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A customer trust-based framework for assessing the functioning of e-commerce companies

Model oceny funkcjonowania przedsiębiorstw e-commerce oparty na zaufaniu klientów

Doctoral dissertation
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*"**Trust** starts with truth and ends with truth."*

— Santosh Kumar Kalwar, DSc

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Introduction

In the evolving landscape of digital commerce, understanding the dynamics of consumer trust is crucial for e-commerce companies aiming to achieve sustained success. Cognitive-affective trust, which encompasses both rational evaluations and emotional responses, has emerged as a key determinant of consumer behavior in online environments. This form of trust not only influences consumers' initial engagement with e-commerce platforms but also plays a vital role in shaping long-term relationships and loyalty, ultimately impacting the performance of e-commerce companies.

The chapter is organized into several sections. It opens with *Motivation and context*, which establishes the relevance of consumer trust in contemporary e-commerce and defines the research problem addressed in the dissertation. The section *Research objectives and research questions* then specifies the overarching research goal and the questions guiding the study. *Research methodology* introduces the methodological foundations of the proposed trust-based framework, while *Research plan* translates these foundations into a structured sequence of research stages, tasks, and milestones. The subsequent *Risk analysis* identifies potential challenges associated with the empirical process and the measures adopted to mitigate them. *Preliminary research results* provide initial empirical support for the relevance of the research problem and its cognitive-affective framing. The chapter then outlines the theoretical, methodological, and managerial value of the study in *Research contribution*. Finally, *Dissertation's structure* explains the organization and substantive role of the chapters that follow.

Motivation and context

E-commerce has emerged as a critical channel for retail services and acts as an increasingly significant catalyst for entrepreneurial performance. In particular, it became

even stronger and more prominent after the outbreak of the COVID-19 pandemic (Galhotra & Dewan, 2020). The pandemic and associated lockdown measures also precipitated changes in consumer purchasing behavior and increased their uncertainty and perceived risk in transactions conducted through digital channels (Sumarliah et al., 2021; Ungerer et al., 2020). The development of the Internet has boosted virtualization of customer purchase behavior, and the COVID-19 pandemic has accelerated and consolidated this process (El Moussaoui & Benbba, 2023).

Under these circumstances, trust serves as a crucial mechanism that allows customers to participate, conduct transactions, and maintain loyalty within online environments. From a managerial perspective, there is a legitimate need to enable e-commerce businesses to retain their customers more effectively, which can be achieved by increasing their loyalty, first gaining (or strengthening) their trust. Previous studies show that satisfaction and trust are linked to positive performance outcomes and higher profitability, primarily through their effects on customer loyalty and retention (Fornell et al., 1996; Mittal & Lassar, 1998; Nguyen et al., 2013; Olsen et al., 2005). However, building trust in e-commerce is not merely an issue for individual enterprises; it also extends to the industry level, since customers tend to extrapolate both good and bad experiences to other online sellers. This challenge is particularly salient for customer segments that are less digitally confident, such as middle-aged and older adults who may experience anxiety, uncertainty, or lack of familiarity during online shopping (Celik, 2016; Hille et al., 2015). It is therefore crucial for companies to be able to understand and evaluate trust in a practical way, as this helps support digital inclusion and contributes to long-term success in e-commerce.

At the same time, existing approaches that dominate the information systems and e-commerce literature oftentimes emphasize technology acceptance and usage intentions (e.g., TAM, or Technology Acceptance Model, pioneered by Davis and Olson (1985) and its further extensions by, e.g., Gefen et al., 2003; Pavlou, 2003). These approaches focus primarily on perceived usefulness and ease of use (but also consider the experience of using the Internet or the short- and long-term consequences), while devoting relatively little attention to trust as the primary explanatory mechanism. Building on these models, researchers have also examined acceptance, satisfaction, and success in the context of e-commerce (Wang et al., 2016), including under the conditions of COVID-19

(Dirgantari et al., 2020). Nevertheless, there are also other existing measurement approaches that address satisfaction, adoption, or e-commerce success, but do not evaluate the level of trust (Dirgantari et al., 2020; Evans & Krueger, 2009; Kelton et al., 2007; Wang et al., 2016). Instead, they focus on opportunities to use technology in e-commerce while omitting other psychosocial determinants of trust. These streams of research often prioritize either technological or socio-psychological determinants, rather than integrating both perspectives into a coherent trust-centric assessment approach. In other words, there is a need for a tool that comprehensively and equivocally treats all of these axes. Neither model relies comprehensively on trust as a sociological primary factor to measure willingness to use e-commerce technology. Although there is a model of trust in e-commerce (Kelton et al., 2007), it focuses mainly on psychological aspects, but hardly on technological ones. Nevertheless, it focuses on an important aspect, which is the quality of information. None of these models takes into account the affective and cognitive perceptions that influence the decisions made by consumers. Moreover, these frameworks are mainly based on customer research, not company performance, and do not link these two sides.

A sudden shift in company development strategies (triggered by pandemic conditions and lockdown measures) revealed that not all dimensions of customer expectations were correctly foreseen and addressed, helping to clarify why some customers may return to their pre-lockdown routines (Sheth, 2020). This observation highlights a problem of persistent trust: in many cases, strategic responses implemented during the pandemic did not generate sufficient trust to ensure sustained retention in e-commerce (cf. Al-Gharaibah, 2020). As trust develops as a ramification of customer satisfaction, it supports retention and ultimately affects company performance (Al-Gharaibah, 2020). Hence, there is a justified need for a tool that assesses the quality of e-commerce enterprise functioning through a trust-based lens. Such an assessment model can also add customer value by enabling deeper insight into individual user profiles and supporting subsequent classification, for instance, via segmentation tools.

The need to create such a versatile instrument to measure trust in e-commerce enterprises is also substantiated in the literature. This is because a particular **research gap** is recognized, stating that despite the existence of many approaches that measure trust, *"to date, no single valid way of measuring trust in organizations has been adopted*

(...) and therefore this topic needs further research" (Gołuchowski & Paliszkiewicz, 2023). Although certain research attempts to capture trust in the most straightforward manner feasible by combining concerns that affect trust into a limited number of factors, it is essential to encompass the relevant trust issues from every angle to fully represent and model it (Zarifis & Fu, 2023). Moreover, noting the complexity and dichotomy of trust (cognitive and affective-based trust - described later in Chapter 2), it is highly recommended that "future theories and models should consider incorporating both the cognitive and the affective components of trust" (Webber, 2008). Another recommendation is that organizations support internal procedures based on the promotion of affective and cognitive trust to measure the quality of corporate performance (Swift & Hwang, 2013). This dissertation is based on the premise that trust is a multidimensional construct and that both cognitive and affective components should be considered when explaining consumer decision-making and evaluating the functioning of e-commerce services.

Research objectives and research questions

This dissertation aims to develop a comprehensive framework for assessing the functioning of an e-commerce enterprise through the lens of customer trust. Beyond providing an aggregate diagnosis at the company level, the framework is designed to generate structured indicators of heterogeneous trust perceptions, which may serve as inputs for subsequent analytical steps (e.g., segmentation) and support managerial decision-making.

> **The main research goal**: to develop and empirically examine a trust-based analytical framework for investigating selected aspects of the functioning of e-commerce companies, integrating the multidimensional nature of e-customer trust with customer-perceived trust-building practices and perceived e-service quality.

The primary goal is guided by the following **main research question**: **RQ1.** *How can multidimensional e-customer trust be incorporated into an analytical framework for examining selected aspects of the functioning of e-commerce companies?* Further,

detailed research questions were also posed to help address the main research objective. They read as follows:

RQ2. To what extent are customer-perceived trust-building practices and service cues associated with cognitive and affective e-customer trust?

RQ3. What relationships link cognitive trust, affective trust, general e-customer trust, and perceived e-service quality?

RQ4. What diagnostic insights and potential areas for managerial intervention can be derived from the proposed trust-based framework?

The stated specific objectives also help answer the above detailed questions. Since this work aims to bring theoretical, cognitive and scientific value, it was also decided to divide the detailed objectives into these three aspects. Thus:

- Among the **theoretical goals** are:

  TG1. A synthesis and structuring of the literature on e-customer trust, with particular emphasis on its cognitive and affective components and their relevance in digitally mediated exchange;

  TG2. The identification and conceptual organization of e-commerce practices and service cues that may serve as managerial trust-building levers from the customer's perspective;

  TG3. A clarification of the conceptual relationships between multidimensional e-customer trust and perceived e-service quality, and their relevance to the analysis of e-commerce companies' functioning.

- Among the **methodological goals** are:

  MG1. The development and assessment of measurement scales for focal constructs, including an examination of their dimensionality, reliability, and validity;

  MG2. The specification and empirical testing of a structural model linking customer-perceived trust-building practices, cognitive and affective trust, general e-customer trust, and perceived e-service quality;

MG3. The development of a structured approach to interpreting the model's results for diagnostic purposes, including the identification of potential trust-related areas for managerial action.

- Among the **empirical goals** are:

EG1. The collection and analysis of survey data on e-customers' perceptions of trust-building practices, e-customer trust, and perceived e-service quality;

EG2. An empirical examination of the relationships between customer-perceived trust-building practices and the cognitive and affective components of e-customer trust;

EG3. The estimation and analysis of structural relationships between cognitive trust, affective trust, general e-customer trust, and perceived e-service quality, including selected moderating effects of customer characteristics and the purchase channel.

The formal research hypotheses and the structural model specification are presented in the following section (concerning research methodology), which builds on the theoretical background and the operationalization of the constructs.

Research methodology

The development of a trust-based framework for assessing the functioning of the e-commerce enterprise requires a methodological approach that supports both artifact construction and its systematic evaluation. Consequently, this dissertation is situated within the paradigm of Design Science Research in Information Systems (DSRIS) and is conceptually anchored in the Information Systems Research Framework as proposed by Hevner et al. (2004). This approach is especially important for the study because it links real-world organizational challenges with theoretical insights and systematic, rigorous research methods.

The choice of DSRIS reflects the interdisciplinary character of the research problem. E-customer trust is grounded in behavioral and social processes, while e-commerce operates through information systems situated at the intersection of people, organizations, and technology (Davis & Olson, 1985; Lee, 1999). The adopted methodological

orientation therefore provides a basis for integrating the behavioral foundations of trust with the technological and organizational conditions of digitally mediated exchange. Within this methodological approach, the research artifact is represented by a validated measurement and structural model that connects firm-managed trust-building mechanisms with the cognitive and affective dimensions of e-customer trust, as well as with general trust and perceived e-service quality. Empirical support for its development and assessment was derived from a nationwide quota-based CAWI survey conducted among adult Polish e-customers.

The evaluation of the artifact is integrated into its quantitative development process. It includes analyzing the measurement model using split-sample EFA and CFA, evaluating reliability and construct validity, and estimating structural and conditional relationships through SEM and moderation analysis. Thus, artifact development and evaluation are interdependent elements of a single research process rather than distinct sequential phases.

Figure 1 depicts the overarching Information Systems Research Framework that serves as the primary methodological foundation for this dissertation. Its project-specific translation into construct operationalization, artifact development, empirical validation, and knowledge contribution is presented in detail in Chapter 3.

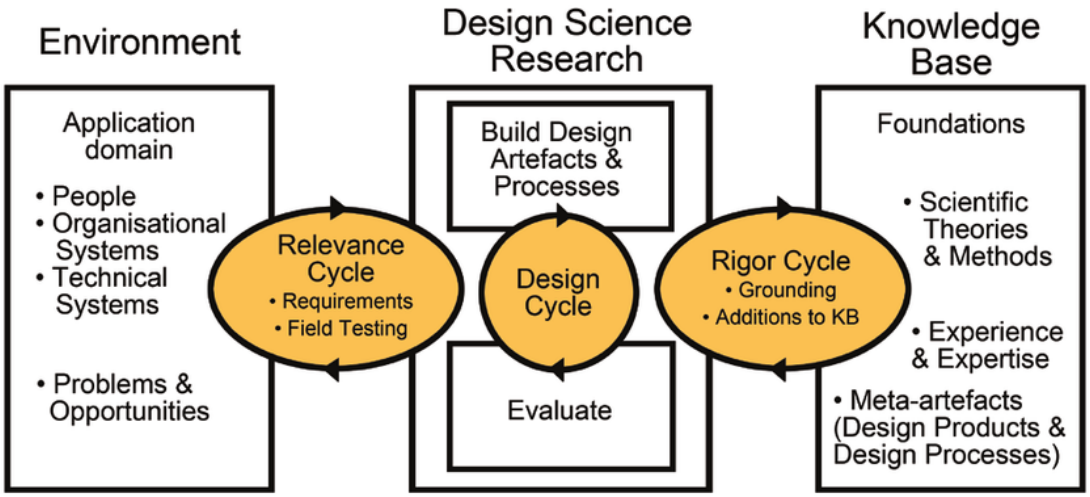


Figure 1: Information Systems Research Framework

Source: Hevner et al. (2004)

Research plan

The achievement of research objectives and the progression through the research process necessitate a well-structured organization of the study. This section presents the research workflow, which systematizes and structures the assumptions over time, while also delineating the research tasks that constitute an integral part of each phase of the workflow.

Workflow of the research

The research plan translates the objectives of the dissertation into a structured sequence of tasks and milestones. This is because at this introductory stage, the workflow gives a programmatic description of the research process, while the detailed methodology for analytical procedures is given in Chapter 3.

With DSRIS providing the overarching methodological orientation (Hevner et al., 2004), the research process is organized into three interrelated stages:

1. *Conceptual grounding and requirement specification* – lays the theoretical groundwork for the study by formulating an e-commerce-specific, cognitive-affective understanding of customer trust and determining the firm-controlled cues that influence its development. These foundations are then converted into constructs and survey items that define the requirements of the proposed research artifact;

2. *Artifact development and empirical validation* – addresses the empirical development of the artifact and its integrated quantitative assessment. It encompasses questionnaire-based data collection, exploratory and confirmatory validation of the measurement model, estimation of the structural model, as well as the analysis of specific boundary conditions using moderation analysis;

3. *Interpretation, synthesis, and knowledge translation* – brings together the empirical results and the theoretical framework, then converts them into theoretical, methodological, and managerial contributions. Special emphasis is placed on pinpointing the leverage points and priority domains that underpin the suggested managerial roadmap.

