 2004). The provision of such feedback supports the panelists reaching a higher consensus more quickly (Rohrbaugh 1979). However, due to the increasing drop-out rates and the fact that a moderate to a high level of consensus was reached (Paré et al. 2013; Singh et al. 2009) across all panels, we refrained from conducting a third-ranking phase.

6.4 Comparing Vendors' Intentions and Consumers' Perceptions

Overall, study findings revealed 15 web assurance seal effects on consumers as well as 18 intentions for vendors to acquire web assurance seals, which will be discussed next. Outcomes are theoretically grouped into five categories based on the underlying concepts of signaling theory to increase generalizability and theoretical contribution (Table 21).

Category Name	Description	Effects	Intentions	Origin Panels
Encourage consumers to purchase	Web assurance seals should encourage consumers to purchase products or provision	Increase purchase intention, make payments	Acquire further consumers, increases in sales and profit	CP, VP, SAP

	services offered by online vendors.			
Convey hidden information and hidden actions	Web assurance seals can bridge informational problems by making otherwise hidden information (i.e., information on vendor's qualities) and hidden actions available (i.e., information on vendors' efforts to fulfill transaction).	Increase vendors' reputation, perceive vendor, website quality and product quality, perceive risk minimization, safety, IT security, data protection, and consumer protection	Increase transparency, use seals as a marketing tool, signal integrity, data protection, and consumer protection	CP, VP, SAP
Influence consumers' affect	Web assurance seals can influence beliefs, emotions, and attitudes of consumers, such as increasing their trust in the vendor.	Induce interest, apathy, trust, and skepticism	Increase consumers' trust	CP, VP, SAP
Influence stakeholders in the environment	Web assurance seals are not only targeting consumers but also other stakeholders in the market, for example, competitors.	-	Gain market access, achieve competitive advantages, pressures from stakeholders, increase comparability	VP, SAP
Lead to internal improvements of vendors	Attestation processes and best practices underlying web assurance seals can lead to quality improvements of the vendor's internal systems and processes.	-	Gain access to experts, increase IT security, achieve legal conformity, improve quality and productivity, increase consumer satisfaction, achieve a better web search ranking	VP, SAP

Note: CP=consumer panel; VP=vendor panel; SAP=seal authority panel

Table 21: Theoretical categories of intentions and effects

6.4.1 Web Assurance Seals Aim to Encourage Consumers to Purchase

In line with signaling theory, for a signal (i.e., web assurance seal) to be effective, the signaler (i.e., vendor) is expected to benefit from some action (i.e., purchasing products or services) performed by the receiver (i.e., consumer) that the receiver would not have done without perceiving the signal (Connelly et al. 2011). We discovered that vendors gravitate to *Acquire further consumers* through embedment of web assurance seals on their website. The web assurance seal should persuade consumers to buy online because vendors proved their quality with the issuance of the seal. As one vendor stated, "*With the seal, we hope to convince consumers to buy from us*". Consumers agree that web assurance seals *Increase purchase intention* because web assurance seals attest that an

independent third-party (i.e., the seal authority) has proven the integrity of the online shop. As a consequence, vendors indicated that they expect *Increases in sales and profit* following the seal acquisition. Finally, it was revealed that consumers feel that payment transactions with online shops having web assurance seals are more secure than with online shops without seals: “*When transacting with certified online shops, I am more willing to use a certain payment method over another*”. They stated that with certified online shops they are more willing to use riskier options (e.g., credit cards) to handle payments. Thus, web assurance seals can indirectly impact consumers to *Make Payments*.

6.4.2 Web Assurance Seals Aim to Convey Hidden Information and Hidden Actions

According to web assurance seal and signaling literature, signals can bridge informational problems (Bergh et al. 2014) by making otherwise hidden information (Mavlanova et al. 2016) and hidden actions (Ponte et al. 2015) available. While hidden information is outlined as a situation, in which the signaler has more information available regarding an imminent decision compared to the receiver, hidden action is defined as the state where the signaler chooses an, for the receiver, unobservable level of effort regarding their agreement (Hart and Holmström 1987). Vendors confirm that they acquire web assurance seals to *Increase transparency* in general. As web assurance seals expose information about various characteristics of the vendor, consumers might value such candor providing an advantage over other vendors. Also, vendors *Use seals as a marketing tool* through exploiting the seal’s popularity. As one vendor stated: “*The public image of a certified company is always better*”. Consumers confirm this intention, mentioning that web assurance seal *Increase vendors’ reputation* because “*web assurance seals serve as evidence that the certified online shop possesses some kind of incumbency*”. More specifically, participants acknowledged that seals function as proof for successful transaction history.

Within the area of hidden information, vendors aspire to *Signal integrity* as one vendor stated: “*By using a seal, we want to be reputable towards our consumers*”. Consumers have a more nuanced view of how web assurance seals can render hidden information. Consumers perceive quality-related information such as *Perceive vendor, website, and product quality*. *Vendor quality* outlines an effect related to the vendor’s external

representation as well as internal processes. Regarding the vendor's external representation, a consumer stated that "*web assurance seals signal the integrity of a vendor*" (e.g., not being a malicious vendor) because vendors adhere to corresponding legislation or seal requirements, matching vendors' intentions. Concerning internal processes, consumers described that web assurance seals attest superior internal processes such as fast delivery processes or qualified personnel. The *Perceive website quality* effect is related to the superiority of the website or interface used to purchase goods online. For example, some consumers stated that seals indicate high ease of use of a website. Lastly, *Perceive product quality* is linked to the quality of the products offered in three dimensions: first, products are delivered as described, second, products exhibit certain idiosyncrasies such as fair trade, and third, products are not counterfeit. Furthermore, we found the effects of web assurance seals on consumers that can be considered to constitute signals to overcome hidden actions from a signaling theory perspective. Consumers argue that web assurance seals ensure a low level of fraud potential, which lowers their risk perception (ex-ante), as well as that web assurance seals, represent measures that ensure recovery of consumers' conceded assets in case something unexpected will be happening (ex-post). Hence, *Perceive risk minimization* as an effect was framed. Similarly, we found *Perceive Safety* as an often conceived and overarching effect. As consumers stated, when noticing web assurance seals "*online shopping feels safer*". In general, certified websites communicate a safe and reliable way of doing online shopping, in which (potential) consumers do not have to conduct safety and security checks on their own (as far as possible). Given the e-commerce contexts, our study further unveiled intentions and effects related to consumers' perceived levels of IT-security, data protection as well as consumer protection. The effect *Perceive IT-security* is related to perceived technical security safeguards and measures applied by the online vendor and their respective information systems. A consumer stated that "*seals confirm the prevention of information and data abuses*". Vendors' intent to *Signal data protection* match with the effect *Perceive data protection*. Participants agreed that web assurance seals assure a confidential and safe usage of their data, which is becoming more and more important in modern electronic markets. Regarding vendors' intention to *Signal consumer protection*, we also identified the corresponding consumer effect *Perceive consumer protection*. Participants acknowledged that the effect captures consumers' protection in case of misbehavior originating from the vendor. That is, some

seals testify a money-back guarantee when products do not exhibit the characteristics as expected or promised by the online vendor. Some participants stated that issuing seal authorities may serve as arbiters for consumers given a potential dispute settlement.

