



# **E-Commerce in the Age of Blockchain and Digital Advertising**

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# E-Commerce in the Age of Blockchain and Digital Advertising

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## DEDICATION BY PROF. DR. TIM WEITZEL (WIDMUNG)

*Cryptographical solutions might with great propriety be introduced into academies as the means of giving tone to the most important of the powers of the mind.*

– **Edgar Allan Poe**

*The internet is going to be one of the major forces for reducing the role of government.  
The one thing that's missing but that will soon be developed is a reliable e-cash.*

– **Milton Friedman**

*Bitcoin is evil.*

– **Paul Krugman, Nobel-prize winning economist**

*Why won't the government embrace Bitcoin?  
They hate the idea of Proof Of Work.*

– **Internet meme**

Wie kann eine Blockchain Menschenleben retten, wann klicken wir auf eine digitale Anzeige, und warum kann eine neue Methode zur Kausalanalyse konfiguratoraler Daten die Wirtschaftsinformatikforschung voranbringen? Diese Fragen beantwortet Dr. Jens Mattke in der vorliegenden Dissertations-schrift. Die Gemeinsamkeit der Fragen ist dabei ein aktueller Blick auf E-Commerce durch eine präzise wirtschaftsinformatische Brille.

Während wichtige Grundkonzepte hinter E-Commerce gut 70 Jahre zurück-reichen – manche sehen die Berliner Luftbrücke als erste EDI- bzw. E-Business-Anwendung – beginnt das heutige E-Commerce seinen Siegeszug in den frühen 1990ern und ist damit so alt wie der Autor. Seitdem hat sich viel getan in Forschung wie Praxis, und neue Technologien (wie *Blockchains*) und Märkte (*digital advertising*) erlauben neue Antworten auf alte Fragen. Und davon gibt **E-Commerce in the Age of Blockchain and Digital Advertising** etliche, die vor allem möglich werden durch eine in der Wirtschaftsinformatik neue Forschungsmethode (fsQCA). So gelingt Herrn Mattke durch gute Domänenkenntnis und präzise Literaturarbeit die Identifikation und - vor allem durch die Möglichkeit, qua fsQCA neue, nicht-lineare Blicke auch auf ältere Fragen werfen zu können - Verkleinerung relevanter Forschungslücken für Wissenschaft wie Praxis.

Die vorgestellten Ergebnisse in der E-Commerce-Domäne sind problemnah und relevant und enthalten sowohl sehr konkret in der betrieblichen Realität umsetzbare Empfehlungen (zB. Klicks-erhöhende Eigenschaften von Anzeigen und landing pages, social advertising und deren Zusammenspiel) als auch interessante theoretische Erweiterungen für die E-Commerce-Forschung (zB. soziale Nähe vs. Informationsstand bei (Kauf-)Herdenverhalten).

Den eindrucksvollsten Fußabdruck hinterlässt die Arbeit aber sicherlich mit dem Hineintragen konfiguratoraler Analysemethoden in die IS-Literatur. Der konkrete wissenschaftliche Beitrag liegt hier zuvorderst im Übertragen einer Methodik aus der Sozial-, Politik- und Organisationsforschung, welche QCA gerne mit kleinen Fallzahlen und vollständigen Datensätzen (zB. Länderebene) verwenden, auf die in der IS-Forschung auch verbreitete Individualebenenforschung, die mit entsprechend größeren Datenmengen arbeitet. Da hierbei keine intime Berücksichtigung einzelner Fallstudiedetails mehr möglich ist, nutzt Herr

Mattke dann auch durchgängig Mixed-Methods-Ansätze zum Zusammenbringen des Besten beider Welten. Insgesamt sind Breite wie Tiefe der Anwendung und Diskussion zu QCA außergewöhnlich originell und neuheitswertig sowie wirklich hilfreich für die IS-Community, um u.a. die Reduktion auf und Abhängigkeit von impliziten oder expliziten Linearitätsannahmen in den relevanten Theorien zu überwinden. Es ist daher zu erwarten, dass die Arbeit frische Beiträge zu der nützlichen Renaissance der wissenschaftstheoretischen Debatte zu Art, Gehalt und Reichweite von ‚Theorie‘ in der internationalen Wirtschaftsinformatik leisten wird.

Die Dissertationsschrift von Dr. Mattke kann jedem, der sich für Wirtschaftsinformatik, Blockchains, Crypto-Währungen, digitales Marketing und konfigurationale Analysemethodik interessiert, ebenso dringend empfohlen werden wie NachwuchswissenschaftlerInnen, die Vorlagen für ernsthafte und gleichzeitig moderne Forschungsarbeiten suchen.



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Thanks to the support of many people, I was able to go on an intellectual journey over the last few years and was eventually able to compose this dissertation. Without the support, I would never have embarked on this intellectual journey and reached its goal. Therefore, I would like to express my deep gratitude to my supervisor Prof. Dr. Tim Weitzel. Special thanks also to my former and current colleagues, especially Dr. Christian Maier and Lea Reis. Finally, I owe gratitude to my friends, family, and, most importantly, my wife.

## GERMAN SUMMARY (ZUSAMMENFASSUNG)

Um das Nutzerverhalten im E-Commerce besser zu verstehen und vorhersagen zu können, werden die Rufe nach neuen methodischen Ansätzen in der aktuellen Forschung (Furnari et al. 2020; Misangyi et al. 2017), insbesondere auch der E-Commerce Forschung (Tan et al. 2016; Yulin et al. 2018), lauter. Die konfigurationale Analyse­methode „Qualitative Comparative Analysis“ (QCA) wird hierbei als vielversprechende Analyse­methodik angesehen (Straatmann et al. 2018), dieses Nutzerverhalten besser zu verstehen.

Im Jahr 2020 bezogen mehr als 72 Prozent der europäischen Internetnutzer Güter oder Dienstleistungen online (Eurostat 2021). Dieser Boom im online Handel, auch als E-Commerce bezeichnet, führte im selben Jahr zu mehr als 400 Milliarden Euro Umsatz in der Europäischen Union (Coppola 2021). Immer mehr Onlinehändler drängen auf den umkämpften Markt und werben um potenzielle Kunden. Dabei nutzen sie verschiedene digitale Technologien, um Nutzer auf den Onlineshop aufmerksam zu machen und dort zu Einkäufen zu verleiten oder um sich durch den Einsatz digitaler Technologien von etablierten Konkurrenten zu differenzieren. Dabei stechen zwei Technologien insbesondere hervor: die Einbindung digitaler Werbung und die Nutzung von blockchainbasierter Kryptowährung. Statistiken für das Jahr 2021 zeigen, dass weltweit mehr als 400 Milliarden Euro in digitale Werbung investiert wird, insbesondere in digitale Werbung auf mobilen Applikationen (Statista 2021a). Onlinehändler erhoffen sich davon einen erhöhten Kundenstrom und Umsatz, da Nutzer, die auf digitale Werbung in den mobilen Applikationen klicken, direkt auf den Onlineshop weitergeleitet werden und anschließend medienbruchlos Käufe tätigen können. Um sich in der Käuferfahrung von der Konkurrenz abzuheben (Buchko 2018), haben zudem mehrere Onlinehändler in den letzten Jahren damit begonnen, Kryptowährungen als Zahlungsmethode in ihren Onlineshops zu akzeptieren (Beigel 2021). Während beispielsweise Burger King in Deutschland mit der Akzeptanz von Bitcoin experimentiert hat (Corinna 2019), ist die Zahlung mit Bitcoin bei Shopify, als einer der führenden Anbieter von E-Commerce Software, bereits als Zahlungsmethode etabliert (Shopify 2021). Um an die erhofften Vorteile dieser Trends anknüpfen zu können, ist es für Onlinehändler notwendig zu verstehen, wie sie digitale Werbung und Kryptowährung bestmöglich einsetzen. Dies verlangt ein tieferes Verständnis davon, warum potenzielle Kunden auf digitale Werbung in mobilen Applikationen klicken, also wie das Klickverhalten ausgelöst wird und welche Faktoren dafür entscheidend sind, aber auch wie Personen Kryptowährung im E-Commerce Kontext nutzen.

Für ein tiefes Verständnis des Nutzerverhaltens im E-Commerce, das mit diesen digitalen Technologien einhergeht, folgt diese Dissertation den Aufforderungen in bestehender Forschung (Misangyi et al. 2017; Woodside 2017) und verwendet Qualitative Comparative Analysis (QCA) als Analyse­methode. QCA basiert auf der Logik der Mengenlehre und verwendet Boolesche Algebra, um das Verhalten von Personen durch mehrere erklärenden Bedingungen zu beschreiben. Auf der einen Seite kann man mit QCA notwendige Bedingungen identifizieren, also Bedingungen, die immer zutreffen müssen, damit das Verhalten auftritt. Auf der anderen Seite kann man mit QCA erklären, welche einzelnen Bedingungen zu einem Verhalten führen oder welche Konfigurationen von Bedingungen zu einem Verhalten führen (Ragin 2014). Damit ist QCA eine vielversprechende Analyse­methodik, um das Verhalten von Personen zu verstehen (Straatmann et

al. 2018). Basierend daraus ist es das erste Ziel dieser Dissertation, mithilfe neuer Analysemethoden, insbesondere QCA, ein besseres Verständnis zu schaffen, warum Personen auf digitale Werbung in mobilen Applikationen klicken und wie diese Kryptowährungen im E-Commerce Kontext nutzen.

Da QCA bisher noch eine junge Analysemethode in der Wirtschaftsinformatikforschung ist, fehlt aktuell noch ein gemeinsames Verständnis über den richtigen Einsatz und bewährte Verfahrensweisen in der Anwendung von QCA. Daher ist das zweite Ziel der Dissertation die Vorteile und bewährten Verfahrensweisen von QCA zu untersuchen, um zu einem gemeinsamen Verständnis in der Disziplin beizutragen und Potentiale zu heben.

Basierend auf dem daraus resultierenden tieferen Verständnis der aktuellen Trends und des vielschichtigen Nutzerverhaltens im E-Commerce, ist das dritte Ziel dieser Dissertation Empfehlungen zur erfolgreichen Implementierung von neuen Technologien zu geben. Vor dem Hintergrund, dass insbesondere die Einführung von Blockchainanwendungen, welche die Basis für die Verwendung von Kryptowährungen bilden, oft zu Problemen führt und so die erfolgreiche Nutzung der Technologie verhindert (Lacity 2018), konzentriert sich die vorliegende Dissertation in ihren Empfehlungen darauf, Unternehmen zu unterstützen, die abgeleiteten Empfehlungen hier anzuwenden.

Um die drei Ziele zu adressieren, besteht die Dissertation aus einem einführenden Kapitel sowie zehn Forschungsarbeiten, welche anhand der drei Ziele in drei Kapitel gegliedert sind.

Das erste Kapitel ist zweigeteilt. Im ersten Teil beschäftigen sich vier Forschungsarbeiten mit der Frage, warum Nutzer auf digitale Werbung in mobilen Applikationen klicken und wie dies das Kaufverhalten beeinflusst. **Forschungsarbeiten I** und **II** bauen auf der Limited Capacity Theory (Lang 2000; Lang et al. 2002) auf und befassen sich mit dem Klickverhalten von Personen bei der Nutzung von digitaler Werbung in mobilen Applikationen. Die Arbeiten begründen theoretisch und zeigen empirisch, dass die sequenzielle kognitive Verarbeitung von strukturellen und semantischen Faktoren von digitaler Werbung das Klickverhalten erklären kann. Da Social-Media-Werbung eine der prominentesten Formen von digitaler Werbung auf mobilen Applikationen ist (Statista 2021b) und spezifische Merkmale besitzt (Brettel et al. 2015), konzentriert sich **Forschungsarbeit III** auf das Klickverhalten bei Social-Media-Werbung. Auf der theoretischen Grundlage des Herdenverhaltens (Banerjee 1992), der Differenzierung verschiedener sozialer Beziehungen (Granovetter 1973) und der Theorie der psychologischen Distanz (Bar-Anan et al. 2006; Trope und Liberman 2010) zeigt die Forschungsarbeit, wie Likes bei Social-Media-Werbung einen besonderen Einfluss auf das Klickverhalten von Personen haben. Die Arbeit zeigt beispielsweise, dass Social-Media Werbung, welche von einem engen Freund geliked wurde, Personen dazu bewegt die Werbung zu klicken, obwohl sie den Inhalt der Werbung als nicht relevant einschätzen. Obwohl das Klickverhalten auf digitale Werbung in mobilen Applikationen eine wichtige Kennzahl für Unternehmen ist, haben Unternehmen jedoch letztendlich das Ziel, ihre Produkte nach dem Klick auf die digitale Werbung im Onlineshop zu verkaufen. Daher konzentriert sich **Forschungsarbeit IV** auf das Zusammenspiel von Klickverhalten bei digitaler Werbung in mobilen Applikationen und Landingpages eines Onlineshops. Basierend auf der Latent-Trait Theorie (Chen et al. 2016; Hamaker et al. 2007) werden eine qualitative Interviewstudie und eine

quantitative Feldstudie durchgeführt. Die Ergebnisse zeigen, dass sich das Kaufverhalten nur erklären lässt, wenn man sowohl den Einfluss der digitalen Werbung in mobilen Applikationen als auch die E-Commerce-Landingpage berücksichtigt. Weder die E-Commerce-Landingpage noch digitale Werbung in mobilen Applikationen allein können das Kaufverhalten von Personen erklären.

Im zweiten Teil des ersten Kapitels beschäftigen sich zwei Forschungsarbeiten mit der Frage, wie Personen Kryptowährungen im E-Commerce einsetzen. Aufbauend auf der Status-Quo-Bias-Perspektive (Samuelson und Zeckhauser 1988) sowie der Regret-Theory (Loomes und Sugden 1982) zeigen die empirischen Ergebnisse, dass trotz der Vorteile von Kryptowährungen als Zahlungsmittel, viele Personen zögern, Kryptowährungen als Zahlungsmittel zu verwenden. **Forschungsarbeit V** zeigt, dass viele Personen Angst verspüren eine weitere Preissteigerung bei Bitcoin zu verpassen. Diese Angst ist ein wesentlicher Faktor der den Widerstand gegen die Verwendung von Bitcoin als Zahlungsmittel erklärt. **Forschungsarbeit VI** zeigt, dass Personen Kryptowährungen vielmehr als eine alternative Form der Investition ansehen.

In den bisher erläuterten Forschungsarbeiten wurde QCA als Analysemethode verwendet, um das Nutzerverhalten im Kontext von aktuellen E-Commerce Trends besser zu verstehen. Da QCA eine verhältnismäßig junge Analysemethode ist (Ragin 2014), werden im zweiten Kapitel die Vorteile von und bewährten Verfahrensweisen für QCA in drei Forschungsarbeiten untersucht. Eine systematische Literaturrecherche (Paré et al. 2015) in **Forschungsarbeit VII** zeigt, dass die Vorteile von QCA insbesondere darin liegen, asymmetrische Kausalität beim Nutzerverhalten zu untersuchen. Ein weiterer Vorteil besteht darin, dass nicht nur eine dominante Erklärung, sondern mehrere Erklärungen für ein Verhalten aufgezeigt werden können, wodurch die Heterogenität der IT-Nutzer (Bapna et al. 2004) berücksichtigt wird. Die Literaturrecherche zeigt zudem, dass QCA bisher sehr wenig in der Wirtschaftsinformatikforschung eingesetzt wird und dass es an einem gemeinsamen Methodenverständnis über die Anwendung von QCA mangelt und nicht alle empirischen QCA-Studien das volle Potenzial der QCA ausschöpfen. Auf dieser Erkenntnis baut **Forschungsarbeit VIII** auf. Um ein gemeinsames Methodenverständnis zu schaffen und das Potenzial von QCA besser auszuschöpfen, wird ein standardisiertes Vorgehen für die Durchführung von QCA-Studien entwickelt und empirisch demonstriert. Da QCA bisher wenig eingesetzt wird, um Nutzerverhalten zu erklären und insbesondere Regressionsanalyse die dominierende Datenanalyse darstellt (Burton-Jones et al. 2015), wird in **Forschungsarbeit IX** gezeigt, wie QCA mit Consistent-Partial-Least-Squares-Path-Modeling (PLSc) (Dijkstra und Henseler 2015), kombiniert werden kann. Das Papier zeigt, dass QCA als Grundlage für die Analyse konträrer Assoziationen dienen kann, so dass QCA differenzierte Einblicke und Erklärungen für nicht-signifikante PLSc Ergebnisse zu liefern.

Das letzte Kapitel umfasst eine Forschungsarbeit, welche auf die Herausforderungen bei der Implementierung von Blockchainanwendungen (Lacity 2018) eingeht. Dazu berichtet die **Forschungsarbeit X** von einer Fallstudie über die erfolgreiche Einführung einer Blockchainanwendung. Das Forschungspapier synthetisiert die gewonnenen Erkenntnisse der Fallstudie und leitet vier wichtige Lehren ab. Diese Lehren können von anderen Organisationen genutzt werden, um erfolgreich Blockchainanwendungen zu implementieren. Die Fallstudie zeigt mitunter, wie Zero-Knowledge-Proofs bei Blockchainanwendungen

dafür eingesetzt werden können Transaktionen zu validieren und gleichzeitig die Privatsphäre der Anwender schützen können.

Übergreifend liefern die Ergebnisse der Dissertation mehrere Beiträge und Implikationen für das Nutzerverhalten im E-Commerce sowie für das methodische Verständnis von QCA. Die Dissertation erklärt theoretisch und zeigt empirisch, wie Personen strukturelle und semantische Faktoren von digitaler Werbung auf mobilen Applikationen verarbeiten und wie dadurch das Klickverhalten beeinflusst wird. Mitunter bedeuten die Ergebnisse, dass semantische Faktoren je nach strukturellen Faktoren unterschiedlich wahrgenommen werden und das Verhalten unterschiedlich beeinflussen. Somit ist es notwendig, die semantischen Faktoren im Kontext von strukturellen Faktoren zu untersuchen, um widersprüchliche Ergebnisse zu vermeiden. Zukünftige Forschung sollte somit die sequenzielle Verarbeitung struktureller und semantischer Faktoren berücksichtigen. Die Ergebnisse der Dissertation zeigen auch, dass soziale Informationen, wie die Likes bei Social-Media-Werbung, berücksichtigt werden müssen. Hierbei ist es wichtig, die soziale Beziehung zur Informationsquelle zu berücksichtigen, da Informationen von Personen mit einer starken Beziehung einen größeren Einfluss auf das Klickverhalten haben, als Informationen von Personen mit schwacher Beziehung. Die Ergebnisse der Forschungsarbeiten implizieren auch, dass Kaufverhalten in Onlineshops nicht allein durch digitale Werbung auf mobilen Applikationen erklärt werden kann, noch durch die Eigenschaften des Onlineshops. Zukünftige Forschung sollte daher den kombinatorischen Einfluss beider Quellen berücksichtigen, da beispielsweise der negative Einfluss einer nicht überzeugenden Landingpage durch den positiven Einfluss einer digitalen Werbung kompensiert werden kann.

In Bezug auf die Nutzung von Kryptowährung zeigt die Dissertation, dass sich Personen bisher dagegen sträuben, Bitcoin als Zahlungsmittel zu verwenden und Bitcoin vielmehr als Investitionsobjekt sehen. Die Ergebnisse der Forschungspapiere liefern hierfür auch übergreifende Erklärungsansätze. Die Ergebnisse implizieren, dass die hohe Volatilität und Wertunsicherheit von Bitcoin zu der Befürchtung führen, dass die Personen die Verwendung von Bitcoin als Zahlungsmittel bereuen werden. Dies hindert, zumal die Verwendung von Bitcoin als Zahlungsmittel und begünstigt gleichzeitig die Nutzung von Bitcoin als Investitionsobjekt.

Methodisch entwickelt die Dissertation Empfehlungen, die dazu beitragen, fälschliche oder wenig robuste QCA Ergebnisse zu vermeiden. Die Dissertation verdeutlicht insbesondere die Relevanz der Eigenschaften der zu analysierenden Datensätze. Hierbei wird theoretisch erklärt und empirisch dargelegt, wie QCA Ergebnisse durch homogene Datensätze an Erklärungskraft verlieren können und wie zukünftige Forschung durch gezielte Datenerhebung die Aussagekraft von QCA Ergebnissen maximieren kann. Das standardisierte Vorgehensmodell, welches im Rahmen der Dissertation entworfen wurde, hilft zukünftigen QCA Forschungsarbeiten, durch klare Reporting-Standards mehr Transparenz in die noch relative neue QCA Methodik zu bringen.

Für Onlinehändler liefern die Ergebnisse der Dissertation mehrere Handlungsempfehlungen. Es wird gezeigt, wie digitale Werbung auf mobilen Applikationen eingesetzt werden kann, wie Unternehmen Kryptowährung

für sich nutzen können und auch wie die Einführung von Blockchain-Applikationen erfolgreich gestaltet werden kann.

Die Dissertation folgt der Empfehlung bisheriger E-Commerce Forschung (Tan et al. 2016; Yulin et al. 2018) und zeigt, wie durch QCA als konfigurationale Analyseverfahren das Nutzerverhalten im E-Commerce detaillierter verstanden werden kann. Dabei liefert die Dissertation detaillierte theoretische und empirische Einblicke wie Personen digitale Werbung in mobilen Anwendungen wahrnehmen, wie dadurch das Klickverhalten beeinflusst wird und warum Personen Kryptowährungen vermehrt als Investitionsobjekt anstatt als Zahlungsmethode sehen.

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# Introductory Paper



## 1 INTRODUCTION

In 2021, around 79 percent of the United States' population (Statista 2021d) shopped in e-commerce stores, generating nearly 469 billion U.S. dollars in revenue (Statista 2021c). The number of e-commerce stores in the United States has increased in the last few years to over 722,000 (Murthy 2021), causing stronger competition among them in attracting individuals' attention to their goods or services. In the face of this competition, e-commerce stores need to understand how to attract individuals and convince them to buy on their platform to eventually generate revenue and to become or remain competitive with dominant and large-scale e-commerce giants such as Amazon (Madh 2021). To this end, e-commerce stores rely heavily on digital technologies to either attract individuals' attention or to differentiate themselves from their competitors by providing a better shopping experience for their customers. Digital technology refers to the representation of information in bits, which significantly changes the way information is collected, stored, and processed (Goldfarb and Tucker 2019a) and which can change the way e-commerce stores interact with their customers (Goldfarb and Tucker 2019b). Two digital technologies used to attract individuals' attention stand out in this context: digital advertising and blockchain-based cryptocurrencies.

It is estimated that organizations will spend around 458 billion U.S. dollars worldwide on digital advertising in 2021 (Statista 2021a), particularly to display advertising within mobile applications (App Annie 2020). The objective is to entice individuals to click the in-app advertising and get redirected to the e-commerce store where they spend money. To increase the revenue that can be generated with in-app advertising, e-commerce stores need to know what factors influence individuals' clicking behavior and what underlying psychological mechanisms trigger clicking behavior. Extant research shows that clicking behavior is influenced by structural factors, such as the size or the animation of in-app advertising, and semantic factors, such as perceived informativeness or irritation (Sun et al. 2013). While previous research offers valuable insights into what factors influence clicking behavior, it is theoretically and empirically unclear how the interaction of these factors influences clicking behavior. For example, research shows that informativeness positively influences clicking behavior and irritation has a negative influence (Zhang and Mao 2016), but it is less clear how the interaction influences clicking behavior. This means, for instance, that it remains unclear if individuals tend to click if in-app advertising is perceived as both irritating and informative. There are also conflicting explanations of what triggers clicking behavior. For instance, it remains unclear to what degree advertising animation leads to clicking behavior (Bruce et al. 2017; Lim et al. 2013). One reason for this is that the underlying psychological mechanism of how individuals process information (Lang 2017; Lang et al. 2002), such as the structural and semantic factors of in-app advertising, are not accounted for adequately. Therefore, new knowledge about individuals' clicking behavior is needed.

The second digital technology that stands out are cryptocurrencies, which are the most widely used blockchain applications. Major e-commerce stores try to convince individuals to choose their e-commerce store by accepting cryptocurrencies (Beigel 2021). E-commerce stores consider adopting cryptocurrency as a payment method as an opportunity to differentiate themselves from their competition (Buchko 2018). For instance, individuals can use cryptocurrencies as a means of payment at AT&T (AT&T 2019) and major e-commerce applications such as Shopify have started supporting cryptocurrency payments for e-commerce

transactions in recent years (Shopify 2021). While cryptocurrency has gained momentum in e-commerce, little is known about individuals' use of cryptocurrencies and how they perceive cryptocurrencies as a new means of payment (Risius and Spohrer 2017). As a blockchain application, cryptocurrencies have some unique characteristics. Among others, a cryptocurrency is not associated with any country or organization but is, rather, a payment application that operates without an intermediary (Nakamoto 2008). The value volatility of cryptocurrencies also distinguishes it from dominant fiat currencies such as the US dollar and the euro and has implications on whether individuals perceive cryptocurrencies as means of payment (Böhme et al. 2015; Ammous 2018). These unique characteristics limit the transfer of existing knowledge to the context of cryptocurrencies and leave many questions unanswered. For instance, it is unclear whether individuals perceive that the benefits of using cryptocurrencies as a means of payment outweigh the disadvantages of doing so and how these perceived advantages and disadvantages influence their use of cryptocurrencies. This shows that more knowledge about individuals' use of cryptocurrencies is needed, which e-commerce stores can leverage to increase sales revenue by attracting new customers or by differentiating themselves from other e-commerce stores.

With regard to these two digital technologies (digital advertising and blockchain-based cryptocurrencies), the first goal of the dissertation is as follows:

Goal 1: Generate new knowledge about individuals' in-app advertising clicking behavior and use of cryptocurrencies for e-commerce.

In the light of the increased inclusion of digital technologies into e-commerce, recent research has shown that individuals' behavior is characterized by complex interdependencies among multiple explanatory factors that together bring about a particular outcome (Maier et al. 2021a; Dane and Pratt 2007). Research has shown that individuals integrate their perceptions into a whole, which in turn shapes their behavior (Pelli and Tillman 2008; Campbell et al. 2016). This means that perceptions, which are known to influence individuals' behavior (Fishbein and Ajzen 1975), are not processed in isolation. Instead, individuals integrate and combine their perceptions. For instance, an individual might click on in-app advertising that is perceived as informative and credible, but then perceives the e-commerce store as untrustworthy. Based on the configurational perception of the attributes the individual might decide not to make a purchase. However, if the individual clicks on the same in-app advertising but gets redirected to an e-commerce store the individual perceives as trustworthy, which depicts a different configuration, the individual might decide to make a purchase. Such interactions of perceptions shaping behavior are highly complex and can be reflected in set-theoretic configurational methods, such as quantitative comparative analysis (QCA) (Maier et al. 2021a; Campbell et al. 2016). QCA, therefore, helps to answer open questions such as how the interaction of semantic and structural factors influences clicking behavior or whether the perceived benefits of using cryptocurrencies as a means of payment outweigh the perceived disadvantages, leading individuals to use cryptocurrencies as a means of payment.

QCA is a set-theoretic configurational data analysis method that uses Boolean algebra to explain the relationship between multiple causal conditions, in the research context explanatory factors, and an outcome

condition, in the research context clicking and cryptocurrency use behavior (Ragin 2014; Mattke et al. 2022). The strength of QCA lies in its ability to clarify and analyze the relationship between causal conditions and the outcome. Using QCA, researchers can identify possible necessary causal conditions for an outcome. In the research context, for example, this would include one or more explanatory factors that must exist in order for individuals to click on in-app advertising or to use a cryptocurrency in e-commerce. Researchers can also use QCA to identify causal conditions or configurations of causal conditions that bring about an outcome. In the context of explaining individuals' behavior in e-commerce, for example, QCA can be used to identify whether specific combinations of present or absent causal conditions bring about a specific behavior in e-commerce (Mattke et al. 2022).

Although this powerful data analysis method has gained increasing popularity in information systems research, the discipline still lacks a shared understanding of the benefits and good practices of applying QCA. Therefore, the second goal of the dissertation is as follows:

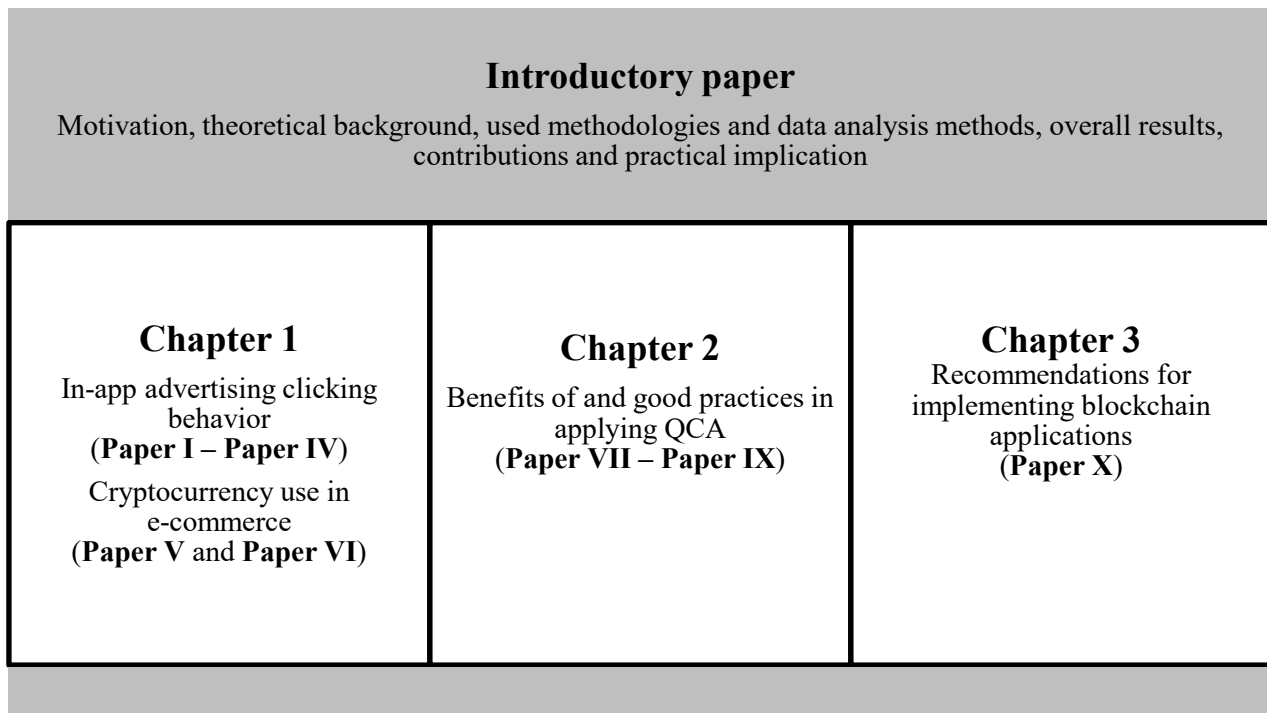
Goal 2: Examine the benefits of QCA and derive good practices in conducting QCA to generate new knowledge about individuals' behavior.

While the present research adopts this goal in the e-commerce store context, it is also important to ensure that the insights are practically applicable on a wider scale (Rosemann and Vessey 2008), such as in implementing other digital technologies successfully in organizational settings. Many organizations struggle to leverage the potential of digital technologies including blockchain applications successfully (Lacity 2018a). Therefore, the third goal of this dissertation is as follows:

Goal 3: Provide actionable recommendations for organizations for implementing blockchain applications.