The completion process for this study is described as sequential; however, each stage of the study is dependent on each other and not necessarily linear. Throughout the course of the research, the literature base was continually updated and the empirical results were repeatedly analyzed and interpreted in light of the conceptual framework that underlies the dissertation.

Research tasks

In order to organize the workflow to achieve the research objectives and verify the hypotheses (outlined in section *Research objectives and research questions*), this dissertation set the following **research tasks**:

RT1. Development of an e-commerce-specific conceptualization of customer trust grounded in technological, behavioral, and sociological perspectives, with an explicit cognitive–affective foundation, and specification of constructs suitable for empirical operationalization.

RT2. Identification and structuring of firm-controllable cues and practices in the e-store environment that plausibly shape e-consumers' trust perceptions and perceived e-service quality, and formulation of empirically testable requirement axes for the proposed framework.

RT3. Operationalization of the identified constructs through the development/adaptation of questionnaire items and specification of the core measurement blocks (covering cognitive, affective and general trust in e-commerce, perceived e-service quality, and trust-building managerial mechanisms) in line with the proposed diagnostic reasoning, followed by pilot assessment and refinement of the measurement instrument, and nationwide quota-sampled CAWI data collection.

RT4. Statistical verification of the measurement structure using EFA/CFA and assessment of reliability and construct validity verified according to conventional psychometric standards.

RT5. Estimation and evaluation of the structural relations embedded in the artifact using SEM, including moderation analysis (where theoretically justified), to

examine how trust components translate into perceived e-service quality and under which usage conditions key effects become stronger or weaker.

RT6. The derivation of practice-oriented recommendations and leverage-point guidelines from the validated artifact, highlighting firm-controllable cues, may be particularly important for trust formation and perceived e-service quality in e-commerce settings.

RT7. Synthesis of findings, discussion of theoretical and managerial implications, and formulation of conclusions and directions for further research.

Individual research tasks are aligned with the specific research objectives presented in section *Research objectives and research questions*. Most tasks took approximately three to four months to complete, although their implementation partially overlapped throughout the research process. Their implementation did not always proceed simultaneously, and some activities partially overlapped throughout the research process. To more precisely structure the progression of the study, the tasks were therefore organized into **milestones**. This approach provides clear control points for the completion of successive research stages, while also emphasizing the interdependence of individual tasks and the tangible outputs generated throughout the project. The use of milestones is well established in project management and can be supported by various planning and progress-monitoring methods (Majchrzak & Stilger, 2017; Sunmola, 2020). Consequently, the research process of this doctoral dissertation is organized around five milestones that mark the completion of its main stages. These milestones are presented in Table 1.

The research plan, developed on the basis of the tasks and milestones outlined, has also been presented in a graphical format (Figure 2). This visualization illustrates the logical flow and sequential interdependence of each stage while emphasizing their integration with the defined milestones. By providing a clear depiction of the process, the diagram improves understanding of the structure of the study and its progress toward achieving the research objectives. However, it should be emphasized that the research tasks (RT1-RT7) presented above are formulated at a higher level of abstraction and serve as a concise, management-oriented structuring of the dissertation agenda (i.e., *what* needs to be achieved to meet the objectives and verify the hypotheses; see more in

Table 1: Description of dissertation milestones with related tasks and means of verification

Milestone no.	**Milestone name**	**Milestone description**	**Related task(s)**	**Means of verification**
MS1	Conceptual framing	Conceptualization and explication of customer trust in e-commerce with a cognitive-affective foundation; synthesis of trust-related perspectives and mapping of firm-controllable cues relevant to e-commerce contexts	RT1, RT2	Completed literature synthesis, conceptual framework, construct definitions, and initial artifact requirements
MS2	Instrument specification and data collection	Specification of empirically testable requirement axes and operationalization through a questionnaire-based CAWI instrument (item blocks and constructs aligned with the proposed diagnostic logic)	RT3	Finalized questionnaire specification; operationalization table/construct definitions
MS3	Measurement model validation	Statistical verification of the measurement structure using EFA/CFA and assessment of reliability and construct validity	RT4	EFA/CFA outputs and reporting tables (loadings, fit indices, reliability/validity evidence)
MS4	Structural model and boundary conditions	Estimation and evaluation of the structural relations of the artifact using SEM, including moderation analysis (PROCESS approach) to examine boundary conditions of key effects across usage contexts (e.g., channel-related conditions)	RT5	SEM results tables (paths, fit, explained variance) and moderation reporting with hypothesis-testing summary
MS5	Implications and synthesis	Derivation of practice-oriented recommendations and leverage-point guidelines from the validated artifact; synthesis of findings, discussion of theoretical and managerial implications (also in the form of roadmap), and formulation of conclusions and further research directions	RT6, RT7	Completed discussion/implications chapter and final conclusions; finalized dissertation manuscript (submission-ready)

Chapter 3.2). The workflow presented in Figure 2 offers an additional, process-focused perspective on the project (i.e., *how* tasks are executed) and therefore breaks down specific research activities into more detailed procedural stages, intermediate deliverables, and methodological components. A one-to-one match between workflow boxes and research tasks is neither expected nor required; the workflow is an operational breakdown of RT1–RT7 across the stages of conceptualization, operationalization/empirical research, and dissemination.

Research contribution

Despite the extensive literature on trust measurement, there is no widely adopted approach that integrates the cognitive, affective, and general dimensions of e-customer trust with firm-controlled trust-building mechanisms and customer-perceived e-service quality within a single assessment framework (Gołuchowski & Paliszkiewicz, 2023). This dissertation addresses this gap by developing an integrated account of trust formation and its relevance to the assessment of e-commerce company functioning from the customer perspective.

The study's theoretical contribution is to differentiate the functions of cognitive, affective, and general trust within a unified explanatory framework (specifically in the context of e-commerce) and to connect these distinct forms of trust to perceived e-service quality. The study also structures firm-controlled cues and practices as managerial trust-building mechanisms, thereby connecting the multidimensional nature of trust with areas of e-commerce functioning that may be influenced through managerial action.

Methodologically, the dissertation develops and validates a trust-based research artifact within the perspective of Design Science Research in Information Systems (Hevner et al., 2004). The artifact combines a model of cognitive, affective, and general trust measurement, perceived e-service quality, and managerial trust-building mechanisms with a structural model explaining the relationships among these constructs. Its evaluation is embedded in a quantitative procedure that involves split-sample factor analysis (both exploratory and confirmatory), structural equation modeling, and further moderation analysis.

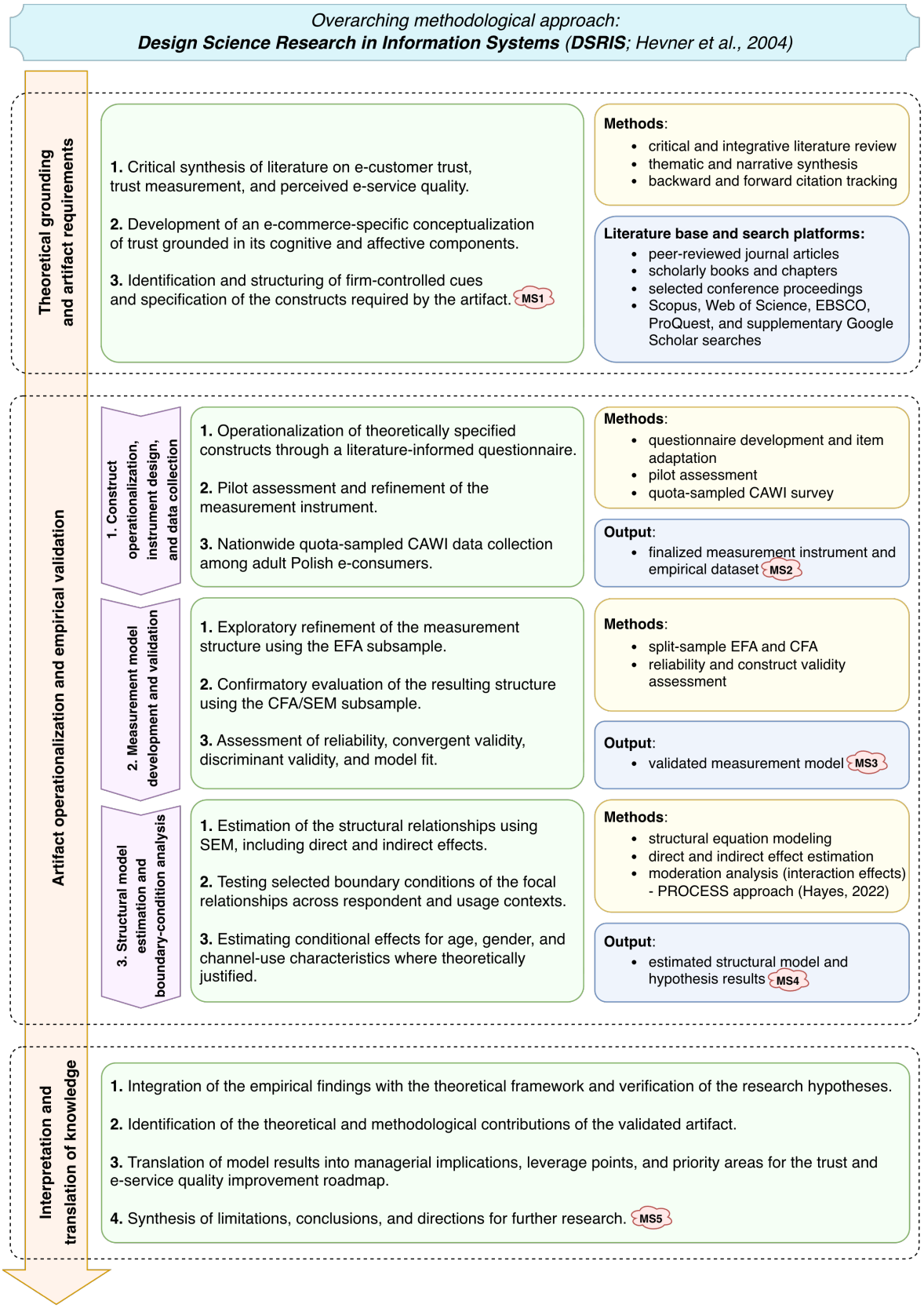


Figure 2: Research workflow, methods, and reference to milestones

Source: Own elaboration

The managerial contribution consists of translating the model's findings into practical diagnostic insights, key leverage points, and priority areas for action to improve trust and perceived e-service quality (along with the meaning of their roles) in the e-commerce realm. These outputs are not universally applicable prescriptions, but serve as evidence to determine areas that will be most critical to trust-building within the scope of the model constructed. Thus, the proposed framework supports the interpretation of customer feedback in a structured way and builds a trust-based managerial roadmap.

Dissertation's structure

The dissertation consists of seven chapters. Following the Introduction, the remaining six chapters are organized into three substantive parts: theoretical grounding, methodology, empirical analysis, and the interpretation and synthesis of the findings.

The first part comprises Chapters 1 and 2 and establishes the theoretical foundations of the dissertation. Chapter 1, entitled *Trust in e-commerce*, examines the concept and diversity of trust, the distinction between trust and trustworthiness, and the cognitive-affective duality of the construct. Afterward, it discusses digital and e-customer trust, reviews the principal approaches and challenges associated with trust measurement, and develops an e-commerce-specific conceptualization of trust. Chapter 2, entitled *Cognitive-affective drivers of e-customer trust and behavior*, extends this theoretical grounding by examining the technological, customer-related, price-related, and service-related factors that can influence e-customer decisions. The chapter also considers selected moderators and the specificity of mobile, social, and live-streaming commerce. In addition, it treats perceived e-service quality as a customer-driven evaluative result of how an e-commerce company operates and examines examples of trust-building practices in e-commerce environments.

The second part comprises Chapters 3 and 4 and presents the methodological and empirical core of the dissertation. The methodological Chapter 3 explains the research workflow adopted within the DSRIS perspective, develops the research hypotheses and model, and describes the design of the questionnaire, the sampling and data collection procedures, and the analytical plan. Therefore, it translates the theoretical foundations of the study into an empirically testable measurement and structural artifact. Chapter 4

reports on the empirical development and quantitative evaluation of the artifact. It presents an exploratory and confirmatory assessment of the measurement structure, the estimation of the structural equation models, and the moderation analyzes regarding the characteristics of the respondent and the use of the e-commerce channel. The chapter concludes with a synthesis of the results of the hypothesis-testing.

The third part comprises Chapter 5, followed by *Concluding remarks*, and focuses on the interpretation and synthesis of the findings. Chapter 5 includes a discussion that interprets the key empirical relationships in light of the theoretical framework and considers the supported and unsupported hypotheses jointly. It also develops the theoretical and managerial implications of the trust-based framework and translates the results into a trust-driven roadmap for decision-makers. The dissertation concludes with *Concluding remarks*. This passage synthesizes the main findings, evaluates the achievement of the research objectives, and presents the theoretical, methodological, and managerial contributions of the study. It also discusses the limitations of the proposed framework and identifies directions for further research.

Chapter 1

Trust in e-commerce

Trust is fundamental in e-commerce, serving as a key driver of customer decisions and the success of online transactions (Bylok et al., 2019). As customers increasingly rely on digital platforms to purchase goods and services, the importance of trust between buyers and sellers has grown exponentially. Trust not only affects how willing consumers are to interact and trade with online sellers, but also helps build customer loyalty, promotes repeat purchasing behavior, and increases the likelihood of subsequent transactions, which is why it is an essential component for the long-term success of e-commerce relationships (Quintus et al., 2024; Taheri et al., 2024). By exploring the multifaceted nature of trust, this chapter highlights its relevance to understanding and assessing the functioning of e-commerce companies, laying the groundwork for the more detailed analysis that follows.