6.4.3 Web Assurance Seals Influence Consumers' Affect

Signaling literature acknowledges that receivers, depending on their idiosyncrasies, interpret signals differently (Perkins and Hendry 2005). Receivers' interpretation is outlined as the process of translating signals into perceived meaning (Connelly et al. 2011). We found that web assurance seals as signals influence consumers' affect (i.e., beliefs, emotions, and attitudes) (Limayem and Hirt 2003; Triandis 1979) and hence, stimulate cognitive trust-building processes (Kim and Benbasat 2006). For instance, the effect *Increase interest* captures a rather positive belief or attitude (Evans 1971). One participant mentioned that web assurance seals increase her or his general interest in the seal itself and how it has been obtained (i.e., assessment process). In this regard, effect *Induce interest* can be considered a precursor of trust. Herein we adopt the definition of trusting belief (McKnight et al. 2004) for the identified *Induce Trust* effect further taking into account trust, trustworthiness, as well as trust transference (cf. Lowry et al. 2012). Participants stated that web assurance seals verify the trustworthiness of online shops due to the examination of an independent third-party. Participants also mentioned that "*seals support my trust in an online shop because I trust the seal issuing instance*", referring to trust transference. *Increasing consumers' trust* in the vendor is also one main intention of online vendors when acquiring web assurance seals. Contrary, *Induce apathy* emerged as an effect that captures consumers' emotions of apathy or indifference (Marin 1991). Some participants delineated that the simple presence of web assurance seals does not "*arouse or influence me in any way*". In contrast, to *Induce apathy*, in which web assurance seals "only" facilitate a state of indifference, the effect *Induce skepticism* – a disbelief (cf. Obermiller and Spangenberg 1998) – has an opposing and dismissive impact. Participants stated that, when seeing web assurance seals, they are not acquainted with, they tend to question the seriousness and reliability of the respective vendor ("*When seeing an unfamiliar seal, I feel rather insecure than more secure*").

6.4.4 Web Assurance Seals Influence Stakeholders in the Environment

Signals are not only used to bridge information asymmetries between the signaler and an individual but also between the signaler and a collective whole – the signaling environment (Connelly et al. 2011). Therefore, the meaning assigned to a signal is not only a function of the receivers' interpretation (e.g., consumers, competitors, or suppliers) but also of a collective belief (e.g., the market in general) (Langfield-Smith 1992). In line with this, we found that vendors acquire web assurance seals to “*achieve competitive advantages over other vendors*”, framed as *Achieve competitive advantages*. In this regard, vendors also stated that web assurance seals *Increase Comparison* between competitors as “*consumers evaluate seals and can compare an offer with other trustworthy offers*”. Some vendors intend to acquire web assurance seals because they feel *Pressure from stakeholders* (e.g., the public, consumers, competitors, suppliers, or governmental institutions). Vendors mentioned that they have to follow certain mandatory or voluntary requirements to be successful in their respective markets. In some cases, vendors even hope to ease their access to markets, framed as *Gain market access* because web assurance seals prove the compliance to minimum standards making the vendor eligible to enter a market.

6.4.5 Web Assurance Seals Lead to Internal Improvements of Vendors

The last category considers intentions of vendors to acquire web assurance seals that do not occur and act as signaling effects on the consumer side (at least not directly) but aim to improve vendors' internal conditions, thus representing the internal perspective (Table 18). When undergoing an attestation process, vendors value to *Gain access to experts*. Seal authorities' profound knowledge and experience in online vendors' businesses and technological and organizational safeguards can be regarded as complementary resources that can be leveraged to improve existing systems and processes. Through web assurance seals, a vendor's IT security standards can be assessed and improved (if necessary) as shown by the intention *Increase IT security*. As one vendor stated: “*with seals, we also check our existing systems with regards to security aspects*”. Likewise, vendors aspire to *Achieve legal conformity*. The seal attestation process provides vendors support for improving the conformity regarding legal

requirements of an online vendor's business, particularly by reviewing online vendors' general terms and conditions as well as related legal texts. In doing so, seal attestations can note weak points regarding legal compliance, which might have led to penalties from consumers in the future. Similarly, vendors mentioned that internal *quality and productivity* are *improved* through the assessment process. While achieving these internal improvements, vendors also intend to *Increase consumer satisfaction*: "It is part of our consumer service to provide [...] a degree of security for the consumer". Finally, vendors claim that acquiring seals help them to *Achieve a better web search ranking*: "appearance at the top of a Google search". Nevertheless, while the specific search algorithms are opaque and constantly evolving, the online community dealing with search engine optimization remains uncertain whether embedding independent reviews and seals impacts search results.

While these intentions to acquire web assurance seals cannot be considered to signal certain hidden information or actions of the vendor nor do they influence consumers' affect, they indirectly impact the signaling process because they positively influence the signaling fit. Signal fit is a characteristic of the signal and outlined as the correlation between the idiosyncrasies of a signal and the unobservable quality of the signaler (Connelly et al. 2011). Internal improvements positively affect signaler's quality resulting in an increased alignment between the signal and the true quality of the signaler, thus increasing signal fit.

6.5 Comparing Vendors' and Consumers' Weighting

6.5.1 Consumers' Selections and Rankings

Following Schmidt et al. (2001), we let the consumer and seal authority independently pare down and rank the lists of web assurance seal effects. After the selection phase, the participants from the consumer panel deemed 11 out of 15 effects important. With selection rates of 90%, *Perceive data protection* and *consumer protection* were rated among the most important effects next to *Induce trust* and *Perceive risk minimization*. In contrast, only 14% marked *Induce interest* and 38% chose *Induce apathy* as important effects. Analog, we analyzed web assurance seal effects from the seal authority panel after the selection phase. All seal authority participants chose *Perceive vendor quality*, *data protection*, *consumer protection*, and *Increase purchase intention* as being relevant

to them. *Induce apathy* (32%) and *Induce skepticism* (74%) are the least often chosen effects among seal authority experts, however, *Induce skepticism* was still considered for the ranking phase given a threshold of 45%.

To be able to compare the ranking results, we calculated the mean rank (=sum of means/number of data points of each effect). Overall (and after the second-ranking phase), the top three effects that consumers named when seeing web assurance seals are *Perceive consumer protection* (mean rank=3.52), *risk minimization* (mean rank=4.38), and *safety* (mean rank=4.76). Contrary, seal authority experts' first three effects were *Induce trust* (mean rank=1.20), *Perceive safety* (mean rank=2.20), and *risk minimization* (mean rank=4.20). On the other end, consumers rated *Perceive vendor quality* (mean rank=7.00), *website quality* (mean rank=8.38), and *product quality* (mean rank=9.44) as least important, while web assurance seal experts ranked *Increase vendors' reputation* (mean rank=7.40), *Perceive website quality* (mean rank=8.80), and *Induce skepticism* (mean rank=9.40) as the three least important effects. The selection and ranking results of consumers' perceived web assurance seal effects are depicted in Table 22.