To address the three goals, this dissertation consists of an introductory paper and ten papers (Figure 1). The introductory paper provides a summary of the theoretical background of the dissertation, the research methodologies, the data analysis method, the major findings of the papers comprising this dissertation as well as an overview of the theoretical and practical contributions.

The ten papers are structured into three chapters, each dedicated to one of the goals of the dissertation: Chapter 1 provides new knowledge about individuals' in-app advertising clicking behavior (**Paper I – Paper IV**) and how individuals use cryptocurrencies (**Paper V** and **Paper VI**); Chapter 2 examines the benefits of and good practices in applying QCA as the dominant set-theoretic configurational method (**Paper VII – Paper IX**); and Chapter 3 provides actionable recommendations to organizations on implementing new blockchain applications (**Paper X**).



**Figure 1. Structure of the dissertation**

The remainder of this introductory paper is structured as follows. The next section provides an overview of the theoretical background of in-app advertising and cryptocurrencies in e-commerce. Then the methodologies and data analysis methods applied in this dissertation are discussed, the main results of the ten papers are summarized, and the overall theoretical contributions and implications are outlined. The introductory paper concludes with future research directions.

## 2 THEORETICAL BACKGROUND

The first goal of this dissertation is to generate knowledge about individuals' in-app advertising clicking behavior and their use of cryptocurrencies for e-commerce. In this dissertation, e-commerce is defined as the trading of physical goods and/or services in which the transaction, i.e., the initiation, execution, and settlement, is carried out via the Internet using digital technologies. E-commerce utilizes various digital technologies to facilitate interactions with customers and the transfer of money and data to execute the transaction. E-commerce stores represent the virtual places where goods and services are offered. The target group of so-called B2C (business to consumer) e-commerce stores is end consumers, while B2B (business to business) e-commerce stores serve business customers (Deges 2020).

E-commerce research has a longstanding tradition in the information systems field covering various e-commerce topics. A summary of the dominant e-commerce topics published in the MIS Quarterly in the last ten years is presented in the following. Most research on e-commerce stores focuses on explaining their performance, mainly by examining how specific explanatory factors such as specific e-commerce functionalities (Li et al. 2019), online ratings (Shun Ye et al. 2014), or recommender networks (Lin et al. 2017) influence sales performance. To guide organizations strategically, extant research has, among others, identified the strategies e-commerce stores follow to maintain profitability in high-competitive e-commerce markets (Etzion and Min-Seok Pang 2014), how they apply cloud technology to optimize request distribution (VanderMeer et al. 2012), and how they utilize pricing mechanism to improve their profitability (Hinz et al. 2011). To guide organizations on overcoming negative aspects of e-commerce, researchers have examined how various measures to prevent identity theft in e-commerce systems impact the value of e-commerce stores (Bose and Alvin Chung Man Leung 2019) and how privacy protection measures impact competition and social welfare (Lee et al. 2011).

A large portion of extant research aims at better understanding individuals' perceptions and behaviors in e-commerce. Among others, extant research focuses on the influence of individuals' online engagement on offline behavior (Bar-Gill and Reichman 2021), on individuals' purchase intention (Ji Wu and Zhao 2019), and on individuals' repurchase intention (Yulin Fang et al. 2014). To understand how individuals' behavior is influenced by negative aspects of e-commerce, studies have focused on detecting negative and positive emotions from individuals' mouse movements (Hibbeln et al. 2017), how individuals respond to failures of e-commerce stores (Tan et al. 2016), how individuals detect deceptive information practices in e-commerce stores (Xiao and Benbasat 2011), and how their perceptions and behavior is influenced by long waiting times in e-commerce stores (Hong et al. 2013).

In line with the tradition of examining individuals' behavior in e-commerce, the first goal of the dissertation is to generate knowledge on individuals' behavior in e-commerce. Particularly, this dissertation focuses on individuals' in-app advertising clicking behavior and their use of cryptocurrencies for e-commerce. The following section addresses each of these issues individually. Section 2.1 discusses the research context of in-app advertising and the fundamental theories explaining individuals' behavior in the context of in-app advertising. Section 2.2 focuses on cryptocurrency in e-commerce, outlining the theoretical foundation of

the use of cryptocurrencies. Overall, the research builds on literature from different domains, including information systems, digital marketing, advertising, and psychology.

## 2.1 IN-APP ADVERTISING IN E-COMMERCE

Recent statistics show that e-commerce stores increasingly use in-app advertising (App Annie 2020) and particularly social media advertising as a distinct form of in-app advertising (Statista 2021b) to entice (potential) customers to visit their e-commerce store. The following sections outline the foundations of in-app advertising, the theoretical foundations of clicking behavior, and previous research into clicking behavior.

### 2.1.1 Research context: in-app advertising

Individuals spend an increasing amount of time on their mobile devices so that the average US adult spends 3 hours and 43 minutes each day (Zalani 2021) and they have on average 20 mobile applications (apps), excluding preinstalled apps, on their mobile devices (Statista 2019). Instead of using the browser to check the weather forecast, most individuals use a weather app and instead of using the browser to check their social media profile, most individuals use the proprietary social media app (Wurmser 2020). E-commerce stores have reacted to the shift from web browsing to the use of apps by using in-app advertising to target app users. In-app advertising is a subclass of digital advertising which refers to planned marketing or advertising messages that are displayed on mobile apps, such as a weather or a social media app (Laszlo 2009). In-app advertising has several distinct features. For instance, in-app advertising can use app-specific information provided by the mobile device, such as the device ID as well as location-based and environmental-based information.

The largest share of in-app advertising budget is spent on social media apps such as Instagram or Facebook (Statista 2021b). The in-app advertising for social media apps is presented to individuals using the social media app, e.g., while browsing their newsfeed, and has some unique characteristics. In-app advertising for social media is enriched with social media features, such that individuals can publicly comment on in-app advertising, repost or share in-app advertising within their newsfeed. Individuals can also express their positive sentiments about in-app advertising through social media likes. Social media likes are associated with a specific individual and others can view who has liked specific in-app advertising (Brettel et al. 2015). Since in-app advertising is a subclass of digital advertising, in-app advertising research builds upon related research into digital advertising. A summary of the relationship between digital advertising, in-app advertising, and in-app advertising for social media apps is displayed in Figure 2.

## Digital advertising

### In-app advertising

Subclass of digital advertising

### In-app advertising for social media apps

Dominant form of in-app advertising with specific characteristics

**Figure 2. In-app advertising as a subclass of digital advertising**

E-commerce stores measure the success of in-app advertising mainly according to individuals' clicking behavior. When an individual clicks on in-app advertising, this is interpreted as evidence of his or her willingness to obtain more information about the advertised product or service (Bleier and Eisenbeiss 2015a). In-app advertisers are often charged based on a cost-per-click model (Lin et al. 2012). It is therefore essential for in-app advertisers to understand how individuals perceive and respond to in-app advertising as a basis for optimizing such in-app advertising and increasing clicking behavior. The following section presents the theoretical foundations of analyzing and explaining clicking behavior.

#### 2.1.2 Theories used to explain clicking behavior

To understand individuals' clicking behavior, extant research has focused on how individuals' perception of digital advertising influences their clicking behavior. This section presents the advertising value model (AVM) and the limited capacity theory, which can be applied to explain individuals' engagement with digital advertising.

##### 2.1.2.1 The advertising value model

The advertising value model (AVM) (Ducoffe 1996) proposes that individuals' attitude towards digital advertising is formed by semantic factors. In other words, individuals process the information provided by digital advertising semantically (Lang 2017). In general, individuals' attitudes are considered strong predictors for their behavior (Ajzen 1991), and individuals' attitude towards digital advertising specifically has been shown to be a good predictor for their clicking behavior (Zhang and Mao 2016). The AVM has been applied to explain individuals' behavior in a wide range of digital advertising contexts, such as mobile advertising (Cheng et al. 2009; Maseeh et al. 2021), digital video advertising (Goodrich et al. 2011; Lou and Xie 2021), and sponsored links (Lin and Hung 2009). Since in-app advertising is a subclass of digital advertising (see Figure 2), the AVM can be applied to this context.

According to the AVM, the main semantic factors influencing individuals' attitudes, and thus their behavior, in the digital advertising context are perceived entertainment value, perceived informativeness, and perceived irritation. Perceived entertainment value refers to the degree to which individuals perceive joy, fun, or excitement, whereas the perceived informativeness describes the perception that digital advertising is informative and acts as a good source of information (Ducoffe 1996). A high level of perceived entertainment

value and perceived informativeness are good predictors for a positive attitude towards digital advertising (Ducoffe 1996), and clicking behavior (Zhang and Mao 2016). The AVM also proposes that a high level of perceived irritation, which is defined as the perceived displeasure or momentary impatience, is associated with a low perceived value of digital advertising and a negative attitude towards digital advertising (Ducoffe 1996).

Digital advertising research has shown that these main semantic factors are also relevant in digital advertising and has identified further semantic factors specific to digital advertising, including perceived credibility (Brackett and Carr 2001; Dao et al. 2014), perceived personalization (Xu et al. 2008), privacy concerns (Bleier and Eisenbeiss 2015b), and perceived congruity (Zhang and Mao 2016) (Table 1). Research has also considered how some of these extended semantic factors explain clicking behavior. For instance, research shows that personalization of digital advertising increases clicking behavior (Bleier and Eisenbeiss 2015a) and that individuals are more likely to click digital advertising that is perceived as congruent to the editorial content (Wang and Chou 2019).

The semantic factor of digital advertising	Definition	Reference
Perceived entertainment value	Individuals' perception of joy fun or excitement caused by digital advertising.	Ducoffe 1996
Perceived informativeness	Individuals' perception that digital advertising is a good source of information.	Ducoffe 1996
Perceived irritation	Individuals' perception of displeasure or momentary impatience caused by digital advertising.	Ducoffe 1996
Perceived credibility	Individuals' perception that the claims of digital advertising are truthful and believable.	Brackett and Carr 2001
Perceived personalization	Individuals' perception that digital advertising is tailored to them.	Xu et al. 2008
Perceived privacy concern	Individuals' perception of concern that digital advertising is tracking their personal information.	Bleier and Eisenbeiss 2015b
Perceived congruity	Individuals' perception that the content of the digital advertising matches the editorial media content.	Zhang and Mao 2016

**Table 1. Semantic factors of digital advertising**

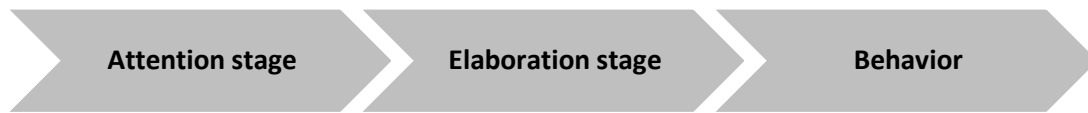
The AVM provides a well-established explanation for individuals' perception of digital advertising and consequently also individuals' behavior. However, information systems research has highlighted that the effectiveness of digital advertising is influenced not only by semantic factors, such as perceived entertainment value, but also by structural factors, which are the sensory components of the ads, such as color or animation (Tam and Ho 2005, 2006). This fact is reflected in the limited capacity theory, which is outlined below.

#### 2.1.2.2 The limited capacity theory

The limited capacity theory is based on the fact that individuals have a limited capacity to process all stimuli in their environment (Lang et al. 2002; Lang 2000) so they subconsciously focus on only a subset of the stimuli (Fisher et al. 2018). In the context of digital advertising, this means that individuals exposed to digital advertising cannot process all of the stimuli it presents simultaneously, but rather process the stimuli in a sequential order. Based on the limited capacity theory, individuals process stimuli from their environment in



two stages: the attention and the elaboration stage (Figure 3).



**Figure 3. Limited capacity theory (Lang 2000; Lang et al. 2002)**

In the attention stage, the individuals subconsciously allocate cognitive resources to specific stimuli in their environment and start processing these stimuli (Lang et al. 2002; Lang 2000). After processing these stimuli, individuals can proceed to the elaboration stage and process other stimuli. Alternatively, individuals can also stop allocating more resources without elaborating on further stimuli. Thus, the elaboration state influences individuals' behavior (Lang 2017). Information systems research has shown that in the attention stage, individuals start by processing the structural factors of digital advertising, such as animation. After processing the structural factors, they then potentially process the semantic factors in the elaboration stage (Tam and Ho 2005).

The rationale for this is that processing structural factors is less resource-intensive than processing semantic factors, which requires more cognitive resources (Tam and Ho 2005). Besides that, the limited capacity theory argues that structural factors trigger orienting responses (Lang et al. 2002), which are the subconscious and automatic processing of stimuli that occur within a very short timeframe (Pavlov 2010).

In summary, the limited capacity theory informs us that when individuals are exposed to digital advertising, they first process the structural factors in the so-called attention stage before potentially processing semantic factors in the subsequent elaboration stage.

### 2.1.3 Previous research on clicking behavior

The previous sections show that in order to understand clicking behavior in the context of digital advertising, it is important to consider the influence of structural and semantic factors. Table 2 summarizes the main research in information systems and marketing literature on the influence of structural factors on clicking behavior. The review reveals that clicking behavior is influenced most by the animation of the digital advertising, and that animated digital advertising is often associated with more clicks. However, this finding depends on the research context: In the context of casino game applications, animation does not influence clicking behavior. Generally, research shows that individuals tend to click more on digital advertising that has bright colors, is positioned prominently, and is large (references provided in Table 2).

Table 3 below summarizes the growing body of research into the role of semantic factors in shaping individuals' clicking behavior. For example, individuals are more likely to click on digital advertising that they perceive as personalized, but when they perceive digital advertising as irritating, the odds of clicking diminish. Research also reveals that high congruity between ad and editorial content leads to more clicks. In line with the AVM (Ducoffe 1996), research shows that when individuals perceive an online ad as informative or entertaining, they are generally more willing to click on the ad (references provided in Table 3).

Structural factor	Authors
Animation	Bruce et al. 2017; Chandon et al. 2003; Cho 2003; Lohtia et al. 2003; Robinson et al. 2007; Rosenkrans 2009; Yoo et al. 2004
Color brightness	Lohtia et al. 2003; Sokolik et al. 2014
Location prominence	Abhishek et al. 2015; Agarwal and Mukhopadhyay 2016; Agarwal et al. 2011; Animesh et al. 2011; Chan and Young-Hoon 2015; Gong et al. 2018; Narayanan and Kalyanam 2015; Rutz et al. 2012
Size	Bruce et al. 2017; Chandon et al. 2003; Cho 2003; Robinson et al. 2007; Rosenkrans 2009; Sokolik et al. 2014

Table 2. Exemplary research into how structural factors influence clicking behavior

Semantic factor	Authors
Perceived entertainment value	Zhang and Mao 2016
Perceived informativeness	Zhang and Mao 2016
Perceived irritation	Bleier and Eisenbeiss 2015b; Tucker 2014; Bleier and Eisenbeiss 2015a
Perceived personalization	Aguirre et al. 2015
Privacy concern	Bleier and Eisenbeiss 2015b
Perceived congruity	Bleier and Eisenbeiss 2015a; Shamdasani et al. 2001; Wang and Chou 2019; Zhang and Mao 2016

Table 3. Exemplary research into how semantic factors influence clicking behavior

## 2.2 CRYPTOCURRENCY IN E-COMMERCE

It has become increasingly easy for e-commerce stores to provide a cryptocurrency payment option in their e-commerce stores, and several major e-commerce stores already do so (Shopify 2021). The option of paying with a cryptocurrency is very new and different from traditional forms of payment, and little is known about how individuals' behavior is influenced by this new digital technology (Mendoza-Tello et al. 2019). This section introduces the cryptocurrency research context and presents an overview of extant information systems research into individuals' behavior in the context of cryptocurrencies.

### 2.2.1 Research context: cryptocurrency

Cryptocurrencies such as Bitcoin and Ethereum are considered breakthrough innovations that have the potential to revolutionize payment (Beck and Müller-Bloch 2017). Cryptocurrency research shows that the benefits of cryptocurrencies, such as fast processing speed, disintermediation, and low transaction costs, make cryptocurrencies well suited to replace traditional payment methods (Ilk et al. 2021; Nofer et al. 2017, p. 185)

A cryptocurrency is a public peer-to-peer payment application that stores all transactions on a distributed and publicly available blockchain ledger and uses a consensus mechanism to validate and process transactions within the payment application (Nakamoto 2008; Mattke et al. 2021a). Peer-to-peer application refers to the fact that every actor in the application has the same rights, i.e., there is no central authority or trusted third party. Rather, everybody can participate in the application, read transactions, or write new transactions. A blockchain ledger is a distributed database where all transactions are stored in blocks and where all blocks

are cryptographically linked. Each block has only one predecessor so that a blockchain ledger forms a sequential and temporal order (Lacity 2018b). To reach an agreement on what transactions are valid and have been executed, cryptocurrencies use specific consensus mechanisms, which are executed by so-called validators or miners. The goal of a consensus mechanism is that all actors of the application reach an agreement on what transactions have been executed. Besides leading to an agreement on the current state of the transactions, the consensus mechanisms are game theoretically designed in a way that following the rules of the application is a self-enforcing optimum for the actors and bad behavior is disincentivized. It is necessary to have a consensus mechanism because cryptocurrencies do not have a central authority that processes the transactions. The most common consensus mechanisms for cryptocurrencies are proof of work and proof of stake (Lacity 2018b; Mattke et al. 2021a).

Bitcoin is the most widely known cryptocurrency with the highest market capitalization and its token is called the bitcoin. An unknown person or group of persons published a Bitcoin whitepaper in 2008 and the genesis block was created in early 2009 (Nakamoto 2008). The consensus mechanism applied is called the proof-of-work consensus mechanism, where the validator applies a try-and-error task to find a hash that is smaller than a given threshold. The actor who successfully finds a hash that is smaller than the given threshold is rewarded with bitcoins as well as the transaction fees paid by the creators of the transactions. The number of bitcoins is limited to 21 million (Nakamoto 2008; Mattke et al. 2021a).

Ethereum, whose token is called the ether, has the second highest market capitalization. Ethereum is considered a second-generation blockchain application because it is a platform for smart contracts. Smart contracts can run transactions autonomously, enabling automatic settlement between transaction partners without an intermediary (Risius and Spohrer 2017; Egelund-Müller et al. 2017). Smart contracts behave passively, meaning that the code of the smart contract must be triggered by an authorized entity. The execution of smart contracts is replicated on all nodes of the Ethereum network. To execute smart contracts, smart contract users must pay a fee, called gas, in ether (Egelund-Müller et al. 2017). For instance, smart contracts make it possible to autonomously apply for a loan, lend money to others, or provide liquidity pools for cryptocurrency exchanges. Since blockchain users do not need to rely on an intermediary, blockchains with smart contract capabilities are seen as a cost-effective alternative to traditional systems with intermediaries (Risius and Spohrer 2017). Ethereum also applies a proof-of-work consensus mechanism but has announced that it will soon switch to a proof-of-stake consensus mechanism (Ethereum.org 2021). Unlike in the proof-of-work consensus mechanism, users who participate in the proof-of-stake consensus mechanism must stake a portion of their ether. The more ether is staked by a participant, the higher the probability of being selected for validation of the next block. When a participant successfully validates a new block, the participant is rewarded with ether. The staked ether can be destroyed if the participant behaves maliciously so that there is a game-theoretical incentive to follow the rules (Beck et al. 2018).

Individuals can use cryptocurrency as a means of payment in an increasing number of e-commerce stores (EcomSutra 2021). In the payment process, individuals create a cryptocurrency transaction, which includes the receiving cryptocurrency address of the e-commerce store, the amount invoiced, and some transaction

fees. The transaction is created and signed with the help of a software or hardware wallet, which is used to store the private key. A wallet is the cryptocurrency equivalent of a bank account (Yin et al. 2019). Once the transaction is signed it gets broadcasted in the cryptocurrency network and processed and validated by the validators in the consensus mechanism. When the transaction has been successfully processed in the consensus mechanism and added as part of a new block to the blockchain, the e-commerce store receives the amount invoiced (Mattke et al. 2018).

### 2.2.2 The theoretical foundation of using cryptocurrencies

As outlined above, the use of cryptocurrency differs from traditional forms of payment and even from traditional currency. This section outlines the theoretical foundations of the use of cryptocurrency as a means of payment and the current state of research about individuals' behavior in the context of cryptocurrency.

To understand whether individuals perceive cryptocurrencies as a currency and are thus willing to use cryptocurrencies as a means of payment, it is important to consider what influences their perception of the currency. Research shows that individuals' perception of how well a certain currency fulfills the functionality of money shapes individuals' behavior (Mattke et al. 2020a; Ammous 2018). The three core functions of a currency are acting as a medium of exchange, a store of value, and a unit of account (Wray 1998; Jevons 1989; Kiyotaki and Wright 1989), as summarized in Table 4.

Acting as a medium of exchange means that different economic actors accept the currency as an exchange for goods or services. This role allows goods and services to be exchanged easily, without bartering. Instead of looking for an economic actor who wants to exchange a certain product or service for the desired good or service, money acts as an intermediary between the exchange of different products (Jevons 1989; Mattke et al. 2020a). In the context of cryptocurrencies, research shows that the overall acceptance of cryptocurrencies, such as Bitcoin, as an exchange for goods or services is still relatively low (Yermack 2015; Baur and Dimpfl 2021).

Acting as a store of value means that when an individual receives money, its purchasing power remains stable over a longer period of time, such that the individual receives a similar value now or in the future (Davidson 1972; McCabe 1989; Mattke et al. 2020a). Extant cryptocurrency research argues that the volatility of most cryptocurrencies, particularly Bitcoin limits the functionality to be an effective short-time store of value (Ali et al. 2014; Kubát 2015; Yermack 2015). However, some cryptocurrencies, such as Bitcoin, have a fixed supply (Nakamoto 2008), which increases the overall long-time store of value functionality (Baur and Dimpfl 2021). Similarly, the number of available ether is also limited and is seen as deflationary and thus as an effective long-time store of value (Buterin et al. 2019).

Acting as a unit of account means that individuals can compare the economic value across different goods and services (Doepke and Schneider 2017; Mattke et al. 2020a). Some argue that the high divisibility of cryptocurrencies makes them a good unit of account (Blundell-Wignall 2014), while others argue that the high volatility of most cryptocurrencies limits the unit of account functionality so that prices are typically displayed in fiat currencies, such as euros or US dollars (Yermack 2015; Ali et al. 2014).

Core function	Definition
Medium of exchange	Facilitating the purchase of goods and services between different economic actors, so that money replaces the reliance on barter.
Store of value	Facilitating the maintenance of purchasing power, so that individuals receive a similar economic value at a later point in time.
Unit of account	Facilitating the comparing of goods and services, so that individuals can compare the economic value among different goods and services.

Table 4. Core functions of a currency (Jevons 1989; Mattke et al. 2020a)

### 2.2.3 Extant research into cryptocurrencies

Information systems research started to investigate individuals' use of cryptocurrencies early on, focusing primarily on Bitcoin as the leading cryptocurrency (Table 5). Four years after the launch of Bitcoin, researchers began investigating individuals' use of bitcoins as a means of payment vis-à-vis for investment purposes (Glaser et al. 2014). They found that early bitcoin owners used it more often as an investment vehicle than as a means of payment, identifying social media sentiment is a strong predictor of Bitcoin investment behavior (Mai et al. 2018). Some research has also focused on how individuals' perceptions of Bitcoin influence their behavior. Due to the decentralized nature of Bitcoin, researchers found that forking is an effective and new way to self-organize in distributed communities (Andersen and Bogusz 2017).

Research focus	Context	Authors
Examining how perceived benefits and perceived risk of Bitcoin influences individuals' bitcoin usage behavior.	Bitcoin	Abramova and Böhme 2016
Examining self-organizing through forking in distributed communities.	Bitcoin	Andersen and Bogusz 2017
Comparing and analyzing individuals' risk perception of cryptocurrencies with other risks.	Cryptocurrency	Chen and Farkas 2019
Individuals' perceptions about the degree of anonymity provided by the Bitcoin application.	Bitcoin	Fabian et al. 2016
Examining whether new bitcoin users use bitcoins as means of payment or as an investment vehicle.	Bitcoin	Glaser et al. 2014
Applying supervised machine learning to classify Bitcoin addresses based on user behavior.	Bitcoin	Harlev et al. 2018; Yin et al. 2019
Examine how individuals react to volatility in fee movements.	Bitcoin	Ilk et al. 2021
Examining the influence of social media posts and future price movements.	Bitcoin	Mai et al. 2018

Table 5. Exemplary research into individuals' behavior in the context of cryptocurrencies

Based on the technology acceptance model (Davis et al. 1989), we know that the risk perceptions associated with Bitcoin, such as legal risk or financial risk, strongly influence individuals' intention to use bitcoins as a means of payment (Abramova and Böhme 2016). However, recent research shows that the risk perception of Bitcoin is similar to the risk normally perceived in e-commerce (Chen and Farkas 2019). In addition, Bitcoin-specific benefits, such as the faster processing speed, the decentralization as well as the perceived security and control, increase the intention to use bitcoins (Abramova and Böhme 2016). While decentralization is seen as a benefit, pseudonymity was found to be a concern for a large part of bitcoin users (Fabian et al. 2016), because of the possibility to deanonymize the Bitcoin address (Yin et al. 2019). Researchers studied the effects of the extreme swings in transaction fees on individuals' behavior (Ilk et al. 2021). An analysis of historic Bitcoin transactions reveals that individuals' do not necessarily abandon

Bitcoin because of high transaction fees and that trading bitcoins leads to higher levels of tolerance to the fees (Ilk et al. 2021). A summary of previous research on cryptocurrency is outlined in Table 5.

## 2.3 A CONFIGURATIONAL PERSPECTIVE ON INDIVIDUALS' BEHAVIOR

The first goal of this dissertation is to generate new knowledge about individuals' clicking behavior for in-app advertising as well as to create new knowledge about the use of cryptocurrencies in e-commerce.

To achieve this goal, this dissertation builds on research into decision making (Campbell et al. 2016) and information processing (Zadeh 1983), which posits that individuals' behavior is formed by integrating perceptions into a whole. In a first step, the individuals perceive relevant attributes that are relevant for their behavior (Campbell et al. 2016). In the context of clicking behavior, when an individual is exposed to in-app advertising the individuals might perceive certain structural factors of an in-app, such as its color, animation, location, and size. In a second step, the individual integrates the perceived attributes, referring to configurational sensemaking (Campbell et al. 2016; Maier et al. 2021a).

The reason for this lies in the human brain's characteristic of recognizing patterns in information that facilitate its processing and that stimulate behavior. The human brain is trained to perceive the world in a holistic, configurational manner by recognizing meaning in simultaneously perceived attributes, through cognitive structures (Pelli and Tillman 2008).

Consider an example outlined in prior research (Campbell et al. 2016). Imagine perceiving a small wooden object with four legs and a seat and a second small wooden object with four legs, a seat, and a back. The recognition and interpretation that one is a stool and the other is a chair, similar but ultimately different objects, occurs quickly. However, the interpretation would not have been possible if the attribute "four legs" had been processed and recognized in isolation (Campbell et al., 2016).

To transfer the insights from this example to the context of in-app advertising, when individuals are exposed to in-app advertising, they will perceive different relevant features and combine and assess these perceptions holistically. The resulting assessment, in turn, influences their behavior. For instance, an individual might perceive an in-app ad with a bright color, with animation and large size and based on the configurational perception of the attributes decide not to click. However, a large, and animated in-app ad with no bright colors, which depicts a different configuration where the bright perception is absent, might lead to clicking behavior. In general, this implies that only considering the perceptions in isolation is not sufficient to explain individuals' behavior, such as clicking behavior or the use of cryptocurrencies. In other words, a single perception alone is rarely sufficient to trigger a behavior but that the interactions of multiple perceptions form individuals' behavior (Dane and Pratt 2007).

To take this into account this dissertation follows recent calls (El Sawy et al. 2010; Misangyi et al. 2017) to use set-theoretic configurational methods, such as qualitative comparative analysis (QCA) to examine individuals' behavior, applying these methods to individuals' clicking behavior and use of cryptocurrencies. This dissertation simultaneously responds to calls in e-commerce literature to depart from the dominance of

variance logic in e-commerce (Yulin et al. 2018). While QCA is still a relatively recent method in information systems research, the second goal of the dissertation is to examine the benefits and good practices of set-theoretic configurational methods to generate new knowledge about individuals' behavior. To address these goals the dissertation uses a variety of methodologies and data analysis methods, which are introduced in the next section.

### 3 RESEARCH METHODOLOGIES AND DATA ANALYSIS METHODS

To address the three different goals, the dissertation applies several different research methodologies and various data analysis methods. The predominant research methodologies are explained in the next section and are discussed by differentiating between research approaches and research methods. This dissertation applies each approach and method several times. In the second part of the section, the main data analysis methods applied in this dissertation are delineated.

Table 6 provides an overview of the applied methodologies and data analysis methods in this dissertation. Each paper in this dissertation follows at least one research approach and applies at least one research method and data analysis method.

	Parameter	Instance				
Research methodology (section 3.1)	Research approach	Quantitative research approach (Papers III, IV, V, VIII, IX)		Mixed method research approach (Papers IV, VI)		Qualitative research approach (Papers I, VII, X)
	Research method	Literature review (Papers I, VII)	Questionnaire-based survey (Papers II, IV, V, VI, VIII, IX)	Interview based survey (Papers IV, VI)	Online experiment (Paper III)	Case study (Paper X)
Data analysis method (section 3.2)	Data analysis method	Qualitative comparative analysis (Papers III, IV, V, VI, VIII)		Two-step qualitative comparative analysis (Papers II, IX)		Interview coding (Papers III, IV)

**Table 6. Overview of the applied methodology in this dissertation**

#### 3.1 RESEARCH METHODOLOGIES

This section explains the research methodologies used in the papers comprising this dissertation. The applied research approaches are outlined first followed by the research methods.

Most information systems literature takes one of three basic research approaches: quantitative, qualitative, or mixed methods, which combines quantitative and qualitative research (Venkatesh et al. 2013; Chen and Hirschheim 2004). Each research approach applies one or more research methods, which refers to the research strategy taken to increase the knowledge for the specific research context. A research method can apply different data acquisition approaches, which refer to the specific technique to collect information for the research context (Chen and Hirschheim 2004). An overview of the research methodologies applied in this dissertation is provided in the top half of Table 6.



### 3.1.1 Research approaches

A quantitative research approach relies on quantitative data in examining the phenomenon of interest. The quantitative data collected is analyzed to describe, explain or predict the relationship between independent and dependent constructs (Chen and Hirschheim 2004). In other words, this research approach uses numbers to represent the values of theoretical constructs and their relationship (Venkatesh et al. 2016; Venkatesh et al. 2013). Six of the papers constituting this dissertation applies a quantitative research approach (Table 6).

In contrast, a qualitative research approach relies on qualitative data, such as written or spoken statements, in examining the phenomenon of interest. Qualitative research approaches are often applied when the phenomenon of interest is not fully understood, complex and multifaceted. Typically, the data collected is an extensive narrative of exploratory nature. This approach is often used for theory building (Sarker et al. 2013). Three of the papers constituting this dissertation apply a qualitative research approach (Table 6).