This chapter seeks to examine the complex and multidimensional notion of trust as it applies to the domain of e-commerce, starting with an analysis of why trust is a particularly timely and relevant issue in today's digital economy. The first section, *The timeliness of the topic of trust in e-commerce* (Chapter 1.1), addresses the contemporary relevance of trust and how technological advancements and evolving consumer behavior patterns heighten its importance. Next, the section *Trust: theoretical grounding* (Chapter 1.2) delves into the foundational theories of trust, drawing on established literature to provide a conceptual framework that informs the subsequent analysis. Moreover, it establishes a clear and comprehensive distinction between the concepts of trust and trustworthiness. The chapter then transitions into *Trust in the e-commerce domain* (Chapter 1.3), which applies these theoretical insights specifically to the digital

environment, exploring how trust functions differently online compared to traditional marketplaces. This section also highlights the unique challenges and opportunities that e-commerce platforms face in building and maintaining trust. In *Measurement of trust* (Chapter 1.4), various methodologies, approaches, and metrics used to assess trust in e-commerce are described, as well as the most pressing contemporary challenges in the trust measurement process. This section outlines the key indicators that researchers and companies use to gauge trustworthiness and how these instruments can influence business strategy. Finally, the chapter concludes with *A new interpretation of trust in e-commerce* (Chapter 1.5), offering an updated and comprehensive definition that reflects the complexities and nuances of trust in the modern online shopping landscape.

1.1 The timeliness of the topic of trust in e-commerce

Traditional businesses have increasingly entered the e-commerce industry in recent years and even decades, accelerating the rapid growth of their economic indices (Gomez-Herrera et al., 2014; Li & Li, 2019). In particular, it gained even more strength and importance after the outbreak of the COVID-19 pandemic (Galhotra & Dewan, 2020; Pollák et al., 2022). The flare-up of the coronavirus pandemic significantly affected all aspects of life and the functioning of societies worldwide; it also forced the suspension of most areas of the economy, particularly in services. Enterprises faced the challenge of adapting their operations to the dynamically changing needs of customers, often dictated by the epidemic situation. Businesses had to change their methods of operation and customer interaction to survive by embracing various digital solutions, which increased their competitiveness and provided an appropriate response to user expectations (Scutariu et al., 2021). It should also be emphasized at this point that the development of the e-commerce industry has been facing a significant challenge for a long time, i.e., information overload (Jiang et al., 2018b), which became even more pronounced during the COVID-19 pandemic (cf. *infodemic* construct; Springer et al., 2021; Zarocostas, 2020).

Customers had to change their habits due to the emergence of a new and unpredictable pandemic situation, causing uncertainty in purchasing. Due to ubiquitous and severe lockdown, consumers had to move their activities to the Internet domain because

many industries had to close their brick-and-mortar stores (Georgiadou et al., 2021; Pollák et al., 2021). As a result, e-commerce has become a phenomenon as it is one of the few industries positively affected by the pandemic. The process of developing the Internet itself has increased the virtualization of customer purchasing behavior, and the coronavirus pandemic has accelerated and consolidated this trend. However, it should be borne in mind that at present, while estimates do not indicate that a global severe lockdown will occur in the near future, customer habits may partially invert, i.e., return to the pre-pandemic state.

Therefore, there is a legitimate need to enable e-commerce businesses to retain users more effectively, which can be achieved by increasing their loyalty, first gaining (strengthening) their trust. This is because trust is noted to be the key factor in the success of e-commerce ventures and enterprises that operate virtually in general (Kim & Tadisina, 2010), which is interconnected with the concept of trust (Rybak, 2018). However, it should be emphasized that the concepts of trust and confidence, although complementary to each other (Cook & Wall, 1980), should not be used interchangeably. It is worth pointing out that trade, also occurring in the online world, is based on interpersonal relationships, and their strength is determined by trust (Fukuyama, 1995). The topicality and importance of this topic are reinforced by the fact of information asymmetry in the consumer-vendor relationship (Rybak, 2018). Choi and Mai (2018) note that customer loyalty inherits from their trust, and moreover, e-trust has a positive influence on loyalty. In particular, the paramount role of trust manifests itself in the context of the inflow of Internet threats, such as phishing or online forgery, which call into question the authenticity of the website (Asiri & Alshamrani, 2021; Choi & Mai, 2018). A huge challenge for the entire e-commerce sector is gaining trust not only in a specific company but for the entire industry. However, this achievement can be realized only when particular representatives of the sector (i.e., e-commerce enterprises) are trustworthy for e-customers. Therefore, it is essential to implement intra-company contrivances to measure online trust effectively in order to respond appropriately to customer expectations.

1.2 Trust: theoretical grounding

To begin considering trust as a multidimensional and interdisciplinary concept, it is necessary to start by asking the question, what exactly is *trust*? From what sides can this notion be pondered? This subsection aims to present the various approaches that the scientific literature presents on the concept of trust. Due to the multifaceted nature of the term, it can be somewhat of a challenge, but in this dissertation an attempt has been made to illustrate the broadest possible spectrum that is contained in the short but capacious word *trust*.

1.2.1 Different viewpoints on the very concept of trust

Trust is one of the most essential and core phenomena in the society in which we live, and many scholars have studied its relevance (Abraham et al., 2019; Gulati & Wohlgezogen, 2023; Levine, 2019). The professional literature presents many definitions of trust, but among them there is no universal and widely accepted one (Beldad et al., 2010), since trust is seen as a largely subjective issue (Gambetta, 1988). However, let us take a look at different views of the concept of trust, detailing several distinct approaches in describing and comprehending it, while also providing its underlying definitions.

It is noted that trust is not based solely on technology, but on many other variables that can be measured or not (Guerrero-Cusumano, 2023). This is because trust is a perennial concept that has been discussed on a philosophical level for centuries. However, great Greek philosophers, such as Aristotle and Plato, made only indirect allusions to trust when describing cooperation, friendship, and human virtues (Hosmer, 1995). Thomas Hobbes, the English philosopher of the 17$^{\text{th}}$ century and founder of conjuncturalism, took a more detailed look at trust and argued in his works that trust is the conviction that we believe the one from whom we expect good (Baumgold, 2013; Odzuck, 2017; Paliszkiewicz, 2013). He also used to say that *"Where's no trust, there can be no contract"* (Baumgold, 2013), which may indicate that without trust it is impossible to complete and keep contracts. This can also be translated into the relationship between stakeholders in business relationships, but this issue is about to be discussed in a subsequent subsection of this dissertation.

Lewicki and Bunker (1996) have organized trust research into three distinct categories, each defined by a specific disciplinary perspective. Initially, trust is viewed as an individual characteristic from the perspective of personality theorists. Secondly, according to social psychologists, trust is seen as the anticipation of another party's actions in any interaction or transaction. Lastly, as sociologists and economists characterize it, trust is an institutional phenomenon. Paliszkiewicz, in her book *"Trust in Management"* (Paliszkiewicz, 2013),[1] also acknowledges the multidimensionality of the concept of trust, and thereby provides a broad overview of definitions of trust, while classifying different approaches and perspectives on understanding this concept. Hence, in addition to the philosophical approach, this book also describes trust orientations in social psychology, sociology, economics, and management. The latter category receives the most attention from the book's author, as is clear directly from the title of this work. Also, this dissertation is mostly devoted to the managerial approach considering trust (quality of operation of e-commerce enterprises), but the interdisciplinarity of this notion will also be manifested in descriptions of the organization's relationships with customers (economic-marketing-sociological approach), as well as in the design of the tool based on automated processes using AI (design thinking and information theory approaches). It was resolved to retain the allocation of trust definitions among disciplines, as presented in the book authored by Paliszkiewicz (2013).

Trust in social psychology

From the perspective of social psychology, trust is studied primarily from the point of view of human behavior and personality, and regardless of the angle it is based primarily on expectations (Paliszkiewicz, 2013). According to social psychologists, trust:

- "is a personality trait that is reflected in general *expectations* about the intentions of others" (Wrightsman, 1966);
- "is the *expectation* of individuals or a group that the words, verbal and written promises of other individuals or groups will be kept" (Rotter, 1967);

[1]This book was written in Polish, and its original title is *"Zaufanie w zarządzaniu."*

- "is the *expectation* that the behavior (verbal and non-verbal) of other individuals or groups will be altruistic and beneficial to the trusting individual" (Frost et al., 1978);
- "is based on the *expectation* of how others will behave in the future; it is a function of past and present behavior - both explicit and implicit" (Good, 1988);
- "is a psychological state comprising the intention to accept vulnerability based on positive *expectations* of the intentions or behavior of another" (Rousseau et al., 1998);
- "is to behave voluntarily in a way to accept vulnerability due to uncertain behavior of another (the trustee), based on the *expectation* of a positive outcome" (Özer & Zheng, 2018);[2]
- "is a psychological state of mind that is multi-dimensional and comprised of factors such as *expectancy*, faith, consistency, and risk" (Connolly, 2020).

In light of the foregoing, trust, although created on the grounds of what is past and what is present, is always directed toward what is expected to happen in the future. However, trust is observed to be related not only to expectations, but also to personal attitudes (Kim & Park, 2013). After all, trust, from the psychological perspective, means believing in another person (Chang et al., 2006). Gibb (1978) beyond the very expectation, though, it mainly focused on presenting the theory that trust is instinctual and, while it being a feeling, is akin to love. Hake and Schmid (1981), on the other hand, believe that trust is "a temporary deviation to equity" (as per Blomqvist, 1997).

The level of trust, and thereby the level of expectation, can vary as people and the things that have shaped them differ (Das & Teng, 1998). The willingness to place trust in an entity, according to Tyler and Kramer, 1996, stems from the estimation that trust will be reciprocated. Trust is believed to have an indispensable relationship with incomplete information (Anderhub et al., 2002; Oakes, 1990; Shen et al., 2024), but when information is complete, trust becomes unnecessary (Granovetter, 1992). This is because trust is a medium that diminishes the occurrence of uncertainty between exchange

[2]The authors of this definition are not social psychologists, as they specialize in operation management, but their definition of trust is based on their own research and "psychological definitions."

partners (entities) (Granovetter, 2005; Uzzi, 1997). When there is no uncertainty, vulnerability does not exist either, making trust play no role in such a case (Moorman et al., 1993; Özer et al., 2011).

Trust in sociology

From a sociological point of view, the core of trust is also expectation, albeit at an altogether different level. Three types of trust expectations are listed, which are grounded in sociological theory (Barber, 1983):

- the expectation of maintaining social order,
- the expectation that people will perform their social roles competently, and
- the expectation that a partner within a relationship will be responsible.

Barber (1983) also highlights the trustee's belief that the trusted person is guided by goodness and honesty towards tangible and intangible goods, despite having tendencies to deceive and betray. Fukuyama (1995), in turn, claims that trust is a mechanism in which it is assumed that other members of a community behave fairly and cooperatively, according to jointly held norms. These norms may encompass deeply ingrained values related to religion or a sense of justice, but also secular relational norms, such as the standards of a profession or adopted norms of demeanor.

Trust is often viewed as the "glue" that holds societal entities together, underscoring its fundamental importance in understanding the dynamics of social relations (Schilke et al., 2021). It is also considered a prerequisite for the very existence of any society, highlighting its fundamental role in the functioning of society (Daneshgar & Ho, 2008). In addition, trust is viewed as a sociological resource or ability obtained through membership in a network, which emphasizes its role in shaping interpersonal relationships within cultural contexts (Choi & Han, 2011; Fukuyama, 1995; Hallikainen & Laukkanen, 2018). That is because sociological research delves into the cultural and contextual dimensions of trust, recognizing its variations between different cultural settings and its impact on social cohesion and well-being (Sønderskov & Dinesen, 2015). It is worth highlighting that the considerations of trust differ depending on certain conditions, societies, and countries (Lomnitz & Sheinbaum, 2004).

The influence of family relationships on social trust is also a subject of sociological inquiry, which sheds light on the interconnection of trust and social bonds within familial and broader social contexts (Newton, 2001). Furthermore, the concept of trust is intricately linked to social capital, as it contributes to the development of cohesive communities and plays a crucial role in the shaping of civil society (Nessel, 2021). Modern societies are known for their greater interaction with strangers, resulting in common vulnerability and "troubles" of uncertainty that can be alleviated by trust (Heimer, 2001). This is because trust, as Bachmann (2001) states, "allows for specific (rather than arbitrary) assumptions about future behavior of other social actors." It is in line with the psychological definition of trust aforementioned by Rousseau et al. (1998), as well as the approach presented by Tatham and Kovács (2010), who state that "trust as a non-rational choice of a person faced with an uncertain event in which the expected loss is greater than the expected gain."

Trust in economics

Trust from an economic perspective encompasses various dimensions that are crucial in, e.g., understanding economic exchanges, market dynamics, and institutional functioning. The economic perspective is also rooted in the sociological one, with the difference that the actor of the relationship can be not only a person but also another individual, organization, or enterprise. Trust is conceptualized as a form of social capital that influences economic exchanges and interpersonal relationships, and is recognized as a central factor in the sound functioning of markets (Nessel, 2021). Moreover, trust is considered a fundamental element in economic relationships and has been recognized as a crucial factor in economic development, wealth creation, and overall economic performance (Hunt, 2012a, 2012b; Kamińska, 2010; Niazi & Hassan, 2016).

The concept of trust within economic paradigms revolves around persons (including: trade partners), rationality, and its quantifiability, as well as the transactions themselves. In the context of people, trust often refers to business partners and participants in transactions. For example, Sabel (1993) defines trust as a mutual belief that neither party will take advantage of the other, which in practice means the need for cooperation based on mutual respect and common interests. Hardin (2002), on the other hand, points out that trust is based on belief in the good intentions of the other person, which

strengthens the economic relationship between the parties. Tilly (2004) further presents a definition of trust as placing valued outcomes at risk of others' malfeasance in the context of debt and credit networks.