Category	Effect	Origin Source	Consumers	Seal authorities	Total
			Rank (selection rate in %)	Rank (selection rate in %)	Effect rank (mean rank)
Encourage consumers to purchase	<i>Make Payments</i>	CP	7 (86)	-	6 (5.83)
	<i>Increase purchase intention</i>	CP, SAP	(48)	4 (100)	5 (5.00)
Convey hidden information and hidden actions	<i>Perceive vendor quality</i>	CP, SAP	9 (76)	5 (100)	9 (6.20)
	<i>Perceive website quality</i>	CP, SAP	11 (52)	8 (79)	11 (8.59)
	<i>Perceive product quality</i>	CP	10 (52)	-	13 (9.44)
	<i>Perceive risk minimization</i>	CP, SAP	2 (90)	3 (84)	4 (4.29)
	<i>Perceive safety</i>	CP, SAP	3 (86)	2 (84)	2 (3.48)
	<i>Perceive IT-security</i>	CP	6 (81)	-	7 (5.88)

	<i>Perceive data protection</i>	CP, SAP	5 (90)	6 (100)	8 (5.92)
	<i>Perceive consumer protection</i>	CP, SAP	1 (90)	4 (100)	3 (4.26)
	<i>Increase vendors' reputation</i>	CP, SAP	8 (62)	7 (95)	10 (7.53)
Influence consumers' affect	<i>Induce apathy</i>	CP	(38)	(32)	-
	<i>Induce skepticism</i>	CP, SAP	(43)	9 (74)	12 (9.40)
	<i>Induce interest</i>	CP	(14)	-	-
	<i>Induce trust</i>	CP, SAP	4 (90)	1 (100)	1 (3.12)
Kendall's <i>W</i>			0.510	0.753	

Note: CP=consumer panel; SAP=seal authority panel; mean rank=sum of mean ranks/number of data points

Table 22: Delphi results: consumers' perceived web assurance seal effects

6.5.2 Vendors' Selections and Rankings

Our results show that nine intentions to acquire web assurance seals were deemed important by at least 45% of vendor experts. *Signal integrity* (100%) was the most often selected intention. With selection rates of 93% *Acquire consumers* and *Increase consumers' trust* were the second most selected intentions, followed by *Increase consumer satisfaction* with a selection rate of 87%. Yet, the least often selected intentions are *Increase comparability* with 20% and *Gain market access* 27% selection rates. Applying also a 45%-threshold for seal authority panelists, experts selected eight intentions among which *Achieve competitive advantages* (84%), *Signal integrity* (79%), and *data protection* (68%) were the most often chosen intentions to acquire web assurance seals in e-commerce. On the other end, only 5% chose *Increase comparability*, 21% *Achieve better web search ranking*, and 26% *Gain market access*.

Category	Intention	Origin Source	Vendors	Seal authorities	Total
			Rank (selection rate in %)	Rank (selection rate in %)	Intention rank (mean rank)
	<i>Acquire consumers</i>	VP, SAP	4 (93)	2 (53)	3 (3.64)

Encourage consumers to Purchase	<i>Increase sales & profits</i>	VP, SAP	- (40)	- (32)	-
Convey hidden information and hidden actions	<i>Signal data protection</i>	VP	7 (60)	5 (68)	8 (6.62)
	<i>Signal integrity</i>	VP, SAP	2 (100)	3 (79)	2 (2.92)
	<i>Signal buyer protection</i>	VP	- (12)	- (38)	-
	<i>Increase transparency</i>	SAP	-	4 (63)	6 (5.40)
	<i>Use as a marketing tool</i>	VP	6 (67)	- (37)	9 (6.67)
Influence consumers' affect	<i>Increase consumers' trust</i>	VP, SAP	1 (93)	1 (58)	1 (1.27)
Influence stakeholders in the environment	<i>Gain market access</i>	VP	- (27)	- (26)	-
	<i>Achieve competitive advantages</i>	VP, SAP	5 (47)	7 (84)	7 (6.00)
	<i>Pressures from stakeholders</i>	VP	(*)	(*)	-
	<i>Increase comparability</i>	VP	- (20)	- (5)	-
Internal improvements of vendors	<i>Improve quality and productivity</i>	VP	- (40)	- (42)	-
	<i>Gain access to experts</i>	VP	- (33)	- (37)	-
	<i>Increase consumer satisfaction</i>	VP, SAP	3 (87)	6 (53)	4 (4.67)
	<i>Achieve better web search ranking</i>	VP	- (33)	- (21)	-
	<i>Achieve legal conformity</i>	VP, SAP	4 (67)	4 (47)	5 (5.04)
	<i>Increase IT security</i>	VP, SAP	8 (53)	- (32)	10 (8.67)
Kendall's W			0.756	0.659	

Note: VP=vendor panel; SAP=seal authority panel; mean rank=sum of mean ranks/number of data points; * an aggregation comprising different types of pressures (i.e., consumer and competitor pressures) that were not selected

Table 23: Delphi results: vendors' intentions to acquire web assurance seals

The top three intentions for vendors to acquire web assurance seals were *Increase consumers' trust* (mean rank=1.33), *Signal integrity* (mean rank=2.83), and *Increase consumer satisfaction* (mean rank=3.33). This was partially supported by the opinions of seal authority experts. They ranked *Increase consumers' trust* (mean rank=1.20), *Acquire consumers* (mean rank=2.60), and *Signal integrity* (mean rank=3.00) as most important. On the other hand, vendors ranked *Use seals as a marketing tool* (mean rank=6.67), *Signal data protection* (mean rank=7.83), and *Increase IT security* (mean rank=8.67) as the least three intentions to acquire web assurance seals for their online shops. Experts from the seal authority panel ranked, similarly to the vendor experts, *Signal data protection* (mean rank=5.40) among the last three intentions. The other two are *Increase consumer satisfaction* (mean rank=6.00) and *Achieve competitive advantages* (mean rank=7.00). The selection and ranking results of vendors' intentions to acquire web assurance seals are depicted in Table 23.

6.6 Discussion

This study aimed to provide a multi-perspective view on web assurance seals to extend our understanding of web assurance seal effectiveness. We started with identifying both, effects that occur when consumers perceive web assurance seals and intentions of vendors to acquire web assurance seals. We did so by applying a multi-perspective Delphi study with three panels comprising consumers, vendors, and seal authority experts. Synthesizing the results from the respective panels not only constitutes a unique way to research web assurance seal effectiveness but enables to contrast consumer perceptions and vendor intentions to come up with novel insights that can provide a basis for research to move forward.

6.6.1 Comparing Vendors' Intentions and Consumer's Perceptions

When revisiting the previously presented results, it becomes evident that we uncovered a mismatch regarding vendors' intentions to acquire web assurance seals and consumers' perceptions of web assurance seals, which has several implications for web assurance seal research.

First, we show that the importance of effects and intentions identified in consumer and vendor panels differ. Based on the cumulated results from the consumer and the seal authority panel, *Induce trust* (mean rank=3.12), *Perceive safety* (mean rank=3.48), and

Perceive consumer protection (mean rank=4.26) were the most important effects that consumers perceive when recognizing web assurance seals. Accumulating results from the vendor and seal authority panel, *Increase consumers' trust* (mean rank=1.27) is also the most important intention to acquire web assurance seals. Yet, the second and third most important intentions are *Signal integrity* (mean rank=2.92) and *Acquire consumers* (mean rank=3.64), therefore, indicating the first hint for a mismatch between consumers' perception of and vendors' intentions to acquire web assurance seals.

Second, we analyzed the identified effects and intentions within the respective theoretical categories. While consumers and vendors both agree that *web assurance seals aim to encourage consumers to purchase*, we identified several mismatches between the other theoretical categories. Starting with the category *web assurance seals aim to convey hidden information and hidden actions*, the study results show that vendors and consumers both value web assurance seals as signals to reduce prevalent information problems (e.g., hidden information or action). Yet, the type of information or action to be transferred in the respective signals such as seals and how they are perceived by stakeholders differs substantially (see Section 6.6.2 for a detailed discussion).