Mixed methods research approach combines quantitative and qualitative research, often to overcome the innate shortcomings of each approach and combine the benefits of both approaches (Venkatesh et al. 2013). With mixed methods approaches, research can leverage multiple perspectives of the phenomenon of interest, which provides more room for several different ontological realities (Venkatesh et al. 2013; Mingers et al. 2013). Two of the papers constituting this dissertation apply a mixed methods research approach (Table 6).

### 3.1.2 Research method and data acquisition approach

This section presents the major research methods applied in the papers constituting this dissertation.

#### 3.1.2.1 Literature review method

The constant growth of knowledge often requires researchers to synthesize the current knowledge on specific phenomena of interest. To achieve this, the scholar identifies and reviews extant literature and derives the current state of knowledge about a certain topic (Paré et al. 2015). Literature reviews apply structured search methods which leads to reproducible results (Paré et al. 2016). It is important to determine the scope of the publication outlets. Common rankings in the field, that can help determine the scope. In the field of information systems, such many reviews include the VHB-Journal<sup>1</sup>, which is widely respected in Germany, and the AIS Senior Scholars' Basket of Eight<sup>2</sup>, which is internationally well established. The search phrases, the time frame, and inclusion and exclusion criteria determine the results of the literature review. Based on recommendations (Webster and Watson 2002), the results should be presented in concept matrixes.

The dissertation includes two literature reviews, each of which follow the five-step approach recommended by vom Brocke et al (2009), including (1) definition of review scope, (2) conceptualization of topic, (3) literature search, (4) literature analysis and synthesis, (5) research agenda.

In **Paper I**, a literature review was conducted to summarize the knowledge of how structural and semantic factors influence clicking behavior. The scope of the literature review included the AIS Basket of Eight as well as major advertising and marketing outlets. The initial result set included 164 articles, 21 of which

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<sup>1</sup> <https://vhbonline.org/vhb4you/vhb-jourqual>

<sup>2</sup> <https://aisnet.org/general/custom.asp?page=SeniorScholarBasket>

remained after the exclusion criteria were applied. The results were synthesized and presented using concept matrixes. In **Paper VII** a literature review was conducted to describe how and why qualitative comparative analysis (QCA) has been applied in information systems research. The scope of this literature review included the major outlets of the information systems discipline, such as the AIS Basket of Eight, and three additional leading outlets identified by Lowry et al. (2013), as well two outlets known to publish emerging topics in the information systems discipline. After applying the exclusion criteria, 32 articles were selected for review. The paper includes descriptive statistics of the articles as well as a range of concept matrixes synthesizing the results.

### 3.1.2.2 Survey method

Surveys are often used to collect primary data about the characteristics, opinions, perceptions, or attitudes of a specific target group (Chen and Hirschheim 2004). The primary data is mainly used to answer research questions such as “how” or “why” a phenomenon is happening and is often grounded in the existing theory that provides first insights into the how or why mechanism (Recker 2013). Surveys are used to generate large amounts of data using various data acquisition approaches, such as mailed questionnaires, online questionnaires, or interviews held by telephone, videoconference, or face-to-face.

#### 3.1.2.2.1 Questionnaire-based data collection approach

The dominant data acquisition approach for surveys in this dissertation is the use of questionnaires. A questionnaire presents questions that are answered by participants. The data thus collected is analyzed to answer the research question. Because the questionnaire is the foundation for the data collection and the subsequent data analysis, the questions in the questionnaire must be designed thoughtfully to ensure high quality data. The questions should be consistent for all participants to ensure that the sequence and the formulation of the questions do not influence the responses (Brace 2018). A questionnaire can be administered by an interviewer in a face-to-face interview or videoconference or participants can fill out the questionnaire alone, which refers to a self-completion questionnaire. Self-completion questionnaires can be administered online with the help of specific web applications or can be administered offline in digital or paper format.

Six of the papers constituting this dissertation analyze data collected from more than 1,000 participants through self-completion questionnaires.

**Paper IX** is based on data collected in a single organization. Of the 200 employees invited to participate in the online survey, nearly 90 percent responded, resulting in a final sample of 178 participants. **Paper II** uses the critical incident technique (Viney 1983) to collect data about participants’ perceptions about in-app advertising. This technique is valuable when examining nonroutine events, such as clicking behavior for in-app advertising. The final sample size is 262. In **Paper VI**, the sampling strategy was to find participants who are in the cryptocurrency pre-adoption phase, i.e., participants who are considering but have not yet invested in cryptocurrency. We invited 528 participants to take part in the survey and filtered out those participants who did not align with the sampling strategy. The paper also followed recommendations of previous literature (Lowry et al. 2016) and used screening and attention tests to increase the data quality. The

final sample consists of 150 participants. A similar data collection approach was used in **Paper V**, where the aim was to gather data from participants who have not used bitcoins as a means of payment. The data collection approach resulted in 167 participants who passed all screening and attention tests. **Paper VIII** demonstrates how to ensure robust and reliable QCA results using two data collection approaches on two data samples with different characteristics. The first data collection approach utilizes data from an external study (Gerow et al. 2015). The sampling strategy was to gather data from CIOs with verified job roles and responsibilities, which led to a final sample of 138 participants. The second data collection approach aimed at participants who own at least one digital assistant-enabled device. The sampling strategy explicitly called for participants who are interested in using and for participants who are not interested in using a digital assistant to increase the heterogeneity of the data sample. The final sample consists of 232 participants.

#### 3.1.2.2.2 Interview-based data collection approach

The second approach used in surveys in this dissertation collects data through interviews, in which participants are asked questions. The interviews can be structured, semi-structured, or unstructured (Myers 2013) and can be conducted face-to-face or remotely via phone or videoconference. The papers constituting this dissertation that apply this approach utilize semi-structured interviews. Such interviews follow an interview guideline containing questions on each relevant topic formulated to guide the interview. However, the procedure in which the questions are asked is flexible and can be adapted according to the participants' answers (Recker 2013).

Two papers constituting this dissertation analyze qualitative data collected in interviews. In **Paper VI**, 73 participants were interviewed about specific motivations for using bitcoins. The semi-structured interviews were conducted at a cryptocurrency event and only participants in the pre-adoption phase of Bitcoin were interviewed. The interview guideline was guided by the regret theory, which serves as the theoretical foundation of the paper. The interviews resulted in 234 hours of audio data. A similar approach was used in **Paper IV**, where interviews were conducted with participants who had recently made at least one online impulse purchase. The participants were recruited from a large university in Germany and pre-screened according to a sampling strategy. Overall, 26 interviews were conducted to gather data about perceptions of in-app advertising and the landing pages of e-commerce websites.

#### 3.1.2.3 Online experiment

Online experiments are suitable for the examination of the cause-effect relationship of a phenomenon of interest. The main benefit is that the online experiment environment is controlled so that one or many independent constructs can be manipulated. The well-controlled manipulation of the independent construct enabled us to examine cause-effect relationships associated with the change in the dependent construct (Karahanna et al. 2018).

Online experiments have three important characteristics. The first characteristic of an online experiment is the treatment of the independent construct, i.e., the manipulation of the construct in focus in the online experiment. Hence, online experiments have at least two groups: the first group receives the treatment and is therefore called the treatment group; the second group does not receive the treatment and is called the control

group. In an optimal setting, participants are randomly assigned to either the treatment or control group (Recker 2013). An online experiment could be used to examine whether the use of in-app advertising with animation influences clicking behavior. In that case, the treatment group would be exposed to an in-app advertisement with animation and the control group would receive the same in-app advertisement without animation. The clicking behavior, which is the dependent construct, is then compared across both groups.

The second characteristic of an online experiment is the factorial design, i.e., the number of treatments or manipulated independent variable (Broota 1989). In a one-factorial design, there is only one treatment with two levels: a control group and a treatment group. In a uni-factorial design, there is also one treatment, but more than two levels. An exemplary uni-factorial design for animated in-app advertising could consider more than two treatments, such as in-app advertising with animated numbers, animated text, and an animated avatar. In a multi-factorial design, there is more than one treatment, each of which refers to a manipulated independent construct and each has at least two levels. To extend the example from above, considering the size of the in-app advertising and the animation would require a multifactorial design.

The third characteristic of an online experiment is the experimental design, which is typically either subject-between or subject-within (Broota 1989). In a subject-between experimental design, each participant of the online experiment is assigned to exactly one level of the treatment. For instance, a participant would either be exposed to in-app advertising with animation or to in-app advertising without animation. In contrast, in a subject-within experimental design, every participant receives all levels of the treatment, i.e., all of the participants would be exposed to the in-app advertising with and without animation.

One paper constituting this dissertation, **Paper III**, analyzes data collected in an online experiment. The paper uses different forms of in-app advertising as the treatment. The design is multifactorial because there are three different levels of treatment. In each group, participants are exposed to in-app advertising that has 100 social media likes. Participants in the first treatment group see in-app advertising with 100 social media likes including a social media like from a person with whom they have a strong tie. Participants in the second treatment group are exposed to in-app advertising with 100 social media likes including a social media like from a person with whom they have a weak tie. Finally, the participants in the control group are exposed to in-app advertising with 100 social media likes from unknown persons. To manipulate this, the online experiment described in **Paper III** in this paper is divided into two parts. In the first part, the participants in the first treatment group name someone with whom they have a strong tie, and the participants in the second treatment group name some with whom they have a weak tie. These names are then used in the second part of the online experiment for the manipulation of the social media likes of the in-app advertising.

Overall, 168 participants were randomly assigned to the treatments. To ensure that the manipulation was successful, a one-way analysis of variance (ANOVA) manipulation check was conducted. To test whether the tie-strength was significantly different across the groups, a one-way t-test was conducted.

#### 3.1.2.4 Case study method

The fourth research method applied in the dissertation is the case study research method. The case study

research method is used to examine phenomena in an authentic setting. Case studies are used to collect empirical evidence as a contribution to a specific field of knowledge. Case studies can be used to discover new knowledge or to test, explain, or compare existing knowledge (Myers 2013). Case studies are often used to answer how and why questions (Sarker et al. 2013). Case studies are particularly useful when the phenomenon is rather unexplored (Eisenhardt and Graebner 2007).

**Paper X** applies a case study method, interviewing people who worked on blockchain projects in sixteen different organizations. The central case study, the MediLedger project, was accompanied throughout two years. Seven interviews were conducted with project members to discuss the current status and relevant challenges and developments. To get a broader understanding of the case study context, five additional interviews with stakeholders were conducted. Based on insights gathered from the case interviews and project documentations, actionable recommendations were made to the project members.

## 3.2 DATA ANALYSIS METHODS

The second part of this section discusses the data analytics methods used in the papers constituting this dissertation.

### 3.2.1 Data analysis method: QCA

The main data analysis method used in this dissertation is qualitative comparative analysis (QCA). QCA is a configurational method that draws on set theory and uses Boolean algebra to explain the relationship between multiple causal conditions – or configurations of those causal conditions – and an outcome condition (Ragin 2014; Mattke et al. 2022). Charles Ragin first developed QCA to analyze the complex pattern of social science phenomena in studies with a sample size too small to apply regression models but too large for cross-case analysis (Ragin 2014).

Information systems research has called for applying QCA to various research topics because of the capability of the data analysis method to cast light on the interplay of multiple causal conditions influencing an outcome condition (El Sawy et al. 2010; Park et al. 2020). The following outlines the foundations and key principles of QCA.

#### 3.2.1.1 Conditions and set theory

As outlined above, QCA is based on set theory, which means that both causal and outcome conditions are represented as a set membership in a well-defined collection of objects, and causal conditions explain outcome conditions (Mattke et al. 2021c; Mattke et al. 2022) (see Table 7).

Terminology	Explanation
Causal condition	Refers to a set membership in a collection of well-defined objects that explain the outcome condition.
Outcome condition	Refers to a set membership in a collection of well-defined objects that is explained by the causal condition.

**Table 7. Central terminology for conditions in QCA**

The two extreme situations of set memberships are when a condition is fully out of a set, i.e., full non-

membership in a set, or when a condition is fully in a set, i.e., full membership in the set (Mattke et al. 2021c; Mattke et al. 2022). Originally, QCA represented conditions as crisp sets (cs) coded binary, i.e., a condition can only be fully out of a set / full non-membership in a set / absent (0), or fully in a set / full membership in a set / present (1) (see Table 8).

Crisp set (cs) condition				
Fully out of a set	Partially out of a set	Point of maximum ambiguity	Partially in a set	Fully in a set
A condition with a cs value = 0 is fully out of a set and is the minimum level of the condition. Absent condition.	Not considered	Not considered	Not considered	A condition with a cs value = 1 is fully in a set and is the maximum level of the condition. Present condition.

**Table 8. Crisp set condition (adapted from Mattke et al. 2022)**

Over time, QCA advanced and conditions could be represented as fuzzy sets, i.e., partial set memberships (Ragin 2000). This means with using fuzzy set representations, it is possible to represent the degree of a membership, which can take values between 0 and 1. A summary is provided in Table 9.

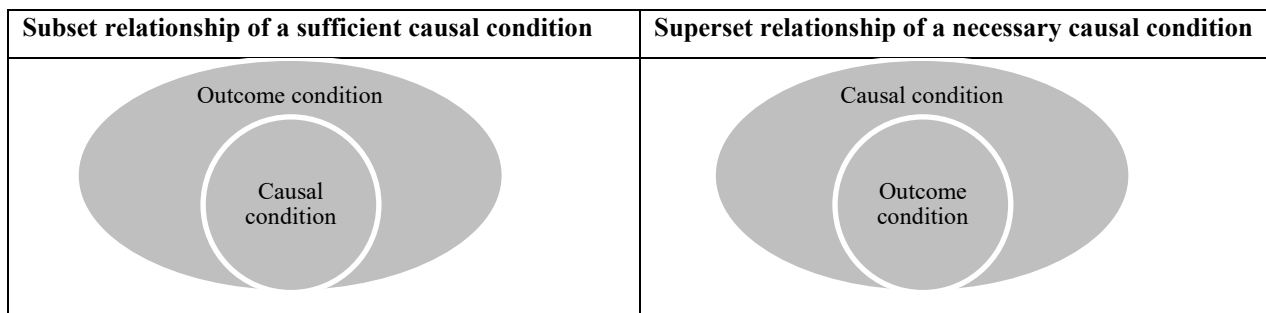
Fuzzy set (fs) condition				
Fully out of a set	Partially out of a set	Point of maximum ambiguity	Partially in a set	Fully in a set
A condition with an fs value = 0 is fully out of a set and is the minimum level of the condition.	A condition with an fs value $> 0$ and $< 0.5$ is partially out of a set.	A condition with an fs value of 0.5 is at the point of maximum ambiguity, where the condition is neither fully/partially in nor fully/partially out of the set.	A condition with an fs value $> 0.5$ and $< 1$ is partially in a set.	A condition with an fs value = 1 is fully in a set and is the maximum level of the condition.
All conditions with fs values $< 0.50$ refer to the low level of the condition and are often called absent conditions.			All conditions with fs values $> 0.50$ refer to the high level of the condition and are often called present conditions.	

**Table 9. Fuzzy set condition (adapted from Mattke et al. 2022)**

### 3.2.1.2 Relationship between causal conditions and outcome conditions

The set-theoretical nature of QCA enables the relationship between a causal condition and an outcome condition to be identified in terms of necessity and sufficiency (Schneider and Wagemann 2012). Necessary causal conditions must exist in order for an outcome condition to exist, i.e., if the outcome condition exists, the necessary causal condition exists as well. Sufficient causal conditions always lead to an outcome condition, i.e., if a sufficient condition exists, the outcome condition exists as well (Ragin 2014).

In set-theory terms, if the causal condition is a consistent subset of the outcome condition, it indicates a sufficient causal configuration, and if the causal condition is a superset of the outcome condition, it indicates a necessary causal condition (Schneider and Wagemann 2012), as illustrated in the Venn diagrams below (Table 10).



**Table 10. Venn diagrams illustrating sufficient and necessary causal condition**

While QCA can be used to identify sufficient conditions, there is generally not a single cause for an outcome condition, empirically and practically speaking, but rather multiple causal conditions which together lead to the outcome conditions (Ragin and Fiss 2008). This describes the configurational nature of QCA, in which one or more configurations of causal conditions lead to an outcome condition. Specifically, a configuration is defined as a group of causal conditions with various degrees of set membership, which may or may not lead to the outcome condition. A necessary configuration is a group of causal conditions that always exists when the outcome condition exists as well, while a sufficient configuration is a group of causal conditions that always leads to the outcome condition (Ragin 2014). A summary is provided in Table 11.

Terminology	Explanation
Necessary causal condition	Refers to a causal condition that always exists when the outcome condition exists as well
Sufficient causal condition	Refers to a causal condition that always leads to the outcome condition
Configuration	Refers to a group of causal conditions linked to the outcome condition
Necessary configuration	Refers to a group of causal conditions that always exists when the outcome condition exists as well
Sufficient configuration	Refers to a group of causal conditions that always leads to the outcome condition

**Table 11. Central terminology for analyzing the relationship between causal conditions and outcome conditions**

In this dissertation, QCA was applied in **Papers II, III, V, VI, VIII, IX**.

### 3.2.1.3 Advanced QCA: two-step QCA

An advanced form of csQCA and fsQCA is two-step QCA, which has been discussed in some QCA method publications (Schneider and Wagemann 2006; Goertz and Mahoney 2005) but which has seldom been applied in empirical research (Schneider 2019).

In a two-step QCA approach, the causal conditions are further differentiated into distant (or remote) and close (or proximate) causal conditions. Both types of causal conditions are used to explain the outcome condition. In a two-step QCA the first step is to analyze sufficient configurations of the distant causal conditions that lead to the outcome condition. The sufficient configurations found in the first step are called outcome-enabling configurations (Maier et al. 2021b). Based on the results of step one, step two is performed. In step 2, for each of the outcome-enabling configurations, the configurations of the close causal conditions are analyzed. In other words, in this second step, sufficient configurations of the close causal conditions are analyzed that lead to the outcome condition. A comparison of QCA and two-step QCA is displayed in Table 12.

Criteria	QCA	Two-step QCA
Conditions	All causal conditions are treated equally.	Differentiates between distant causal conditions and close causal conditions.
The goal of the analysis	Revealing sufficient configurations of causal conditions leading to the outcome conditions.	Revealing sufficient configurations of the sequentially processed structural and semantic factors.  Step one: Revealing configurations of distance conditions, which lead to the outcome condition.  Step two: For each outcome-enabling configuration revealed in step one, step two analyzes how the close causal conditions lead to the outcome condition.

Table 12. Difference of QCA and two-step QCA (Mattke et al. 2021b)

To illustrate the two-step QCA approach, consider the example provided by Maier et al. (Maier et al. 2021b). Consider three distant causal conditions (DCC1, DCC2, and DCC3). In step one, the first QCA, sufficient configurations of these causal conditions are analyzed that lead to the outcome condition. In the example, the analysis results in two sufficient configurations (outcome-enabling configurations 1 and 2) leading to the outcome condition. Next, two datasheets are created: The first datasheet contains all observations that match outcome-enabling configuration 1 and the second datasheet contains all observations matching outcome-enabling configuration 2. In step two, an analysis of sufficient configurations of close causal conditions (CCC1, CCC2, CCC3) is conducted for outcome-enabling configuration 1 (second QCA) as well as for outcome-enabling configuration 2 (third QCA). This analysis results in sufficient configurations of close causal conditions leading to the outcome conditions for each of the outcome enabling configurations. In the example, the analysis of outcome-enabling configuration 1 results in two sufficient configurations of close causal conditions (1a and 1b). In addition, the analysis of outcome-enabling configuration 2 results in one sufficient configuration of close conditions (2a). Finally, the results from steps one and two are combined, resulting in combined sufficient configurations. Figure 4 illustrates the two-step QCA process.

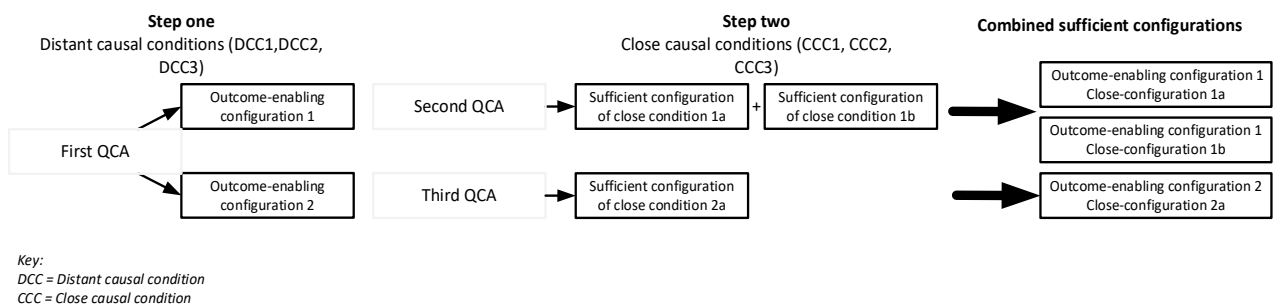


Figure 4. Illustration of two-step QCA (Maier et al. 2021b)

**Paper II** and **Paper IX** use two-step QCA. **Paper II** uses two-step QCA to analyze the sequential processing of perceptions. **Paper IX** demonstrates that this advanced form of QCA is particularly suited for analyzing mediating research models.

#### 3.2.1.4 Presentation and evaluation of QCA results

The sufficient configurations are represented in terms of a solution formula, which uses Boolean expressions, where \* depicts the logical and, + indicates the logical or, ~ represents the absence of a condition and →



denotes the logical implication operator. An example solution formula for the high level of an outcome condition is displayed in the first row of Table 13 and an example solution formula for the low level of an outcome condition is displayed in the second row of Table 13.

<i>Causal condition A</i> * <i>Causal condition B</i> * <i>Causal condition C</i> + <i>Causal condition A</i> *~ <i>Causal condition B</i> * <i>Causal condition C</i> + <i>Causal condition A</i> * <i>Causal condition C</i> → <i>Outcome condition</i>
<i>Causal condition A</i> *~ <i>Causal condition B</i> *~ <i>Causal condition C</i> + ~ <i>Causal condition A</i> *~ <i>Causal condition B</i> *~ <i>Causal condition C</i> → ~ <i>Outcome conditions</i>

**Table 13. Example solution formulas**

Instead of using a Boolean expression, most scholars display solutions graphically (Ragin and Fiss 2008). It is common to use black circles to indicate the high level of a causal condition and crossed-out white circles to represent the low level of a causal condition. Because sufficient configurations in QCA results can be logically minimized, white spaces indicate ‘don’t care’ situations, where the causal condition can either have a high or a low level. The graphical representation can also indicate the necessary causal conditions, e.g., with a star instead of a circle (Mattke et al. 2022).

	C1	Outcome condition C2	C3	~Outcome condition C4	C5
Causal condition A	●	●	●	●	⊗
Causal condition B	●	⊗		⊗	⊗
Causal condition C	★	★	★	★	★
Raw coverage	0.48	0.47	0.43	0.26	0.26
Unique coverage	0.01	0.01	0.18	0.01	0.01
Consistency	0.90	0.90	0.93	0.95	0.97
Solution coverage		0.66		0.36	
Solution consistency		0.89		0.95	

Key:

- Causal condition present      ★ Presence of a necessary causal condition
- ⊗ Causal condition absent      ★ Absence of a necessary causal condition
- “Don’t Care situation”

**Table 14. Example graphical representation of the solution formula**

The results of a QCA are commonly assessed along the measures of consistency and coverage.

The formula for measuring consistency is

$$\text{Consistency } (X_i \leq Y_i) = \frac{\sum \min(X_i, Y_i)}{\sum X_i}.$$

In this formula, “min indicates the selection of the lower of the two values. When the  $X_i$  values are all less than or equal to their corresponding  $Y_i$  values, the consistency score is 1.0; when there are only a few near

misses, the score is slightly less than 1.0; when there are many inconsistent scores, with some  $X_i$  values greatly exceeding their corresponding  $Y_i$  values, consistency may drop below 0.5” (Ragin 2009, p. 52).

The formula for measuring coverage is

$$\text{Coverage } (X_i \leq Y_i) = \frac{\sum \min(X_i, Y_i)}{\sum Y_i}$$

Coverage thereby expresses “the overlap expressed as a proportion of the sum of the membership scores in the outcome” (Ragin 2009, p. 52). The most important measures for a single sufficient configuration (raw coverage, unique coverage, and consistency) and for the overall solution (solution coverage and consistency) are summarized in Table 15.

Measure	Explanation
Raw coverage	Quantifies the extent of the data set explained by one configuration.
Unique coverage	Quantifies the extent of the data set explained solely by one configuration excluding the extent explained by other configurations.
Consistency	Quantifies the extent to which the configuration exhibits the outcome.
Solution coverage	Quantifies the extent to which the observations in the data set fit to at least one configuration of the solution.
Solution consistency	Quantifies the extent to which the observations in the data set correspond to the solution.

**Table 15. Essential measures of a QCA solution (Mattke et al. 2022)**

### 3.2.1.5 Accounting for validity, reliability, and common method bias

To draw insights from a QCA analysis, the data must be tested for validity and reliability (Mattke et al. 2022). Since at least one paper constituting this dissertation applies QCA for survey methods with a questionnaire-based data collection approach, the following section discusses testing for validity and reliability as well as common method bias in this context. A summary is provided in Table 16.

#### 3.2.1.5.1 Content validity

In the context of the relevant studies of the dissertation, content validity refers to the extent to which measurement items are representative of the target construct (Haynes et al. 1995). To ensure content validity, all quantitative studies in the papers constituting this dissertation rely on pre-validated and established measurement items from previous literature. In addition, all measurement items were discussed within the project team to ensure high content validity. In **Paper IV**, new measurement items for a construct were developed because this construct had not yet been researched. We followed recognized recommendations for new measurement item development and applied a q-sorting method for item development (Nahm et al. 2002; Stephenson 1953). The q-sorting method involves participants sorting newly created measurement items into different categories and calculating the agreement rates across the sorting results. As suggested in previous research (Landis and Koch 1977) we only used new measurement items with agreement rates above the threshold of 61%.

Criterion	Definition	Realization of the criterion
Content validity	The extent to which the measurement instrument is representative of the target construct	Valid construct based on pre-validated constructs used in previous literature (Straub and Gefen 2004) or conducting q-sorting method (Nahm et al. 2002)
Discriminant validity	The extent to which constructs differ from each other	The square root of the AVE must be greater than the corresponding bivariate correlations of the constructs (Fornell and Larcker 1981).
		The heterotrait-monotrait (HTMT) ratio must be below 0.85 (Henseler et al. 2014)
Convergent validity	The extent to which a construct correlates with other constructs.	All loadings of the items must exceed the threshold of 0.707 (Carmines and Zeller 2008)
		The AVE must exceed the threshold of 0.50 (Fornell and Larcker 1981)
Construct reliability	The extent of the internal consistency of a construct	Cronbach's alpha must exceed 0.70 (Nunnally 1978)
		The composite reliability (CR) must exceed 0.70 (Fornell and Larcker 1981)
Common method bias	The variance that can be attributed to the measurement method, rather than to the construct	Harman's single factor test to examine the variance explained by one factor, whereby a value above 50 indicates that CMB might be an issue.
		Strong correlations between bivariate correlations ( $r > 0.90$ ) indicate that CMB might be an issue (Pavlou et al. 2007).
		Strong bivariate correlations of an unrelated marker variable indicate that CMB might be an issue (Lindell and Whitney 2001).

Table 16. Tests for validity, reliability, and common method bias (Hair et al. 2017)

### 3.2.1.5.2 Discriminant validity

Discriminant validity refers to the degree to which constructs differ from each other, i.e., do not reflect the same concept. In this dissertation, we tested for discriminant validity following two approaches. The first approach applies the Fornell-Larcker criterium, which is fulfilled if the square root of the construct's average variance extracted (AVE) is greater than the corresponding bivariate correlation of the constructs (Fornell and Larcker 1981). The second approach is to calculate the heterotrait-monotrait (HTMT) ratio of the correlations of the constructs. If the HTMT ratio is below the threshold of 0.85, then it indicates that discriminant validity is given (Henseler et al. 2014).

### 3.2.1.5.3 Convergent validity

Convergent validity is "the extent to which a measure correlates positively with alternative measures of the

same construct” (Hair et al. 2017, p. 112). In this dissertation, convergence validity is tested at the measurement item level and the construct level.

Convergent validity at the measurement item level is examined by investigating the loadings of the measurement items. At a very minimum, these loadings should all be significant. The value of the loading should be at least 0.707, which shows that at least 50 percent of the variance is explained by the measurement item (Hair et al. 2017; Carmines and Zeller 2008). At the construct level, it is common to examine the average variance extracted (AVE), which should exceed the threshold of 0.50 (Fornell and Larcker 1981).

#### 3.2.1.5.4 Construct reliability

Construct reliability refers to the internal consistency of a construct. In this dissertation, two approaches are used to test for construct reliability. On the one hand, Cronbach’s Alpha is used and it should exceed the threshold of 0.70 (Nunnally 1978). In addition to this, the composite reliability (CR) is calculated. Values above the threshold of 0.70 indicate high construct reliability (Hair et al. 2017).

#### 3.2.1.5.5 Construct reliability

Because the studies in this dissertation rely on self-reported measurements, the studies in the dissertation follow good practices to test for common method bias (CMB). CMB refers to the variance that is “attributable to the measurement method rather than to the constructs the measures are assumed to represent” (Podsakoff et al. 2003, p. 879). To test whether CMB is distorting the results in the study, various approaches are used. Harman’s single factor test shows the extent to which the variance of the data is explained by a single factor, whereby a low level indicates that CMB is not an issue. A common rule is that if a threshold above 50 percent indicates that CMB might be an issue in the study. The second test used in the studies is to examine the bivariate correlations of the constructs. Very high bivariate correlations ( $r > 0.90$ ) indicate that CMB is an issue (Pavlou et al. 2007). Another approach used to test for CMB is the marker variable approach (Lindell and Whitney 2001; Chin et al. 2012). In this approach, a construct unrelated to the constructs in the study (e.g., “I prefer pizza over pasta”) is included and the bivariate correlations of this unrelated construct are examined. Low bivariate correlations indicate that CMB is not an issue.

### 3.2.2 Data analysis method: interview coding

To analyze the transcribed text data from interviews, a descriptive and interpretive coding approach was applied in this dissertation (Myers 2013).

Descriptive coding is the process of assigning a descriptive label to each applicable passage of text and capturing the core themes that are being articulated by the interviewee (Myers 2013). Whenever possible, the exact words used by the interviewees are used to name the descriptive codes. The descriptive coding results in a list of descriptive codes, which are used for the interpretive coding.

Interpretive coding refers to the process of synthesizing the descriptive codes into higher-level interpretive codes. This means that the descriptive codes were analyzed in a more structured way, whereby the core meaning of the descriptive codes is examined and the goal is to group several similar descriptive codes into an interpretive code (Myers 2013).

To increase the reliability of the coding, it is a good practice that at least two persons apply the coding steps independently. The results of each person are then compared to reveal the consistency of the coding procedure by calculating the agreement score and the free-marginal multirater kappa coefficient (Randolph 2005; Warrens 2010). The coders can then discuss codes with low agreement scores and recode them accordingly to increase the consistency of the coding.