Trust in business transactions is also understood as the willingness to engage in transactions despite the lack of adequate safeguards. Noorderhaven (1992) defines it as the risk an individual is willing to take based on the belief that a trading partner will act according to established rules. Similarly, Sako (1992) treats trust as a mental state of expectation that trading partners will comply with standards and norms, which translates into acceptable risks in transactions.

The economic viewpoint on trust also focuses on the very essence of the relationship. Thus, for example, according to Coleman (1990), trust is considered "a relationship of mutual calculation between the entity placing trust and the entity being trusted." Here, a reference to the previously mentioned aspect of measurability (calculability), which is an indispensable element of the economic perception of the trust notation, is also observable. For more on the complexity and diversity of the trust concept, including the calculability component, see Chapter 1.2.2. In economics, therefore, trust, framed as a relationship between trading partners, is inherent in rational choices and transactional efficiency, as reflected in both economic theory and practice.

Trust in management

The notion of trust can be defined from various scholar perspectives, also from the one that is shedding light on its significance in managerial interactions and implications. On this face, trust can be defined as:

- "a state of mind, an expectation held by one partner about another, that the other behaves or responds in a predictable and mutually accepted manner" (Sako, 1992);
- "a level of of the subjective probability with which an agent assesses that another agent or group of agents will perform an action" (Gambetta, 1988);[3]

[3]The author of this definition also states that this *level* of probability can be also attached to the distrust notation, symmetrically.

- "the trustor's expectation of the trustee's competence and goodwill toward the trustor" (Blomqvist, 1997);
- "an expectancy of positive (non-negative) outcomes that one can receive based on the expected action of another party in an interaction characterized by uncertainty" (Bhattacharya et al., 1998);
- "the expectation that a partner can be relied upon to keep their commitments predictably and act fairly in a situation of different possibilities" (Zaheer et al., 1998);
- "the belief that another party: (i) will not act in a way that is harmful to the trusting firm, (ii) will act in such a way that is beneficial to the trusting firm, (iii) will act reliably, and (iv) will behave or respond in a predictable and mutually accepted manner" (Paliszkiewicz, 2013, p. 23);
- "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action to the trustor, irrespective of the ability to monitor or control that other party" (Mayer et al., 1995).

Again, similar to sociological and social psychological approaches, it is noted that trust is based on the expectation that the other party (trustee) will behave towards us (trustor) in an acceptable way. This also emphasizes the uncertainty that characterizes a trust relationship (Bhattacharya et al., 1998), as well as the calculability, which is measured (assessed) in a subjective way (Gambetta, 1988).

But let us pause on the last definition authored by Mayer et al. (1995), since it is remarkably often considered a reference point for scientific consideration of the trust phenomenon. It also serves as a kind of "binder" and "bridge" between other attempts to define the trust term. The definition of trust by Mayer et al. (1995), based on the resources in the trust-driven literature that they thoroughly analyzed, became the starting point for the comprehensive model of trust that has been influential in various fields. In particular, the model separates trust from trustworthiness,[4] with

[4]A more extensive explanation of the distinction between the two concepts is included in the dedicated Chapter 1.2.3,

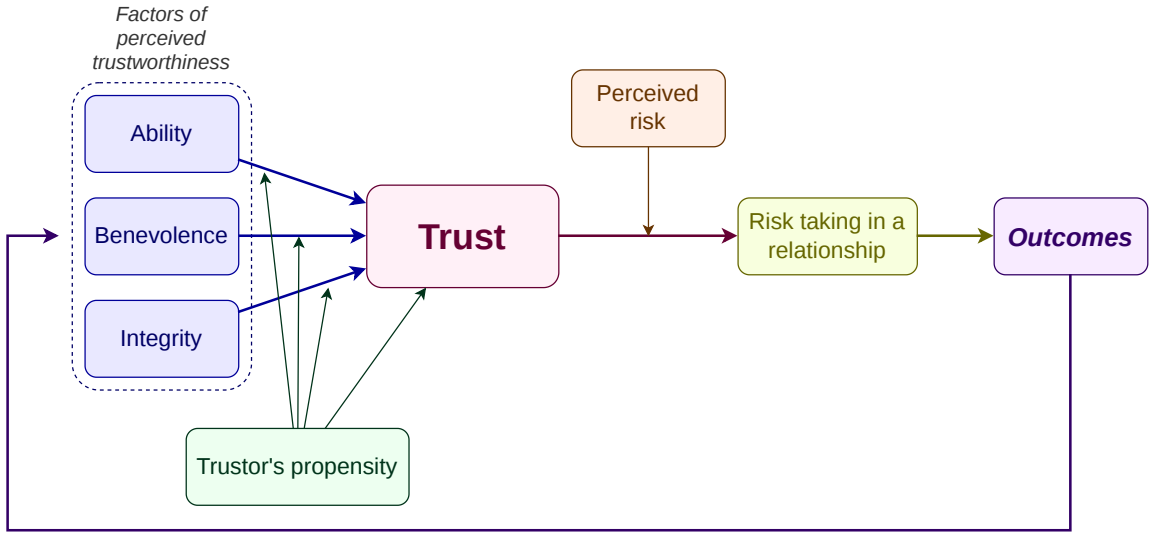


Figure 1.1: Model of trust

Source: Mayer et al. (1995)

three characteristics of the trustee (ability, benevolence, and integrity) appearing as antecedents of trust. This trust framework emphasizes the essence of the trustee's perceived ability, benevolence, and integrity, as well as the trustor's propensity to trust in shaping trust in a dyadic relationship. Furthermore, the originators of this model acknowledged the role of emotions in their later work, adding an important dimension to their original framework (Schoorman et al., 2007). The framework for the operation of the trust by Mayer et al. (1995) is presented in Figure 1.1.

In order to understand the operation of the proposed and widely used trust model by Mayer et al. (1995), it is essential to elucidate the conceptual understanding of the terms appearing in it. Thus:

- *ability* refers to the perceived competence, skills, and expertise of the trustee to fulfill their obligations and responsibilities;
- *benevolence* encompasses the perception of the trustee's goodwill, kindness, and concern for the trustor's well-being, indicating the trustee's positive intentions and altruism;

- *integrity* involves the perception of the trustee's honesty, reliability, and adherence to a set of sound principles, reflecting the trustor's confidence in the trustee's moral character and ethical behavior.[5]

The relevance of vulnerability is underscored, without which trust would have no meaning (cf. Moorman et al., 1993; Özer et al., 2011). Vulnerability, in particular with regard to trust and therefore trustworthiness, means that there is something of importance that may be lost (Boss, 1978). Additionally, the relationship between trust and risk has been highlighted, with the argument that trust is necessitated by the presence of risk, underscoring the interplay between these concepts (Bøegh & Yuan, 2012). The concept of risk appears side-by-side with the notion of vulnerability in the context of trust. The definition of trust by Mayer et al. (1995) implies that trust involves a degree of vulnerability and risk-taking, as the trustor places themselves in a position of dependence on the trustee's actions, despite potential uncertainties or hazards. That is because "making oneself vulnerable is taking risk [and] trust is not taking risk *per se*, but rather it is a «willingness» to take risk" (Mayer et al., 1995). Consequently, in the model analyzed, there is a differentiation between "risk taking in a relationship" and "perceived risk" that has a direct influence on the relationship between trust and the factual risk that occurs.

The comprehensive framework (authored by Mayer et al., 1995) established not only what trust is but also what it is not. Furthermore, Mayer et al. (1995) differentiated between trust as a situational condition and trust as a personality component, characterizing trust propensity as a consistent distinctive trait that influences an individual's tendency to trust. Thus, based on the definitions collected and analyzed by Colquitt et al. (2007) the following distinction is made between the three concepts: *trust*, *trust propensity*, and *trustworthiness*:

- *trust* – the intention to accept vulnerability to a trustee based on positive expectations of his or her actions;
- *trust propensity* – a dispositional willingness to rely on others;
- *trustworthiness* – the ability, benevolence, and integrity of a trustee.

[5]This can be compared with the approach presented by Brenkert (1998), who mainly considers trust a concept based on morality.

The trust model discussed by Mayer et al. (1995) is not the only theoretical conceptualization of the concept that occurs in the academic space. It is also notable to mention the trust framework of Mishra (1996), who elucidated four aspects that constitute the influential axes of trust in the organizational context:

- *concern* – this notation describes the trustee's apparent care, awareness, and regard for the trustor's interests and well-being. Furthermore, it demonstrates a genuine concern for the trustor's well-being and indicates the trustee's empathy and emotional commitment in the relationship;

- *reliability* – this refers to the trustee's perceived reliability, consistency, and predictability in carrying out commitments and responsibilities. It also displays the trustor's belief in the trustee's capacity to fulfill commitments and expectations, establishing a sense of security and reliability in the relationship;

- *competence* – this term is related to the trustee's recognized competence, expertise, and proficiency in carrying out their obligations and activities successfully and efficiently. This expression also indicates the trustor's confidence in the trustee's ability to accomplish desired results and carry out activities with competence and expertise;

- *openness* – it refers to the trustee's perceived transparency, honesty, and readiness to give information. In addition, it represents the trustor's faith in the trustee's candor and readiness to communicate truthfully, thereby advocating a culture of openness, as well as transparent and candid communication within the very relationship.

In creating the model and the new conceptualization of trust, Mishra (1996) not only did a review of the literature sources, but also verified the influencing factors of trust through a qualitative approach, namely in-depth interviews with senior managers. From the point of view of organizational decision-makers, trust can be one of the main factors that support decision-making processes that take place decentralizedly, that is, at different levels of decisiveness and within the framework of undistorted communication (Mishra, 1996). Again, the phenomenon of risk should be kept in mind, specifically in terms of organizational response to crisis, but here is where the

decentralized decision-making that trust-driven decisionalism entails comes in handy. Transferring decision-making to others raises both dependability and jeopardy (Mishra, 1996; Robinson, 1996). Dependability manifests itself as the ceding of authority to a person who previously lacked it, while jeopardy can be described when ceding authority, according to the perspective of agency theorists (Arrow, 1985), who contend that others might act opportunistically.

Based on the sources analyzed that consider the trust notation from the managerial perspective, the following characteristics that are attached to trust can be enumerated (Grudzewski et al., 2007; Paliszkiewicz, 2013):

- trust is related with the presence of specific expectations: about the future, deriving from the social order in which the trustee functions, about the technical competency of the transaction's participants, or about the moral rectitude of the other party. On the other hand, trust is based on personal experience, i.e., it relates to the past. Its current level relates to the present;
- trust exists under conditions of uncertainty and risk – the results of trust behavior are not controlled by the relying party;
- trust implies vulnerability to harm from a partner; the degree of possible damage from untrustworthy action tends to be far more than the expected rewards from fair business;
- trust describes a certain degree of predictability (determined by subjective measures) and is also calculable;
- trust evolves under conditions of unforced collaboration, is dynamic, albeit temporary, develops over time, increases, or is interrupted;
- trust always concerns (is geared towards) someone or something;
- trust is the foundation of social (and, therefore, economic/organizational) interactions. It allows cooperation and the achievement of mutual goals, enables the cultivation of social bonds, new contacts, or business endeavors;
- trust is considered to be a positive (or at least non-negative) phenomenon in its nature.

Trust can therefore be conceived as a peculiar "bridge" between behavior that occurred in the past and expectations that are projected to occur in the future. Paliszkiewicz (2013) states that trusting someone (or something) involves the belief that the other party (which is a person or an impersonal entity, such as a company or organization) will not act against the trustor. The stronger this conviction, the stronger the willingness to cooperate. In light of this, it is believed that trust can be assessed using subjectively determined probability measures, which show the gradability of this phenomenon (Paliszkiewicz, 2013). Thus, the degree of trust becomes one of the criteria by which decisions are made in an organization. Bachmann (1998), meanwhile, considers trust to be a phenomenon that involves, admittedly, quantitative considerations, but sees it as more than just a calculable concept. He recognizes trust as a hybrid occurrence that sits somewhere between calculation, predictability, and goodwill, and voluntary exposure to the risk that a trustee may fail them.

Trust in system theory

In addition to the trust classifications that Paliszkiewicz (2013) presents, it is also worthwhile to take a look at this concept from the point of view of system theory. In light of the aforementioned definition of trust by Mayer et al. (1995), trust can be considered a mitigator of entropy in society, creating simpler and more predictable actions and, by extension, consequences. Since entropy is a measure of disorder, trust can be used to make business relationships and transactions less complicated. Entropy is a direct indicator of system complexity; a lower value of entropy denotes a less complex system, while a higher value denotes a more exacerbated system (Guerrero-Cusumano, 2023).

Trust, in systems theory parlance, draws on the approaches outlined earlier, mainly philosophical and sociological, which can also be translated into the managerial stream. Trust, according to the works of Luhmann (1968, 1979), a German sociologist and philosopher of science, is a medium that simplifies complexity by substituting the internal order of data processing for the original amorphous complexity of the environment. In response to this, trust reduces complexity by increasing the ability to tolerate uncertainty. Luhmann (1968) sees the peculiar reduction in complexity as a central role in generating trust and calls it "separating the needle from the haystack."

1.2.2 Trust along with its diversity

At this point, it is also impossible not to mention the sheer complexity of the concept of trust, which manifests itself not only in terms of understanding this concept from different field perspectives, but also in terms of its multidimensionality, which was outlined in the preceding Chapter 1.2.1. This subsection is a sort of condensation of the aspects involved in the formation of trust, as well as highlighting how the emergence and development of this phenomenon take place on multiple fronts.

The element of complexity of trust is emphasized in the literature, hence various classifications of it appear. One of the main divisions of trust is the one proposed by Williamson (1985), who distinguishes three main types of trust: calculative, personal, and aggregate (institutional). Calculative trust is based on an analysis of the benefits and costs associated with an exchange. Personal trust refers to intentions and belief in the goodwill of the other party, while aggregate trust is rooted in social and organizational contexts, such as company culture, policies, or regulations.