The third rationale that underlines a mismatch between intentions and actual effects of web assurance seals, is the fact that a signal is not necessarily a tailored measure to be received by only one type of receiver (e.g., consumers), but by various receivers (e.g., consumers, competitors or the market in general) at the same time. In particular, we identified intentions where no counterpart effect could be identified. For instance, vendors intend to use web assurance seals not to address their consumers but their environment, as embodied in the category *web assurance seals influence stakeholders in the environment*, or acquire web assurance seals to achieve internal improvements (see Section 6.6.3 for a detailed discussion).

Finally, inspecting the category *web assurance seals influence consumers' affect*, one can derive an additional mismatch between vendors' intentions and consumers' perceived effects. Whereas vendors aim to increase trustworthiness, consumers perceive a far more diverse and surprising set of effects (see Section 6.6.4 for a detailed discussion).

6.6.2 Comparing Study Findings with Prior Literature on Web Assurance Seals' Effects on Consumers

Our study supports the refinement of our understanding regarding the three – in web assurance literature often researched effects – trust, perceived assurance, and purchase intention. We confirm that *increasing consumers' trust* is an important effect, given the high ranks in multiple panels (rank 1 seal authority and vendor panel, rank 4 consumer panel). More importantly, our results confirm that trust takes a dual form in the context of web assurance seals. First, consumers' trust in online vendors is increased because information asymmetries are reduced, and web assurance seals confirm vendors' integrity, competence, and benevolence. Second, the mechanism of trust transfer takes place to increase consumers' trust as highlighted by diverse consumers in our panel: *"Online shops that display seals are trustworthy because those institutions that issued the seal are trustworthy"*. Assuming that a seal authority is trustworthy, a seal can establish a cognitive association between a certified vendor and a seal authority whereby a consumer's trust in a seal authority is transferred to a certified vendor (Doney et al. 1998). Although prior studies on web assurance seal effectiveness acknowledge the potential occurrence of trust transference (e.g., Hu et al. 2010; Kim and Kim 2011), existing studies have neglected to test whether and how trust transference takes place in the context of web assurance seals. We thus recommend seal research to consider the duality of trust when analyzing seal effectiveness. Prior research has already shown that consumers' perceived credibility of the seal authority plays an important role in achieving seals' intended effects (Wakefield and Whitten 2008). A fine-grained analysis of trust mechanisms may help to understand boundary conditions of seal effectiveness, for example, in contexts where seal authorities are not perceived as trustworthy, and thus trust transference is disturbed. Hence, online vendors should be cautious when selecting seal authorities because consumers' perceived credibility and trustworthiness of these authorities might have an impact on acquired seal effectiveness.

This research also provides a more nuanced view on *increasing consumers' perceived assurance*. Prior research has mostly operationalized perceived assurance regarding reducing security and privacy concerns of consumers (e.g., Kim et al. 2008c; Kim and Kim 2011; Lowry et al. 2012). While our study findings confirm that vendors acquire seals to convey secure, reliable, and confidential handling of consumers' data (i.e.,

intention *Signal data protection*), consumers report that they also *Perceive vendor, website, or product quality* when seeing web assurance seals. In addition, we not only found evidence for context-specific effects on consumers depending on the objectives and content of the seal but also for the fact that consumers derive effects from seals independent of their actual specification and that misconceptions may arise about seals' true meaning. For instance, *Perceive safety* was referred to as: "*I feel safer when recognizing seals*" by one consumer, while another stated: "*The online shop displaying seals seems to be safer than non-certified shops*". The concept of safety, typically defined as the absence of risk, is very broad and it remains vague what consumers are actually expecting from the seal. Similarly, the effect *Perceive risk minimization* reflects a broader perception of seals. On the other hand, *Perceive consumer protection* captures the very specific idea of a shop that has to provide a money-back guarantee in case of unsatisfying delivery, which is not part of every seal (cf. Hu et al. 2010; Lansing et al. 2019). As one consumer stated: "*I see seals as a guarantee of low fraud potential and that I will receive my money back, in case, I do not want the product anymore*". Thus, our findings highlight that some consumers may form a general assurance perception of seals (e.g., feeling safe and expecting fewer risks), while others may have specific expectations regarding the assurances a seal provides (e.g., providing money-back guarantees). Early research findings on seals might provide reasoning because it was shown that an expectation gap might exist between the intended assurances and perceived qualities of web seals—even when the seal in question has been widely adopted (Houston and Taylor 1999; Lala et al. 2002; Odom et al. 2002). Such an expectation gap may result because consumers often do not understand what seals are, what they stand for, and how to interpret and classify the information they intend to convey (Kimery and McCord 2006; Milne and Culnan 2004; Moores 2005). We, therefore, recommend research on web assurance seal effectiveness to take a look at the content of the seal under examination (e.g., security vs. quality seal) and prevalent information asymmetries (e.g., hidden information concerning product qualities). Then, researchers should identify (context-specific) effects on consumers to better operationalize the effect *perceived assurance*. In addition, research may control for whether consumers understand the assurances the seal under examination provides to ensure that intended effects are perceived, or whether a limited understanding leads to confounding effects, such as only increasing consumers' general perception (e.g.,

Perceive safety and risk minimization). Online vendors should also carefully elaborate on the content of seals to ensure that they are signaling their unobservable qualities to consumers (cf. Lansing et al. 2019).

Regarding *increasing consumers' purchase intention*, our study shows mixed and surprising findings. Whereas each seal authority expert selected the effect *Increase purchase intention*, only 47.62% of the consumers selected this effect. Instead, consumers perceive seals as guarantees for secure payments: “*I believe that payment transactions with certified online shops, in general, are more secure than with shops that do not own a certificate.*” – leading to the assumption that seals indirectly impact their purchasing behavior. In line with this, we recommend seal research to consider identifying potential mediators impacting the influence of seals on consumers' purchase intentions. Trust and perceived assurance, for example, have been regarded as antecedents for consumers' behavioral intentions (Kim and Kim 2011; Lowry et al. 2012; McKnight et al. 2002b), and thus seals might have an indirect effect on purchase intention via increasing consumers' trust and perceived assurance (cf. Löbbers and Benlian 2019). We thus propose that researchers should not only analyze the direct effect of seals on purchase intention but also examine the role of potential mediators for consumers' purchase intention to control for indirect effects of seals. Our recommendation is thus consistent with recent calls for contextualized theory (i.e., considering context-specific mediation and moderation effects) in the broader IS discipline (Hong et al. 2014; Ogbanufe et al. 2019).

6.6.3 Comparing Study Findings with Prior Literature on Vendors'

Intentions to Acquire Seals

We identified the diverse intentions of online vendors to acquire web assurance seals. Some of these intentions are consistent with prior literature, such as *Increase sales and profit* (Corbett et al. 2005; Disterer 2012; Gopal and Gao 2009; Kammoun and Aouni 2013), *Improve quality and productivity* (Heras-Saizarbitoria et al. 2011; Martínez-Costa et al. 2008; Nair and Prajogo 2009), and *Achieve competitive advantages* (González-Benito and González-Benito 2005; Heras-Saizarbitoria et al. 2011; Terlaak and King 2006). Our results thus provide a first indication that there is a set of factors impacting organizations' intentions when deciding to acquire a web assurance seal that is independent of the actual contexts, such as electronic markets or environmental

certification. Contrary, we found intentions that were not present in prior literature and are specific to electronic markets, including *Signal data protection*, and *Achieve legal conformity*. These differences mainly relate to the actual content of the seal (i.e., what is certified), such as security and privacy requirements for online platforms. Consequently, our findings also support our assumption that intentions in electronic markets differ from motives in related disciplines.