In **Paper VI**, descriptive and interpretive coding has been applied to analyze what perceptions about Bitcoin, personal factors, and regret sentiments influence individuals' investment in Bitcoin. The descriptive coding yielded 32 different descriptive codes which were aggregated into seven interpretive codes. In **Paper IV**, a similar coding approach was used to analyze the transcribed interviews to gather insights about factors influencing online impulse buying. The descriptive coding yielded 45 different descriptive codes which were aggregated into eight interpretive codes. In each of the papers, the coding was conducted by multiple persons, the initial agreement score was calculated and differences in the coding were discussed to ensure consistent coding.

### 3.3 SUMMARY

In the papers comprising this dissertation, multiple research approaches, research methods, data acquisition approaches, and data analysis methods were applied. Most papers in this dissertation apply a quantitative research approach with questionnaire-based data collection. The main data analysis method is QCA.

## 4 RESULTS

In this section, the results of the paper comprising this dissertation are presented. The results are structured according to the three goals of the dissertation.

### 4.1 CHAPTER 1: IN-APP ADVERTISING CLICKING BEHAVIOR AND CRYPTOCURRENCY USE IN E-COMMERCE

This section summarizes the results of six studies contributing to the goal of generating new knowledge about individuals' in-app advertising clicking behavior and about cryptocurrency use in e-commerce. The results of each paper are summarized in the following sections.

#### 4.1.1 Paper I: Advertising-funded IS: a literature review on factors influencing users' clicking behavior for in-app ads<sup>3</sup>

To understand individuals' in-app advertising clicking behavior, **Paper I** takes an information processing perspective and applies the limited capacity theory (Lang et al. 2002; Lang 2000), which suggests that structural factors and semantic factors influence individual behavior. The paper asks the following research question: What structural and semantic factors of in-app ads influence users' clicking behavior? The paper answers this research question by conducting a literature review of relevant publications in major outlets in the information systems discipline as well as marketing and advertising outlets (Figure 5).

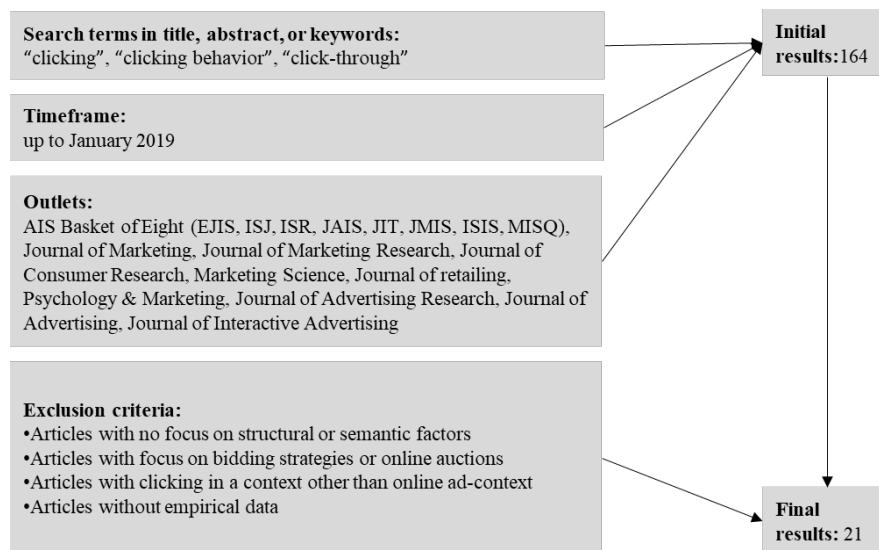


Figure 5. Literature review in Paper I (Mattke 2019)

The literature review synthesized the known structural and semantic factors that are known to influence clicking behavior. The literature review includes 21 articles, which are displayed in Table 17.

Prior literature reveals that four structural factors (animation, color brightness, location prominence, and size) influence individuals' clicking behavior. Based on the synthesis of existing literature, seven semantic factors (entertainment value, informativeness, usefulness, personalization, congruity, irritation, and privacy

<sup>3</sup>Mattke, Jens (2019): Advertising-Funded IS: A Literature Review on Factors Influencing Users' Clicking Behavior for In-App Ads. In Twenty-fifth Americas Conference on Information Systems.

concern) are found to influence individuals' clicking behavior. Based on these findings, **Paper I** proposes considering additional widely studied structural factors, particularly the similarity to the background structure (Duff and Faber 2011; Lavie et al. 2004). The paper recommends that future research consider other semantic factors that influence individuals' clicking behavior known from related research, such as the credibility of in-app advertising (Brackett and Carr 2001).

Author	Structural factors				Semantic factors						
	Animation	Color brightness	Location prominence	Size	Entertainment value	Informativeness	Irritation	Usefulness	Personalization	Privacy concern	Congruity
Abhishek et al. (2015)			✓								
Agarwal and Mukhopadhyay (2016)			✓								
Agarwal et al. (2011)			✓								
Aguirre et al. (2015)									✓		
Animesh et al. (2011)			✓								
Bleier and Eisenbeiss (2015a)									✓		✓
Bleier and Eisenbeiss (2015b)							✓	✓	✓	✓	
Bruce et al. (2017)	✓			✓							
Chan and Young-Hoon (2015)			✓								
Chandon et al. (2003)	✓			✓							
Gong et al. (2018)			✓								
Lohtia et al. (2003)	✓	✓									
Narayanan and Kalyanam (2015)			✓								
Rosenkrans (2009)	✓			✓							
Rutz et al. (2012)			✓								
Shamdasani et al. (2001)											✓
Sokolik et al. (2014)		✓		✓							
Tucker (2014)									✓		
Wang and Chou (2019)											✓
Yoo et al. (2004)	✓										
Zhang and Mao (2016)					✓	✓					✓

Table 17. Results of the literature review of Paper I (Mattke 2019)

Finally, based on theoretical arguments from information processing literature (Tam and Ho 2006, 2005; Sun et al. 2013), **Paper I** recommends considering the mutual influence of structural and semantic factors on individuals' clicking behavior. Specifically, building on the limited capacity theory (Lang et al. 2002; Lang 2000), the paper proposes studying the moderating effects of structural factors on semantic factors as well as considering nonlinear relationships between those factors. These suggestions have been considered in **Paper II**, which results are presented next.

#### 4.1.2 Paper II: In-app advertising: a two-step qualitative comparative analysis to explain clicking behavior<sup>4</sup>

**Paper II** expands the knowledge on how the processing of structural and semantic factors leads to in-app advertising clicking behavior. Based on the limited capacity theory (Lang et al. 2002; Lang 2000), **Paper II** investigates how the sequential processing of structural and then semantic factors leads to clicking behavior.

This paper builds on the findings from the literature review in **Paper I**, which identified five structural factors and seven semantic factors relevant for explaining clicking behavior. To test the sequential processing of these factors, a process-oriented two-step QCA is applied to data collected during 262 incidents of in-app advertising exposure,

	Processed structural factors					Processed semantic factors											
	Animation	Color brightness	Location Prominence	Large size	Similarity to background structure	Perceived entertainment value	Perceived informativeness	Perceived irritation	Perceived privacy concern	Perceived credibility	Perceived congruity	Perceived personalization	Raw coverage	Unique coverage	Consistency	Solution coverage	Solution consistency
<i>Non-animated small in-app ad (C1)</i>	⊗	●	●	⊗	●	●	●	⊗	⊗	●	●	●	0.26	0.21	0.92	0.46	0.94
<i>Non-animated small invasive in-app ad (C2)</i>	⊗	●	●	⊗	●	●	●	●	●	●	●	●	0.25	0.19	0.90		
<i>Non-animated privacy-invasive in-app ad (C3)</i>	⊗	●	●	●	●	●	⊗	●	●	●	●	●	0.40	0.40	0.86	0.40	0.86
<i>Animated non-personalized in-app ad (C4)</i>	●	●	●	●	●	●	●	⊗	⊗	●	●	⊗	0.36	0.36	0.95	0.36	0.95

Key:

- Causal condition present      ★ Presence of a necessary causal condition
- ⊗ Causal condition absent
- “Don’t Care situation”

**Figure 6. Results of Paper II (Mattke et al. 2021b)**

. The results of the two-step QCA support the proposed sequential processing because neither structural nor semantic factors in isolation could explain clicking behavior. Four different configurations are revealed that lead to clicking behavior, which, as recommended by (Ragin and Fiss 2008), are represented graphically (see

<sup>4</sup> Mattke, Jens; Maier, Christian; Reis, Lea; Weitzel, Tim (2021b): In-app advertising: a two-step qualitative comparative analysis to explain clicking behavior. In European Journal of Marketing (55:8), pp. 2146–2173. DOI: 10.1108/EJM-03-2020-0210.



Figure 6).

In summary, the results indicate, first, that individuals click in-app advertising that is not animated, even if it is perceived as irritating or causing privacy concerns. Second, individuals click on animated in-app advertising only if it is not perceived as irritating, causing privacy concerns, and not personalized.

While previous research into advertising clicking behavior has mostly studied either the role of structural factors or semantic factors in isolation, the results show that research needs to consider the combined influence of structural and semantic factors to reflect the fact that structural and semantic factors are processed sequentially, as the paper explains theoretically and proves empirically. The results also show that isolated negative perceptions such as irritation or privacy concern do not necessarily hinder clicking behavior because other factors can compensate for those negative perceptions. This study is the first to demonstrate how to use a two-step QCA approach to test sequential or mediating research models.

#### 4.1.3 Paper III: Herd behavior in social media: the role of Facebook likes, strength of ties, and expertise<sup>5</sup>

While **Paper I** and **Paper VI** focus on in-app advertising in general, **Paper III** focuses on in-app advertising in social media outlets, one of the most prominent forms of in-app advertising.

The paper explains two behavioral intentions to in-app advertising, namely whether individuals click the in-app ad, i.e., develop click-through intentions, and whether individuals visit the e-commerce website later, i.e., develop view-through intentions. A specific characteristic of social media advertising is that individuals process the social media ad but also who has liked the social media ad. The paper builds upon herd behavior literature (Bikhchandani et al. 1992; Banerjee 1992; Bikhchandani et al. 1998), the strengths of weak ties concept (Granovetter 1973), and theoretical arguments from the perspective of social distance (Trope and Liberman 2010). The paper differentiates three types of social media likes. The social media like can be from a person who is strongly tied to the individual (e.g., a close friend), from a person who is weakly tied (e.g., an acquaintance), or there can be no tie to the like of a person (e.g., an unknown person). Based on this differentiation, the overarching research question is: Under what condition does a social media ad that has been liked by an individual with a) strong, b) weak, or c) no ties to a focal user lead that user to develop click-through and view-through intentions? The paper takes a configurational approach. **Paper III** samples data from 168 participants based on an online experiment research method and applies a QCA to analyze the data.

The results (Figure 7) show that in-app advertising liked by others including a strongly tied person leads to click-through and view-through intentions, while in-app advertising liked by others including a weakly tied and experienced friend only leads to view-through intentions. Particularly, in-app advertising with social media liked by a better-informed close friend can even drive a user to click on sponsored content that was not previously perceived as valuable. The results also show that in-app advertising liked by only unknown

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<sup>5</sup> Matthe, Jens; Maier, Christian; Reis, Lea; Weitzel, Tim (2020): Herd behavior in social media: The role of Facebook likes, strength of ties, and expertise. In *Information & Management* 57 (8), pp. 1–16. DOI: 10.1016/j.im.2020.103370.

persons does not explain individuals' clicking behavior or their intention to visit the e-commerce store, even if the in-app advertising is seen as valuable. The results thereby shed new light on the underlying psychological mechanism of herd behavior by highlighting the role of experts in a herd and how herd behavior arises.

	Click-through intention		View-through intention		
	C1	C2	C3	C4	C5
<b>Herd behavior-specific conditions</b>					
Observation includes a strongly tied predecessor	●	●	●	●	⊗
Observation includes weakly tied predecessor	⊗	⊗	⊗	⊗	●
Observation of unknown predecessors	⊗	⊗	⊗	⊗	⊗
Discounting own information	●			●	●
Imitating others	●	●	●	●	●
Predecessor's expertise	●	●	●	●	●
<b>Sponsored content-specific conditions</b>					
Perceived value of the sponsored content	●	●	●		●
Male social media user		●	●	⊗	
Frequent social media use	●	●	●	●	
Raw coverage	0.22	0.13	0.14	0.13	0.25
Unique coverage	0.11	0.02	0.14	0.13	0.25
Consistency	0.93	0.91	0.94	0.97	0.92
Solution coverage	0.24		0.52		
Solution consistency	0.92		0.94		

Key:

- Causal condition present      ★ Presence of a necessary causal condition
- ⊗ Causal condition absent
- “Don't Care situation”

**Figure 7. Results of Paper III (Mattke et al. 2020b)**

#### 4.1.4 Paper IV: Impulse buying in e-commerce: a mixed-method study of social media ads<sup>6</sup>

The previous studies (**Paper I, II, III**) focus on clicking behavior. In-app advertising is the first valuable touchpoint with potential customers and the clicking behavior on an in-app ad is an important metric for organizations. However, organizations ultimately aim to sell their products and to generate revenue through in-app advertising. To achieve this, individuals need to click the in-app advertising which redirects them to an e-commerce landing page, and both need to trigger a conversion, i.e., online impulse buying.

**Paper IV** proposes two customer touchpoints that set the stage for online impulse buying: in-app advertising and the e-commerce landing page. A review of the relevant information systems and marketing outlets reveals a gap in research into how these two touchpoints influence online impulse buying. This paper asks

<sup>6</sup> Mattke, Jens; Maier, Christian; Reis, Lea; Weitzel, Tim: Impulse buying in e-commerce: A mixed-method study of social media ads.

two research questions: What social media ad-related factors, e-commerce landing page-related factors, and traits influence online impulse buying? What configurations of social media ad-related factors, e-commerce landing page-related factors, and traits lead to online impulse buying?

This paper takes a mixed-methods research approach (Figure 8), including a qualitative study, to answer the first research question and conduct a quantitative study to answer the second research question. The underlying theoretical concept of the latent state-trait (LST) theory (Steyer et al. 1999; Hamaker et al. 2007) serves as a theoretical foundation for both studies.

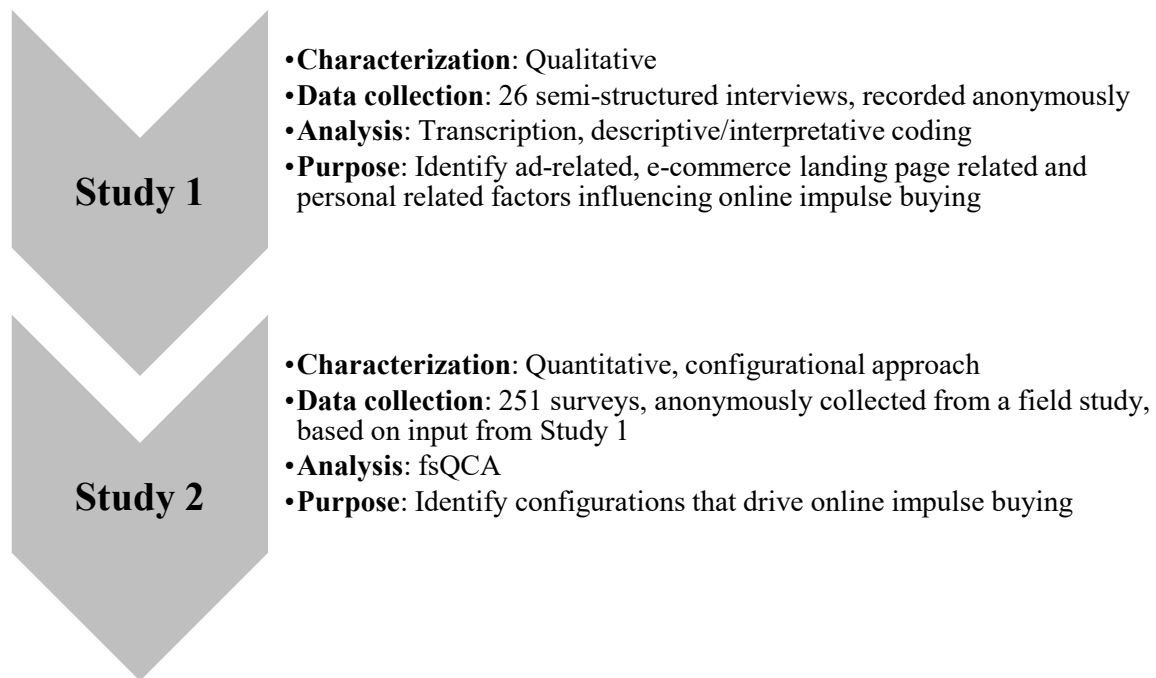


Figure 8. Mixed methods approach in Paper IV

Factors influencing online impulse buying		Definitions adapted to the context of impulse buying	Definition based on
Social media ad-related factors	Informativeness	The extent to which the social media ad informs the user about products or services.	Zhang and Mao 2016
	Credibility	The extent to which the social media ad is perceived as truthful.	Brackett and Carr 2001
	Personalization	The extent to which the social media ad is perceived to be tailored to the individual.	Xu et al. 2008
E-commerce landing page related factors	Information fit to the ad	The extent to which the information on the e-commerce landing page fits the individual's information needs after clicking on a social media ad.	<i>Not studied so far</i>
	Visual appeal	The extent to which the e-commerce landing page is perceived as visually appealing.	Loiacono et al. 2007
	Usability	The extent to which the e-commerce landing page is evaluated to have good usability.	Zhang et al. 2011
	Trust	The extent to which the e-commerce landing page is perceived as trustworthy.	McKnight et al. 2002
Traits	Impulse buying tendency	The extent to which the individual tends to buy impulsively.	Rook and Fisher 1995

**Table 18. Results of Study 1 in Paper IV**

In Study 1, data from 26 semi-structured interviews are analyzed and revealed the relevant social media ad-related factors, e-commerce landing page-related factors, and what traits influence online impulse buying. The identified factors influencing online impulse buying are summarized in Table 18.

The identified factors are used as input for Study 2, where a questionnaire-based data collection approach is applied in an observational field study. The paper uses QCA to analyze the survey data. The results of Study 2 are displayed in Figure 9.

		High intention to buy impulsively				
		C1		C2		C3
<b>Social media ad-related factors</b>	Informativeness	⊗		●		●
	Credibility	●		●		●
	Personalization	⊗		●		●
	<b>E-commerce landing page reflected factors</b>					
	Information fit to ad	★		★		★
	Visual appeal	★		★		★
	Usability	●		●		⊗
	Trust	●		●		⊗
	<b>Personal traits</b>					
	Impulse buying tendency	●				●
Raw coverage		0.22	0.69	0.20	0.22	0.69
Unique coverage		0.02	0.47	0.01	0.02	0.47
Consistency		0.98	0.97	0.99	0.98	0.97
Solution coverage		0.71				
Solution consistency		0.97				

Key:

- Causal condition present      ★ Presence of a necessary causal condition
- ⊗ Causal condition absent      ★ Absence of a necessary causal condition
- “Don’t Care situation”

**Figure 9. Results Study 2 in Paper IV**

In summary, the results show that for online impulse buying to occur, the e-commerce landing page needs to be visually appealing, and the information of the e-commerce landing page needs to fit the social media ad. While previous research provides valuable insights into how an e-commerce site can trigger online impulse buying, little had been known about how social media ads can trigger online impulse buying. The results reveal that neither an e-commerce landing page nor a social media ad in isolation triggers online impulse buying, but that the combination of factors from both is sufficient to lead to online impulse buying. The results also provide insights into how an e-commerce landing page can compensate for social media advertising perceived as neither personalized nor informative and still lead to online impulse buying. Similarly, a social media ad can compensate for an e-commerce landing page with low usability and little

trustworthiness.

While the papers (**Paper I – IV**) so far focused on how in-app advertising can be used to attract individuals' attention from outside the e-commerce store, the next papers examine how individuals use cryptocurrencies as a means of payment influence in the e-commerce store itself.

#### 4.1.5 Paper V: Bitcoin resistance behavior: a QCA study explaining why individuals resist Bitcoin as a means of payment<sup>7</sup>

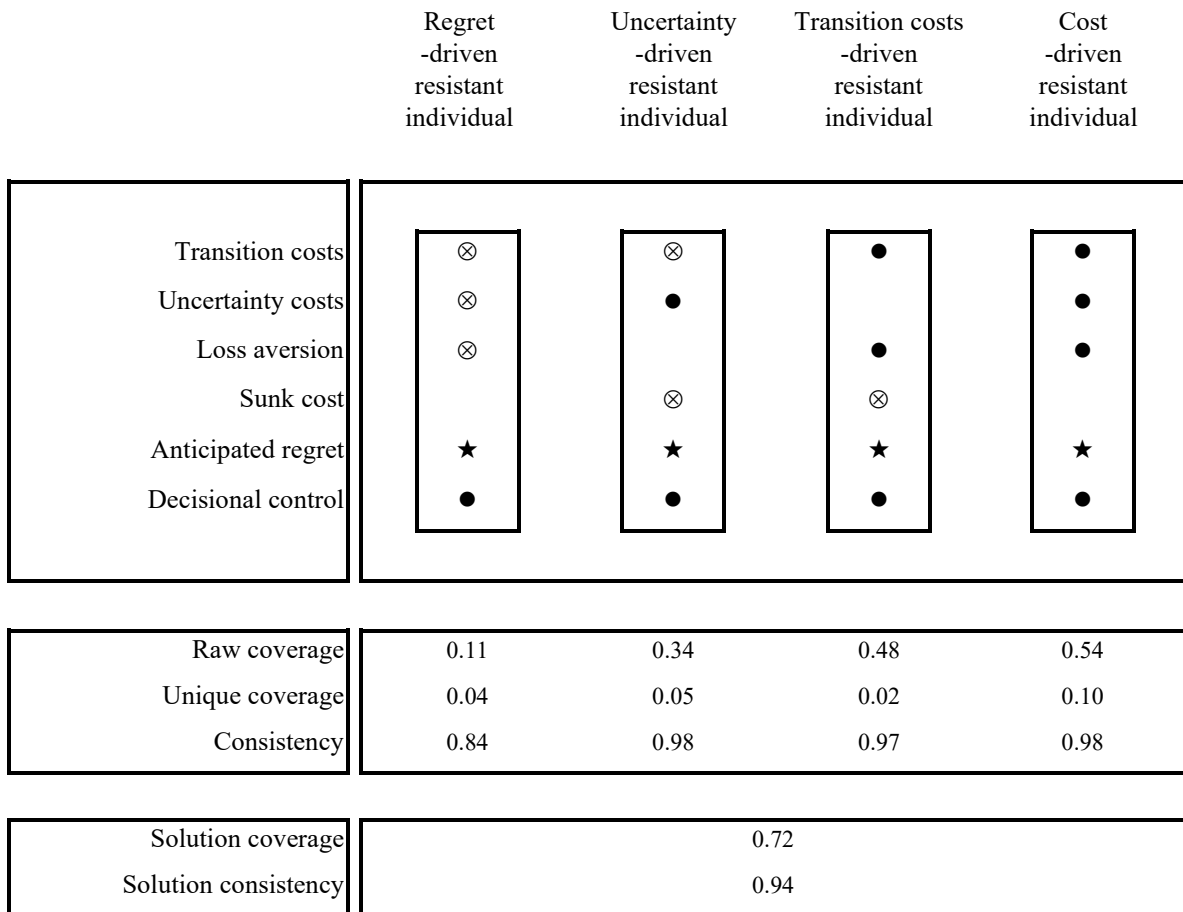
E-commerce stores have started to implement cryptocurrency payment options in their shops. Research into cryptocurrencies finds that cryptocurrencies, such as Bitcoin, have the potential to revolutionize national and global payment transactions by offering multiple benefits for individuals and society, such as worldwide access to banking at lower costs and reduced financial fraud (Rosic 2017; Shin 2014). Despite this fact, many people resist using cryptocurrencies as a means of payment. **Paper V** investigates why individuals resist using bitcoins as a means of payment, asking the research question: What configurations of influencing factors lead to an individual's resistance to Bitcoin as a means of payment?

The paper builds upon the status quo bias perspective (SQBP) (Samuelson and Zeckhauser 1988), which offers a useful theoretical frame for analyzing why people resist something new, such as the use of bitcoins as a means of payment. A configurational research model is derived from the SQBP and data of 167 participants is collected with the help of a questionnaire-based data collection approach.

The data is analyzed with QCA and the results reveal four sufficient configurations explaining individuals' resistance to using bitcoins as a means of payment (see Figure 10). Anticipated regret is a necessary condition for individuals' resistance to use bitcoin as a means of payment, which is present in all four sufficient configurations. The first sufficient configuration, the *regret-driven resistant individual*, shows that some individuals resist because they fear they will regret the decision to use bitcoins for payments now, even though they do not perceive any costs associated with the use of bitcoins as a means of payment. The second sufficient configuration, the *uncertainty-driven resistant individual*, explains that some individuals resist because they perceive high uncertainty associated with gathering and analyzing information about whether Bitcoin is suited as a means of payment. In contrast, the third sufficient configuration, the *transition cost-driven resistant individual*, shows that even if uncertainty costs do not matter, some individuals resist using bitcoins as a means of payment because they perceive the cost of transitioning to using bitcoins as a means of payment as higher than the benefits associated with the use. Similarly, the *cost-driven resistant individual* shows that individuals who are driven by transition costs, uncertainty costs, and loss aversion resist using bitcoins as a means of payment.

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<sup>7</sup> Matthe, Jens; Maier, Christian; Müller, Lea; Weitzel, Tim (2018): Bitcoin Resistance Behavior: A QCA Study Explaining Why Individuals Resist Bitcoin as a Means of Payment. In Thirty Ninth International Conference on Information Systems.

**Resistance to use bitcoins as a means of payment**

Key:

- Causal condition present      ★ Presence of a necessary causal condition
- ⊗ Causal condition absent
- “Don’t Care situation”

**Figure 10. Results of Paper V (Mattke et al. 2018)**

Extant research has only revealed that risks, such as legal risks, negatively influence individuals’ intention to use bitcoins as a means of payment. The study contributes deeper insights into why many people resist using bitcoins as a means of payment, identifying anticipated regret as a necessary causal condition for resistance. This implies that to reduce individuals’ resistance to using bitcoins as a means of payment, their perceptions about anticipated regret must be eliminated.

#### 4.1.6 Paper VI: Bitcoin investment: a mixed methods study of investment motivations<sup>8</sup>

As shown in **Paper V**, certain conditions make individuals likely to resist using bitcoins as a means of payment. While extant research indicates that individuals are more willing to use bitcoins as an investment (Lielacher 2019), little is known about what motivates them to do so. **Paper VI** posits that given that Bitcoin is an exclusively information systems-enabled and information systems-governed investment, individuals’ motivations for investing in Bitcoin cannot be explained by existing, traditional knowledge about investment decision-making behavior. This paper builds upon regret theory (Loomes and Sugden 1982) and proposes

<sup>8</sup> Mattke, Jens; Maier, Christian; Reis, Lea; Weitzel, Tim (2021): Bitcoin investment: a mixed methods study of investment motivations. In European Journal of Information Systems (30:3), pp. 261–285. DOI: 10.1080/0960085X.2020.1787109.

that perceptions about the investment object, individual personal factors, and regret sentiments influence Bitcoin investment. We ask two research questions: What perceptions about Bitcoin, personal factors, and regret sentiments motivate Bitcoin investment? What configurations of motivations influence Bitcoin investment? A mixed-method research approach is applied to answer both questions.

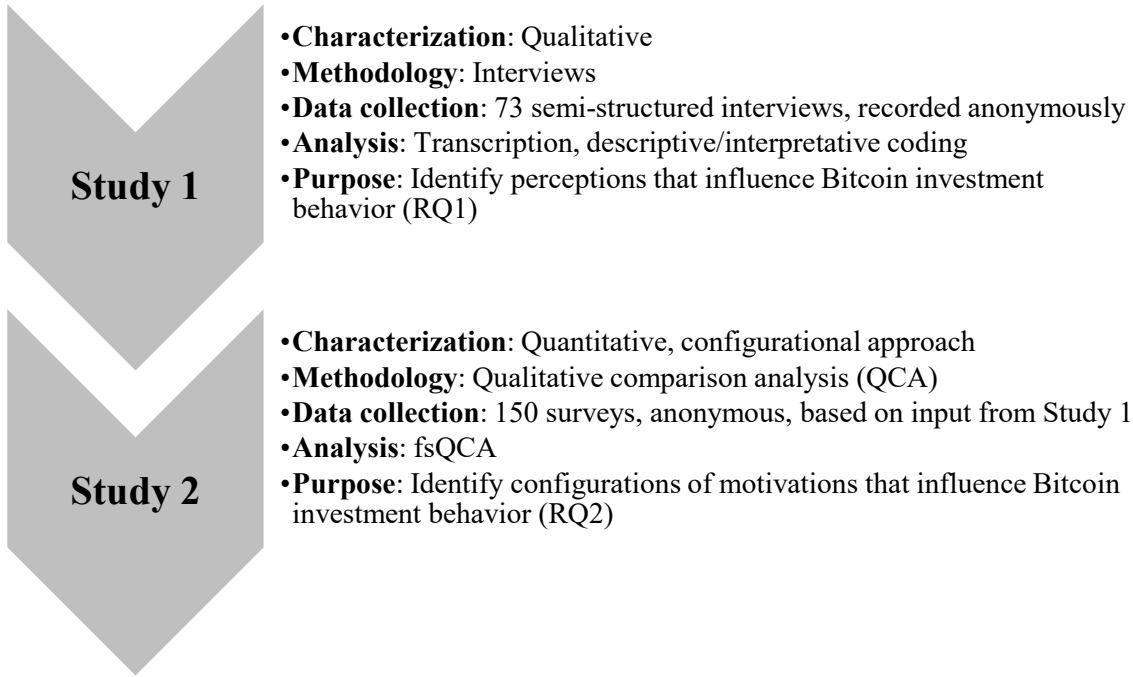


Figure 11. The mixed-methods approach in Paper VI (Mattke et al. 2021a)

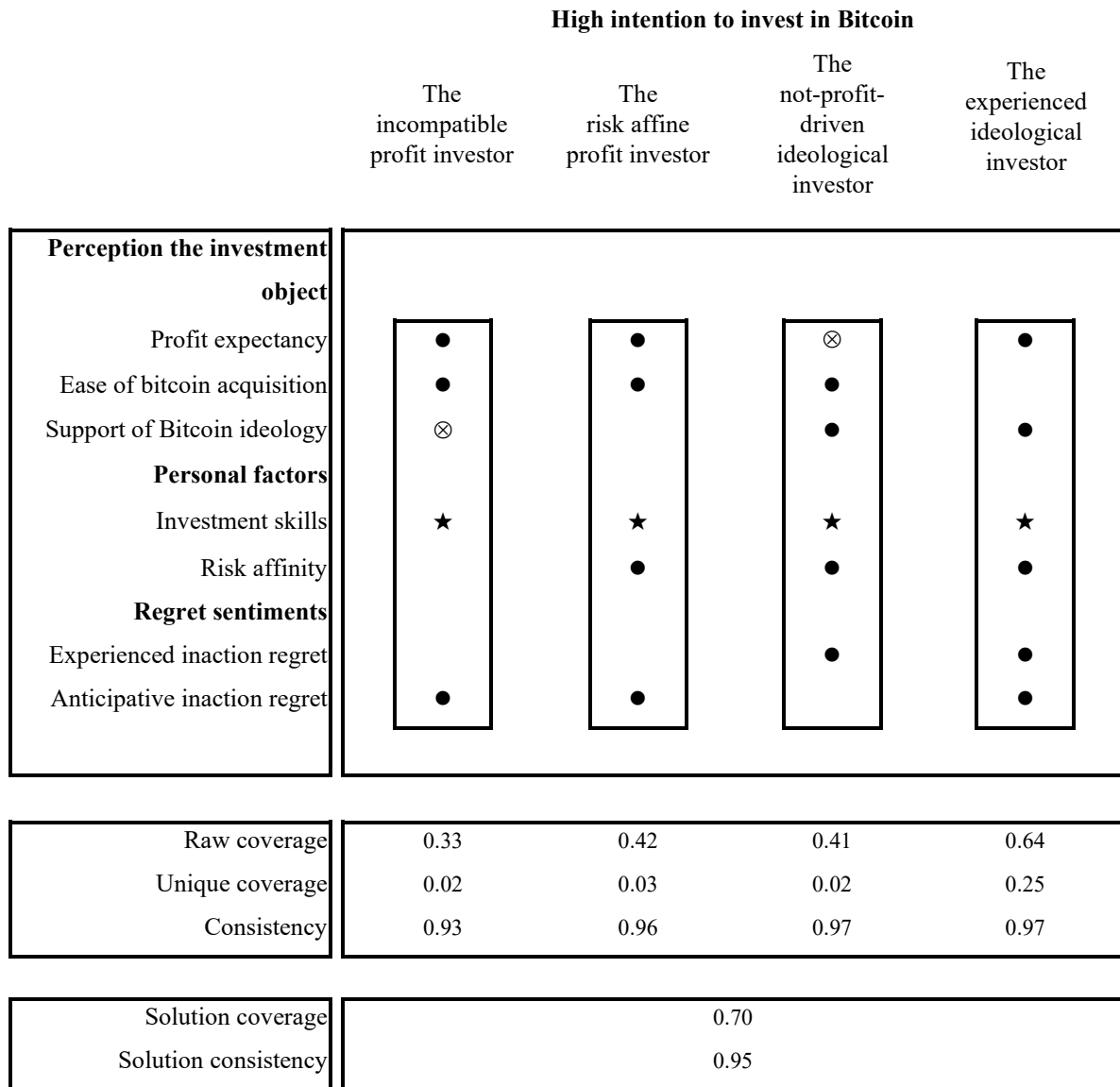
Study 1 is a qualitative research study that identifies the motivations that influence Bitcoin investment. Based on the analysis of 73 semi-structured interviews, we identify seven motivations (Table 19).