Other scholars, such as Morris and Moberg (1994), distinguish between personal and interpersonal trust. In this conceptualization, personal trust denotes an individual's confidence in their own competence, whereas interpersonal trust pertains to trust embedded in relationships with other employees. McAllister, 1995 divides trust into cognitive (competency-based) and affective (related to emotions and values).[6] On the other hand, Lewicki and Bunker (1996), as well as Harris and Dibben (1999), distinguish three types of trust: calculative, based on a history of cooperation and based on identification.

As presented, the literature distinguishes between different types of trust, sometimes also recognizing the evolution of this concept among its types. Nevertheless, all these classifications indicate how complex trust is and how different aspects can affect its formation in organizations. Meanwhile, McKnight et al., 1998 (as per Paliszkiewicz, 2013) note that, after taking into account the temporal aspect, the following types of trust form the process of building trust in an organization:

1. *calculative trust* – based on the benefits of the relationship (including: a rational belief in its profitability) and cost calculations;

[6]This theoretical differentiation, which is also a foundational axis of this dissertation, is presented in more detail in Chapter 1.2.4.

2. *personality trust* – focuses on the structure of a person's personality, including their innate and acquired traits, such as empathy, responsibility, sensitivity, or emotional restraint;

3. *institutional trust* – based on formal regulations (safeguards), resulting in a sense of security, influencing transparency and circumstantial soundness;

4. *perceptual trust* – pertains to the process of perceiving others, focusing on individuals' cognitive traits, and is demonstrated through observations of behavior, reactions, or actions;

5. *knowledge-based trust* – the most durable and longest-forming category of trust, which is developed on the basis of accumulated experience, and the mechanism of formation of this type of trust is also analogous to learning processes.

The process of building trust in an organization, which can also find its application at the level of consumer-business relations, is multifaceted and multidimensional, and the different levels are intertwined. The process proposed by McKnight et al. (1998) to build trust in an organization, considering its types, is also illustrated in Figure 1.2.



Figure 1.2: The process of trust formation based on its types

Source: Own elaboration based on: McKnight et al. (1998), as per Paliszkiewicz (2013)

1.2.3 Trust vs. trustworthiness

Trust is an attitude that cannot exist on its own. When trust arises, the aspect of being trustworthy must also be taken into account. This is because *trust* and *trustworthiness* are considered by two key components of social capital (Glaeser et al., 2000). Is it possible to consider the notation of trust without considering the concept of trustworthiness? It turns out that these concepts have quite a lot in common, as indicated not only by the semantic construction of the two words, but also by pragmatic references to other concepts, as the researchers highlight (cf. Colquitt et al., 2007;

Mayer et al., 1995). This subchapter is intended as a kind of theoretical supplement to Chapter 1.2.1 entitled *"Trust in management,"* where the trust model of Mayer et al. (1995) was analyzed and the permeability of the notions of trust and trustworthiness is deeply embedded therein.

The concept of trustworthiness can be defined as the properties through which a trusted entity, whether it be a person or an institution, serves the interests of the trustor. On the other hand, trust reflects the trustor's beliefs or perceptions of the trustworthiness of the entity (Avgerou et al., 2009). In either case, trustworthiness is a largely social concept guided by societal norms (Bøegh & Yuan, 2012). In essence, trustworthiness refers to the characteristics and behaviors that make an entity reliable and dependable, while trust relates to the confidence and reliance placed on the perceived trustworthiness of that entity. Moreover, trustworthiness judgments are made by reasoning about whether a source has the necessary expertise to provide correct information and whether the source is likely willing to do so, which depends on whether a source adheres to certain ethical standards and has the goodwill to provide true information (Gierth & Bromme, 2020).

The conceptual relationship between the notation of both trust and trustworthiness is, after all, not a matter that can readily be apparent from a scientific perspective. However, substantial attempts have been made to compare and contrast these terminologies with each other. Cox et al. (2016) highlighted the lack of consensus in the literature on the definitions of trust and trustworthiness and the factors driving them, underscoring the ongoing discourse on the conceptualization of trust and trustworthiness. However, their findings also indicate that vulnerability-responsiveness constitutes the central dimension exerting a direct influence on perceived trustworthiness. Vulnerability is also an aspect that binds together the concepts of trustworthiness and trust, which can be read directly from the definition of trust based on social-psychological theory by Özer and Zheng (2018) or the definition of trust based on management theory by Mayer et al. (1995), as quoted earlier.

It has already been mentioned (see Chapter 1.2.1 and the aforementioned differentiation of trust-related terms by Colquitt et al., 2007) that trust is based on expectation, but here it is worth quoting directly three definitions that point to trustworthiness as a driving force for the emergence of trust:

- "First, trust is based on a cognitive process which discriminates among persons and institutions that are *trustworthy*, distrusted, and unknown. In this sense, we cognitively choose whom we will trust in which respects and under which circumstances, and we base the choice on what we take to be «good reasons,» constituting evidence of *trustworthiness*" (Lewis & Weigert, 1985);
- "In the ideal case, one trusts someone because she is *trustworthy*, and one's *trustworthiness* inspires trust" (Flores & Solomon, 1998);
- "Trust is based on beliefs of *trustworthiness* and on unconditional kindness; *trustworthiness* is related to unconditional kindness and reciprocity" (Ashraf et al., 2006).

Thus, it is evident that understanding and forecasting trust levels are highly dependent on the idea of trustworthiness. This also underlies the psychology-driven origin theories quoted about trust (see the "good reasons" or "kindness" enumerated in the foregoing definitions).

The interpenetration of trust and trustworthiness is also confirmed in conceptualizations from the philosophical side. For example, Rolin (2020) explored the notion of trust in claims of scientific knowledge, emphasizing the importance of both reliance on claims and trust in the scientists who present the claims, thus underscoring the interconnectedness of epistemic trust and trustworthiness. This also coincides with an attempt to operationalize these concepts by Hussain et al. (2006) who define trustworthiness as "a numeric value that depicts the level of trust between in a trust relationship." Attention is drawn here primarily to the quantifiability of the concept and thus its measurability and subsequent benchmarking. The imperative for trustworthiness to occur in a generally trust-driven relationship is also accentuated.

In conclusion, trust and trustworthiness are interrelated concepts that influence each other. Trust is shaped by uncertainties, vulnerabilities, and contextual expectations, while trustworthiness is more stable and inherent, often guided by social norms and values (Özer & Zheng, 2018). Knowing that one is interacting with a trustworthy individual can reduce the vulnerability experienced by the trustor. Research, such as that conducted by Choi et al. (2016), has demonstrated that a trusting individual may not necessarily be trustworthy, and vice versa. The literature also highlights

the importance of trustworthiness in qualitative research, highlighting aspects such as credibility, transferability, dependability, and confirmability to ensure the validity and rigor of research findings (Adler, 2022; Pohl et al., 2018; Porter, 2007). In view of the above, this provides a robust basis for the application of qualitative methods that form the backbone of the practical component of this dissertation.

1.2.4 Cognitive and affective trust: the duality of the concept

Having a theoretical and definitional grounding in what trust is (and also trustworthiness), as well as being aware of the multicontextuality and interdisciplinarity of the concept, it is relevant to outline approaches that integrate perspectives while demonstrating the multilayered nature of the trust concept. Beldad et al. (2010), for example, note the two-dimensional concept of trust, which, on the one hand, plays a behavioral role in interactions with a partner and, on the other hand, links trust with acceptance and 'exposure to vulnerability' (see Gambetta, 1988; Mayer et al., 1995; Özer and Zheng, 2018; Rousseau et al., 1998). This is confirmed in the work of (Abedi et al., 2019), who also distinguish between the duality of the concept of trust, dividing it into sociological and psychological spheres. From the sociology perspective, trust should take into account the indispensibility of the social aspect, i.e., not ignoring the relationship with another person, on which trust can be formed (trust cannot play out inside a particular individual; Lewis and Weigert, 1985). The dichotomous concept of trust is also evident in the study of Chowdhury (2005), who distinguishes two forms of trust:

- *cognitive trust*, which is based on the course of cognitive reasoning, taking into account reliability of performance as well as competence;
- *affective trust*, which is founded on building emotionally-based relationships with someone (i.e., emotional connections or bonds; cf. Bigley and Pearce, 1998; McAllister, 1995).

Cognitive trust, in addition to reliability and competence, refers to rational beliefs about the consistency of the trustee (McAllister, 1995; Su et al., 2020). Furthermore, it is based on a rational judgment of the trustee's abilities and character, and tends to benefit the performance of ability-related tasks (Su et al., 2020). On the other

hand, affective trust is also characterized by mutual interpersonal concern with the person/entity being trusted. It involves emotional attachment and a sense of mutual care and concern within the relationship (Bigley and Pearce, 1998; McAllister, 1995; cf. Blackstock et al., 2022).

The differences between cognition and affect developed in the subject of psychology, where they have been regarded elements of the mind and human interactions since the 18th century (Forgas, 2008). However, in the context of trust considerations, affective trust, i.e., trust with emotionally-driven factors at its core, has received less attention in scientific works and considerations (McEvily & Tortoriello, 2011). Even the majority of measures for gauging trust are primarily grounded in its single dimension: cognition (Ashkanasy et al., 2017). Commonly acknowledged juxtaposes between cognition- and affect-based trust appeared in the academic community as recently as in the mid-1990s, coinciding with the start of the so-called "emotional revolution," i.e., the period when research on emotions in trust received due attention (Legood et al., 2023). Liu and Lu (2020) also examined the definitions of cognition and affect-based trust and explored the theoretical distinction between these two bases, drawing parallels with other theoretical trust models.

Of the two, cognition is the broader term and is defined by the American Psychological Association (APA) as "all forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem solving" (APA Dictionary of Psychology, n.d.). It is one of the three conventionally recognized components of the mind, together with affect and conation (APA Dictionary of Psychology, n.d.). Narrowing it only to peri-trust deliberations, trust cognitions are characterized in the professional literature as "all perceptual, evaluative, reasoning, and judgmental processes involved in a trust decision" (van der Werff et al., 2019). In view of this, cognition-based trust has received a much more elaborate and detailed definition: "trust that is based on any type of cognition including perception of, and judgment about, characteristics of another party, the quality of the relationship, and the social environment in which interactions are taking place" (Legood et al., 2023). Willing to extend this definition within the very management-driven context, it is highlighted that the ability to reasonably and objectively assess the qualities of people or organizations,

such as their competence and dependability, is a prerequisite for cognitive-based trust (Wang et al., 2010).

In contrast, affect is frequently described as states of feeling that encompass emotion and mood (Barsade & Gibson, 2007). Despite the attention paid and the prevailing consensus on the distinction between cognition and affect, unfortunately, the fundamental theory in the multidimensional trust literature did not incorporate these notions as they were understood in the larger psychological and organizational fields (Legood et al., 2023). In light of this, a definition of affect-based trust has emerged: "trust that is based on experiences of emotion and mood that are specific to a particular relationship, or more generalized incidental affect that influences trust in that relationship" (Legood et al., 2023). Recapitulating, emotional ties are the foundation of affect-based trust. Through reciprocal social interaction, a strong and lasting social bond is formed (Schaubroeck et al., 2013).

Within the materiality of the relationship between trust and the concepts of affect and cognition, the bidirectionality of this very link is underscored. This is because trust is seen as an important mediator between affect and cognition and the intention to continue the relationship and seek a second opinion (da Silva Terres & Pizzutti dos Santos, 2013). Moreover, cognitive trust positively influences affective trust, thus affecting behavioral intention (McAllister, 1995).

The role of cognitive and affective trust has been extensively researched in the context of organizational behavior and leadership. For example, Zhu and Akhtar (2014) found that affect-based trust exerts a complete mediating role, while cognition-based trust exerts a partial mediating role. It is also confirmed in the work of Pučėtaitė and Novelskaitė (2014), who showed that affective trust plays a more significant role than cognitive trust in increasing the innovation of the process. Additionally, Ng and Chua (2006) demonstrated that affect-based trust mediated the relationship between transformational leadership and the helping behavior of followers among employees with high prosocial motivation, while cognition-based trust mediated this relationship among those with low prosocial motivation. As trust plays a crucial role in company channels, it is scholarly supported that organizations should strive to reinforce intra-organizational processes that rely on promoting and fostering cognitive and affective trust (Swift & Hwang, 2013).

However, because companies could not exist without the recipients of their products or services (i.e. customers), trust is also subject to scientific analyzes also from the perspective of customers and their trust-driven behaviors and attitudes. The dual construct of trust consisting of cognitive and affective components has been researched considering the importance of both dimensions in understanding trust in online shopping contexts (Nghia et al., 2020).

1.3 Trust in e-commerce domain

The scholarly literature on trust is highly extensive, encompassing a wide array of theoretical and empirical perspectives that examine the construct of trust from multiple, and often complementary, analytical angles. Trust is one of the key axes addressed in the e-commerce field and is the cornerstone of building a vendor-buyer commercial relationship. The concept of trust with the internet vendor has been found to be essential for the success of an e-commerce company (Torkzadeh & Dhillon, 2002). Given the verticality and applicability of this perspective, it was decided to treat the section on trust in e-commerce separately from the section that addresses the fundamental nature of the concept of trust (i.e., Chapter 1.2). This subchapter highlights issues related to digital trust and e-consumer trust, which inevitably intertwine the concept of trust in the e-commerce industry.

1.3.1 E-customer trust

In this dissertation, the terms *consumer* and *customer* are used deliberately rather than interchangeably. *Consumer* is retained when referring to the broader consumer-behavior literature, established theoretical models, and studies that conceptualize individuals primarily as participants in purchasing and consumption processes. By contrast, *customer* is used when the analysis concerns the focal relationship between an individual and an e-commerce firm, particularly in the context of trust formation, perceived e-service quality, and firm-controlled managerial mechanisms. Accordingly, the empirical part of the dissertation primarily adopts the term *e-customer*, while the original terminology is preserved when discussing established theories and prior studies.