Moreover, our results demonstrate that web assurance seals do not only serve as signals to bridge information asymmetries between consumers and vendors but also to address other stakeholders in the signaling environment. In line with signaling theory, the interpretation of a signal is not only a function of a single receiver but can also inform collective beliefs (Langfield-Smith 1992). Therefore, it can be argued that a certain signal can be received and evaluated by various receivers. Nevertheless, our results confirm that the intended signal objective might diverge, such as to comply with pressures from external stakeholders or to achieve advantages over competitors, requiring a multi-receiver perspective to study signal effectiveness. This situation can further be impaired by environmental noise that originates from the signaling environment, other signalers with similar aims or external referents (Connelly et al. 2011). Consequently, when planning to acquire web assurance seals, vendors should critically evaluate who may be receiving the signal and then acquire a web assurance seal that best fits the information problem to be overcome.

Finally, our results show that vendors acquire seals to achieve internal improvements (e.g., *Increase IT security* or *Gain access to experts*). Nevertheless, our brainstorming phases reveals that 12 out of 18 intentions are related to external intentions, which were also more often selected and higher ranked than internal intentions. Revisiting our initial question, whether online vendors are more driven by external than internal intentions (see Section 6.2.2.1), we can conclude that our results give an initial indication that external intentions are more important in electronic markets. In addition, taking a signaling theory perspective, we propose that internal intentions to acquire web assurance seals also improve signaling fit as described above and, therefore, improving signal effectiveness indirectly. Consequently, when analyzing web assurance seals effectiveness, researchers should evaluate the indirect or long-term effects of web assurance seals too, to better understand and predict web assurance seals' true effectiveness.

6.6.4 Unintended Effects of Web Assurance Seals

Although we found that trust, as a belief, is the most important effect when recognizing web assurance seals as well as intention to acquire web assurance seals, our findings, surprisingly, also revealed unintended effects of seals on consumers, such as *Induce apathy* and *Induce skepticism*. We assert that due to variances in signal interpretation among receivers (Connelly et al. 2011; Lansing et al. 2019) unintended side effects can arise. Our results show that consumers felt emotionally apathetic when recognizing web assurance seals: “*web assurance seal do not arouse me in any way*”. Signaling theory provides rationales as apathy might be a result of weak signaling strength, for example, because of a low signaling fit (Busenitz et al. 2005). Moreover, consumers even mentioned opposing or dismissing beliefs when seeing web assurance seals such as *Skepticism*. One consumer stated: “*When seeing unfamiliar web assurance seals, I question the seriousness of the online shop*”. As such, the signal failed to achieve its intended effect, which further emphasizes a mismatch between vendors’ intentions and consumers’ perception of web assurance seals. More importantly, this is a surprising finding because previous studies have only explicitly identified trust as a positive effect of web assurance seals. With this study, we show that extremely opposing effects (i.e., skepticism) may be induced for consumers. Both, from theoretical as well as practical perspectives, this finding is of highest relevance because it provides deeper insights about the volatility of consumer perceptions in digital contexts. Thus, signal effectiveness may be balanced *on a razor edge*.

According to the rationales of signaling theory, an explanation for the emergence of skepticism might be a lacking signaler’s honesty. Signaler’s honesty defines the degree to which the signaler is capable of meeting the characteristics as promised by the signal (Durcikova and Gray 2009). Such low signaler’s honesty was also reported in negative media news about seals throughout the last years. Media frequently warns consumers that online vendors may embed fake seals on their websites. Similarly, blog entries (e.g., Hoffmann (2014a)) and consumer reports (e.g., Mandle (2009)) instigate consumers to be skeptical about issued web seals. Consumers’ skepticism toward seals may also be strengthened due to famous incidents that became public, as in the case of *TRUSTe* (Rodrigues et al. 2013). *TRUSTe* provides web seals assuring consumers that businesses’ privacy practices comply with specific privacy standards. *TRUSTe*, however, has been

given a \$200,000 fine by the US Federal Trade Commission after consumers were deceived into thinking that *TRUSTe* was doing proper auditing of those organizations displaying its web seal (Federal Trade Commission 2014). In fact, *TRUSTe* allowed commercial websites and mobile apps to display their web seal but did not verify whether these websites and apps were indeed meeting privacy standards (Los Angeles Times 2014).

While negatively connoted, affective influences have not been part of prior investigations on seal effectiveness, we recommend seal research to control for potential unintended effects, such as consumer skepticism. Likewise, research might add moderators on the relationship between the presence of seals and their intended effects, for example, consumers' willingness to depend on the seals or general attitude toward the seals to control whether consumers value the seal in general. Including these variables in theory building, especially potential effect moderators, may help to get a more comprehensive picture of seal effects and define potential boundary conditions helping to uncover origins of the seal effectiveness variation. A deeper understanding will also help vendors and seal authorities to prevent such unintended effects.

6.7 Conclusion

Previous web assurance seal literature has been impeded by the fact that research findings were based on a unilateral view on web assurance seals. That is, web assurance seals have been researched either from the vendor or the consumer perspective. However, the nature of web assurance seals, as shown in this study, contradicts this approach. Hence, the paper at hand has examined web assurance seals in a novel way, that is, by using a multi-perspective approach that advances our understanding of the phenomenon under investigation. In doing so, we reveal a mismatch between perceived and intended effects of web assurance seals.

6.7.1 Theoretical Implications

Our study has several implications for research (summarized in Table 24): Although embodying valuable contributions, previous research has applied a lopsided (and hence limited) view on web assurance seals. That is the analysis of web assurance seals from either a consumer (perceptions) (e.g., Kim and Kim 2011; McKnight et al. 2004; Özpolat et al. 2013), or vendor (intentions) perspective (e.g., Gopal and Gao 2009;

Heras-Saizarbitoria and Boiral 2013; Prajogo 2011) only. To the best of our knowledge, this is the first study to utilize a multi-perspective investigation on web assurance seals in e-commerce. Using signaling theory as our theoretical lens, we derive five aggregated categories of intentions and effects that enable better comparison and theoretical grounding. For each category, we show an incongruence between what web assurance seals as signals are intended by vendors to transfer versus what is truly perceived by consumers. We not only reveal that the importance of effects and intentions identified in consumer and vendor panels differ but also revealed intentions were no counter-part effects could be matched and vice versa. For example, whereas vendors aim to increase trustworthiness, consumers perceive a far more diverse set of effects. These advancements expand our knowledge to allow for a more differentiated and nuanced analysis of web assurance seal effectiveness.

Second, while extant research analyzes organizations' motivations to adopt certifications that are based on ISO standards (Heras-Saizarbitoria and Boiral 2013; Marimon and Casadesús 2017), it remains unclear whether motives are applicable and relevant in electronic markets, which is an essential context in everyday life. By conducting a Delphi study with stakeholders from electronic markets and identifying 18 intentions to acquire a web seal, we were able to confirm that certain intentions of related streams are applicable in electronic markets, proving that that certain intentions are context-independent. Additionally, our Delphi study leads to the identification of novel motives that have not been discussed in related literature to date and are specific for electronic markets, such as *Signal data protection* and *Achieve legal conformity*. We further inform research by giving an initial indication that external intentions are more important in electronic markets, thereby helping to resolve prevalent debates about whether vendors' intentions of seal acquisitions are more internally or externally driven (Djofack and Camacho 2017).