	Motivation	Contextual definition (based on; context)
Perception about Bitcoin	Profit expectancy	The degree to which an individual expects to benefit financially from investing in Bitcoin (Ali 2011; East 1993; context: investment).
	Ease of Bitcoin acquisition	The degree to which an individual expects the process of acquiring bitcoins to be easy (based on Pavlou and Fygenson 2006; context: electronic commerce).
	Support of Bitcoin ideology	The degree to which an individual supports the ideology of Bitcoin (Karahanna et al. 2006; context information systems adoption)
Personal factors	Investment skills	The degree to which an individual has knowledge about investments and how to make sound investments (Pavlou and Fygenson 2006; context: electronic commerce).
	Risk affinity	The degree to which an individual tends to make risky investments (Allen et al. 2005; Slovic 1972; context: risk-taking behavior).
Regret sentiments	Experienced inaction regret	The degree to which an individual has the feeling of regret not having invested in Bitcoin in the past (Zou et al. 2015; context: post-adoption).
	Anticipated inaction regret	The degree to which an individual anticipates regretting in the future not having invested in Bitcoin (Nasiry and Popescu 2012; Tsiros 2008; context: purchase behavior).

Table 19. Results of Study 1 in Paper VI (Mattke et al. 2021a)

The results of Study 1 serve as the input for the quantitative research in Study 2, which applies a questionnaire-based data collection approach. We analyzed data collected from 150 survey participants using

QCA, which resulted in four sufficient configurations explaining individuals' high intention to invest in Bitcoin. The four sufficient configurations reflect four types of potential Bitcoin investors (Figure 12).



Key:

- Causal condition present      ★ Presence of a necessary causal condition
- ⊗ Causal condition absent
- “Don't Care situation”

**Figure 12. Results of Paper VI (Mattke et al. 2021a)**

The results show that for some individuals, support for the Bitcoin ideology is highly relevant and they invest regardless of whether they expect to earn profits, i.e., profit expectancy is not a necessary causal condition. This result contradicts traditional investment literature, which maintains that individuals only invest if they expect a profit, including investment in socially responsible investments and ethical investments (McLachlan and Gardner 2004). This indicates that since Bitcoin is a new and exclusively IS-enabled and IS-governed phenomenon, knowledge about traditional investment motivation cannot be transferred automatically to explain it.



#### 4.1.7 Summary

The first six papers constituting this dissertation provide a better understanding of how in-app advertising and cryptocurrencies shape individuals' behavior in e-commerce. To generate knowledge for e-commerce stores on how to leverage in-app advertising, four papers (**Papers I-IV**) show what factors influence individuals' in-app advertising clicking behavior as well as what underlying psychological mechanisms drives such clicking behavior. **Papers I** and **II** focus on individuals' in-app advertising clicking behavior from an information processing perspective. The paper shows that the sequential processing of structural and semantic factors influences clicking behavior. Both papers show that both types of factors need to be considered in combination in order to understand clicking behavior. Because social media advertising is one of the most prominent forms of in-app advertising with specific characteristics, **Paper III** focuses on in-app advertising clicking behavior in social media to generate specific knowledge for e-commerce stores on how to maximize the impact of this form of in-app advertising. The paper shows that the likes in social media advertising exceed any one particular influence on individuals' clicking behavior. Moreover, the strength of ties to the persons who liked the social media ad influence individuals' click-through and view-through intentions. **Paper IV** focuses on the interplay between clicking in-app advertising and e-commerce landing pages and examines how this interplay can explain individuals' purchase behavior. The results show that to understand individuals' purchase behavior both the in-app advertising and the e-commerce landing page need to be considered in combination.

Because e-commerce stores need knowledge on how the rising trend of cryptocurrencies influences their business, **Papers V** and **VI** provide insights into individuals' use of cryptocurrencies for e-commerce. Both papers show that despite the benefits of cryptocurrencies as a means of payment, many hesitate to use cryptocurrencies as a means of payment. **Paper V** shows that the volatility and thus the anticipated regret of using bitcoins as a means of payment is a key determinant for the resistance to using bitcoins as a means of payment. **Paper VI** shows that individuals rather see cryptocurrencies as a new and alternative form of investment. In contrast to traditional forms of investment, profit is not a necessary causal condition for cryptocurrency investment. Rather the ideology surrounding cryptocurrencies can also shape the investment behavior of individuals.

## 4.2 CHAPTER 2: BENEFITS OF AND GOOD PRACTICES IN APPLYING QCA

As outlined above, many of the papers constituting this dissertation apply set-theoretical configurational methods, particularly QCA to generate new knowledge about individuals' clicking behavior and use of cryptocurrency. The second goal of the dissertation is to identify the benefits of and derive good practices of applying this relatively new data analysis method to generate new knowledge about individuals' behavior. **Papers VII, VIII, and IX** contribute to reaching this goal.

#### 4.2.1 Paper VII: Qualitative comparative analysis in the information systems discipline: a literature review and methodological recommendations<sup>9</sup>

As outlined above, QCA is a relatively new data analysis approach which is growing more popular in information systems research. However, there is a lack of a shared understanding of how QCA is best applied. **Paper VII** introduces the basic concepts of QCA, outlines the value of QCA for developing new insights in the information systems discipline, and applies a descriptive literature review to summarize how QCA has been applied in the information systems discipline to date and derive recommendations for future research taking the QCA approach.

**Paper VII** illustrates how QCA can be applied to developing new insights in the information systems discipline by investigating three specific aspects of causal complexity (Misangyi et al. 2017), as summarized in Table 20.

Aspect of causal complexity	Explanation
Causal asymmetry for presence and absence of the outcome condition	The sufficient configurations for the high level of an outcome condition can be different from the sufficient configurations leading to the low level of an outcome condition
Equifinality	Various sufficient configurations can lead to the same outcome condition, thus there is not necessarily exactly only one but there can be multiple sufficient configurations explaining the outcome condition
Asymmetric relationships between causal conditions	An outcome condition can be grounded in the high and or low level of multiple causal conditions that simultaneously exist in a configuration

**Table 20. Three aspects of causal complexity (Mattke et al. 2021c)**

First, QCA can identify causal asymmetry for the presence and absence of individuals' behavior, revealing different sufficient configurations for the presence of individuals' behavior or the absence thereof (Fiss 2011). The sufficient configurations for the presence and absence can be asymmetrical, meaning that inversion of the sufficient configurations for the presence of individuals' behavior can be quite different from the sufficient configurations explaining the absence of individuals' behavior.

Second, QCA can also identify equifinality, which is the fact that the outcome condition can be achieved by multiple sufficient configurations (Katz and Kahn 1978). In other words, QCA provides the opportunity to reveal not one explanation, i.e., a single sufficient configuration, for individuals' behavior, but rather multiple explanations.

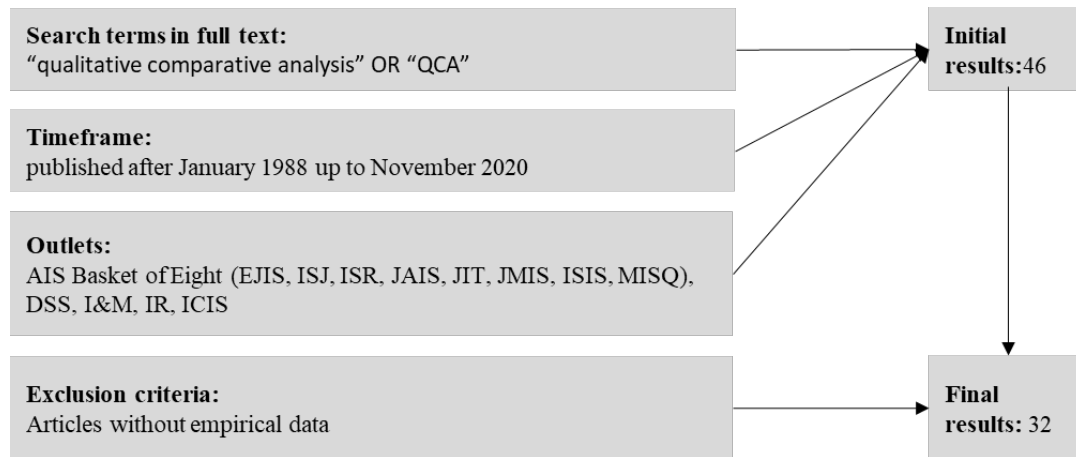
Third, QCA can identify the aspect of causal complexity known as the asymmetric relationship between causal conditions. This implies that multiple high and low levels of the causal conditions – combined as one or more configurations – can be related to individuals' behavior (Woodside 2014). Thus, the high level of a causal condition or the low level of a causal condition might be related to individuals' behavior, depending on the simultaneous existence and interaction of other causal conditions in a configuration. Depending on

<sup>9</sup> Mattke, Jens; Maier, Christian; Weitzel, Tim; Thatcher, Jason Bennett (2021): Qualitative comparative analysis in the information systems discipline: a literature review and methodological recommendations. In *Internet Research* (31:5), pp. 1493–1517. DOI: 10.1108/INTR-09-2020-0529.

the causal conditions in a configuration, the same causal condition may also be unrelated to individuals' behavior.

**Paper VII** shows that applying QCA to examine all three aspects of causal complexity leads to a better understanding of the relationship between causal conditions and the outcome condition. Using QCA, relationships far more complex than linear relationships can be explained, which helps avoid oversimplification or incomplete interpretation of information systems-related phenomena.

The descriptive literature review reveals that 32 empirical QCA studies have been published in major information systems outlets (Figure 13).



**Figure 13. Literature review in Paper VII (Mattke et al. 2021c)**

Extant research employing the QCA method focuses on topics at the individual and organizational levels. QCA has mainly been applied as a standalone technique for developing theory, elaborating on theory, and testing theory. The review of the 32 empirical QCA studies shows that most published information systems research articles do not fully exploit the potential of QCA, for example, to analyze necessary causal conditions or test the robustness of QCA results.

#	Recommendation
1.	Develop hypotheses about specific sufficient configurations rather than hypotheses about the existence of causal complexity, when using QCA to test theory.
2.	Use data sets with a high number of different configurations.
3.	Discuss whether limited diversity distorts the results.
4.	Report sufficient configurations for the high and for the low level of the outcome.
5.	Report the results of necessary causal conditions.
6.	Consider the coverage as well as the relevance of necessity (RoN) in the analysis for necessary causal conditions.
7.	Test for robustness to calibration and to changes in the thresholds for sufficient configurations.

**Table 21. Seven recommendations for applying QCA in the information systems discipline (Mattke et al. 2021c)**

Based on the status quo of QCA in information systems research, the article makes seven recommendations (Table 21) for future information systems research using QCA. The recommendations derived provide clear

guidance for future QCA studies in how to develop hypotheses with QCA and how the data needs to be analyzed to see whether the results are distorted by the characteristics of the sample. Because existing research does not utilize the full potential of QCA, it is recommended to test for sufficient configurations for the high as well as for the low level of the outcome condition. Also, to provide detailed insights, the paper highlights that the analysis for necessary causal conditions should always be performed. While some papers covered in the literature review analyze necessary causal conditions, most results are prone to Type 1 error, therefore the paper recommends including the RoN as an additional measure for necessary causal conditions. To improve the reliability of future QCA results and to ensure that QCA results are not idiosyncratic to specific thresholds, the paper shows how to use robustness checks, which help provide robust and reliable results.

#### 4.2.2 Paper VIII: Qualitative comparative analysis (QCA) in information systems research: status quo, guidelines, and future directions<sup>10</sup>

There are still only a few studies applying QCA in information systems research (Mattke et al. 2021c) and there is no shared understanding in the information systems discipline on how to conduct a QCA study or how to report and validate QCA results. **Paper VIII** proposes guidelines for applying QCA in information systems research, illustrates the guidelines with two studies, and derives specific recommendations for QCA application. Specifically, we develop a seven-step QCA application framework (Figure 14), describing the main task and the common challenges for each step. Finally, we provide checklists for researchers applying QCA and for reviewers of QCA manuscripts.

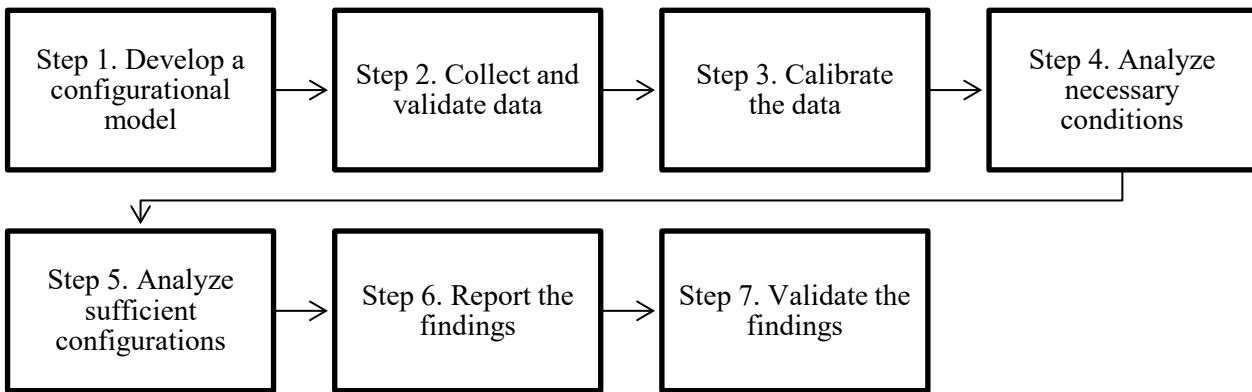


Figure 14. Seven step framework for applying QCA (Mattke et al. 2022)

To illustrate the guidelines and checklists, this paper uses two exemplary studies. Study 1 analyzes survey data from 138 CIOs, focusing on the influence of configurations of different forms of alignment on a firm's performance. Study 2 analyzes data from 232 owners of digital assistants, focusing on the intention to use digital assistants. Both studies highlight QCA specific challenges and how researchers can overcome these to derive robust and reproducible results from QCA studies.

<sup>10</sup> Mattke, Jens; Maier, Christian; Tim Weitzel; Jennifer E. Gerow; Jason Bennett Thatcher (2022): Qualitative Comparative Analysis (QCA) In Information Systems Research: Status Quo, Guidelines, and Future Directions. In Communications of the Association for Information Systems (50), pp. 208–240. DOI: 10.17705/1CAIS.05008.

#	Recommendation
1.	Whenever possible, use data sets for QCA, where the distribution of observations with a high and low level of the outcome is balanced.
2.	Use data sets for QCA which represent many possible configurations and discuss how logical remainders might impact the results of the QCA study.
3.	Consider the coverage scores and the relevance of necessity (RoN) scores to avoid identifying trivial necessary conditions.
4.	Use an appropriate frequency threshold according to the research setting and the sample size.
5.	Test and report the robustness against the calibration and the selected threshold values.

**Table 22. Five recommendations for QCA studies in information systems research (Mattke et al. 2022)**

Based on a critical examination of the two studies, we derive five recommendations for information systems research (Table 22) and demonstrate how to generate QCA results that are robust to changes in calibration or thresholds. We also suggest a new validation criterion to assess the robustness of the QCA results, which will help future QCA studies avoid trivial results caused by sample characteristics, and generate reproducible and robust insights from QCA studies. Critically, we demonstrate that analytic thresholds used when QCA was initially developed are insufficient for analyses of the large-n data sets common in the information systems discipline.

#### 4.2.3 Paper IX: Challenge and hindrance IS use stressors and appraisals: explaining contrarian associations in post-acceptance IS use behavior<sup>11</sup>

The third paper in this dissertation that contributes to the goal of examining the benefits of set-theoretical configurational methods, particularly QCA, is **Paper IX**. This paper is situated in the post-acceptance information systems use context and develops a theory that explains how challenge information systems use stressors and hindrance information systems use stressors influence routine use and innovative use. We collected data from 178 users working in a single organization, followed a structural equation modeling (SEM) approach, and tested four hypotheses applying consistent PLS (PLSc). Three out of four hypotheses were confirmed, and one relationship was nonsignificant.

Type of test	Explanation	Data analysis method
Symmetric test	“Symmetric tests study the accuracy in high values of a [causal] condition indicating high/low values of an outcome condition and low values of the [causal] condition indicating low/high values of the outcome condition” (Maier et al. 2021b, p. 2).	SEM
Asymmetric test	“Asymmetric tests study the accuracy of a specific value (i.e., high or low) of a [causal] condition, indicating a specific value (i.e., high or low) of an outcome condition without predicting how the inverse value of the [causal] condition relates to values of the outcome condition” (Maier et al. 2021b, p. 2).	QCA

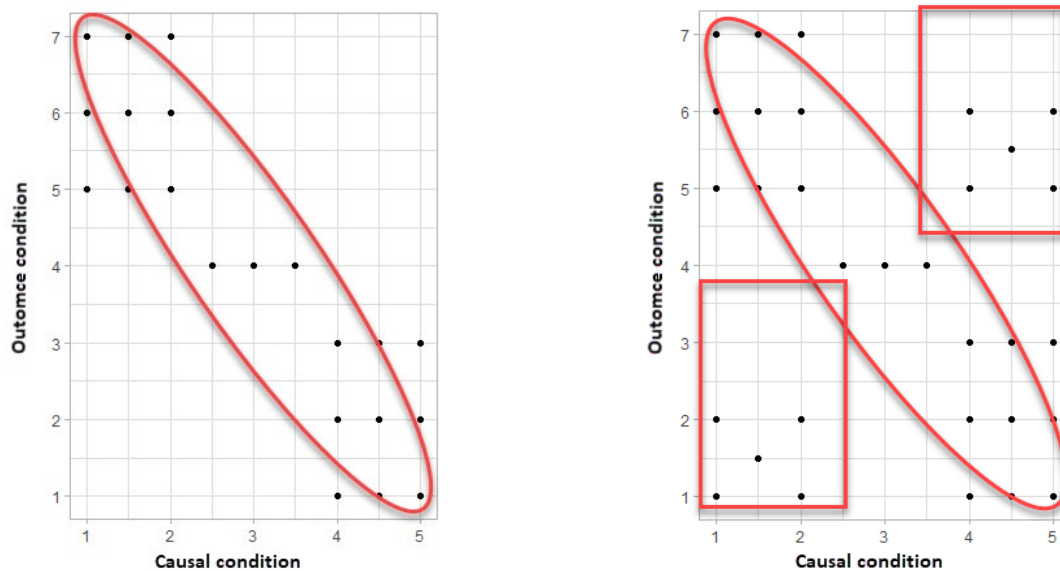
**Table 23. Symmetric and asymmetric tests**

This paper demonstrates how QCA can be used to better understand such a nonsignificant relationship.

<sup>11</sup> Maier, Christian; Laumer, Sven; Tarafdar, Monideepa; Mattke, Jens; Reis, Lea; Weitzel, Tim (2021): Challenge and Hindrance IS Use Stressors and Appraisals: Explaining Contrarian Associations in Post-acceptance IS Use Behavior. In Journal of the Association for Information Systems (22:6), pp. 1–35. DOI: 10.17705/1jais.00709.

Specifically, we demonstrate the value of using QCA as a case-focused data analysis method to complement the variable-focused SEM data analysis method. The rationale for this is that SEM performs a symmetric test while QCA also enables asymmetric testing (Table 23).

In this paper, we demonstrate that asymmetric tests, which are possible with QCA as a data analysis method, offer an effective way to analyze contrarian associations. Previous research (Spivack and Woodside 2019), indicated that even for large effect sizes in symmetric tests, up to 20% of the observations in the data set are contrarian associations. Nonsignificant findings may indicate an even higher percentage of contrarian associations. A prototypical symmetric relationship between a causal condition and an outcome condition, which can be tested with symmetric tests is displayed in Figure 15 on the left side. Figure 15 on the right side shows an exemplary contrarian association, where additional observations exist that go against the symmetric relationship and require asymmetric testing.



**Figure 15. Prototypical and exemplary symmetric relationship (left), and prototypical and exemplary contrarian associations (right) (Maier et al. 2021b)**

The results of the QCA confirm the existence of contrarian associations that explain the nonsignificant result. Moreover, the QCA results reveal causal asymmetry for the high and low level of the outcome condition, as well as the asymmetric relationship between the causal conditions, which enriched findings of the nonsignificant hypotheses.

In summary, the paper shows that using QCA post-hoc can be a valuable extension of SEM results, particularly for explaining nonsignificant or unexpected results. Since QCA also accounts for contrarian association and provides insights into necessary causal conditions as well as sufficient configurations, the use of QCA is highly appropriate for gaining further insights and enriching SEM findings. The paper is also the first paper in the information systems discipline that uses a two-step QCA techniques to test mediating hypotheses. The paper thus follows recent suggestions (Leidner 2020) to combine multiple methods to reveal wider and richer insights and can be seen as a temporal forerunner in showing the combined benefits of QCA and SEM.

#### 4.2.4 Summary

Because QCA is the major data analysis method used to generate knowledge about individuals' clicking behavior and use of cryptocurrency and because QCA is a relatively recent methodology, three papers in this dissertation focus on identifying the benefits of QCA and deriving good practice in applying QCA. A literature review in **Paper VII** summarizes the benefits of QCA and the status quo of how QCA is applied in information systems research. The results indicate a lack of shared understanding and illustrate that not all QCA studies leverage the full potential in QCA and that the current state of the art of applying QCA is susceptible to idiosyncratic results. To fill this gap, **Paper VIII** derives good practices in applying QCA, proposes a framework for conducting QCA studies, including ways to overcome typical challenges in QCA studies, and derives and empirically demonstrates good practices for QCA studies. **Paper IX** demonstrates how QCA can generate valuable insights and how QCA can be combined with regression analysis methods, particularly with structural equation modeling. The paper is the first in the information systems discipline to apply a two-step QCA for testing mediation hypotheses, illustrating that QCA can be applied in analyzing contrarian associations, thus providing rich insights into nonsignificant regression results. Overall, these three papers significantly advance the current methodological understanding of QCA in the information systems discipline and provide a path forward to generating robust and reliable insights from QCA.

### 4.3 CHAPTER 3: RECOMMENDATIONS FOR IMPLEMENTING BLOCKCHAIN APPLICATIONS

The papers presented so far focus on generating knowledge on how digital technologies influence individuals' behavior. Since it is essential to ensure that the insights are applicable in practice (Rosemann and Vessey 2008), it is valuable for organizations to successfully implement digital technologies. The final goal of this dissertation is, therefore, to provide actionable recommendations for organizations on how to successfully implement new digital technologies, such as blockchain applications, which many struggle to do (Lacity 2018a).

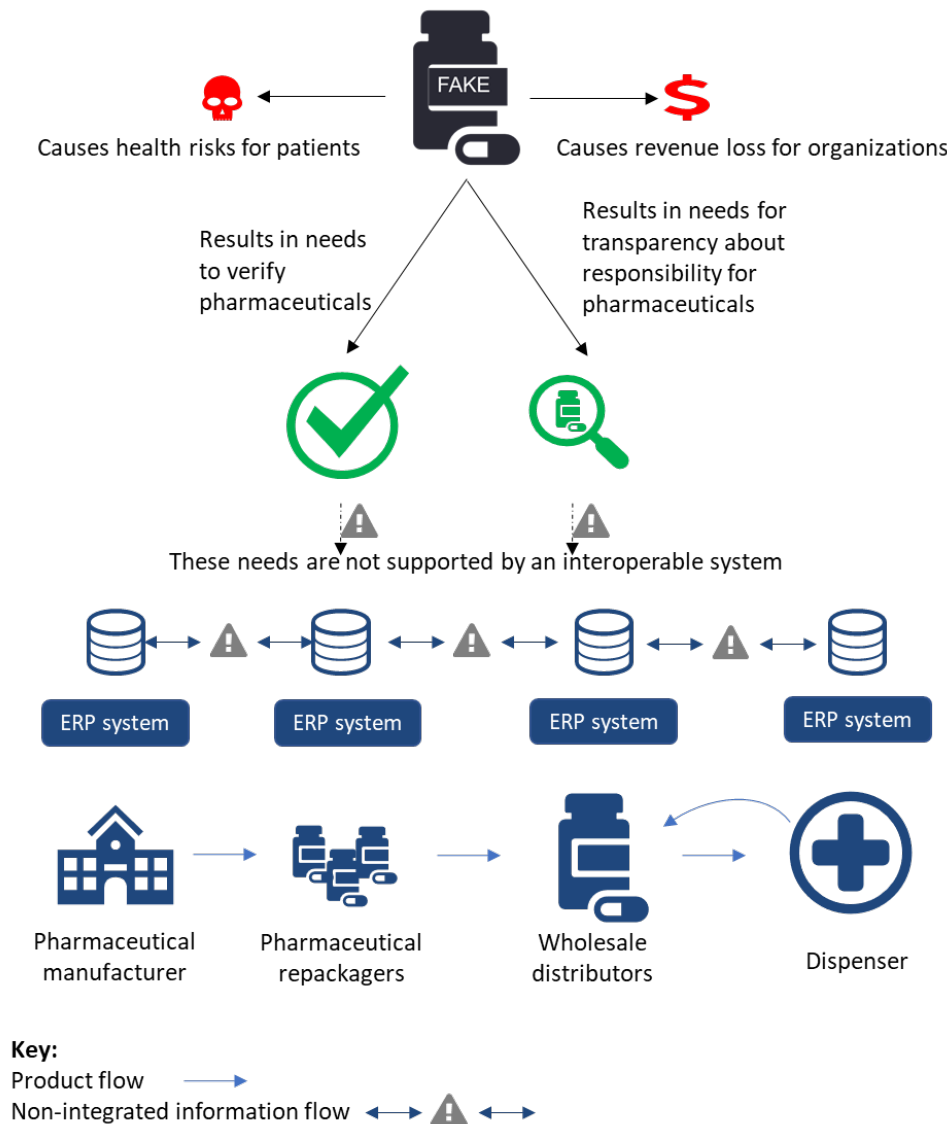
The hype around blockchain has long outgrown internet discussion boards and has officially arrived in the corporate world. Organizations in many industries, such as finance, automotive, and pharma, have initiated large-scale blockchain projects (Lannquist 2018). The main driver of that development is the potentially innovative power of blockchain applications e.g., through the use of trustless and irreversible transactions (Beck and Müller-Bloch 2017). In the pursuit of harnessing blockchain applications' disruptive power – rather than being disrupted by it – organizations from various industries are increasing their investments steadily (Goepfert and Shirer 2018). Global investments in blockchain applications are expected to reach up to USD 12 billion per year by 2022. However, despite the increasing attention and investments in the billions, recent reports reveal that organizations struggle to create value through blockchain projects (Gupta and Mondal 2017). **Paper X**<sup>12</sup> of this dissertation applies a qualitative research approach and analyzes data collected in expert interviews to derive actionable recommendations for organizations.

The central case study of this paper tracks the MediLedger Project for over two years. MediLedger was

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<sup>12</sup> Mattke, Jens; Maier, Christian; Hund, Axel; Weitzel, Tim (2019): How an Enterprise Blockchain Application in the U.S. Pharmaceuticals Supply Chain is Saving Lives. In MIS Quarterly Executive 18 (4), pp. 245–261. DOI: 10.17705/2msqe.00019.

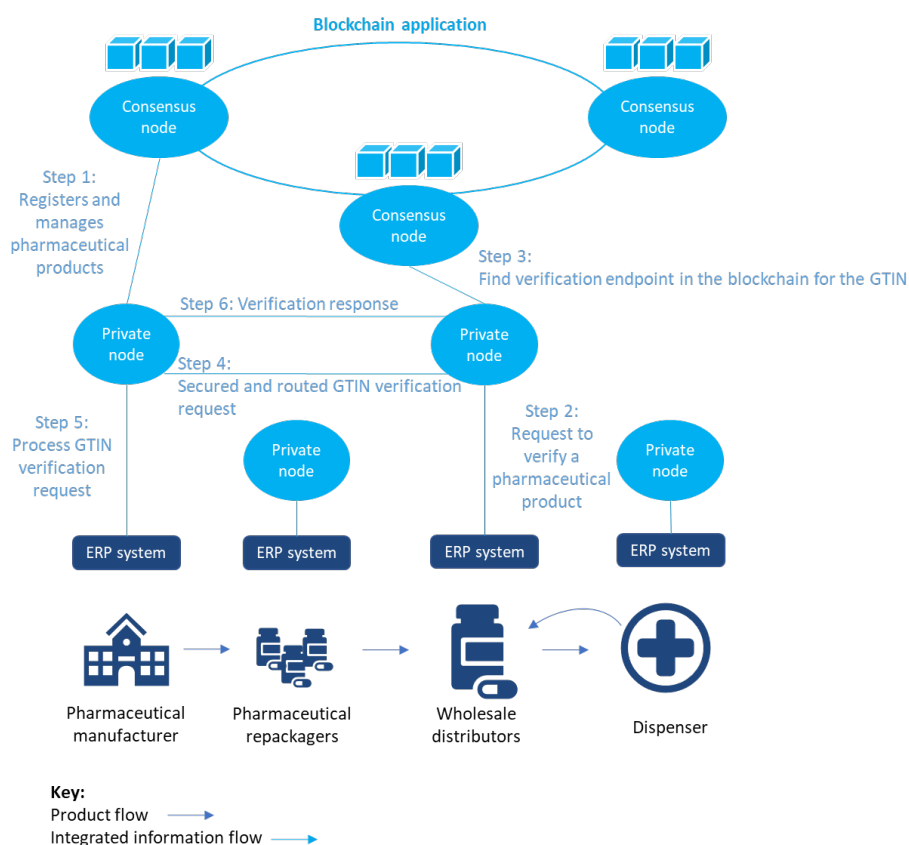
founded in early 2017 with two objectives. First, to design a suitable blockchain application in the United States pharma supply chain to meet newly emerging legal regulations (DSCSA). Second, to fight the increasing number of counterfeit pharmaceuticals. Achieving these objectives would overcome current threats to businesses and human well-being. For example, counterfeit pharmaceuticals cause around one million deaths globally per year through inactive or harmful ingredients and are responsible for up to \$200 billion lost revenue for the pharmaceutical industry (LSPediA 2018). A summary of the challenges faced is displayed in Figure 16.