As can be concluded from Chapter 1.2, trust always takes place in some relationship (cf. Kim and Peterson, 2017; Söllner et al., 2016). In the examples given in the psychology- or sociology-driven conceptualizations of trust (e.g. Barber, 1983; Chowdhury, 2005; Colquitt et al., 2007; Fukuyama, 1995; McAllister, 1995; Rotter, 1967), these are interpersonal relationships, but when referring to the area of e-commerce enterprise management, it can be assumed that businesses can also be actors in a relationship based on trust. This comprehension is confirmed in the work of Kee and Knox (1970), whose definition of trust assumes that both the trustee and the trustee are 'parties,' with no person *per se* specification. This provided the epistemological basis for the creation of the organizational trust model mentioned above, which was originally proposed by Mayer et al. (1995) and highlighted the essence of business-based trust research. Therefore, it can be concluded that the basic aspect in building trust is not the individual but the relationship between entities (actors that can take the form of, for example, a person or a company). In view of the aforementioned claim by Lewis and Weigert (1985) that trust cannot exist for itself and only takes place within a given person, it can be concluded that a self-to-self relationship cannot exist in the case of trust and therefore someone cannot trust themselves. The originators of that belief also argue that trust cannot be expressed as a personal characteristic (Lewis & Weigert, 1985).

As parties (actors) in a trust-based relationship can be any entity (which may be human beings but not necessarily), the trust-based formula between the consumer and the trade-related enterprise (directly or indirectly) is created liquidly and naturally. In the broader behavioral literature, this relationship is commonly discussed under the notion of consumer trust. However, in this dissertation, the term e-customer trust is preferred when specifically referring to the trust relationship between an individual customer and an e-commerce enterprise. Table 1.1 presented below illustrates theoretical attempts made to empirically understand the reasoning and actions of consumers (i.e., introduced intention-based models/frameworks).

The models presented in Table 1.1 are not directly related to trust; however, they provided a theoretical basis for creating trust-oriented frameworks in the field of consumer/customer behavior, also for those related to online purchasing processes. When it comes to investigating the e-commerce industry with these models, a significant

Table 1.1: Frameworks explaining consumer's behavior against technology

Name of the model	**Description**	**Author(s)**
Expectation and disconfirmation theory (EDT)	A function of customer satisfaction which consists of two variables: expectation (that advances in perceived performance) and expectancy disconfirmation.	Oliver, 1980 (nourished from cognitive dissonance theory [CDT] by Festinger, 1957)
Theory of reasoned action (TRA)	Individuals' performance are inclined by their behavioral intentions (and they are impelled by their attitudes and subjective norms).	Ajzen and Fishbein (1980)
Technology acceptance model (TAM)	Concentrates on the individual's decision and personal attitude towards using information systems (initiates influencing factors: "perceived usefulness" and "perceived ease of use").	Davis (1985, 1989)
Theory of planned behavior (TPB)	Aims at researching cases when users do not have full control over the choice but are in some way affected by non-motivating factors connected to the accessibility of certain needs and requirements (initiates influencing factors: "subjective norm" and "perceived behavioral control").	Ajzen (1991)
TAM-TPB model	A model that combines features of Davis' TAM framework and Ajzen's TPB blueprint (a mixture of advanced "perceived value" instead of "perceived usefulness" from TAM and annexing "subjective norm" and "perceived behavioral control" from TPB).	Nysveen, 2005 (advanced later by Kondo and Ishida, 2014)
Unified theory of acceptance and use of technology (UTAUT)	Assumes the presence of four variables influencing the intention to use a given technology: expected performance, expected effort, social impact and favorable circumstances. Extended version of the model (UTAUT2) moreover incorporates hedonic motivation, price value and habit (that are moderated by individual differences) to the original framework.	Venkatesh et al., 2003 (extended version UTAUT2: Venkatesh et al., 2012; advanced later by Ul-Ain et al., 2016; AI-enhanced version of UTAUT by Venkatesh, 2021)

number of references can be cited. For example, Grandón et al. (2011) and Lee and Chan (2018) used models based on TRA, Islam et al. (2016), Pikkarainen et al. (2004) and Hassanein and Head (2007) used approaches based on TAM, while TPB was the basis of the model created by Dodor and Rana (2009) or Herrero Crespo and Rodriguez del Bosque (2010). The UTAUT model is also frequently used to investigate phenomena related to the e-commerce space, as it is considered one of the most effective approaches to technology acceptance (Haryanti & Pribadi, 2019). The UTAUT framework finds its usefulness in describing phenomena in the sustainable e-commerce sphere (Haryanti & Subriadi, 2022; Mustafa et al., 2022), creating value to assist the repurchase intentions of e-consumers (Chen et al., 2021; Jebarajakirthy et al., 2022), or to improve the quality of online banking adoption (Rahi et al., 2019). These frameworks can also be used simultaneously, like in the paper of Awa et al. (2015), where authors of this study parallelly used both TAM and TPB models (cf. Nysveen, 2005) for developing e-commerce adoption by SMEs.[7] Similarly, the paper by Salimon et al. (2023) is based on using a combination of TAM and UTAUT models to describe m-commerce adoption in Malaysian SMEs.

Returning to fully understand the concept of cosnumer (customer) trust that occurs in the online domain (i.e., e-commerce), it is worth highlighting that although a trust-based relationship between entities must occur, physical contact (due to the nature of internet transactions) does not have to be involved (Shi & Chow, 2015). Trust has been shown to have a major influence on consumer behavior intentions, making it a vital aspect for the success of online businesses (Hansen et al., 2018), e-services and e-communications (Lee & Lee, 2005; Tajvidi et al., 2021). E-customer trust revolves around the trust that consumers have in e-commerce transactions and relationships with online businesses. It is centered on the trustworthiness of e-commerce companies, their products, and the overall shopping experience (Punyatoya, 2019). In addition, it is recognized that e-consumer trust has a direct impact on purchase decisions, repeat purchases, and loyalty to online retailers (Özdemir & Sonmezay, 2020; Punyatoya, 2019). Nevertheless, empirical research shows that the behavior of trust-driven consumers is

[7]The acronym SME stands for "Small and Medium-sized Enterprises." It refers to businesses that fall within the small and medium-sized category, typically defined based on criteria such as the number of employees, revenue, and other factors, which may vary depending on the country or organization, such as the European Union or the World Bank.

impacted both by their expectations and their feelings toward the people who offer them a service (Kim & Park, 2013). As a consumer in the e-commerce industry is called an e-consumer, hence a consumer trust can be called an e-consumer trust. Bylok et al. (2019) indicate six main factors that influence the level of e-consumer trust:

1. the approach (attitude) of a consumer to online shopping based on their previous experience;
2. perceiving an online store as trustworthy;
3. the usefulness of an online store's website (with regard to both ease of use and security);
4. the interaction with the vendor (regarding both pre- and post-purchase service) that translates into customer experience and satisfaction;
5. the reputation of an online store (its credibility);[8]
6. the (perceived) risk that the consumer must take (connected with the level of experience when benefitting an Internet use, i.e., digital literacy).

This is consistent with the approach presented by Oliveira et al. (2017) who argue that the formation of trust in e-commerce is influenced by customer characteristics (subjective likability of a website / e-commerce store, the level of satisfaction), firm characteristic (brand recognition and reputation), website infrastructure (quality and usability of a website / e-commerce store, as well as its attention to privacy and security matters) and customers' previous interactions and experience. According to their findings, customers with high overall trust are more likely to make a purchase on the internet. A similar, though slightly more synthetic, classification of trust drivers within the e-commerce landscape was made by Zarifis and Fu (2023), highlighting that consumer trust in e-commerce is determined by four major components:

1. the individual's psychology (Bansal et al., 2010; McKnight et al., 2011);
2. the organizations that are responsible for mitigating the hazards associated with the use of technological advances (Vance et al., 2008);

[8]This factor might interact with factor #2.

3. the very technology with which they interact (Lankton et al., 2015; McKnight et al., 2011; Sillence et al., 2007);

4. consumer's concern with respect to the dissemination of their private data (Aiken & Boush, 2006; Bansal et al., 2010; Hsu et al., 2014; Lauer & Deng, 2007; Zarifis & Fu, 2023).

These are undoubtedly factors that should be taken into account by entrepreneurs running their e-commerce enterprises when implementing models measuring the level of trust by their clients. The trust of the e-customer is one of the key factors that affect not only the perception of the store by a specific customer but also translates into measurable profits that the enterprise achieves. It is also essential to distinguish between the four forms that an online trust takes (Hsu et al., 2014): (1) trust in the website, (2) trust in the vendor, (3) trust in the auction initiator, (4) trust in group members. The literature also recognizes the distinction between trust in the salesperson and trust in the seller company, which are two separate categories of e-consumer trust (Morgan & Hunt, 1994). Such categorization may allow for a more appropriate orientation to areas in which an e-commerce enterprise can develop. This understanding as well as fostering e-consumer trust is essential for e-commerce businesses to establish long-term relationships with customers and drive sustainable growth in the digital marketplace.

However, the impact of risk should be once again underlined when it comes to trust, also online. The four aforementioned types of online trust directly affect "perceived risk" in the e-commerce world (Hsu et al., 2014; cf. Kim et al., 2008). As the study by Hsu et al. (2014) shows, perceived risk turns out to be correlated with factors of importance that affect online trust: attitude (negative correlation) and intention (positive correlation). The conclusion is to mitigate the perceived risk of the e-customers in all efforts, as it is a significant determinant of attitude; reducing uncertainty and the concerns resulting from it can translate into a positive purchase decision. The significance of perceived risk is confirmed in the study of Kim and Koo (2016), however, since a correlation coefficient was not that strong in this research, they see it as an important component but has an indirect impact on the purchase decision making process. In addition, the perception of risk by the customer is directly related to the level of Internet fluency (i.e., digital literacy), and this has an impact on information technology and the planning of the expansion of e-commerce (Metzger, 2006).

But what is "perceived risk" exactly, especially when juxtaposed with the construct of e-consumer trust? Risk is a quantifiable variable when combined with the theory of decision making. However, risk is hardly to be calculated by the e-consumer but is merely estimated; therefore, it is more about "perceived risk" (Kim et al., 2008; Lopez-Nicolas & Molina-Castillo, 2008). As risk is an indispensable variable that has a direct impact on the level of trust, it is worth noting that from the perspective of consumer online trust is an effective utensil when it comes to decreasing the perceived risk by e-consumer. Therefore, they tend to shop online in a particular store more likely, which is confirmed by the research conducted by Jadil et al. (2022). It should be emphasized that the perception of risk and trust by the e-consumer (which go hand in hand) are considered two of the most vital cognitive factors that impact online behavior (Mou et al., 2015). Within the customer–company relationship adopted in this dissertation, perceived risk is therefore treated as a customer-level cognitive assessment that may shape trust in a particular e-commerce enterprise and, consequently, the willingness to maintain transactions with it.

As mentioned above (see Chapter 1.2.3), the concept of trust is somewhat different from trustworthiness. This part of the dissertation, which is devoted to an e-commerce perspective on trust-based conceptualizations, requires reiterating the differentiation between these two terms, but with an eye to other points that are relevant to the buyer-seller relationship, among others. Consequently, from the e-commerce angle, the notion of trustworthiness is defined as "a customer's perception of confidence in the online vendor's reliability and integrity" (Belanger et al., 2002). This notion also refers to "the willingness and ability of an online vendor to deliver high quality products" (Utz et al., 2012). In the case of building the image of a company with a high sense of trustworthiness, the key is to clearly provide high-quality information about how it operates, as this shapes how customers perceive it (Mayayise & Olusegun Osunmakinde, 2014). Therefore, it can be concluded that both trust and trustworthiness revolve around "high quality."

1.3.2 Digital trust

Trust is always based on interaction, but, as mentioned earlier, physical contact between actors does not always need to be present (Shi & Chow, 2015). Where trust is

built on an intangible relationship in environments where direct and physical contact is not involved and digital devices are considered intermediaries of trust-driven interaction, this is where the phenomenon of digital trust emerges (Paliszkiewicz et al., 2023). Since trust is affected by a variety of factors (which are increasingly being reshaped by the evolving circumstances of the digital age), it cannot be considered a self-sustaining phenomenon (Rakowska & Barna, 2025). Digital trust in the scientific literature is defined as:

- "an attitude of confident expectation in an online situation of risk that one's vulnerabilities will not be exploited" (Corritore et al., 2003);
- "general beliefs in online service providers that result in behavioral intentions" (Wang & Jeong, 2018);
- "reliance on technology systems to share knowledge or perform other tasks" (Tessier, 2021).

It should be noted that the terms "digital trust" (Connolly, 2020; Paliszkiewicz et al., 2023; Pietrzak & Takala, 2021) and "online trust" (Al-Gharaibah, 2020; Beldad et al., 2010; Kim & Peterson, 2017) are used interchangeably in the literature for the concept of trust occurring in the digital sphere. The designation "e-trust" is also used to refer to the same concept (Anser et al., 2023). Accordingly, these terms will be used interchangeably in this dissertation.

It is worth underlining that online/digital trust and e-consumer trust are different, as these concepts are significantly divergent. These notions are indeed interrelated, but differ in their scope and focus. Online trust generally refers to the confidence and reliance that individuals have in the overall online environment, including websites, platforms, and digital interactions. It encompasses the larger notion of trust in the internet sphere, considering aspects such as website security, privacy policies, and the general credibility of online sources (Wang & Emurian, 2005). On the other hand, e-consumer trust specifically pertains to the trust that consumers place in e-commerce entities, such as online retailers or service providers. It focuses on the trust relationship between consumers and online businesses, considering factors such as product quality, customer service, and transaction security (Punyatoya, 2019). Thus, it can be concluded that online trust is a more general concept that extends beyond e-commerce interactions

to encompass trust in various online activities and platforms. While e-consumer trust plays an essential role in influencing consumers' attitudes and behaviors, particularly in relation to e-commerce, online trust serves as the basis for people to participate in an assortment of internet-based interactions and activities. In this regard, the term "online/digital trust" can also be used to refer to the realm of electronic commerce; however, the greater capacity of the notion should be considered.