Third, we provide a more nuanced analysis of the effects of web assurance seals, discussing 15 effects compared to prior research that mostly uses an exclusive set of three effects, namely perceived assurance, trust, and purchase intention. We not only refine our understanding of these effects but also identify effects of web assurance seals that have been overlooked in previous research (e.g., skepticism or apathy). By relating our findings to prior research, we derived several recommendations for research on web

assurance seals (see Table 25). These advancements expand our knowledge to allow for a more nuanced analysis of web assurance seals' effects on consumers.

Fourth, our findings contribute to the signaling theory knowledge base by demonstrating that scholars should consider a shift from researching unilateral signaler–receiver relations to more complex signaler–multi-receiver relations (e.g., consumers *and* competitors), considering multiple actors in the signaling ecosystem (Löbbers and Siegfried 2018). Whereas prior web assurance seal research was mainly on the isolated influence of one or more signals on a single target group (e.g., consumers) (e.g., Aiken et al. 2014; Mavlanova et al. 2016), with this study we provide deeper insights about why vendors acquire seals to influence their signaling environment.

Previous research gaps	This study's findings	Implications for research
Although embodying valuable contributions, previous research has applied a lopsided (and hence limited) view on web assurance seals. That is the analysis of web assurance seals only from a consumer (perceptions) (e.g., Kim and Kim 2011), or vendor (intentions) perspective (e.g., Gopal and Gao 2009).	A comparison of vendors' intentions and consumers' perceived effects across five theoretical categories.	<p>We advance seal research by uncovering a mismatch regarding vendors' intentions to acquire web assurance seals and consumers' perceptions of web assurance seals.</p> <hr/> <p>We not only contribute to research by revealing that the importance of effects and intentions identified in consumer and vendor panels differ but also by identifying intentions were no counter-part effect could be identified and vice versa.</p> <hr/> <p>By comparing our findings with prior research, we also derive several recommendations for research on web assurance seals.</p>
Extant research analyzes organizations' motivations to adopt certifications that are based on ISO standards (Heras-Saizarbitoria and Boiral 2013; Marimon and Casadesús 2017). It remains unclear whether motives are applicable and relevant in electronic markets. In addition, prior research is debating whether vendors' intentions of seal acquisitions are more internally or externally driven (Djofack and Camacho 2017).	A rank-order list of 18 intentions to acquire web assurance seals.	<p>We contribute to research by validating that certain vendor intentions of related research streams are applicable in electronic markets. Further we identify novel intentions that have not been discussed in related literature to date and are specific for electronic markets.</p> <hr/> <p>This finding supports certification research by revealing the existence of context-independent and context-specific intentions that should be considered when analyzing vendors' intention to acquire web assurance seals.</p> <hr/> <p>We further inform research by giving an initial indication that external intentions are more important in electronic markets, thereby helping to resolve prevalent debates.</p>
Empirical work exhibits inconsistent findings regarding the effectiveness of web assurance seals (Kim et	A rank-order list of 15 effects that consumers perceive when	We contribute to research by not only identifying novel effects of web assurance seals that have been overlooked in previous research (e.g., skepticism or apathy) but also refine our

al. 2016; Lansing et al. 2018; Löbbers and Benlian 2019). One of the multiple reasons behind the ambiguity of research findings lies in the use of an exclusive set of seal's effects, namely perceived assurance, trust, and purchase intention.	recognizing web assurance seals.	understanding of existing effects (i.e., trust, perceived assurance, and purchase intention). These advancements expand our knowledge to allow for a more differentiated and nuanced analysis of web assurance seal effectiveness.
Prior research mostly examines unilateral signaler–receiver relations (e.g., Aiken et al. 2014; Mavlanova et al. 2016).	Identification of vendors' intentions to address other stakeholders in the signaling environment by acquiring seals.	We inform research on signaling theory by acknowledging that signals can have multiple receivers at the same time. We recommend future research to consider multiple receivers when evaluating seal effectiveness, as such seals might also pertain to pressures of competitors, the public, or government.
Even though contemporary literature discusses signaling feedback (from the receiver to the sender) to improve signal effectiveness (Connelly et al. 2011), it neglects the influence of side effects that can occur parallel to the intended signaling effect.	Identification of signaling side effects, namely apathy and skepticism.	We advance research by revealing potential signaling side effects that constitute a potential boundary extension to signaling theory. We thus recommend future seal research to control for potential unintended effects. While discussing origins for side effects, we add to web assurance seal literature by highlighting the need for signals to be understood by the receiver (McCoy et al. 2009).

Table 24: Summary of the main findings and their relation to existing certification research

Finally, with this study, we also contribute to signaling theory literature, as we uncover an additional concept worth spending consideration: *signaling side effects*. Signaling side effects constitute a potential boundary extension to signaling theory. Even though contemporary literature discusses signaling feedback (from the receiver to the sender) to improve signal effectiveness, and the influence of the signal environment being a source of signal distortion (Connelly et al. 2011), it neglects the influence of side effects that can occur in parallel to the intended signaling effect. In this way, the identified *signaling side effects* apathy and skepticism may play an important role concerning the complexity of evaluating signal effectiveness. While discussing origins for side effects, we also add to web assurance seal literature by highlighting the need for signals to be understood by the receiver (McCoy et al. 2009). Otherwise, web assurance seals might not only be ignored but also induce negative and counteracting side effects.

6.7.2 Practical Implications

Besides theoretical implications, this work also has implications for practice. First, caused by the mismatch of web assurance seals perceptions and intentions, vendors should crucially evaluate web assurance seals content with, first, their aims regarding the type of information problem to overcome (e.g., unobservable vendor characteristics to signal) and second, evaluate (e.g., utilizing web tracking mechanisms) what their respective consumers perceive or value when recognizing web assurance seals. Second, for seal authorities, we provide the groundwork to improve the seal design to suppress undesirable side effects that weaken the quality and strength of web seals as signals. Third, based on our finding that web assurance seals may not only be received by consumers but also by competitors, legal authorities or the market in general (i.e., collective belief), seal authorities should tailor or multipurpose their web assurance seals as to better target the individual audience or various audiences, respectively.

6.7.3 Limitations and Future Research

This study is subject to limitations. First, our results are based on the responses from initially 60 participants of which 25 (14 consumers, six vendors, and five seal authority experts) participated in all four rounds, leaving concerns regarding a sufficient sample size open. However, contemporary Delphi studies within the IS area exhibit even smaller sample sizes (Keil et al. 2002; Piccinini et al. 2015), and, following Okoli and Pawloski (2004), samples are not required to be statistically representative. However, we believe that we have produced results that exhibit above-average reliability, due to the combination of three separate, yet mutually supporting panels with the same goal. Second, as with every Delphi study, responses given by the participants are rather subjective. This also becomes evident when looking at the consensus calculated between participants (cf. Table 22 and Table 23). Besides, responses from seal authorities and vendors might be biased because experts wanted to emphasize the positive aspects of web assurance seals to ensure their effectiveness. Nevertheless, compared to other recent method-related studies, the consensus among participants was moderate to high, which we acknowledge as acceptable (Piccinini et al. 2015).