**Figure 16. Summary of faced challenges in the pharmaceutical supply chain (Mattke et al. 2019)**

The MediLedger Project successfully developed a blockchain application for the pharma supply chain to ensure a single source of truth (Figure 17). The solution brought together competitors who are usually not willing to share sensitive private data to collaborate on a blockchain application that can track and trace pharmaceuticals without sharing business intelligence.





**Figure 17. Blockchain application in the pharma supply chain ensures a single source of truth (Mattke et al. 2019)**

**Paper X** concludes with four key lessons derived from the MediLedger case that other organizations can use to successfully create blockchain applications (see Table 24).

#	The lesson derived from the case study
1	Use a “benevolent dictator” and base governance on “consensus through collaboration”
2	Store proofs that transactions were verified, not the transactions themselves, on the blockchain ledger
3	Use zero-knowledge proofs to verify products and transaction authenticity while preserving full privacy
4	Use blockchain application capabilities not found in traditional technologies to fix ineffective information systems landscapes

**Table 24. Summary of the lessons derived from the case study**

## 5 THEORETICAL CONTRIBUTIONS AND PRACTICAL IMPLICATIONS

With the rising competition in e-commerce, e-commerce stores need to attract individuals and differentiate themselves from other e-commerce stores. For this, e-commerce stores increasingly rely on in-app advertising (App Annie 2020) and offer individuals the opportunity to pay with cryptocurrency (Beigel 2021). Therefore, the first goal of this dissertation is to generate new knowledge about individuals clicking behavior for in-app advertising and about individuals' use of cryptocurrencies. Therefore, in the first section, the theoretical contributions of individuals' clicking behavior and the use of cryptocurrency in e-commerce are highlighted.

To generate this knowledge about individuals' behavior in e-commerce, this dissertation follows the calls of recent literature (Park et al. 2020; El Sawy et al. 2010; Misangyi et al. 2017) and uses QCA as a set-theoretic configurational data analysis method. Because QCA is a relatively recent data analysis method in the information systems field, the second goal of the dissertation is to contribute to a better understanding of QCA and how QCA can help to generate new knowledge about individuals' behavior. Therefore, the contributions to QCA particularly to configurational theorizing with QCA are outlined in the second section.

Finally, in the third section, the practical implications for how organizations can leverage digital technologies in e-commerce are discussed, which corresponds to the third goal. This section outlines the theoretical contributions and practical implications of this dissertation, concluding with discussing the limitations of the studies and by identifying fruitful avenues for future research.

### 5.1 CONTRIBUTION TO THE UNDERSTANDING OF INDIVIDUALS' BEHAVIOR IN E-COMMERCE

Six papers in this dissertation focus on generating new knowledge about individuals' clicking behavior and the use of cryptocurrencies in the context of e-commerce, contributing both theoretically and practically in multiple ways.

While previous e-commerce research has focused on individuals' behavior on e-commerce sites, such as individuals' purchase or repurchase behavior (Ji Wu and Zhao 2019; Yulin Fang et al. 2014), this dissertation contributes to better understanding how e-commerce stores can attract individuals to come to the e-commerce store in the first place. Several papers (**Papers I - IV**) extend extant research by examining how in-app advertising serves as the necessary precondition to attract individuals' attention. Particularly, **Paper IV** shows that individuals' purchase behavior cannot be explained by only focusing on the perspective of e-commerce when individuals get to the e-commerce site through in-app advertising. Thus, future research needs to consider how individuals reached the e-commerce site to understand their purchase behavior.

#### 5.1.1 Contributions to understanding clicking behavior

The results of **Paper I** and **Paper II** contribute to a better understanding of clicking behavior. **Paper I** reveals that structural and semantic factors have mostly been studied separately and that interactions among structural and semantic factors have not been considered. **Paper II** addresses these research gaps and

provides a theoretical understanding of why individuals process structural and semantic factors sequentially. The paper also empirically confirms this sequential processing in the context of individuals' clicking behavior. Particularly **Paper II** enhances the understanding of sequential processing, demonstrating how structural factors influence the way semantic factors are perceived. For example, small and non-animated in-app advertising can be perceived as irritating and still lead to clicking behavior, while large non-animated in-app advertising may not. Therefore, to understand the influence of semantic factors, future research needs to consider the semantic factors in the context of the structural factors. The paper highlights that these new insights also help to explain conflicting results regarding the influence of animation in previous studies (Bruce et al. 2017; Robinson et al. 2007; Rosenkrans 2009) because the results show that animated and non-animated ads can foster clicking behavior. Also, the results shed new light on the role of a negative perception, such as perceived irritation and privacy concerns (Ducoffe 1996; Bleier and Eisenbeiss 2015b). The results indicate that the perception of irritation or privacy concerns does not necessarily inhibit clicking behavior. This stresses the importance of considering configurations of causal conditions rather than conditions in isolation because the results suggest that some negative perceptions can be outweighed by other perceptions. Thus, in order to avoid oversimplified results, future research needs to control for positive perceptions even if they focus on examining the influence of negative perceptions.

**Paper III** considers how social media advertising, a prevalent form of in-app advertising, is affected by social interaction, i.e., by social media likes. The paper contributes to an enhanced understanding of individuals' in-app advertising clicking behavior. In particular, it shows that when an individual sees that someone likes an in-app advertisement, the degree to which their click-through and view-through intention is influenced depends on how closely tied they are to the person. **Paper III** thus contributes to herding literature (Sun 2013; Duan et al. 2009; Walden and Browne 2009) by considering the ties to the people in the herd (Granovetter 1973). On the one hand side, the paper shows that it does not only matter that a user observes the behavior of many persons, which was the main focus in previous herding literature (Sun 2013), but that it is important whether those persons include a strongly or weakly tied person. The study explains how strongly tied or weakly tied persons in a herd influence individuals' behavior. For instance, the empirical results show that observing a strongly tied person in a herd exudes a stronger influence than observing a weakly tied person. Besides that, the study also extends the knowledge on the role of expertise of the observed persons in a herd (Keongtae and Visawanathan 2019). For instance, the results indicate that individuals' do not follow any strongly or weakly tied person, but they follow the experienced ones.

Finally, **Paper III** provides a fine-granular look at the underlying aspects of herd behavior and explains why herd behavior arises. It extends the current understanding of the underlying aspects of herd behavior, namely that herd behavior arises through discounting one's information and imitating others (Sun 2013). The paper extends this notion by showing that in certain situations both underlying aspects of herd behavior do not need to be present. The findings suggest that the influence of observing a strongly tied person in a herd exudes a strong enough influence that herd behavior arises, even if the individual does not discount one's information.

**Paper IV** extends the understanding of clicking behavior by examining the situation when individuals have

clicked on social media advertising and have been exposed to the e-commerce landing page. The paper thereby examines how social media advertising and the e-commerce landing page influence individuals' purchase behavior. The paper contributes by revealing a new explanatory factor. More precisely, the study reveals that the information on the e-commerce landing page needs to be adapted to the information shown in the social media advertising. This new insight connects the advertising perspective with the e-commerce landing page perspective, showing that the perspectives should not be treated in isolation. The analysis of necessary conditions provides an enriched understanding as it highlights that a visually appealing e-commerce landing page with information adapted to the social media ad is necessary for impulse buying. Thereby, the paper highlights that are not enough to only focus on the e-commerce landing page to understand online impulse buying, rather other factors, such as social media ad-related factors also need to be considered. Therefore, in order to understand individuals' purchase behavior in e-commerce, future research should consider the source and the root motivation for why individuals visit the e-commerce store.

All three papers (**Papers II, III, IV**) show that there is not a single explanation for what in-app advertising leads to clicking behavior or triggers purchase behavior on an e-commerce site. Rather, multiple explanations exist for individuals' clicking behavior.

#### 5.1.2 Contributions to understanding the use of cryptocurrencies

Two papers in this dissertation contribute to a better understanding of the use of cryptocurrencies, focusing on Bitcoin as the most common cryptocurrency. **Paper V** provides a better understanding of why individuals resist using cryptocurrencies as a means of payment despite the potential benefits that cryptocurrencies can provide. Previous research has shown that different perceptions of risks negatively influence individuals' intention to use cryptocurrencies (Abramova and Böhme 2016). **Paper V** thereby enriches these findings, showing that an individual's resistance to using a cryptocurrency as a means of payment is influenced by several other factors, including their assessment of time and effort needed to adapt to using a cryptocurrency as a means of payment and the general uncertainty associated with comparing cryptocurrency payment to the status quo means of payment. Individuals' tendency to weigh costs higher than the benefits in the context of using cryptocurrencies, as well as the perceived sunk costs, are also relevant in explaining why individuals tend to stick with the status quo rather than using cryptocurrencies as a means of payment. The paper also contributes to cryptocurrency research, as it highlights that even if individuals see the benefit in using cryptocurrency as a means of payment, they resist using it because of the anticipated regret. The anticipated regret is mostly associated with the volatility and uncertainty that rapidly influences the price of cryptocurrencies.

**Paper V** also contributes to a better understanding of the SQBP by overcoming the prevalent focus on cost-benefit analyses and offers a new way to operationalize loss aversion, which has been largely neglected in previous research (Lee and Joshi 2017). As demonstrated in early behavior research (Kahneman and Tversky 1979), loss aversion is a good predictor of individual behavior, and including loss aversion in resistance behavior studies will improve the understanding of why individuals tend to stick to the status quo and resist using a certain technology. While research has shown that multiple types of resistance behavior exist in the

context of enterprise information systems (Klaus et al. 2010), **Paper V** uncovers four types of resistance behavior in the private information systems context. This knowledge about resistance behavior in the private information systems context is furthermore refined with the finding that anticipated regret is a necessary condition for this type of resistance behavior, i.e., resistance behavior in the private information systems context does not occur without an individuals' perception of anticipated regret.

Since many individuals resist using cryptocurrencies, such as Bitcoin, as a means of payment **Paper VI** examines the more widely user behavior, namely individuals' investment in cryptocurrency, using the example of Bitcoin. The paper studies the investment in Bitcoin as an exclusive information systems-enabled and governed phenomenon. Study 1 sheds new light on the motivations that drive Bitcoin investment by identifying profit expectancy, ease of bitcoin acquisition, and support of Bitcoin ideology as the relevant perceptions about Bitcoin. The paper contributes by revealing the relevance of non-economic motivations for investing in Bitcoin. **Paper VI** contributes to previous investment literature by highlighting the differences between investing in Bitcoin and other forms of investment. More precisely, previous research postulates that individuals only invest if they expect a reward or profit (Beal et al. 2005), even for ethical investments (Lewis and Mackenzie 2000). In contrast, the results show that profit expectancy is not a necessary condition for Bitcoin investment, because some people invest to support the Bitcoin ideology without expecting a profit. A further difference is that more investment skills are needed to invest in Bitcoin than for many other forms of investment. Among others, this differentiates investment in Bitcoin from other investments, such as crowdfunding, which also attracts non-professional investors (Hoegen et al. 2018). In summary, **Paper VI** contributes by studying revealing the motivations why individuals invest in an exclusively information system-enabled and information system-governed cryptocurrency, spotlighting the role of profit and ideology as contrary to previous investment literature.

Both papers confirm payment industry reports that many individuals resist using bitcoins as a means of payment and prefer to use them as an investment vehicle (Browne 2021). The results show that this behavior can be explained by Bitcoin-specific characteristics (**Paper V** and **Paper VI**). Bitcoins' high volatility and value uncertainty drive individuals to fear later regretting using bitcoins as means of payment now and thereby hinders the use of bitcoins as a means of payment (**Paper V**). Simultaneously, the fear of later regretting not having invested in Bitcoin now influences the Bitcoin investment behavior (**Paper VI**). Additionally, individuals who have made payments using bitcoins may experience regret if the price of bitcoins appreciates, which may motivate individuals to keep their bitcoins as an investment instead of using it as a means of payment. Finally, the historic and present volatility of cryptocurrency values makes it difficult to use cryptocurrencies as a mainstream means of payment.

## 5.2 CONTRIBUTIONS TO CONFIGURATIONAL THEORIZING WITH QCA

While QCA was developed more than three decades ago and the first article published in a major information systems outlet acknowledging the potential of QCA for advancing theoretical knowledge was written in 2004 (Fichman 2004), **Paper VII** shows that QCA application in information systems research remains relatively uncommon and that the status quo of applying QCA in the information systems discipline deserves more

attention to avoid idiosyncratic or non-robust results. A reason for this might be the lack of a shared understanding of configurational theorizing using QCA and the application of QCA to generate robust and reliable results. Several papers in this dissertation argue (**Papers VIII, VII, IX**) and empirically show (**Papers II, III, IV, V, VI**) that individuals' behavior in the information systems context is characterized by complex relationships among explanatory factors and a configurational perspective can explain how these explanatory factors bring about the outcome of interest.

**Paper VIII** contributes by developing a seven-step framework for using QCA, which serves as the foundation of the empirical paper ins this dissertation. Additionally, this framework formalizes the process of configurational theorizing. The goal of configurational theorizing is to explain how and why multiple configurations of causal conditions lead to an outcome of interest. In line with related research (Furnari et al. 2020), the paper argues that configurational theorizing differs from conventional correlational theorizing, which is widely used in current information systems research (Burton-Jones et al. 2015). The dominance of correlational theorizing and net effect thinking, which focuses on the unique contributions of explanatory factors (Misangyi et al. 2017), underscores the need for clear guidance on configurational theorizing (Furnari et al. 2020).

**Paper VIII** provides several guidelines for configurational theorizing. When developing a configurational research model, it is important to justify the selection of the causal conditions. Besides that, the paper argues that it is essential to highlight why outcomes are explained by configurations of conditions. While some theories explicitly highlight their configurational nature (Greckhamer et al. 2013), it remains important to stress why combinations of multiple causal conditions can better explain an outcome and how the causal conditions relate with each other.

Some empirical papers in this dissertation (**Papers II and III**) build upon arguments from configurational sensemaking (Campbell et al. 2016; Pelli and Tillman 2008; Dane and Pratt 2007), such as the insight from neuroscience research that the human brain tends to recognize patterns in information or empirical evidence of equifinal explanations of the outcome of interest (**Papers V and VI**). A second avenue taken to provide insights into the selection of the causal conditions and on the configurational nature is the application of mixed-method research approaches, where a qualitative study provides these insights. For instance, **Paper VI** provides empirical evidence from data collected in interviews that causal conditions combine to influence individuals' behavior. Based on these findings, a quantitative research approach with QCA was applied.

In the case of configurational theory testing, **Paper VII** provides an overview of how configurational theory testing has been applied in information systems research. Based on a critical assessment of the status quo, the paper develops clear guidance for configurational theory testing. Particularly, the paper recommends developing hypotheses about specific sufficient configurations rather than hypotheses about the existence of causal complexity (Table 20), when using QCA for theory testing.

### 5.2.1 Configurational theorizing with QCA and the importance of sample characteristics

Two papers comprising this dissertation contribute to a better understanding of the particular importance of

sample characteristics for QCA. **Papers VII and VIII** demonstrate that sample characteristics are even more essential for configurational theorizing with QCA because of the aspect of causal complexity (Table 20).

The causal asymmetry for the presence and absence of the outcome condition implies that the sufficient configurations explaining the presence of the outcome condition differ from the configuration explaining the absence of the outcome condition. Also, there is no symmetry so that the configurations explaining the presence of the outcome are not the inverse configuration explaining the absence of the outcome condition.

**Paper VIII** argues to use data sets containing a balanced number of observations showing the presence and the absence of the outcome conditions. Due to the asymmetric relationships between causal conditions, i.e., the fact that the high and or low levels of multiple causal conditions together explain an outcome, the sample must contain a sufficiently high number of different configurations. **Papers VII and VIII** provide guidance for assessing whether the lack of logically possible configurations which do not exist in the data set is distorting the results. **Paper VIII** shows that it is essential to pay attention to sample characteristics in QCA studies, at the risk of distorting the validity of the study and yielding unreliable results. The results of the papers show that sampling a population purposefully can help gather data with a sufficiently high number of different configurations and a balanced distribution of presence and absence outcome conditions.

### 5.2.2 Configurational theorizing with QCA and advanced QCA methods

This dissertation also advances the understanding of how to apply QCA to produce robust and reliable results. **Paper VIII** discusses and empirically shows how non-standard calibrations, meaning the transformation of data into set-membership values, can disturb the results. The paper particularly highlights this issue for Likert-scale data and suggests clear guidelines for avoiding such disturbance. **Paper VII** revealed that many QCA studies in the information systems discipline base their analysis of necessary causal conditions on insufficient criteria, running the risk of identifying trivial necessary conditions. **Paper VIII** introduces two additional criteria for assessing necessary conditions, demonstrating how they can help minimize this risk and strengthen the analytic validity of QCA.

**Papers IX and II** are the first papers in the information systems and marketing discipline that apply two-step QCA. These papers demonstrate the power of two-step QCA in analyzing mediating relationships (**Paper IX**) and mirroring sequential processing (**Paper II**). **Paper IX** follows recent calls to “extend beyond the common” (p. 240) and combine data analysis methods in new ways (Leidner 2020). The paper contributes by providing insights into how QCA can extend structural equation modeling results by analyzing contrarian associations for explaining non-significant results. Finally, **Papers VII and VIII** show that only a limited number of QCA studies in the information systems discipline have tested their QCA results for robustness. **Paper VIII** contributes to more rigorous applications of QCA by providing a summary of existing validation criteria used in the related research field and proposes new ways to validate the robustness when using fuzzy sets.

### 5.3 PRACTICAL IMPLICATIONS

The results of the dissertation also offer several implications for practice.

#### 5.3.1 The practical implication for clicking behavior

The dissertation provides several practical implications for organizations to attract individuals' attention and entice them to click on in-app advertising (**Papers I, II, III**) and potentially make an online purchase (**Paper IV**).

**Paper II** provides practical guidance and actionable recommendations for what types of in-app advertising should be used to increase clicking behavior. Based on the results and the discussion of the results with several practitioners from the advertising and marketing industry, several design guidelines for optimizing the use of in-app advertising. In general, the results suggest that to attract individuals' attention in-app advertising should be in a prominent location, have bright colors, and should be similarly designed as the background structure of the app. Depending on whether the in-app advertising is personalized, e.g., through targeting techniques, animation can help trigger clicking behavior. **Paper III** specifies these recommendations for the specific characteristics of social media advertising. Among others, the findings help optimize performance campaigns, in terms of increasing click-through intention, and awareness-based campaigns, in terms of increasing view-through intention. To improve performance campaigns, targeting algorithms in advertising technology should prioritize social media likes from a person with whom the user has a strong social tie. Likewise, to improve awareness campaigns, social media advertising with likes from a weakly-tied person considered as an expert will be useful as well. These findings can also be transferred to most other social media and social networking platforms where the social network structure of individuals exists. For instance, utilizing the likes of strongly or weakly tied persons can help to overcome uncertainties for products or services that are difficult to evaluate.

**Paper IV** provides practical insights into how organizations can not only generate clicks on their in-app advertising but on how the e-commerce landing page should be designed to foster online purchase behavior. For instance, the results suggest that the e-commerce landing page needs to be adapted to the information displayed on the social media ad. That can be achieved if the e-commerce landing page acts as a logical extension of the in-app advertising.

#### 5.3.2 The practical implication for use of cryptocurrency

The results of the two studies addressing the question of what motivates individuals to use cryptocurrencies in e-commerce show that individuals tend to resist using cryptocurrencies as a means of payment and prefer to use cryptocurrency as an investment. **Paper V** shows that anticipated regret is a key driver for individuals to not use bitcoins as a means of payment, meaning that individuals fear that using bitcoins as a means of payment may be financially detrimental for them so that they will regret using it. This implies that uncertainty about Bitcoin's financial value hinders individuals from using it as a means of payment. Similarly, **Paper VI** shows that individuals invest in Bitcoin because they anticipate that they will regret not having invested in Bitcoin or because they have already experienced the regret of not having invested in Bitcoin. To make



cryptocurrencies more suitable as a means of payment, individuals' uncertainty about Bitcoin's financial value needs to be reduced. This implication is reflected in the recent success of stable coins, which refer to a cryptocurrency that is pegged to a reserve asset like the US dollar and therefore has no volatility relative to the reserve asset. Examples of successful stable coins that reduce the financial uncertainty are Tether (USDT) and USD Coin (USDC) (Bullmann et al. 2019).

Cryptocurrency tokens such as bitcoins are seen as a commodity rather than a legal tender in many jurisdictions (Cavicchioli 2021), which makes them similar to goods or products that are exchanged in e-commerce stores. Specialized crypto exchanges and wallet providers offer typical e-commerce capabilities and enable individuals to purchase cryptocurrencies on their online platforms. The results of **Paper VI** have several implications for such organizations. The process of acquiring cryptocurrencies must be as easy as possible and it should be possible to acquire smaller fractions of a cryptocurrency. Because investment skills are an essential explanatory factor, organizations need either attract potential customers with those skills or invest resources in educating potential customers.

### 5.3.3 The practical implications for the implementation of blockchain applications

The MediLedger case study in **Paper X** provides detailed insights into how new digital technologies, in this case, blockchain applications, can be successfully implemented, pointing to new solutions to previously unsolved issues. The insights from the case study shed new light on the challenges associated with implementing blockchain applications and how these challenges can be overcome to use blockchain applications successfully in different contexts. The lessons derived from the MediLedger case can be applied to other contexts as well. For example, the use of zero-knowledge proofs has widescale potential application in different areas, such as voting, auctions, or proving credentials in customer interactions. The MediLedger case also highlights how a blockchain ecosystem application can fix a broken information systems landscape, enable ecosystem participants to meet regulatory requirements, and collaborate to create an industry-wide standard.

## 5.4 LIMITATIONS

Some of the empirical studies in this dissertation explain behavior (**Papers II** and **V**), while others explain intention rather than actual behavior. Although the intention is considered a reliable predictor of actual behavior, it does not explain behavior (Polites et al. 2017). For instance, **Paper VI** relies on intention to invest rather than actual investment behavior and **Paper IV** relies on purchase intention rather than actual purchase behavior. This might weaken the explanatory power of the findings to a certain degree.

Also, not all empirical studies in this dissertation analyze data collected in a field study. For instance, **Paper III** relies on an online experiment, which enables external influences to be controlled and the desired explanatory factors to be manipulated. However, this data collection approach does not account for the full complexity of individuals' normal environment (Robert et al. 2009).

All cryptocurrency research must consider the fast-moving and changing environment. **Papers V** and **VI** sampled data in the early days of Bitcoin and the cryptocurrency space has changed dramatically since then.

For example, cryptocurrencies have received much more attention in popular media outlets, and major organizations and investment funds have since invested in cryptocurrencies. Furthermore, the value of the major cryptocurrencies, such as Bitcoin and Ethereum, has risen dramatically. Moreover, the rapid development of their underlying technology has led to easier payment options, among others using sidechains, and lower transaction costs, and simpler micropayments, among others through second-layer solutions. Similarly, the emergence of decentralized finance (DeFi) applications has opened the door for individuals to engage in crypto lending and borrowing or use stable coins. These and other similar developments have likely changed individuals' overall perceptions and opinions about cryptocurrencies and blockchain applications. A further limitation of the empirical studies in this dissertation is their sole focus on Bitcoin. While Bitcoin is the most well-known cryptocurrency with the highest market capitalization, it is different from other cryptocurrencies in some ways. For example, Ethereum, the second-largest cryptocurrency by market capitalization, enables decentralized applications, while Cardano, an emerging cryptocurrency, has a less energy-intensive consensus mechanism.

Finally, the prevalent data analysis method for the empirical paper in the dissertation is QCA. As mentioned above and discussed in **Paper VII**, QCA is a relatively new data analysis method in information systems research, in comparison to other widely used methods (Burton-Jones et al. 2015). This implies that IS scholars are still working to ensure that QCA provides robust and reliable results. To overcome this potential limitation, two papers in this dissertation summarize the status quo of QCA application in the information systems discipline (**Paper VII**) and synthesize knowledge from other disciplines to develop recommendations and identify good practices for applying QCA (**Paper VIII**). In addition, these insights have been applied in the empirical studies using QCA as a data analysis method to increase the reliability and robustness of the results. A further potential limitation is the literature reviews (**Papers I and VI**) show that most research into clicking behavior and cryptocurrency use applies correlation-based and regression-based data analysis methods. This makes it more difficult to compare previous results with the QCA approach-based results because the underlying understanding of causality differs significantly across these approaches (Ragin 2014).

## 5.5 FUTURE RESEARCH

The above-mentioned results, contributions, and limitations of the dissertation point to potentially fruitful avenues for future research.

The in-app advertising clicking behavior studies in this dissertation create a solid base for future research to reveal additional insights. Building on insights from extant literature that the way information is processed is influenced by individuals' overall goals and habits (Sun et al. 2013), future research should investigate how repeated exposure to the same in-app advertising or repeated exposure to in-app advertising in the same format creates mental schemas and alters how individuals process in-app ads. Future research should also investigate how individual preferences for various types of products or services influence their clicking behavior, building on extant research demonstrating the importance of differentiating between hedonic and utilitarian products or search and experience products (Ryu et al. 2006). Such research could identify

psychological mechanisms governing the influence of product/service preferences on clicking behavior. Further research can build on the findings about in-app advertising clicking behavior in general and in a social media advertising context, by also considering other important in-app advertising contexts, such as gaming, for example, to identify the drivers of context-specific behavior, such as in hedonic contexts.

Building on the findings that support for cryptocurrency ideology is an important predictor of investment behavior, future research should investigate to what degree specific types of information about this new and rapidly developing blockchain-based technology-driven innovation influence individuals' cryptocurrency investment and use behavior. For instance, how much does better understanding the impact of inflation and deflation influence the way individuals perceive the fixed supply character of cryptocurrencies such as Bitcoin? Similarly, does better understanding the decentralized nature of cryptocurrencies and how blockchains work influence individuals' motivation to invest in and use cryptocurrencies? Since different cryptocurrencies are perceived differently (Mattke et al. 2020a), future research should investigate to what degree research into Bitcoin can be transferred to other cryptocurrencies and how each cryptocurrency's unique characteristics influence individuals' perceptions and behavior.

Building on this dissertation's significant contribution to applying QCA to better understand non-linear relationships and user behavior, future information systems research should also apply QCA to non-linear multidimensional constructs (Lankton et al. 2016; Moody et al. 2017). Related to this, some information systems research discusses the role of causal asymmetry between the occurrence and the nonoccurrence of a behavior, outside the scope of QCA (Cenfetelli 2004; Cenfetelli and Schwarz 2011; Polites et al. 2017). Among others, some selected studies argue that a high level of specific perceptions is a good predictor for the adoption of an application, but that the low levels of these perceptions must not be a good predictor for not adopting the application (Cenfetelli and Schwarz 2011; Cenfetelli 2004). The guidelines for applying QCA in information systems research and the specific recommendations for ensuring robust and reliable QCA results presented in this dissertation pave the way for a thorough analysis of such phenomena.

## 6 CONCLUSION

In the face of increasing competition in the e-commerce space, e-commerce stores rely on in-app advertising to attract individuals' attention and offer customers the option of paying with cryptocurrencies to differentiate themselves from their competitors and attract new customers. This dissertation generates new knowledge about individuals' in-app advertising clicking behavior and what motivates them to use or not use cryptocurrency in e-commerce. The empirical papers in this dissertation apply a set-theoretical configurational approach and use QCA as the dominant data analysis method to understand human behavior. Since information technology research has only infrequently applied QCA, often failing to leverage its full analytic potential, this dissertation develops a seven-step QCA application framework to guide future information system research, including specific recommendations for ensuring robust and reliable QCA results, applying these principles in five empirical studies.

The results of this dissertation show that sequential processing of structural and semantic factors explains individuals' clicking behavior. The results show that social media advertising, a specific form of in-app advertising, evokes underlying psychological mechanisms, such that individuals' clicking behavior is influenced by close friends' likes and recommendations. The findings show that when individuals click on in-app advertising, it is essential that the e-commerce landing page is adapted to the in-app advertising. The dissertation shows several ways how e-commerce landing pages and in-app advertising must interact to influence individuals' purchase behavior. Finally, the dissertation examines identifies the factors driving the use/nonuse of cryptocurrencies as a new means of payment in the e-commerce context, revealing that individuals are driven by uncertainty and the fear of regret to resist using cryptocurrencies as a means of payment are more willing to buy cryptocurrencies as a form of investment. The results demonstrate that investment in cryptocurrencies differs from traditional forms of investment in that some individuals' investment in cryptocurrency is driven more by their support for its underlying ideology and less by whether they expect to earn profits.

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# **Chapter 1: In-app advertising clicking behavior and cryptocurrency use in e- commerce**

## PAPER I

# Advertising-Funded IS:

## A Literature Review on Factors Influencing Users' Clicking Behavior for In-App Ads

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Mattke, Jens (2019): Advertising-Funded IS: A Literature Review on Factors Influencing Users' Clicking Behavior for In-App Ads. In *Twenty-fifth Americas Conference on Information Systems*.  
[https://aisel.aisnet.org/amcis2019/adoption\\_diffusion\\_IT/adoption\\_diffusion\\_IT/9/](https://aisel.aisnet.org/amcis2019/adoption_diffusion_IT/adoption_diffusion_IT/9/)

## PAPER II

# In-app advertising:

a two-step qualitative comparative analysis to explain clicking behavior

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## PAPER III

# Herd behavior in social media:

The role of Facebook likes, strength of ties, and expertise

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<https://doi.org/10.1016/j.im.2020.103370>

## **PAPER IV**

# **Impulse buying in e-commerce:**

**A mixed-method study of social media ads**

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# Impulse buying in e-commerce: A mixed-method study of social media ads

**Abstract:** Online impulse buying, i.e. an individual's unplanned and spontaneous purchase of a product in an online store, is an attractive opportunity for organizations to increase e-commerce revenues. To stimulate online impulse purchases, organizations utilize two touchpoints: social media ads and e-commerce landing pages. We suggest that there are multiple factors influencing online impulse buying when individuals click a social media ad and getting redirected to an e-commerce landing page. We follow a mixed-methods approach with two studies. In a qualitative study, we identify factors influencing online impulse buying. In a quantitative study, we reveal how the interaction between social media ad-related factors and e-commerce landing page related factors leads to an online impulse purchase. We collect our data in a field study with a well-known online fashion brand and evaluate them through a configurational analysis using fuzzy-set qualitative comparative analysis (fsQCA). The results reveal that a visually appealing e-commerce landing page with information adapted to the social media ad is necessary for online impulse buying, but also that an e-commerce landing page — in isolation — does not lead to online impulse buying. Only the interplay of a credible social media ad with a visually appealing e-commerce landing page having the information adapted to the social media ad is sufficient to lead to online impulse buying. The results contribute by showing that it is not enough to only focus on the e-commerce landing page to understand online impulse buying. Instead, we need to consider external influences, such as the social media ad, that lead to impulse buying, as well as the underlying mechanisms triggering online impulse.