Researchers list many factors that influence the formation of digital trust. Among them are: past performance, long-term orientation, perceived size and reputation of the website, perceived information availability, references, effective and efficient navigation on the website (as well as its search engine), presentation of the content (along with accurate descriptions of the products), ease of use, presence of a sitemap, privacy and security issues (Aiken & Boush, 2006; Engriani & Novaris, 2020; Falahat et al., 2019; Hsu, 2008; Koehn, 2003; Lauer & Deng, 2007; Liao et al., 2006; Lin et al., 2009; Lohse & Spiller, 1998; Paliszkiewicz et al., 2023; Shankar et al., 2002; Sillence et al., 2007). Figure 1.3 illustrates the factors that influence the shape of the online trust, having previously grouped them together.

Digital trust may vary according to the following dimensions: generality, kind, degree, stage, and level (Corritore et al., 2003). The sheer level of digital trust among e-users is positively correlated with their previous experiences: the better these were, the greater the overall level of trust in e-technologies (Corritore et al., 2003). This should be matched with the direct proportional relationship mentioned above between digital literacy (including perceived risk) with trust in the e-commerce sphere and the ease of doing online transactions (Metzger, 2006). Although experiences during the initial phases of internet use are beneficial in shaping trust levels, it is recognized that cumulative experience experienced over time, which can comprise a range of positive and negative contingencies, can evolve into distrust related to concerns about security and privacy-related issues (Aiken & Boush, 2006).

As mentioned earlier, digital trust is a broader concept than e-consumer trust, as its targeting can be towards any Internet/digitized technology, not merely that it necessarily takes place in the e-commerce sphere. It is observed that online trust plays an important role in the adoption of ICTs such as Internet of Things (IoT), Big Data Analytics (BDA), and cloud computing (Paliszkiewicz et al., 2023). Digital trust is

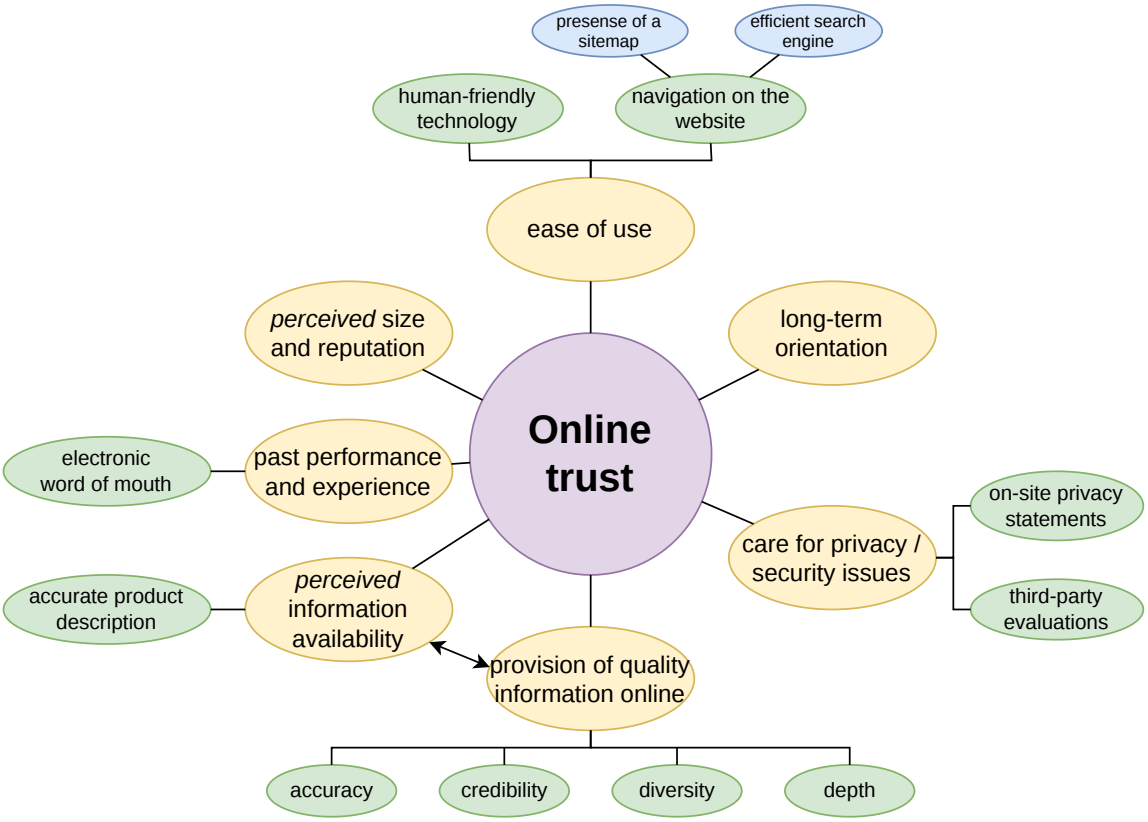


Figure 1.3: Factors that influence online trust

Source: Own elaboration based on: Aiken and Boush (2006), Engriani and Novaris (2020), Falahat et al. (2019), Hsu (2008), Koehn (2003), Lauer and Deng (2007), Liao et al. (2006), Lin et al. (2009), Lohse and Spiller (1998), Paliszkiewicz et al. (2023), Shankar et al. (2002), and Sillence et al. (2007).

the eagerness to utilize and embrace new technology originating from a positive and demonstrable perception about the perceived dependability of a digital information source (Rowley & Johnson, 2013).

In the case of IoT, which has unequivocally influenced the possibilities of how users/customers interact with enterprises, the importance of trust is undeniable. The involvement of technology as it develops within enterprises, as well as in the channels where IoT devices mediate between the company and the potential customer,[9] is unequivocally linked to how users have formed a level of online trust (Paliszkiewicz et al., 2023). Building trust and maintaining it among IoT-oriented companies is

[9]When referring to the e-commerce industry (specifficaly: B2C relationships), and the user of an IoT device can be called a customer, it is eligible to refer to the trust of the e-customer, not just online / digital trust.

a task of strategic importance to achieve business success, where the acquisition of a competitive advantage may be a derivative (Kökciyan & Yolum, 2020). In terms of online trust towards IoT devices, the essentialness of ensuring security compliance and privacy protection standards is accentuated, most notably authentication, authorization within the IoT network, data confidentiality, and the enforcement of security policies (Sicari et al., 2015).

In the context of BDA, trust is crucial to ensure the accuracy, integrity, and ethical use of data. Trust-driven approaches in cloud computing can be extended to BDA to establish trust in data processing, storage, and analysis (Manuel, 2013). Data security and privacy concerns in multicloud environments underscore the importance of trust in protecting sensitive information and ensuring compliance with data protection regulations (Fabian et al., 2015; Kurdi et al., 2019).

Trust mechanisms are also critical to creating trust in cloud computing environments, ensuring that customers have confidence in the services provided. Cloud computing, as a fast emerging field, requires the utilization of robust trust management systems to satisfy data security, privacy, and dependability concerns. Trust-based frameworks in cloud computing seek to develop trust between users and cloud service providers, facilitating consumers to feel trust in the services offered (Hayat, 2020; Noor et al., 2013). Factors such as identification, privacy, security, and scalability are critical to building trust in cloud environments, and addressing these issues is essential for the widespread adoption of cloud computing (Noor et al., 2013). In addition, it is urged to employ trust labels, trust management models, and trust evaluation techniques to convey and evaluate consumers' trust in cloud services and give them clear information on the dependability and caliber of cloud providers (Emeakaroha et al., 2017; Fan & Perros, 2013). Such trust mechanisms assist users in making informed decisions and building trust in cloud computing services.

It should be noted that the prevalence of theoretical and illustrative case studies indicates a lack of maturity in the notion of digital trust (Pietrzak & Takala, 2021). Therefore, it justifies further exploration of this research strand and the state of knowledge on the topic of digital trust.

1.4 Measurement of trust

There is a tendency to create modern mechanisms, the core of which is trust and its proper processing. The question to ask is how is trust itself measured and thereby portrayed in the most objective and measurable way possible? The most important challenge in creating these trust-based tools is correct reading, processing, and verification (assessment) of the trust of a specific customer (entity) (Ahmad et al., 2025; Wei & Tang, 2010). Measurement of customer trust requires psychometrically validated instruments, since the reliability and validity of the measurement scale directly determine whether the resulting trust assessment can be considered credible (Ahmad et al., 2025; Wang et al., 2026). However, it should be noted that instruments for measuring trust vary depending on the subject and context in which it is examined. Trust is measured against, for example, vaccinations (Larson et al., 2018), process automation (Hoff & Bashir, 2014), AI-based decision support (Solberg et al., 2022), or employees at various levels within an organization (Dietz & Den Hartog, 2006). Anyhow, it is believed that it is the measurement of trust that is of utmost importance for adequate management and, consequently, for organizational growth (Buck et al., 2021; Gołuchowski & Paliszkiewicz, 2023; Pascual-Ferrá, 2021).

1.4.1 Ways and approaches to measure trust

Various models and frameworks have been proposed to understand and measure trust in online transactions. These models often consider factors such as technological trust, institutional trust, and interpersonal trust in shaping the overall trust environment in e-commerce (Tislar et al., 2014). Customer trust in e-commerce is a multidimensional construct shaped by technological, relational, and institutional mechanisms, rather than by a single source of trust (Dong, 2026). Recent studies frame consumer trust in social commerce as a mediating mechanism that channels the effects of technological, organizational, social, and motivational factors on users' engagement and purchase behaviors (Ahmad et al., 2025). In addition, studies have highlighted the emotional aspect of trust in exploring how emotions influence trust in online transactions, emphasizing the role of emotional comfort in building trust among customers (Cuong, 2024; Shankar et al., 2002; Tislar et al., 2014).

Experimental approaches

A fairly common and well-known attitude that seeks to visualize and materialize a mathematical approach to the measurement of trust is that of Coleman (1990). This is because he is considered to be the originator of the concept of trust calculations. The approach to measuring trust presented by him depicted it as a relationship of mutual calculations in which the trusting entity makes a decision based on the probability of a trading partner's trustworthiness and the risk of loss. The mathematical model proposed by Coleman (1990), presented in Equation 1.1, depicts a relationship according to which trust is profitable when the expected gain exceeds the potential losses from the failure of the transaction, which is one of the basic tools in evaluating trust from an economic perspective.

$$\begin{cases} \frac{p}{1-p} > \frac{L}{G} : 1 \\ \frac{p}{1-p} = \frac{L}{G} : 0 \\ \frac{p}{1-p} < \frac{L}{G} : -1, \end{cases} \tag{1.1}$$

where:

- 1 – a situation worth trusting,
- 0 – indifferent situation,
- –1 – a situation not worth trusting,
- p – chances of gaining profit (probability of reliability of the partner),
- 1–p – chances of failure (the probability that the partner is unreliable),
- L – potential loss,
- G – potential gain.

Coleman (1990) suggested that trust can be understood as a decision made in the context of risk. He also views trust as a distinct relationship that involves potential benefits, possible losses, and the probability of each occurring.[10] However, this perspective has faced criticism, particularly from Hardin (2002), who contends that Coleman's

[10]This contrasts Luhmann's idea of functional equivalence between trust and mistrust (Luhmann, 1979).

approach confuses the concepts of trust, trustworthiness, and the act of entrusting. According to Hardin (2002), it is actually trustworthiness – not trust itself – that requires the trustor to engage in a rational assessment (see: Frederiksen, 2017). In addition, it is observed that the experiments involve the creation of an artificial "laboratory" situation, and the approaches presented also mix the concepts of cooperation and trust (Hardin, 2002; Paliszkiewicz, 2013), so the robustness is questioned.

Another of the older and sleeker approaches to measuring both trust and trustworthiness is the so-called "trust game,"[11] which was originally conceived by Berg et al. (1995). This trust measurement technique was explained in detail (along with its applicability) in a paper by Kumar et al. (2020a). This theoretical game is based on the following assumptions, which are concisely outlined. Player A (the *trustor*) starts with 1 unit of money and can transfer a portion x (where $x \in [0, 1]$) to Player B (the *trustee*). If Player A transfers money, it triples, leaving Player B with $3x$ and Player A with $1 - x$. Then, Player B decides how much of their money r (where $r \in [0, 1]$) to return to Player A. The final payoffs are $1 - x + 3xr$ for Player A and $3x(1 - r)$ for Player B. Although logic suggests that Player B would keep all the money, leading Player A not to trust, scientific experiments (Berg et al., 1995; Bohnet & Zeckhauser, 2004; Johnson & Mislin, 2011; Malhotra, 2004) show that many players transfer money and Player B often returns a significant portion. What should be highlighted is that this behavior cannot be attributed to risk aversion (Ortmann et al., 2000) or an abundance of understanding (Corgnet et al., 2016).

These core approaches to measuring trust, despite their apt depiction of the very idea of bestowing trust (and thus the degree of being trustworthy) on a given relationship actor (including consideration of their "coreness"), are based only on a single-vector view of the concept. It is in line with the observation by McEvily and Tortoriello, 2011, who noted that the most often used trust metrics only account for one aspect of trust, which is primarily cognitive in nature. Given the complexity of the concept and the multidimensionality of factors that affect the level of trust, more elaborate mechanisms should be considered here. That is because the concept "trust" is imponderable, multifaceted, and convoluted, with many impacting elements (Simpson, 2012).

[11] In the literature (e.g., Aksoy et al., 2018; Buchan et al., 2008), an alternative name for this approach can also be found, i.e., the "investment game."

Applicative approaches

The aforementioned "trust game" is one of the basic approaches to measuring trust (also called "incentivized measure"), which finds its applicative basis in the work by Glaeser et al. (2000). The instrument originated by Berg et al. (1995) is one of the two axes in the study by Glaeser et al. (2000). The second approach used in the above-mentioned work is the so-called "survey-based measure," which is based on two pillars that originate in the extensively employed General Social Survey (GSS):[12]

- the trust question – *"Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"*[13] and
- the trust index – which includes two more questions in addition to the GSS trust question: *"Do you think most people would try to take advantage of you if they got the chance, or would they try to be fair?"* and *"Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves?"*[14]

The absence of an association between the trust indicators in the survey and the trustworthy behavior of the players in the game is a significant discovery in the work of Glaeser et al. (2000). Remarkably, the survey's trust and trustworthiness metrics show a positive correlation, according to the authors of the mentioned research.