In general, Delphi studies are often treated as explorative starting points for further empirical investigations. We, therefore, first and foremost, call upon future research to

investigate and validate the identified web assurance seal effects of consumers as well as intentions to acquire web assurance seals for vendors. By comparing our results with prior research, we were able to derive particular recommendations for future research on web assurance effectiveness, summarized in Table 25. Especially, we encourage scholars to examine the most important effects revealed herein as well as controversial effects such as *Apathy* and *Skepticism*. In particular, and referring back to the two latter mentioned effects, the influence of consumers' personality traits on web seal effectiveness may be of prime interest for future research.

Related Variables	Recommendations
Trust	We propose that research should consider the duality of trust when analyzing seal effectiveness. First, consumer's trust in online vendors is increased because information asymmetries are reduced, and seals confirm vendor's integrity, competence, and benevolence. Second, trust transfer takes place if consumers perceive that a seal authority is trustworthy, a seal than can establish a cognitive association between a certified vendor and a seal authority whereby a consumer's trust in a seal authority is transferred to a certified vendor.
Perceived assurance	We propose that research should take a look at the content of the seal under examination (i.e., security vs. quality seal) and prevalent information asymmetries (i.e., hidden information concerning product qualities), and identify (context-specific) effects on consumers to better operationalize the construct perceived assurance.
Purchase intention	We propose that research should not only analyze the direct effect of seals on purchase intention but also examine the role of potential mediators (i.e., trust, perceived assurance) for consumers' purchase intention to control for indirect effects of seals.
Consumers' understanding of seals	We propose that research should control whether consumers understand the assurances a seal provides to ensure that indented effects are perceived.
Receiver of seals	We argue that research should consider multiple receivers when evaluating seal effectiveness, as such seals might also pertain to pressures of competitors, the public, or government.
Skepticism and Apathy	We recommend research to control for potential negative effects of seals, such as consumer skepticism.
Consumers' general perception of seal	We recommend research to add moderators on the relationship between the presence of seals and their intended effects, for example, consumers' willingness to depend on the seal or general attitude towards the seal to control whether consumers value the seal in general.

Table 25: Summary of recommendations for future research on web assurance effectiveness

7. Thesis Conclusion and Contributions

As certifications take an ever-increasing role in digital and especially online contexts as means to reduce online risks, researchers as well as practitioners are still in doubt about their true effectiveness. This thesis was motivated by the need to understand the ambivalent outcomes that IS certifications' effectiveness research has yielded so far. Using different perspectives within the IS certification ecosystem, this thesis provides distinguished explanations for why IS certifications might unfold their full potential in reducing online risks and therefore increasing perceived assurance in one case, whereas in another case they completely miss to influence human perceptions and thus, for instance, decision-making. In this section, the main theoretical and practical contributions are outlined. Applicable limitations to this study as well as avenues for future research conclude this section and therefore this thesis.

7.1 Theoretical Contributions

The approach of this thesis was to determine the role of the IS certification ecosystem's acting stakeholders in understanding and explaining the mechanisms and dynamics of IS certifications' effectiveness in digital and online environments. Using four different perspectives on IS certifications' effectiveness, it is shown how each of these perspectives provides a contribution in understanding the inconclusive results past research has produced. Consequently, this thesis provides a deeper and more differentiated understanding regarding the effectiveness of IS certifications.

First, a structured literature review was conducted to set the groundwork for further IS certification research and to contribute to the IS certifications' effectiveness discussion. This thesis (and the respective article 1) presents a state of the art literature synthesis (Schryen et al. 2015) that can be seen and used as a first step towards comprehensively understanding and explaining IS certifications in digital and online environments. The thesis at hand does not only provide transparency regarding the current state and progress of IS certifications' effectiveness domain (Hart 1998; Vom Brocke et al. 2009), but it identifies variables (i.e., trust, perceived assurance and purchase intention) levels of analyses and theories (e.g., trust theory, signaling theory, etc.) that are central to the domain of IS certifications' effectiveness research (Hart 1998). However, the review of literature especially uncovers a central issue (Cooper 1988; Cooper et al. 2009) that

serves as the first rationale in explaining the effectiveness' ambivalence: past research has used a variety of different theories (sometimes even no theoretical foundation) to explain and predict the effectiveness of IS certifications. However, comparing studies with different theoretical foundations is similar to comparing apples with oranges.

Second, from a consumer perspective, this thesis' findings exhibit that the effectiveness of IS certifications highly depends on the idiosyncrasies of the individuals perceiving and processing them. In general, different consumer characteristics (i.e., their personality) lead to different interpretations and sense-making of information signals such as IS certifications. Considering that "not all consumers are created equal" puts another light on past literature, which assumed in most cases uniformity of consumer characteristics and hence in the process of perceiving and interpreting information signals. With the thesis at hand, a more nuanced view on IS certifications as information signals and thus their sense-making is provided. In the context of the overall research question, the findings also constitute a cause why previous studies have produced such mixed results. Assuming that all consumers who are targeted by various certification or web assurance seals react in the same way might be too short-sighted for the complex IS certifications' effectiveness dynamics that are present in digital and online environments.

Third, from a vendor perspective, this thesis' research outcomes show that vendors in online environments use IS certifications for various reasons that are not by default associated with intentions to signal specific information (e.g., trustworthiness) to consumers. While this is might be true for most vendors, it was however found that vendors also use IS certifications for further internal as well as external purposes. While in the former case vendors aim to improve, for instance, payment or check-out processes based on the pre-defined evaluation criteria that need to be adhered to in order to obtain a certification, in the latter case, vendors utilize IS certifications to signal, for instance, compliance to a certain type of certification to their competitors, governmental institutions or the market in general (e.g., compliance to cloud computing standards specific for certain domestic markets). From that perspective, the definition of "effectiveness" needs to be reconsidered in order to fit the respective purpose that the vendor aims at. Otherwise, a mismatch between the intended vendor aim and the actual effectiveness measurement remains and IS certifications' effectiveness studies would continue to produce ambivalent results.

Fourth, past IS certification research has mainly investigated simple one-directional vendor-consumer-relationships. The herein presented research (cf. Article 4) applies a multi-perspective lens and is first of all able to show that vendors do not acquire IS certifications with the aim to only address a single target group, but sometimes also multiple groups simultaneously (e.g., consumers, competitors, governmental institutions). Second, it shows that the target group, the certification was supposed to address, does not necessarily perceive and process the signal as intended by the signaler (e.g., vendor). This circumstance leads to a situation where vendors' intentions can backfire, because consumers (or other signal receiving parties) perceive the IS certification in erroneous way or even not at all. In fact, the article 4 contributes to the signaling theory literature by proposing a concept called *signaling side effects* that represents the causation of unintentional and opposing IS certification effects (e.g., skepticism or apathy). Consequently, the mismatch between intentions and perceptions as well as the signaling side effects can be considered as another argument that serves as an explanation for the inconclusiveness of IS certifications' effectiveness in IS research. Moreover, article 4 contributes to IS literature by highlighting the multilateral and perceptual congruence nature of IS certifications and especially their effectiveness (Siegfried and Löbbers 2018). Perceptual congruence is pivotal to a variety of IS studies as can be seen by research that has evaluated the reciprocal perception and congruence between service providers and users (Benlian 2013, 2014).