## 1. INTRODUCTION

Estimates say that around 40 percent of all money spent by individuals on e-commerce sites in the U.S. is grounded on online impulse buying (Khalid 2019). This is characterized as an unplanned and spontaneous online purchase. For organizations, such kind of purchases are a viable opportunity to sell their products online and to generate additional revenue. In the U.S., organizations will spend around \$57 billion in 2022 on social media advertising to attract the attention of individuals (Williamson 2020). Social media advertisements (ads) are the first touchpoints with potential customers and organizations often use such ads to target different clusters of individuals with similar traits (Boerman et al. 2017; Zhang and Mao 2016). Social media ads are often used to forward individuals to specialized e-commerce landing pages, which are the second touchpoints to trigger online impulse buying (Dobrilova 2019; Sherman 2019). The relevant research stream about social media ads and online impulse buying in e-commerce is still unexplored, but there are two related research streams relevant to study online impulsive buying in e-commerce. The first research stream shows that online ad-related factors, such as perceived relevance, influence *traditional offline* impulse buying (Fang et al. 2015; Ho and Lim 2018). However, online impulse buying has specific characteristics as it is free of media disruptions so that we need to study what online ad-related factors are relevant. The second research stream shows that the e-commerce related features, such as the product availability on the e-commerce website, can influence online impulse buying (Adelaar et al. 2003; Koufaris

2002; Parboteeah et al. 2009; Wells et al. 2011). These findings are specifically relevant for situations when an individual is already browsing on a firm's e-commerce sites and thus already in a kind of 'shopping mode' (Chen et al. 2016; Wells et al. 2011). Hence, such e-commerce sites depict a substantially different situation, and known e-commerce related factors, such as navigability of the e-commerce site, do not matter. In summary, we do not know how the two touchpoints e-commerce landing pages and social media ads influence online impulse buying. From an individual perspective, having two touchpoints leads to a complex situation, because both touchpoints exceed an influence on online impulse buying and an individual feels the urge to buy impulsively solely because of one touchpoint or because of the interplay of the social media ads and e-commerce landing pages. However, we have limited knowledge of how the complex situation influences individuals and their online impulse buying.

To provide these insights, we draw upon the underlying theoretical concept of the latent state-trait (LST) theory (Hamaker et al. 2007; Steyer et al. 1999), as applied by previous research (Chen et al. 2016; Wells et al. 2011). The underlying theoretical concept of the LST theory summarizes that online impulse buying is influenced by environment-related factors, traits, and the interaction thereof (Hamaker et al. 2007; Steyer et al. 1999). The theoretical concept is particularly suited for online impulse buying, because considering the interactions enables to explain unplanned and non-utility-based individual behavior. The underlying theoretical concept of the LST theory has been proven to be very useful in explaining impulsive behavior in other contexts (Chen et al. 2016; Wells et al. 2011). Therefore, we ask the first research question (RQ):

**RQ1: What social media ad-related factors, e-commerce landing page related factors, and traits influence online impulse buying?**

Besides that, we need to understand how these factors, or a subset thereof, play together and lead to online impulse buying. Such knowledge is essential for organizations to implement strategies to increase online impulse buying. In line with the underlying concept of LST theory (Hamaker et al. 2007; Steyer et al. 1999), information processing is influenced by the collective existence of factors (Campbell et al. 2016; Maier et al. 2021). Furthermore, the interaction of social media ads and an e-commerce landing page reflects an individual's experience in the purchase funnel when making an online impulse purchase (Wijaya 2015). Therefore, we examine whether the identified factors influence online impulse buying as well as examine how the identified factors, grouped together as configurations, lead to online impulse buying. For instance, it might be that a social media ad is sufficient to trigger online impulse buying, or that only the collective influence of a social media ad and an e-commerce landing page can trigger online impulse buying. Therefore, we use a configurational approach which offers the advantage to analyze whether there are necessary factors, thus factors that always must exist to trigger online impulse buying. Also, configurational approaches can reveal whether a subset of the factors is sufficient to trigger online impulse buying (Mattke et al. 2021; Rihoux and Ragin 2009). This adds value to the predominant variance-based approaches in the stream of online impulsive buying. Therefore, we take a configurational perspective and ask the second RQ:



**RQ2: What configurations of social media ad-related factors, e-commerce landing page related factors, and traits lead to online impulse buying?**

We follow a mixed-method approach with two sequential studies to answer both research questions guided by the underlying theoretical concept of the LST theory. Study 1 uses a qualitative approach based on interviews ( $N = 26$ ) and identifies three social media ad-related factors, four e-commerce landing page related factors, and one trait that might influence online impulse buying. We use these results as input for our quantitative Study 2, in which we cooperated with a well-known online fashion brand to conduct a field study. Based on the collected survey data ( $N = 251$ ), we apply a qualitative comparative analysis (QCA) to reveal configurations influencing online impulse buying. We thereby reveal that for online impulse buying to occur, the e-commerce landing page needs to be visually appealing and the information of the e-commerce landing page needs to be adapted to the social media ad. However, an e-commerce landing page in isolation does not trigger online impulse buying. Only the interplay with a credible social media ad triggers online impulse buying. Additionally, an e-commerce landing page can compensate for a social media ad that is not informative or personalized. On the other hand, when a social media ad presents the products in a personalized, credible, and informative way, the social media ad can compensate for an e-commerce landing page with low usability and trust. Finally, the results reveal that online impulse buying tendency does not matter when the social media ad represents the information in a personalized and credible way, and when the e-commerce landing page is visually appealing, trustful, and has high usability with information adapted to the social media ad.

We enrich our understanding of the interplay of social media ads, e-commerce landing pages, and traits regarding impulse buying in two ways: First, we identify new context-specific factors, and second, we highlight that a visually appealing e-commerce landing page with information adapted to the social media ad is necessary for impulse buying. It does not, however, trigger impulse buying in isolation. Only the interplay with a credible social media ad triggers online impulse buying. We thereby show that only studying the information systems perspective (here: the e-commerce landing page) is insufficient to understand online impulse buying. We emphasize focusing on the interplay of social media ad-related factors, e-commerce landing page related factors, and traits.

In the next section, we outline the theoretical background, provide a summary of the existing research streams, and highlight the existing research gaps. We then outline our methodology, consisting of two studies, and discuss our theoretical contributions and practical implications before concluding the paper.

## **2. THEORETICAL BACKGROUND**

We will next present research related to online impulse buying in the context of social media ads and e-commerce landing pages. Based on the characteristics of online impulse buying, we then explain that the underlying theoretical concept of the latent state-trait (LST) theory with its specific characteristics has a high fit to serve as a theoretical lens to study factors leading to online impulse buying. Therefore, we lay out the

basic tenet of the underlying theoretical concept of the LST theory and finally review related research to highlight that our research will contribute to existing research.

## 2.1. ONLINE IMPULSE BUYING

Based on early research in the stream of traditional offline impulse buying (Beatty and Elizabeth Ferrell 1998; Rook 1987), we consider online impulse buying as an unplanned, compelling urge that arises within an individual to buy immediately on an e-commerce site.

Organizations aim to make revenue with online impulse buying. For instance, online fashion brands gather empirical data regularly when releasing new fashion collections. The fashion brand depends on quick revenue after release to free capital tied in the products to produce the new collection. The potential customers do not have experience and knowledge with the new collection so that the organization cannot use retargeting mechanisms to remind individuals of the collection. Thus, organizations need to understand how to trigger online impulse buying. Therefore, organizations need to get individuals to their e-commerce websites. For this, organizations increasingly rely on social media advertising as the first touchpoint with the individual. U.S. organizations are expected to spend around \$57 billion in 2022 on social media ads (Williamson 2020). These are used to attract individuals' attention so that they click the social media ad, get redirected to the organizations' e-commerce website and impulsively purchase products. Statistics reveal that the effective use of social media ads increases sales by more than 20 percent (Sherman 2019) and research shows that social media ads positively influence individuals' behavior and attitudes (Knoll 2016).

To increase the chance to trigger online impulse buying, organizations have a second touchpoint: the e-commerce landing page. After individuals have clicked on a social media ad, they get redirected to an e-commerce landing page. This is a standalone web page that is particularly used for a marketing campaign. The main objective of the e-commerce landing page is to fulfill a specific conversion, e.g. to trigger online impulse buying. A vast agreement concludes that e-commerce landing pages increase conversions, e.g. online impulse buying, and thus drive the revenue of organizations (Dobrilova 2019).

Finally, organizations have realized for a long time that different individuals react differently to social media ads so that organizations need to be aware of the traits of their targeted audience (Zhang and Mao 2016). Traits include the frequency of using social media use and demographics, such as gender, and are typically seen as factors determining individuals' behavior (Matke et al. 2020; Zhu and Kanjanamekanant 2020) in general and online impulse buying in particular (Chen et al. 2016).

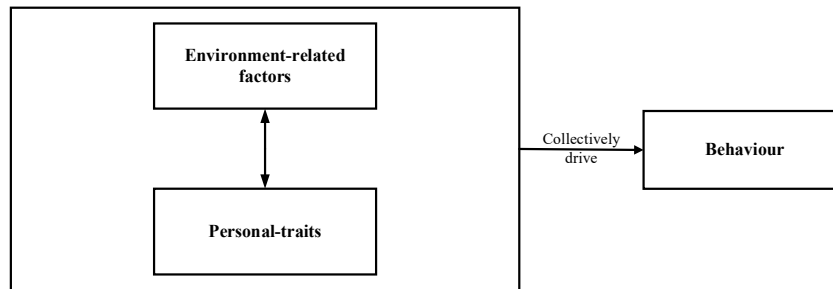
To maximize revenues from online impulse buying, organizations need to consider the two touchpoints — the social media ad and the e-commerce landing page — as well as the traits of their targeted audience. By providing insights into how these influence an individual's online impulse buying, organizations can create an optimal 'social media ad to e-commerce landing page' experience.

Traditional utility-based theories, such as the theory of planned behavior (Ajzen 1991), do not explain well non-utility and impulsive behavior, and information processing theories fall short as they ignore the focus on

traits. As a consequence, we draw on the underlying theoretical concept of the LST theory (Hamaker et al. 2007; Steyer et al. 1999), as applied by previous research (Chen et al. 2016; Wells et al. 2011). It considers how different states, i.e. the social media ad and the e-commerce landing page, traits, i.e. the traits of the target audience, and the interaction thereof influence behavior such as online impulse buying. While also similar models and theories, such as the unplanned purchase model (Beatty and Elizabeth Ferrell 1998), uses states and traits to understand behavior, the underlying theoretical concept of the LST theory respects the interplay of states and traits to account for impulsive behavior. Besides that the underlying theoretical concept of the LST theory considers endogenous environment-related factors, such as social media ad-related and e-commerce landing page related factors, which are under the control of the organizations (Hamaker et al. 2007). Also, the unplanned purchase model suggests that individuals are in a shopping environment and that the affect experienced while shopping is an important predictor for impulse buying (Beatty and Elizabeth Ferrell 1998). However, in our context, individuals browse on social media and not in a shopping environment. Therefore, we take the underlying theoretical concept of the LST theory (Hamaker et al. 2007; Steyer et al. 1999) which we outline next.

## 2.2. THE UNDERLYING THEORETICAL CONCEPT OF THE LATENT STATE-TRAIT THEORY

The underlying theoretical concept of the LST theory (see Figure 18), as applied by previous research (Chen et al. 2016; Wells et al. 2011), supposes that an individual's behavior depends on environment-related factors, traits, and the interaction of both factors (Hamaker et al. 2007; Steyer et al. 1999). This theoretical concept has been proven useful in extant research to explain impulsive behavior in other contexts (Chen et al. 2016; Wells et al. 2011). We apply the underlying theoretical concept of the LST theory to guide our research and outline the underlying theoretical concept next.



**Figure 18. The underlying theoretical concept of the LST theory as applied by previous research**

The underlying theoretical concept of the LST theory suggests that individual behavior is influenced by *environment-related factors*, reflecting factors from the environment and that these factors differ for each context (Hamaker et al. 2007; Steyer et al. 1999). For instance, there are specific environment-related factors relevant to an individual who is shopping offline in a grocery store than for an individual shopping online. Individuals' shopping in a grocery store is among others influenced by the smell of the groceries, while this environment-related factor does not exist in an online shop.

The individual's behavior is also influenced by *traits*. Traits represent relatively stable inter-individual characteristics that describe an individual and distinguish persons (Steyer et al. 1999). Research has identified

various traits, such as proneness, tendencies, style, or dispositions (Hamaker et al. 2007; Pflügner et al. 2020). For instance, some individuals may be high on impulsiveness whereas others only show a low level of impulsiveness, which then has an influence on whether individuals conduct online impulsive purchases

Even if environment-related factors and traits influence an individual's behavior, research has shown that the *interaction of both* is fundamental to understand an individual's behavior (Epstein 1980; Hamaker et al. 2007; Steyer et al. 1999). The basic rationale for this is that traits influence the perception of environment-related factors. This means that environment-related factors might have a different influence on an individual's behavior depending on specific traits. For instance, somebody who is high on impulsiveness might react differently to special offers than somebody low on impulsiveness. Thus, only considering the influence of traits and environment-related factors may lead to oversimplified explanations (Wells et al. 2011). In summary, the underlying theoretical concept of the LST theory suggests that an individual's behavior is influenced by three concepts which are summarized in Table 25.

Concept influencing an individual's behavior	Definition (Hamaker et al. 2007; Steyer et al. 1999)
Environment-related factors	Situation-specific factors which influence an individual's behavior.
Traits	Relatively stable interindividual characteristics which influence an individual's behavior.
Interaction of environment-related factors and traits	The interaction of environment-related factors and personal factors which influences an individual's behavior.

Table 25. Definition of the key concepts

## 2.3. RELATED RESEARCH

Research so far has not considered how social media ads, e-commerce landing page ads, and personal factors influence online impulse buying. Therefore, we next outline different research streams that explain what environment-related factors — social media ad-related factors and e-commerce landing page related factors — and what traits influence online impulse buying. For this, we conducted a literature review in relevant information systems and marketing journals<sup>13</sup>. There is substantial research on the influence of different types of online ads, such as social media ads (Che et al. 2017; Zhang and Mao 2016), targeted online ads (Summers et al. 2016), or mobile ads (Bues et al. 2017) on non-impulsive purchase behavior. However, impulsive behavior is often linked to an individual's traits, such as the ability to control, so that it differs from non-impulsive behaviors (Chan et al. 2017). The literature review showed two other relevant research streams, though, which we outline below. For each research stream, we additionally discuss whether the existing knowledge can be transferred to our context.

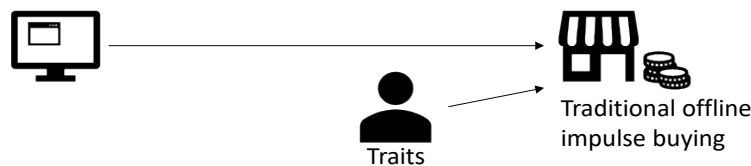
### 2.3.1. Research stream 1: The influence of online ad-related and traits

Research has explained how different types of online ad-related factors, such as social media ads (Chen et al. 2016; Chen et al. 2018) and mobile ads (Fang et al. 2015; Ho and Lim 2018), are related to traditional offline impulse buying (see Figure 19). Among others, research has focused on environment-related factors,

<sup>13</sup> We searched for articles about 'impulse buying', 'impulse purchase', 'unplanned buying' or 'unplanned purchase'. For IS journals, we searched in the AIS Senior Scholar Basket. We additionally searched in Information & Management and Decision Support Systems. For marketing journals, we included the following 'Financial Times 50' marketing journals in our search: Journal of Consumer Psychology, Journal of Consumer Research, Journal of Marketing, Journal of Marketing Research, Journal of the Academy of Marketing Science, Marketing Science.

showing that the information quality of social media ads in ‘buy and sell’ Facebook groups and the number of likes influence an individual’s urge to buy impulsively (Chen et al. 2016). Similarly, trust in the recommender of the social media ad and product affection influence an individual’s impulse buying (Chen et al. 2018). In the context of mobile SMS ads, research shows that ads trigger traditional offline impulse purchases and that traditional offline impulse purchases are influenced by location congruence, time congruence (Fang et al. 2015), and the type of recommended product (Ho and Lim 2018).

Additionally, this research stream reveals that traits such as an individual’s impulsiveness (Chen et al. 2016; Chen et al. 2018) influence traditional offline impulse buying.



**Figure 19. Research stream 1 — online ad-related factors influence traditional offline impulse buying**

However, the factors that lead to traditional offline impulse buying are different from the factors leading to online impulse buying. The rationale is that the path from social media ads to online impulse buying involves an e-commerce landing page and thus it does not involve media discontinuities, as for traditional offline impulse buying.

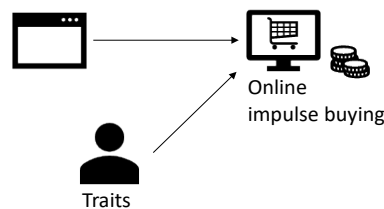
For instance, when an individual clicks on a social media ad about a new Nike shoe, she is directly redirected to a specific e-commerce landing page for the Nike shoe. At this e-commerce landing page, they can instantly make their purchase, without having to search for the specific Nike shoe and without any delay. This example shows that the time lag between seeing a social media ad and deciding to buy the advertised product is a fraction for online impulse buying compared to offline buying. In contrast, for traditional offline impulse buying, the individual sees the online ad, and purchasing the product offline requires bridging one or more media discontinuities. To continue the example, if an individual sees a social media ad about the new Nike shoe, they need to find the next shoe store, the specific Nike shoe and line up at the cash desk to buy the shoes. We thus suppose that the same ad-related factors do not influence online impulse buying in our research context.

### 2.3.2. Research stream 2: The influence of e-commerce-related and traits

The second research stream focuses on how various e-commerce related factors and traits influence online impulse buying. E-commerce refers to the entire information system which enables the buying and selling of products using the website.

Existing research has examined the influence of environment-related factors on online impulse buying, such as product presentation, perception of the e-commerce sites, and the assortment offered by the e-commerce sites. Research shows that the different media formats for the product presentation on e-commerce sites, such as text, image, or video representation, influence an individual’s online impulse buying (Adelaar et al. 2003).

Interactive, vivid product presentations (Vonkeman et al. 2017) and a friendly, calm communication style (Verhagen and van Dolen 2011) also influence online impulse buying. Besides that, research shows that the use of recommendation agents (Hostler et al. 2011) and the use of search mechanisms in e-commerce sites (Koufaris 2002) can drive impulse buying. Furthermore, the perception of e-commerce sites plays an important role in influencing an individual's impulse buying. Research supposes that the ease of navigability (Wells et al. 2011), ease of use (Verhagen and van Dolen 2011), usefulness (Parboteeah et al. 2009), perceived security (Wells et al. 2011), the information provided (Parboteeah et al. 2009) and the visual appeal of the e-commerce sites (Liu et al. 2013; Parboteeah et al. 2009; Wells et al. 2011) influence online impulse buying. Also, the attractiveness of the assortment in e-commerce sites (Verhagen and van Dolen 2011) and product availability (Liu et al. 2013) influence online impulse buying. Furthermore, traits, such as impulsiveness (Liu et al. 2013; Wells et al. 2011), impulse buying tendency (Adelaar et al. 2003) media preferences (Adelaar et al. 2003), and an individual's web skills, as well as product involvement, influence online impulse buying (Koufaris 2002).



**Figure 20. Research stream 2 — e-commerce features influence online impulse buying**

In summary, we notice that existing research has focused on how e-commerce related features influence online impulse buying (see Figure 20). This research stream postulates that an individual is already browsing on the e-commerce sites, thus being in kind of a ‘shopping mode’ (Chen et al. 2016; Wells et al. 2011). However, this does not apply to the situation when individuals click a social media ad and get redirected to an e-commerce landing page.

Additionally, when talking about e-commerce landing pages, we refer to a subset of the e-commerce website. E-commerce landing pages are designated websites that are used as a logical extension of an online ad and whose main purpose is to generate a conversion for a specific product. Classical e-commerce related factors, such as navigability of the e-commerce site, search functionalities, often do not even exist on an e-commerce landing page (Dobrilova 2019), because the individual does not need to search for a specific product but is already on a tailored e-commerce landing page. Individuals have different needs depending on whether they are browsing the e-commerce website or getting directly redirected to an e-commerce landing page. Furthermore, other factors such as the attractiveness of the assortment may not matter, because individuals have already been exposed to a product with the social media ad and do not need to use recommendations or search functions to find a product. For instance, when an individual is browsing social media and clicks a social media ad, the individual is directly redirected to an e-commerce landing page. This e-commerce landing page is tailored to a specific product and shows the relevant information. In contrast, when

individuals browse an e-commerce website, other environment-related factors, such as navigability or a recommendation function, are relevant for impulse buying. This implies, that we cannot assume that the same e-commerce related factors influence online impulse buying in our research context.

## 2.4. RESEARCH MODEL

Organizations can use two touchpoints to influence an individual's online impulse buying. They can use social media ads as well as e-commerce landing pages. Based on the underlying theoretical concept of the LST theory (Hamaker et al. 2007; Steyer et al. 1999), we know that an individual's behavior is influenced by environment-related factors, traits, and the interplay of both. This means that the individual runs through a 'social media ad to e-commerce landing page' experience where social media ad-related factors, e-commerce landing page related factors as well as personal factors jointly influence online impulse buying (see Figure 21). As outlined above, there is no specific research explaining how online ads and e-commerce landing pages influence online impulse buying, which leaves an important part of possible revenue drivers not understood. Due to the two touchpoints, we cannot transfer existing knowledge to our context. These two touchpoints define a new context in which complex interactions of the two touchpoints and the traits influence online impulse buying. So, we do not know what social media ad-related factors, e-commerce landing page related factors and traits influence online impulse buying (see Figure 21). These need to be identified first.

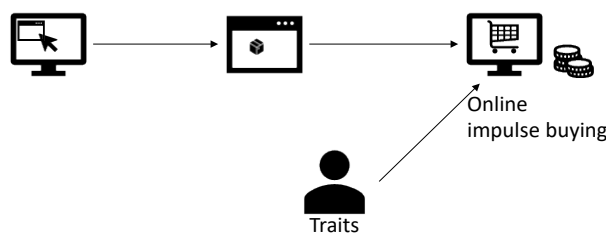


Figure 21. Individual's impulse buying process from social media ad to e-commerce landing page

## 3. MIXED METHODS APPROACH

We follow a developmental mixed-methods approach (Venkatesh et al. 2013) that consists of a sequential two-strand design with two equally-weighted studies in which we adopt the single worldview framed by the underlying theoretical concept of the LST theory (see Figure 22). As outlined above, existing research is not sufficient to capture all factors relevant to the context of online impulsive buying. To fill this gap, we first conduct a qualitative study. In Study 1 we conduct 26 interviews to examine social media ad-related factors, e-commerce landing page related factors, and personal factors that influence impulse buying.

**Study 1****Characterization:** Qualitative**Data collection:** 26 semi-structured interviews, recorded anonymously**Analysis:** Transcription, descriptive/interpretative coding**Purpose:** Identification ad related, e-commerce landing page related and personal related factors influencing online impulse buying**Results:**  
Identified  
factors**Study 2****Characterization:** Quantitative, configurational approach**Data collection:** 251 surveys anonymously collected from a field study, based on the results from Study 1**Analysis:** Fuzzy-set qualitative comparative analysis (fsQCA)**Purpose:** Identification of configurations that drive impulse buying behaviour**Figure 22. Mixed methods approach**

Even though identifying a list of factors influencing online impulse buying provides a better understanding, it remains unclear whether an individual's perception of the e-commerce landing page is independent of the perception of the social media ad. We aim to know whether one touchpoint, i.e. the social media or the e-commerce landing page in isolation is sufficient to triggers online impulse buying. When an individual is exposed to a social media ad and decides to click on the ad, the individual is at the beginning of a purchase process and runs through the different steps of the purchase process (Wijaya 2015). Thus, the perception of the social media ad, which triggers an individual's awareness, might influence how the individual perceives the e-commerce landing page. This means that individuals collectively consider all information and that the complex interaction of those perceptions, in turn, forms their intention or behavior. For online impulse buying, this implies that individuals do not process the social media ad-related factors and subsequently the e-commerce landing page related factors in isolation, but they decide based on the total set of factors and their interaction. In summary, theory and previous research suggest that an individual's online impulse buying is determined by configurations of factors, however, this has not been considered in related impulse buying research. To reflect this, the second part of our mixed-method study will be a configurational approach. This allows us to capture the interaction of more than two variables (Mattke et al. 2021; Misangyi et al. 2017) so that we understand how the two touchpoints and the traits interact. Each study is explained in the following sections.

### 3.1. STUDY 1: IDENTIFICATION OF FACTORS LEADING TO ONLINE IMPULSE BUYING

In Study 1, we conduct semi-structured interviews. Guided by the underlying theoretical concept of the LST theory, our goal is to identify environment-related factors, particularly social media ad-related factors and e-commerce landing page related factors, that influence online impulse buying, as well as relevant traits.

#### 3.1.1. Data collection

We conducted semi-structured interviews in 2019 (see demographics in Table 26). Our sampling strategy was to involve participants with a social media account who have conducted at least one online impulse purchase in the past three months. We recruited participants from a large University. To ensure that the participants are appropriate for the study, we pre-screened the potential participants. We only invited



individuals to an interview who reported to have a social media account and have made an online impulse purchase triggered by a social media ad.

Age (in percent) (Mean 26.23; SD 6.74)		Gender (in percent)		Highest education level (in percent)	
< 20	15.36	Male	46.15	53.85	53.85
21-30	57.70	Female	53.85	38.46	38.46
31-40	19.24			Master	7.69
> 40	7.70				

*Note: SD = standard deviation*

**Table 26. Demographics of 26 participants (Study 1)**

At the beginning of each interview, we ensured that the pre-screening was successful. All participants were able to recall at least one situation where they conducted an online impulse purchase that was triggered by a social media ad. To ensure that the participants report their perceptions about online impulse buying, we asked the participants about the product. After we had ensured that the participants recalled an online impulse purchase, we asked them to describe the social media and the e-commerce landing page in as much detail as possible. Afterward, we asked what traits had been relevant for their online impulse purchase. We asked follow-up questions to clarify the answers of the participants. At the end of the interviews, we gathered the demographics of the participants.

After the pre-screening, we ended up with 26 participants. The number of interviews is sufficient because, after the 19th interview, we did not reveal any new insights, which reflects the point of saturation (Saunders et al. 2018). Nevertheless, we moved beyond the point of saturation and conducted seven additional interviews which confirmed that we have reached the point of saturation. On average, the interviews lasted 24 minutes.

### 3.1.2. Data analysis

To analyze the interviews, we followed a four-step approach (Table 27). In the first step, we transcribed and anonymized the interviews. In a second step, we then applied descriptive coding (Myers 2013) to identify all text passages of the transcribed interviews which give insights about factors influencing online impulse buying. Whenever practicable, we used the exact phrases of the participant to label the descriptive codes. The second step resulted in 45 different descriptive codes. These descriptive codes are then used for further analysis. The purpose of the third step was to classify the identified descriptive codes into the social media ad-related, e-commerce landing page related, or traits. Two authors individually classified the descriptive codes and compared the classification.

Analysis step	Description of the analysis step
Step 1: Transcribe interviews	Transcription and anonymization of the interviews.
Step 2: Descriptive coding	Identification of text passages that reveal insights about why individuals conducted the online impulse purchase.
Step 3: Classify descriptive codes	Classification of the descriptive codes into the social media ad-related, e-commerce landing page related, or traits.
Step 4: Interpretive coding and formal review of interpretative coding	Interpretative coding of the descriptive codes. Ensuring coding consistency through inter-judge reliability.

**Table 27. Coding procedure (Myers 2013)**

The two authors reached a full agreement (Randolph 2005). Overall, we classified 13 of the descriptive codes into the category ‘social media ad-related’, 27 into the category ‘e-commerce landing page related’, and five descriptive codes into ‘traits’. Based on the classified descriptive coding, we applied interpretive coding (Myers 2013) to aggregate similar descriptive codes to more general interpretive codes. Two of the authors coded the classified descriptive codes separately. To ensure consistent coding, the results of the interpretive coding were compared, and the inter-judge reliability was calculated. The interpretive coding for e-commerce landing page related factors and traits were consistent, thus reached a 100 percent inter-judge reliability. Three descriptive codes for social media ad-related factors were coded differently having an initial overall agreement of 77 percent with a free-margin kappa of 0.65 (Randolph 2005; Warrens 2010). The coders compared, discussed, and settled the differences to ensure complete agreement.

### 3.1.3. Results

We identified three social media ad-related factors, four e-commerce landing page related factors, and one trait which influences online impulse buying. The factors and their definitions are displayed in Table 18.

<b>Factors influencing online impulse buying</b>		<b>Definitions adapted to the context of impulse buying</b>	<b>Definition based on</b>
Social media ad-related factors	Informativeness	The extent to which the social media ad informs the user about products or services.	(Zhang and Mao 2016)
	Credibility	The extent to which the social media ad is perceived as truthful.	(Brackett and Carr 2001)
	Personalization	The extent to which the social media ad is perceived to be tailored to the individual.	(Xu et al. 2008)
E-commerce landing page related factors	Information fit to the ad	The extent to which the information on the e-commerce landing page fits the information needs after clicking on a social media ad.	<i>Not studied so far</i>
	Visual appeal	The extent to which the e-commerce landing page is perceived as visually appealing.	(Loiacono et al. 2007)
	Usability	The extent to which the e-commerce landing page is evaluated to have good usability.	(Zhang et al. 2011)
	Trust	The extent to which the e-commerce landing page is perceived as trustworthy.	(McKnight et al. 2002)
Traits	Impulse buying tendency	The extent to which the individual tends to buy impulsively.	(Rook and Fisher 1995)

**Table 28. Definitions of the identified factors influencing online impulse buying**

## 3.2. STUDY 2: EXAMINE CONFIGURATIONS LEADING TO ONLINE IMPULSE BUYING

In Study 2, we use the factors of Study 1 to identify which configurations of them lead to online impulse buying.

### 3.2.1. Data collection

For the data collection, we work together with an online fashion brand to collect survey data in a field study. The field study was conducted in fall 2019. The online fashion brand advertised its new autumn fashion product line using social media ads and the goal of the company was to understand online impulse purchases, particularly online impulse buying, for all products related to the new autumn fashion product line. The social

media ads were published before selling in the brick-and-mortar shops.

The social media ads were displayed on Facebook. When the individual clicked on the social media ad, they were redirected to the e-commerce landing page. This e-commerce landing page was tailored to the autumn fashion product line and only products of the autumn fashion product line were linked on this page.

On the e-commerce landing page, our survey was shown to a random sample of 1,800 individuals after browsing on the e-commerce landing page for at least six seconds. With this, we assured that the individual was confronted with the e-commerce landing page and had enough impressions to answer the questions about the e-commerce landing page related factors. Overall, 294 individuals filled out the survey, but we removed 43 participants as they did not completely fill out the survey. The final sample consists of 251 participants.

Age (in percent) Mean 36.07; SD 11.88		Gender (in percent)		Highest education level (in percent)	
< 21	4.51	Male	44.72	University entrance degree	33.33
21-30	40.98	Female	55.28	Bachelor	52.25
31-40	24.18			Master	14.41
> 40	30.33				
Note: SD = standard deviation					

**Table 29. Demographics of 251 participants (Study 2)**

As we used self-reported data, we test whether a common method bias (CMB) influences our results. For this, we conducted Harman's single factor test and examining the correlation matrix as specified by Pavlou et al. [25]. The result of Harman's single factor test shows that only 39.3 percent of the variance of the entire data is explained by one factor. As this is below the threshold of 50 percent, this test indicates that CMB is not an issue. The results of the second test revealed that no high correlations ( $r > 0.90$ ) between the constructs exist. This second test also attests that CMB does not compromise the data. Furthermore, the sample size exceeds the minimum sample size for QCA to avoid finding random results in the data (Marx 2010). According to the guidelines, we would need more than 45 observations, thus our sample size clearly exceeds the minimum requirements.

This study benefits from data collected in a field study within an individual's realistic impulse buying process. Most companies are reluctant to support field studies that interrupt the individual buying process to take a snapshot of an individual's current status (Koufaris 2002). Therefore, a large part of existing research has collected data in a controlled setting and used experimental e-commerce sites (Hostler et al. 2011; Parboteeah et al. 2009; Wells et al. 2011) to collect data or asked participants to recall an instance of an e-commerce site (Koufaris 2002; Liu et al. 2013). Furthermore, relying on a convenient sample and not real customers limits the generalizability of the results. Measuring online impulse buying in controlled settings is often prone to biased data (Chen et al. 2018; Luo 2005), and participants tend to behave in a socially desirable manner (Chan et al. 2017).

### 3.2.2. Measures

To operationalize the identified factors from Study 1, we adapted items used in previous research whenever

possible and applied q-sorting to develop new measurements for the construct ‘information fit to the ad’. Based on the descriptive codes we revealed in Study 1 for the construct ‘information fit to the ad’, we created four items to reflective measure the construct. To validate those items, we followed the q-sorting method with 48 participants. The task of the participants was to assign different items to a selection of constructs. In order to have more than one construct, we included the three items of visual appeal and the three items of usability to the list of items. Thus, we had a list of ten items that the participants should assign to one of the three constructs (information fit to the ad, visual appeal, usability). We additionally gave the participant the option to indicate that they found no matching assignment if they were uncertain how to assign an item. Before the participants started the task, they read through instructions and a fictive example that demonstrated how the task should be performed. We also highlighted that it is possible to assign an item to no construct. Based on the assignment we calculated the consistency of the items for ‘information fit to the ad’. We only used three out of four items, which had a consistency above 61 percent [24].

Before using the empirical data, we first tested the measurement model for 1) content validity, 2) indicator validity, 3) construct validity and 4) discriminant validity (Bagozzi 1979). The validation is summarized in Table 30. The results show that the measurement model is valid and can be used for further analysis.

Validation	Test and explanation of validation
Content validity	We use items from previous research, whenever possible. We used two-step q-sorting to develop and validate items for the construct ‘information fit to the ad’
Indicator validity	The loadings of all items are at least 0.707 (Carmines and Zeller 2008)
Construct validity	The average variance extracted (AVE) is higher than 0.50 and the composite reliability is higher than 0.70 (Fornell and Larcker 1981)
Discriminant validity	The square root of the AVE is greater than the corresponding bivariate correlations of the constructs (Fornell and Larcker 1981; Hulland 1999). Additionally, the heterotrait-monotrait (HTMT) ratio, calculating the highest value of 0.81 for intention to use and usefulness, is lower than the absolute HTMT <sub>0.85</sub> criterion (Henseler et al. 2014).

**Table 30. Validation of the measurement model.**

### 3.2.3. Data analysis

To analyze which configurations of the eight identified factors lead to an individual’s online impulse buying, we take a configurational approach. The state of the art method for configurational approaches is fuzzy-set qualitative comparative analysis (fsQCA), which is increasingly used in information systems research (Lee et al. 2019; Maier et al. 2021; Park et al. 2020; Sun et al. 2020). The basic concept of fsQCA is to reveal what configurations of factors lead to an individual’s online impulse buying. In fsQCA configurations that consistently lead to the outcome are called sufficient configurations. This means that fsQCA does not aim at identifying the influence of every single factor but at revealing how constellations of these factors, combined in a configuration, lead to online impulse buying. Configurational approaches assume that there are always multiple configurations that lead to a particular outcome, i.e. online impulse buying, and that some factors exist across multiple configurations. Those factors, which exist in all configurations, are called necessary factors. One advantage of using fsQCA is that the methodology differentiates whether a factor is present, i.e. has a high level (e.g. somebody has a high impulse buying tendency) or a factor is absent, i.e. a low level (e.g. somebody has a low impulse buying tendency) (Mattke et al. 2021).

To analyze the survey data, we apply a three-step approach. First, we calibrate the survey, which is measured

on Likert-Scales, into fuzzy sets. Second, we test whether there are any necessary factors, thus factors that always exist in each sufficient configuration leading to online impulse buying. Third, we analyze what sufficient configurations of influencing factors leading to online impulse buying. For all three steps, we used the fsQCA software 3.0 (Ragin et al. 2016) and the QCA package in R (Dusa 2018).

**Calibration.** To calibrate the data, we perform a log-transformation with the direct calibration function provided in the fsQCA software. This transforms the interval scale values into fuzzy sets so that the minimum value of the Likert-scale (1 refers to ‘strongly disagree’) results in a fuzzy value of 0.05. The median value of the Likert-scale (4 refers to ‘neither agree nor disagree’) results in a fuzzy value of 0.50 and the maximum value of the Likert-scale (7 refers to ‘strongly agree’) results in a fuzzy value of 0.95. With the calibrated data, we can next perform the analysis of necessary factors and sufficient configurations of factors.

**Analysis of necessary factors.** Necessary factors are factors that are always present if an individual makes an impulse buy. To reveal the necessary factors, the factor needs to exceed the recommended consistency threshold of 0.90, coverage threshold 0.60, and the relevance of necessity threshold of 0.60 (Mattke et al. 2021). Consistency indicates the degree to which a factor consistently leads to high intention to buy impulsively, while coverage assesses the empirical relevance of the factor (Ragin 2006; Schneider and Wagemann 2012). The relevance of necessity is a threshold to avoid false-positive necessary factors (Ragin 2006).

**Analysis of sufficient configurations.** A sufficient configuration of factors is a set of factors that collectively exist and whose interaction leads to an individual’s intention to buy online impulsively. In other words, every time a sufficient configuration of factors is present, the individual will have a high intention to buy online impulsively. To analyze what sufficient configurations lead to high intention to buy online impulsively, we construct the truth table which lists all possible configurations. In this case, we have 256 possible configurations because we have eight factors and thus  $2^k$  configurations, with  $k$  being the number of factors. Then, the calibrated data is mapped to the 256 rows, and for each row, the number of observations is counted, the raw consistency and the proportional reduction in inconsistency (PRI) are calculated. To reveal only sufficient configurations, we apply a frequency threshold of three, a consistency threshold of 0.90, and a PRI threshold of 0.90, because higher thresholds are recommended for large  $n$ -studies (Rihoux and Ragin 2009). Additionally, with those thresholds, we follow the recommendation that not more than 20 percent of the configurations should be dropped through the thresholds (Ragin 2008; Rihoux and Ragin 2009). Lastly, we apply a logical minimization algorithm, Quine-Mc-Cluskey algorithm, to minimize the sufficient configurations and reveal more parsimonious configurations.

### 3.2.4. Results

The analysis of necessary factors for an individual’s high intention to buy impulsively reveals two necessary factors. High information fit to ad (consistency  $> 0.90$ , coverage  $> 0.84$ ) and high visual appeal (consistency  $> 0.95$ , coverage  $> 0.83$ ) are necessary factors for online impulse buying. This means that in all situations an individual makes an online impulse purchase, they assess the e-commerce landing page to have high information fit with the previously clicked social media ad and perceive it to be highly appealing visually.

Hence, two out of four e-commerce landing page related factors are necessary factors for online impulse buying. In other words, a visually appealing e-commerce landing page with information adapted to the social media ad is necessary for online impulse buying. However, such a landing page alone does not lead to online impulse buying, and the social media ad is also needed. This is shown by the analysis of sufficient configurations leading to online impulse buying.

The analysis of sufficient configurations reveals three sufficient configurations leading to online impulse buying (see Figure 23). In the graphical representation of the sufficient configurations, black circles indicate the high level of a factor. For example, the black circle for credibility in the first configuration (C1) indicates that credibility needs to be high for this configuration to lead to online impulse buying. Crossed out white circles indicate the low level of a factor. For example, the crossed-out white circle for informativeness in C1 means that in this configuration the informativeness of the social media ad has to be low, and this configuration still leads to online impulse buying. Through the process of logical minimization, we reveal one 'don't care situation' which is indicated by a blank space. The blank space for impulse buying tendency in configuration C2 means that this factor has a subordinated role because an individual in this configuration can have a low or high impulse buying tendency and this configuration will still lead to an online impulse purchase. The overall solution consistency is 0.86, and the solution coverage is 0.67. The solution consistency is the extent to which the sufficient configurations lead to high intention to buy impulsively. Coverage assesses the proportion of observations explained by the four sufficient configurations. All three sufficient configurations are displayed in Figure 23.

Configuration		High intention to buy impulsively		
Factor		(C1)	(C2)	(C3)
<b>Social media ad-related factors</b>				
	Informativeness	⊗	●	●
	Credibility	●	●	●
	Personalization	⊗	●	●
<b>E-commerce landing page related factors</b>				
	Information fit to ad	★	★	★
	Visual appeal	★	★	★
	Usability	●	●	⊗
	Trust	●	●	⊗
<b>Personal traits</b>				
	Impulse buying tendency	●		●
Raw coverage		0.22	0.69	0.20
Unique coverage		0.02	0.47	0.01
Consistency		0.98	0.97	0.99
Solution coverage		0.71		
Solution consistency		0.97		

Note:  
 Black circles (●) indicate the high level (i.e. presence of a condition) of a social media ad-related factor, e-commerce landing page-related factor or personal trait. White circles (⊗) indicate the low level (i.e. absence of a condition) thereof. The black star (★) indicates a high level of an e-commerce landing page-related factor that was found to be necessary.  
 The comparison of the intermediate and parsimonious solutions for high intention to buy impulsively reveals the high level of credibility as core condition.

Figure 23. Graphical representation of three sufficient configurations leading to online impulse buying

### 3.3. SUMMARY AND COMBINED RESULTS OF BOTH STUDIES

The benefit of the applied mixed-methods approach consists of the combination of two research paradigms (here: qualitative and configurational). This means we create results that cannot be generated with one study because Study 1 identifies relevant social media ad-related factors, e-commerce landing page related factors, and traits that influence online impulse buying. We complement these results of Study 1 by examining what configurations of those factors lead to online impulse buying in Study 2. Thus, we create knowledge beyond the capabilities of one single method (Venkatesh et al. 2013). Here we triangulate the results of both studies to fulfill the purpose of a complementary understanding of online impulse buying. We enrich the identification of influencing factors of online impulse buying with the relative importance of those factors varying from configuration to configuration stressing the heterogeneity of individuals and their situational perceptions. Using a set-theoretical approach we can examine how the high or the low level of an identified factor is related to online impulse buying. These complementary results create knowledge beyond the understanding of the qualitative study and enrich the configurational study with context factors and details helping to interpret the relative importance of the identified factors. For example, the statement of almost every participant in the qualitative study that visual appeal is very important to trigger online impulse buying is in line with the finding of visual appeal as a necessary factor within the QCA approach. This supports our findings and increases the robustness and generalizability of the results (Venkatesh et al. 2013). Further benefits of this combination of results are discussed below.

## 4. DISCUSSION

It is estimated that online impulse buying accounts for around 40 percent of all online purchases on U.S. e-commerce sites (Khalid 2019). To generate more online revenue, organizations use social media ads to present products to potential customers. By clicking on those social media ads, individuals get redirected to e-commerce landing pages. With social media ads and e-commerce sites, organizations aim to trigger online impulse buying and thus maximize their revenues. To achieve this, organizations need to know what factors influence an individual's online impulse buying and optimize the interplay of social media ads and e-commerce landing pages.

We conduct Study 1 because knowledge from related research cannot be transferred to online impulse buying and is thus insufficient to reveal what factors influence online impulse buying. In Study 1, we collect qualitative data using interviews and reveal three social media ad-related factors, four e-commerce landing page related factors, and one trait influencing online impulse buying. In Study 2, we cooperate with an online fashion brand to collect data in a field study of individuals who have clicked on a social media ad and browsed the e-commerce landing page. As an individual's impulse buying intention and behavior is based on the evaluation of a multitude of factors in various constellations, we apply a configurational analysis and show three configurations that trigger impulse buying. This study differs from previous research as our data collection approach gathered more realistic data on online impulse buying and can shed new light on online impulse buying. Concretely, we delineate a validated, realistic snapshot of an individual's perceptions about social media ad-related, e-commerce landing page related, and traits within the individual impulse buying process that would have been impossible using a controlled laboratory setting. This means that we collected data from individuals who have clicked a social media ad and have been redirected to an e-commerce landing page within a field study. The results offer the following contributions.

### 4.1. SEVEN FACTORS INFLUENCING AN INDIVIDUAL'S ONLINE IMPULSE BUYING

Extant research in the literature strands on the influence of online ads-related factors as well as on the influence of e-commerce related factors are specific to their contexts but do not fit to the seamless purchase process without media disruptions, as well the specific standalone design of an e-commerce landing page in our context. In Study 1, we reveal what social media ad-related factors, e-commerce landing page related factors, and personal factors influence an individual's online impulse buying.

**Social media ad-related factors.** From the underlying theoretical concept of the LST theory, ad-related factors are classified as environment-related factors. We identify *informativeness*, *credibility*, and *personalization* as social media ad-related factors which influence an individual's impulse buying. While the research stream of online ads buying and traditional offline impulse buying (see research stream 1) shows that information quality (Chen et al. 2016; Chen et al. 2018) influences online impulse buying, credibility, and personalization have not been considered and are context-specific for our research.

**E-commerce landing page related factors.** From the underlying theoretical concept of the LST theory, e-commerce landing page related factors are also classified as environment-related factors. We reveal



*information fit to the ad, visual appeal, usability, and trust* as four e-commerce landing page related factors influencing online impulse buying.

We see that visual appeal is also relevant for the research stream of e-commerce and online impulse buying and it is anchored in the perception of the e-commerce website and influences online impulse buying (Liu et al. 2013; Parboteeah et al. 2009; Wells et al. 2011). With this, we extend the knowledge that visual appeal is also relevant for e-commerce landing pages and also for the entire e-commerce system.

The usability of the e-commerce landing page is another identified factor, which was also found in the research stream of e-commerce and impulse buying. Similarly, research reports that the ease of use of e-commerce sites influences online impulse buying (Liu et al. 2013; Verhagen and van Dolen 2011), thus we also extend knowledge by revealing that usability is relevant for e-commerce landing pages as well. This implies that the e-commerce landing pages, despite their unique characteristics, are influenced by a subset of factors that influence behavior on e-commerce sites.

The study also reveals trust as a new factor. So far, trust has mostly been considered for rational behavior (McKnight et al. 2002; McKnight et al. 2017) and was not considered for impulse buying. With this, we show that even if online impulse buying is an impulsive behavior, individuals still are influenced by the perception of trust. It also means that trust can be seen as an enabler of impulse buying behavior. Individuals only act impulsively, if they feel that they can trust the counterparty and the interaction of trust with the other factors can then trigger impulse buying behavior.

Furthermore, we show that information that fits the social media ad influences an individual's impulse buying. With this, we extend existing knowledge about online impulse buying as we show that the social media ad and the e-commerce landing page are linked. So far, research has only considered e-commerce factors, such as visual appeal or usability, which are solely anchored in the e-commerce website. By revealing that information fit to the ad influences an individual's online impulse buying, we contribute that there is another class of factors, anchored in the interplay with the social media ad. This means that information that fits the ad is a new factor for the design of e-commerce landing pages which needs to be considered together with the design of the social media ad. This implies that information on the e-commerce landing pages needs to be matched to the social media ad to influence online impulse buying.

**Traits.** In contrast to the factors discussed above, we now discuss traits, which is the second class of factors according to the underlying theoretical concept of the LST theory. We reveal *impulse buying tendency* as a trait influencing online impulse buying. With this, we show that impulse buying tendency is relevant for the research stream of the influence of ad-related factors (Chen et al. 2016; Chen et al. 2018), for the research stream treating the influence of the e-commerce related factors on impulse buying (Liu et al. 2013; Wells et al. 2011) and for the research stream at hand. For the research stream at hand, we also see that impulse buying tendency is not a necessary factor, and impulse buying can occur even if individuals do not have a high impulse buying tendency.

## 4.2. A CONFIGURATIONAL PERSPECTIVE ON ONLINE IMPULSE BUYING

Beyond identifying factors influencing online impulse buying, we apply a configurational approach to further shed light on online impulse buying. With this, we reveal two necessary factors for online impulse buying and three distinct sufficient configurations of the identified factors all leading to online impulse buying. With this, we can explain how the identified factors collectively exist in configurations and how the interplay of those factors leads to online impulse buying. Despite the vast online impulse buying literature, we so shed new light on individuals' online impulse buying.

The results highlight the importance of e-commerce landing page related factors. Information fit to ad and visual appeal are necessary factors for individual online impulse buying. This means that for online impulse buying to occur, a visually appealing e-commerce landing page with information adapted to the social media ad is necessary, as without this impulse buying will not occur.

From the perspective of an individual, it seems plausible that a fit between product information in the social media ad on the one side and e-commerce landing page information on the other side is a necessary factor because clicking on a social media ad represents an individual's desire to find out more about the product (Bleier and Eisenbeiss 2015). Besides that, a high information fit of the e-commerce landing page simplifies the use of the e-commerce website for the user because the user gets the relevant information displayed and does not need to search for the needed information. This seems plausible because research shows that an easy-to-use e-commerce site positively influences emotions (Verhagen and van Dolen 2011) and increases the chance of online impulse buying (Liu et al. 2013). When the individual clicks the social media ad to find out more about the product on the e-commerce landing page, the results of the study show that the information also needs to be visually appealing. The rationale for this could be that a high visual appeal elicits more pleasure and generates more gratification, and gratification is known to be necessary for an individual's intention to buy impulsively (Liu et al. 2013; Parboteeah et al. 2009). Therefore, we propose:

***P1: A visually appealing e-commerce landing page with information adapted to the social media ad is a necessary foundation for online impulse buying.***

A visually appealing e-commerce landing page with information adapted to the social media ad lays the necessary foundation to conduct a transaction on the website, but it does not trigger online impulse buying (see Figure 21). To trigger online impulse buying, an individual must also be exposed to a credible social media ad. This suggests that a credible social media ad inspires the individual and constitutes a first step in building up an individual's online impulse buying intention. After clicking on a credible social media ad, a visually appealing e-commerce landing page with information adapted to the social media ad is necessary so that individuals develop a high intention to buy impulsively. But a visually appealing e-commerce landing page with information adapted to the social media ad itself does not lead to high intention to buy impulsively. To put it set-theoretically: a visually appealing e-commerce landing page with information adapted to the social media ad is an insufficient but necessary part of a configuration leading to online impulse buying, while this configuration itself is unnecessary but sufficient for online impulse buying. This is in line with

research suggesting that individuals run through different steps of a purchase process (Wijaya 2015) so that only the credibility of the social media is needed in the first step while the e-commerce landing page is the subsequent second step. The relevance of a credible social media ad is also supported by advertising research that shows that the credibility of online ads is essential for individuals' positive assessment of the ad as well as for their behavior (MacKenzie and Lutz 1989). Among others, research shows that a highly credible ad is associated with a positive attitude (Brackett and Carr 2001) and in turn influences (Sigurdsson et al. 2018) individuals' behavior. Based on this we propose the following proposition (P):

***P2: Only a visually appealing e-commerce landing page with information adapted to the social media ad, in combination with a credible social media ad leads to online impulse buying.***

Furthermore, our results show different ways how the interplay of social media ads, e-commerce landing pages, and traits drive impulse buying. On the one hand, if an individual clicks on a credible social media ad that is neither very informative nor personalized, a visually appealing e-commerce landing page with information adapted to the social media ad, which has high usability and is trustworthy, can compensate for the lack of information and personalization of the social media ad and still trigger impulse buying (see Figure 23 configuration 1). This seems plausible as research shows that high usability improves the overall user experience (Liu et al. 2013; Verhagen and van Dolen 2011) so that the individual will find the relevant information on the e-commerce landing page which then compensates for the low informativeness of the social media ad. A trustworthy e-commerce landing page additionally gives the individual a sense of safety to make an online conversion (McKnight et al. 2017), which in turn can favor online impulse buying. Therefore, we propose:

***P3: Impulse buying can occur even if the social media ad is not informative or personalized in case of a visually appealing e-commerce landing page with information adapted to the social media ad which has high usability and is trustworthy.***

The impulse buying literature suggests that low website quality reduces the likelihood of online impulse buying (Wells et al. 2011) and that trust in the e-commerce website is essential (McKnight et al. 2002). However, our results show a rare configuration where an individual clicks on a social media ad and impulse buying will still occur even if the individual perceives the usability and the trust in the e-commerce landing page as low (see Figure 23 configuration 3). This suggests that a social media ad that represents the information about the product in a credible and personalized way already generates a high impulse buying intention so that the low perception of usability and trust regarding the landing page does not hinder impulse buying. This resonates with advertising research that shows that high credibility is necessary to click on online ads and that online ads with low credibility lead to avoidance or ignorance of the ad (Sigurdsson et al. 2018). Research furthermore shows that high credibility and high informativeness lead to an overall positive assessment of the online ad (Brackett and Carr 2001). When an online ad is assessed positively, research shows that personalized content can substantially enhance the positive perception (Bleier and Eisenbeiss 2015) and that such a social media ad can compensate for low usability and trust in the e-commerce landing page. Therefore, we propose the following:

***P4: A credible, personalized, and informative social media ad can compensate for low trust and usability in the e-commerce landing page and still trigger online impulse buying.***

The findings also offer important insights into the underlying theoretical concept of the LST theory (Hamaker et al. 2007; Steyer et al. 1999). As the results reveal, the combination of the three environment-related factors (visual appeal, information fit to ad, and credibility) enables online impulse buying. This means that for individuals' behavior to be triggered, some of the environment-related factors are the necessary foundation. In contrast, the trait, i.e. impulse buying tendency, is not a necessary condition, nor is the trait present in all three configurations. This shows that while the trait interacts with the environment-related factors to trigger online impulse buying, the traits are not necessary for the context. This seems plausible from the underlying theoretical concept of the LST theory (Epstein 1980; Hamaker et al. 2007; Steyer et al. 1999), which argues that individuals are triggered by environment-related factors and that the influence of the environment-related factors differs depending on the traits.

Related to this, the role of traits, i.e. impulse buying tendency, differs for the three sufficient configurations. We see that in one configuration where all environment-related factors have a high level (see Figure 23 configuration 2), the trait does not matter. This means that impulse buying will be triggered irrespective of whether the person is high or low on impulse buying tendency. In contrast, in the two other configurations, where either the social media ad or the e-commerce landing page has some factors with a low level, the trait needs to be high (see Figure 23 configuration 1 and 3). This extends the current understanding of the underlying theoretical concept of the LST theory and sheds new light on the interplay of environment-related factors and traits. Particularly it shows that the environment-related factors are a sufficient explanation in a configuration, where all environment-related factors have a high level, but the interplay of both is needed otherwise. Therefore, we propose:

***P5: If all environment-related factors are perceived as high, online impulse buying is triggered irrespective of the personality trait.***

Through the configurational approach with using fsQCA, we show that there are multiple equifinal explanations for online impulse buying. Among others, the explanations differ depending on the social-media ad, the e-commerce landing page, and the trait. We also show that one factor alone does not explain online impulse buying. This means that impulse buying is not triggered only because a social media ad is perceived as informative or because an e-commerce landing page is highly trusted. Only the conjunction of social media ad-related factors, e-commerce landing page related factors, and traits can trigger online impulse buying. Finally, the configurational approach also sheds new light on distinct influencing factors. For instance, we can show an asymmetry of informativeness and personalization of social media ad-related factors, because the high, as well as the low level of these factors, can be linked to online impulse buying. The same applies to the usability and trust of e-commerce landing page websites. The high, as well as the low level of these factors, is part of an explanation for online impulse buying. Based on those methodological insights provided in that paper, we motivate further research in the stream of online impulse buying to use configurational approaches, because our results suggest that the underlying mechanisms triggering online impulse buying

are rather complex so that multiple and quite different explanations are needed.

### 4.3. PRACTICAL IMPLICATIONS

With this research, we provide practical implications for targeting social media ads and the design of e-commerce landing pages.

The results show that an individual's impulse buying tendency influences online impulse buying. Thus, organizations need to go beyond traditional targeting of existing customers and identify the relevant clusters of their existing customers who have shown impulse behavior. For this, organizations can use the e-commerce data on previous shopping behaviors, e.g. filter for individuals who conducted a purchase shortly after being exposed to a product. Based on this, special retargeting campaigns that aim at the existing customers who tend to buy impulsively could increase online impulse buying. The results suggest that e-commerce landing pages should not only be functional in terms of usability but also visually appealing. This means that organizations need to go beyond usability tests and also optimize and test for visual appeal. Furthermore, we see that the interplay between an e-commerce landing page and a social media ad is important to influence online impulse buying. This means that the information on the e-commerce landing page should be aligned with the information on the social media ad. For instance, individuals should be redirected to the specific product or product categories instead of being forced to search for the products. Also, the information on the e-commerce landing page should be a logical extension of the information provided in the social media ad.

### 4.4. LIMITATIONS AND FUTURE RESEARCH

Our results have limitations and open up new research opportunities for future research. We measured only an individual's intention to buy impulsively. Therefore, future research could track real impulse purchases. When considering behavior instead of intention, additional factors, such as financial resources or delivery conditions, might be relevant. Future research can address this by collecting survey data at different points of the purchase process. In this paper, we collected data after the individuals have been on the e-commerce landing page for several seconds. When randomly collecting data before conducting the impulse buy or shortly after the purchase was done, one might get additional insights into actual impulse buying. We collaborated with an online fashion brand that advertised their new autumn collection. This means that our findings might not be transferable to other products, such as electronics, because other influencing factors could be relevant. Therefore, future research might test for product-specific influencing factors.

## 5. CONCLUSION

This paper examines how social media ads and e-commerce landing pages together can lead to the online impulse buying of individuals. The results of the two studies reveal two general mechanisms. First, if a social media ad, does not trigger online impulse buying, a positively assessed e-commerce landing page can still trigger online impulse buying. Second, if the social media ad is generally evaluated positively by the individual, this compensates for a slightly negative e-commerce landing page and can still lead to online

impulse buying. So, a well-designed e-commerce landing page can compensate for a badly designed social media ad, and a well-designed social media ad can compensate for a badly designed e-commerce landing page and lead to online impulse buying.

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## PAPER V

# Bitcoin Resistance Behavior:

A QCA Study Explaining Why Individuals Resist Bitcoin as a Means of Payment

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Mattke, Jens; Maier, Christian; Müller, Lea; Weitzel, Tim (2018): Bitcoin Resistance Behavior: A QCA Study Explaining Why Individuals Resist Bitcoin as a Means of Payment. In Thirty Ninth International Conference on Information Systems.

<https://aisel.aisnet.org/icis2018/crypto/Presentations/4/>

## PAPER VI

# Bitcoin investment:

a mixed methods study of investment motivations

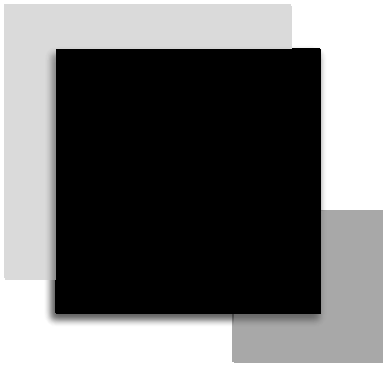
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<https://doi.org/10.1080/0960085X.2020.1787109>



## **Chapter 2: Benefits of and good practices in applying QCA**

**PAPER VII**

# **Qualitative comparative analysis in the information systems discipline:**

a literature review and methodological recommendations

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Mattke, Jens; Maier, Christian; Weitzel, Tim; Thatcher, Jason Bennett (2021c): Qualitative comparative analysis in the information systems discipline: a literature review and methodological recommendations. In Internet Research (31:5), pp. 1493–1517. DOI: 10.1108/INTR-09-2020-0529.  
<https://doi.org/10.1108/INTR-09-2020-0529>

**PAPER VIII**

# **Qualitative Comparative Analysis (QCA) In Information Systems Research:**

**Status Quo, Guidelines, and Future Directions**

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<https://doi.org/10.17705/1CAIS.05008>

**PAPER IX**

# **Challenge and Hindrance IS Use Stressors and Appraisals:**

**EXPLAINING CONTRARIAN ASSOCIATIONS IN POST-ACCEPTANCE IS USE  
BEHAVIOR**

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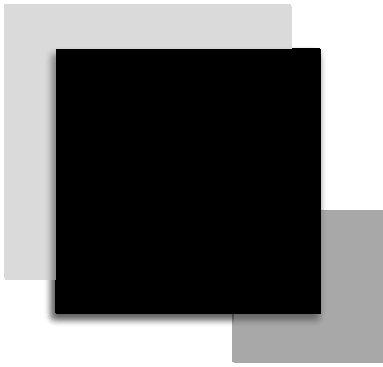
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## **Chapter 3: Recommendations for implementing blockchain applications**



**PAPER X**

# **How an Enterprise Blockchain Application in the U.S. Pharmaceuticals Supply Chain is Saving Lives**

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# Appendix

## PUBLICATIONS

### PEER REVIEWED JOURNAL ARTICLE

Maier, Christian; Laumer, Sven; Joseph, Damien; Mattke, Jens; Weitzel, Tim (2021a): Turnback Intention: An Analysis of the Drivers of IT Professionals' Intention to Return to a Former Employer. In *MIS Quarterly* 2021 (45:4), pp. 1777–1806. DOI: 10.25300/MISQ/2021/16033.

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Mattke, Jens; Maier, Christian; Hund, Axel; Weitzel, Tim (2019): How an Enterprise Blockchain Application in the U.S. Pharmaceuticals Supply Chain is Saving Lives. In *MIS Quarterly Executive* 18 (4), pp. 245–261. DOI: 10.17705/2msqe.00019.

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