Lastly, the research outcomes presented in this thesis extend past research by not only considering motivators for vendors to acquire IS certifications, but also by identifying de-motivators for vendors to acquire IS certifications. Based on this, one is able to dive deeper into the reasoning and sense-making of vendors in evaluating and deciding on the usage of IS certifications within their organization. Considering de-motivators allows to outline boundary conditions for IS certification adoption decisions that serve as an important guideline for IS certification effectiveness' research.

7.2 Practical Contributions

Besides the before mentioned theoretical contributions, this thesis also adds some important practical implications as well as actionable recommendations for vendors, certification authorities and consumers.

First, vendors should abstain from using IS certifications as a universal silver bullet. As this thesis' research shows, the effectiveness of IS certifications is highly reliant on consumers' personality traits. Vendors who are able to collect valuable consumer related information (e.g., by means of behavioral web tracking techniques) may use this information to improve their decision-making processes regarding IS certifications: first, by more narrowly targeting consumers as well as by applying and exposing IS certifications in the right stages of the consumer journey which can lead to improved consumer behavior towards the vendor (e.g., increase purchase intentions or shopping cart value). Second, vendors should thoroughly inspect, evaluate and compare available certifications. By better fitting the available IS certification to the information problem that needs to be overcome (e.g., signal hidden vendor characteristics or dispel consumer concerns regarding hidden actions), increased effectiveness of IS certifications might be ensured in the future.

Second, certification authorities might use this research as a basis to improve IS certification and seal design in order to overcome and suppress undesirable and unintended certification side effects that weaken the effectiveness of IS certifications as a signal. Against the backdrop of the herein presented findings, certification authorities should take into consideration a multi-purpose effect of IS certifications. This thesis demonstrates that IS certifications do not fit simple one directional vendor-consumer-relationships but are much more complex in a way that they are simultaneously recognized by competitors, legal authorities or the market in general (i.e., collective belief). Hence, IS certifications should be designed and tailored to either better address multiple heterogeneous groups or a single distinct target group, respectively.

Third and on the flip side, this research also postulates a cautionary message to consumers in general. Online consumers should evince prudence when taking IS certifications into account for a potential purchase decision. Personalized IS certification designs and promotional tactics become more and more disseminated constituting a red herring to push the boundaries of profit maximization. Therefore, the herein presented research findings also aim to raise consumers' awareness and foster a thorough assessment of the presented certification. In addition, consumers should take a look behind the scenes and inspect the respective authority or equivalent party that issued the certification or web assurance seal concerning their trustworthiness and integrity.

7.3 Limitations and Future Research

Beyond the specific limitations presented in the research through chapter 3 to 6, three major limitations generally apply to this thesis. First, literature reviews face the problem of rapid expiry (Schryen et al. 2017). Between the first submission of the literature review and the publication of the last article (i.e., article 3) of this thesis, roughly 2.5 years elapsed leaving possibly important contributions for the IS certifications' effectiveness discussion unnoticed. Additionally, literature reviews, especially in interdisciplinary disciplines like information systems research, are confronted with construct identity fallacies (i.e., diverging constructs names for the same phenomena – or vice-versa – within or across disciplines) (Larsen and Bong 2016; Schryen et al. 2017). This ontological issue makes it challenging for scholars to synthesize and interpret extant literature correctly. To counteract these issues, two facts come into play: first, the nature of writing standalone research articles for this thesis allows to incorporate new publications that are relevant to the research question on an ongoing basis, rendering it less likely to overlook highly relevant publications. Second, this thesis' literature review (cf. article 1) comprises, on the one hand, a great variety of outlets (i.e., the review includes adjacent research fields such as marketing or computer science), on the other hand, it utilizes abstract keywords (e.g., certif*) allowing for a wide range of potential literature matches, which will at least significantly reduce the possibility of unintentionally excluding relevant publications.

Second, the findings and contributions of this thesis rely on self-reported constructs (cf. article 2 – 4) to measure the variables under investigation. A resulting issue is, that the reliability and generalizability of the results may be undermined by common method variance or related distortions. Yet, appropriate and acknowledged ex-ante (e.g., appropriate experiment setup) as well as ex-post measures (e.g., application of statistical procedures) have been applied to reduce methodological influences that would potentially diminish the explanatory power of this research.

The third limitation is embodied in the experimental environment of this thesis. All empirical contributions of this thesis were conducted in simulated and hypothetical environments (e.g., a fictional online shop utilizing self-developed visualizations of IS certifications). While this prevents study participants to be biased through the influence of previous experiences they might have had with real online shops or other platforms

(e.g., amazon.com), it still poses a potential shortcoming as participants might have acted differently in real-life situations. However, using simulated or hypothetical environments is not only a commonly accepted approach in IS research (Chen and Hirschheim 2004; Gupta et al. 2018), but the main benefit of such approaches is the opportunity to reduce environmental noise (e.g., the impact of other unintentional influences during experiments) thereby allowing to fully ascribe identified effects to the phenomenon being researched (e.g., the influence of IS certifications).

Going forward, future research is encouraged to dive even deeper into explaining the principles of IS certifications and their effectiveness by sharpen previously taken perspectives and approaches as well identifying new avenues to enhance our understanding of IS certifications. First, previous research should dive deeper into the area of cognitive recognition of IS certifications. That is not only by researching other individual-related factors that come into play when perceiving IS certifications, but also by integrating these factors with other environmental (e.g., informational cues like consumer ratings and recommendations) or temporal and chronological (e.g., longitudinal) effects of IS certifications. Especially, future research might dive deeper into the change of IS certifications' effectiveness for repeated encounters on the same platform or with the same vendor (cf. Siegfried et al. 2020). Specifically, it would be of interest to see if the effect of IS certifications is transferable between websites or information systems provided by the same vendor that is certified according to a certain standard.

Second, future research should further aim to replicate the here presented observations conducted in simulated environments by using field experiments (Gneezy 2017), experience-sampling approaches (Fisher and To 2012) or other large scale empirical investigations. In doing so, research would be able to assess the dynamics of IS certifications in more realistic settings producing insights with increased external reliability.

Third, since it was demonstrated that IS certifications' effectiveness research is not of unilateral nature, future research might shed more light into the multi-directional aspects of IS certifications. Expanding this thesis' findings with large scale and multi-dimensional empirical results will further strengthen the validity of the presented findings. In doing so, research is able to move forward in more comprehensively understanding the effect mechanisms that take place when IS certifications are applied.

Eventually, the discussion around IS certifications and their effectiveness will greatly benefit, if future research would assess the application of IS certifications in other more innovative environments (other than, for instance, e-commerce and cloud computing). One example would be to focus on physical human-computer-interaction scenarios like in the case with smart home devices (e.g., Amazon Alex or Google Home). For example, recent publications explored the effects of intrusive features of smart home devices (e.g., Benlian et al. 2020b). IS certifications might play a central role in creating or coping with strain resulting from smart devices with intrusive features. More broadly, the role of IS certifications in reducing work or home induced technostress (e.g., Benlian 2020a) is largely under-explored, leaving interesting opportunities for future research to solidify and broaden the IS certification knowledge base.

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Eidesstattliche Erklärung

Ich erkläre hiermit an Eides statt, dass ich die vorliegende Arbeit selbstständig angefertigt habe. Sämtliche aus fremden Quellen direkt und indirekt übernommenen Gedanken sind als solche kenntlich gemacht.

Die Arbeit wurde bisher nicht zu Prüfungszwecken verwendet und noch nicht veröffentlicht.

Julian Löbbers