It should be noted that Glaeser et al. (2000) used an adapted version of the "trust game" originated by Berg et al. (1995). The original unmodified version was used in the study by Aksoy et al. (2018). In the standard version of the game, both players receive an endowment, whereas in the modified version, as presented in the work by Glaeser et al. (2000), only the first mover is endowed. When both players were endowed in

[12]The General Social Survey is a sociological survey conducted in the United States, established in 1972 by the National Opinion Research Center at the University of Chicago and funded by the National Science Foundation.

[13]This question can be answered in a threefold way (in addition to non-programmable "Don't know," or "Inapplicable" answers): "Can trust," "Can't be too careful," and "Depends."

[14]The wording of both questions is the same for the European Social Survey, and the first for the World Values Survey. In the European Social Survey questionnaire, the answer to this question is on an 11-point ordinal scale, while for the World Values Survey the answer is on a 10-point ordinal scale (OECD, 2017a).

the reinvestigation experiment, a significant correlation was observed between the two measures. This indicates that trust is a unified construct, whether assessed through survey questions or through an incentivized trust game (Aksoy et al., 2018).

Another handy tool to measure trust, that is utilized in a variety of contexts, is the Interpersonal Trust Scale (ITS). It is a psychometric tool developed to assess the level of trust individuals have in others in various social contexts. Originally conceptualized by Rotter (1967), the ITS comprises 25 items that evaluate trust in different social roles, including family members, peers, and strangers. The scale is designed to measure two primary dimensions of trust: trust in familiar individuals (such as friends and family) and trust in unfamiliar individuals (strangers) (see more in: Li et al., 2023a). The ITS operates on a Likert scale,[15] which allows respondents to express their level of agreement or disagreement with statements regarding their trust in others. The reliability of the scale is tested by the Cronbach's α coefficient.

The format of ITS facilitates the quantification of interpersonal trust, making it a valuable tool for researchers and practitioners interested in understanding the dynamics of trust in personal and professional relationships (Evans, 2016). The psychometric properties of the scale have been validated in various studies, confirming its reliability and effectiveness in measuring interpersonal trust between diverse populations (Li et al., 2023a; Shabahang et al., 2020). The ITS has also been adapted for specific populations and contexts, demonstrating its versatility as a measurement tool. For example, scale adaptations have been made for use with adolescents and in different cultural settings, to ensure that it remains relevant in diverse social landscapes (McElroy-Heltzel et al., 2018; Zhang et al., 2022a).

Also worth mentioning is the Behavioral Trust Inventory (BTI), a psychometric tool designed to measure trust in an organizational context, particularly in leader–follower relationships. Developed by Gillespie (2011), the BTI, similar to the aforementioned ITS measure, uses a Likert scale, allowing respondents to indicate whether they agree or disagree with statements on their degree of trust in other people in the company's environment.[16] The tool consists of 10 questions, an example of which is *"Can I share*

[15]More precisely: 5-point Likert scoring, where 1 stands for "strongly disagree" and 5 stands for "strongly agree."

[16]More precisely: the BTI tool uses a 7-point Likert scale, where 1 stands for "not willing" and 7 stands for "willing."

my private feelings with my boss?". The BTI operates on the premise that trust is a multidimensional construct that can significantly influence organizational outcomes. In addition to measuring trust, the BTI is often integrated with other psychological scales to provide a comprehensive understanding of the factors influencing trust dynamics. For example, it has been used alongside the Work-Related Basic Need Satisfaction Scale (WRBNSS) to explore how trust affects psychological need satisfaction and participation in work (Heyns & Rothmann, 2017, 2021). This integration underscores the salience of trust not only as an independent theoretical construct, but also as a foundational element within more comprehensive frameworks of organizational behavior.

An important aspect is the context of trust-driven relationships between vendors and customers. An example of a tool based on this interaction can be the Brand Trust Scale (BTS; Delgado-Ballester et al., 2003), which is also a psychometric instrument designed to measure the level of trust consumers have in a brand. This scale is crucial for understanding consumer behavior, as brand trust is a significant predictor of brand loyalty, customer satisfaction, and overall brand equity. This approach examines trust along two basic dimensions:

- elements describing brand credibility, examples of which are questions in the BTS questionnaire:
  - *"I feel trust in Brand X,"*
  - *"Brand X has never let me down,"*
  - *"Brand X meets my expectations,"*
  - *"Brand X is a guarantee of success;"*
- components describing the "intentions" of the brand, of which sample questions in the BTS questionnaire are:
  - *"Brand X puts a lot of effort to satisfy me,"*
  - *"Brand X would compensate me for any problems associated with it,"*
  - *"I can rely on Brand X to help solve my problems,"*
  - *"Brand X responds sincerely and honestly to all my concerns."*

As seen, BTS is an established two-dimensional scale that captures the essence of brand trust, demonstrating its relevance in predicting brand loyalty and consumer behavior. This approach highlights the importance of trust as a relational construct that influences how consumers interact with brands over time (Delgado-Ballester & Munuera-Alemán, 2005).

In addition to the above, there are many other approaches to measure trust in consumer-to-business and reverse relationships. For example, Young and Albaum (2003) proposed a trust-based measurement approach based on a questionnaire whose three bases are attitudes, feelings and values, measuring trust in buyer-seller relationships. Plank et al. (1999), on the other hand, developed a set of survey forms aimed at consumers, examining trust in the organization, the product, and the seller. Swan et al. (1988), moreover, created a 20-question questionnaire to ask customers (on a 5-point Likert scale) about their perceptions of the salesperson along the following dimensions: reliability, honesty, professionalism, customer orientation and likability.

Measuring trust in the digital domain

As a foreword to the presentation of more complex approaches to measure trust in the digital-to-online realm, it is worth mentioning that when the concept of trust is characterized as an attitude, it argues that trust should be considered a psychological construct that is subjective (i.e., biased) and different from objective behavioral expressions of trust, such as reliance (Sanneman & Shah, 2022; Scharowski et al., 2023). This indicates that scholarly investigations that only assess trust-related behaviors, such as trust, are insufficient to adequately capture and evaluate the phenomenon of trust itself (Papenmeier et al., 2022).

Referring to the distinction between objective and subjective aspects of trust, it is worth mentioning the model for assessing trustworthiness in computer science proposed by Schlicker and Langer (2021). This framework embodies the dual significance of both objectively measurable attributes and subjective evaluations of trustworthiness as articulated in foundational trust research. This model is based on four key pillars that affect the precision of trustworthiness measurement, i.e., (i) relevance of the signal, (ii) availability, (iii) detection and (iv) utilization.[17]

[17]This refers to measurable criteria to assess the trustworthiness of an information system.

The framework outlined above is intended to assess whether a particular information system can be considered trustworthy. However, there are also other models that concentrate on identifying the factors that shape the development of trust among e-customers.[18] Therefore, it is worth mentioning here the methodological proposal of Oliveira et al. (2017), which is underpinned by three basic axes: (i) competence, (ii) benevolence and (iii) integrity. This division draws its roots from the work of Chen and Dhillon (2003), which proposes a three-dimensional division of trust based on the same three aspects. In addition, four cornerstones are considered as sources of trust in the model by Oliveira et al. (2017):

1. *consumer characteristics* that consists of:
    - *trust stance*, i.e., when consumers share personal information with online vendors only when they trust specific aspects of the site (Palvia, 2009), and
    - *attitude towards online shopping* – shaped by their beliefs about online shopping and how much they value the experience (Herrero Crespo & Rodriguez del Bosque, 2010);
2. *characteristics of an enterprise*, which covers:
    - *reputation* of an enterprise – strongly correlated with customers' trust in a seller (Teo & Liu, 2007), and
    - *brand recognition* – the ability of consumers to recall and identify a brand based on their stored perceptions and memories when they encounter it (Nguyen & LeBlanc, 2001);
3. *website infrastructure*, comprising:
    - *likability* to use a website, i.e., the user's ability to quickly learn and remember the system's functions, the efficiency of the site's design, error prevention, and overall user satisfaction (Flavián et al., 2006), as well as website's ease-of-use, user-friendliness, and quality of the information on the website (Huang & Benyoucef, 2013), and

[18] This should be juxtaposed with the distinction inherent in the notation of *trust* and *trustworthiness*, which was outlined in Chapter 1.2.3.

- *(lack of) integrity, privacy and security* , resulting in the higher risk of using a website, with lower consumer satisfaction, comfort, and (perceived) negative intention to continue shopping on the website of a particular vendor (McKnight et al., 2002b);

4. *interactions*, including online shopping history, as well as past e-consumer experience (Weisberg et al., 2011), with value and satisfaction deriving from it (Palvia, 2009).

It should also be noted that their study, which employed a questionnaire using a 7-point Likert scale, demonstrates that consumer trust in online shopping is influenced by multiple determinants, such as trust stance, attitude, brand reputation, website infrastructure, and service quality. These factors influence all three key dimensions of consumer trust: competence, integrity, and benevolence. Consequently, the level of general trust exerts a direct and significant influence on the consumer's behavioral intention to participate in online purchasing activities, which further underscores the importance of trust as a multidimensional construct.

A different model-quantitative approach to measuring trust in the digital domain (more specifically: among e-consumers towards online shopping), also worth familiarizing with, is the one presented in a paper by Bianchi and Andrews (2012). The authors of this paper investigate the impact of several determinants on e-customers' purchasing decisions, attitudes, and behavioral intentions, specifically: trust in online vendors, trust in third-party assurances, perceived online risk, as well as consumer propensity to trust, and the broader cultural environment of trust. What differentiates this approach from earlier frameworks is its explicit consideration of additional contextual determinants that shape the situation, including risk-related factors and cultural background,[19] which deepens understanding of the multifaceted nature of the trust concept. The questionnaire consists of two sections (in addition to the respondents' particulars), one of which consists of statements in which the degree of agreement with them needs to be rated on a 7-point Likert scale, while the other consists of questions of varying types

[19]This can also be compared with Hofstede's approach in the form of "cultural dimensions" (Hofstede, 1984), as well as Fukuyama's view on this issue (Fukuyama, 1995), resulting, for example, in other research instruments that discuss the aspect of cultural background in the e-commerce arena (e.g., Ajmal, 2015; Greenberg et al., 2008; Hallikainen and Laukkanen, 2018).

(yes/no, choose multiple, enter a numerical value). This section of the questionnaire was designed to test the extent of personal proficiency/frequency of online shopping, while the Likert scale ratings of statements were already concerned with examining trust itself in the Internet sphere. The analysis performed by Bianchi and Andrews (2012) shows that the perceived risk on the Web negatively impacts consumer attitudes, while the attitude positively influences continued purchasing intentions. Among trust factors, third-party assurances and a culture of trust most strongly boost purchase intentions, whereas trust in online vendors and propensity to trust are insignificant.

Cultural issues are also an important factor that affects trust in the e-commerce sphere and is an issue that needs further scientific exploration. A recent study conducted by Bhattacharya et al. (2023) confirmed that the country of origin, which is a culturally dependent aspect, affects consumer privacy, trust, and intention to purchase. What should be underlined is that the authors of the study found that online retailers' privacy practices boost consumer trust, which, in turn, influences purchase intention. Again, a survey questionnaire was used with questions that respondents were asked to rate in terms of how they felt on a 7-point Likert scale. The questionnaire contained questions that were designed to examine three aspects: consumer privacy, trust, and purchase intention.

Also worth mentioning is a study by Falahat et al. (2019), which aimed to create a model of trust among e-consumers. The study was conducted using a questionnaire with a 5-point Likert scale, consisting of formulations based on the following matrices: (i) brand recognition, (ii) service quality, (iii) customer satisfaction, (iv) security, (v) word-of-mouth communication, and (vi) customer trust. The authors examined how factors (i-v) affect the formation of overall consumer trust (vi). The findings indicate that brand recognition, service quality, security, and word of mouth significantly enhance consumer trust, while customer satisfaction has little impact on it. The researchers used structural equation modeling in a two-stage process: first to evaluate the reliability and validity of the measurement model, and second to test hypotheses through structural path modeling. Confirmatory factor analysis was performed to assess reliability, convergent validity, and discriminant validity. Convergent validity was evaluated through loadings, average variance extracted, and composite reliability.[20]

[20]It is in line with the recommendation by Hair et al. (2017).

Interestingly, the questionnaire section on the particulars of the respondents (in addition to basic personal metrics) included a question not only on their level of experience with electronic purchases, but also on their monthly income.

In summary, the approaches presented to measuring trust in the digital sphere are strictly based on scientific definitions of the concept, which underscores the importance of correctly defining trust in the context of e-commerce. Application-based methods typically use quantitative tools, such as Likert scale-based questionnaires. However, it is important to take into account the sophistication of respondents in online shopping (as seen, e.g., work by Bianchi and Andrews (2012) or Falahat et al. (2019)), which can significantly affect the results of a trust survey, before proceeding. In addition, it is essential to keep in mind the OECD guidelines for measuring trust (OECD, 2017b),[21] which should provide a foundation both at the questionnaire design stage and when using alternative, non-quantitative survey methods.

1.4.2 Challenges in trust measurement

The bridge between trust and technology promises to be one of the most pressing topics on the agenda of policy research (Bodó, 2020). Several in platform regulation policy discussions are questioning the efficacy of existing regulatory frameworks in addressing our current issues (van Dijck et al., 2019). This is because in the face of today's challenges, which include the rapid expansion of AI (already being used extensively by the public), but also the spread of disinformation, it is imperative to adapt and readdress already existing norms and policies. This poses the question to the public (or more to the point), which entities can be trusted, and are all "weaponized" Internet services (see: Bodó, 2020) trustworthy? Hence, also (or especially) on the academic level, it is appropriate to take into account all the challenges that are currently forming in the creation of trust research methodologies, as well as to make them as resilient as possible against new (emerging nowadays) social concerns in the development of technology (e.g., the deepening phenomenon of "digital divide").

Depending on the realm in which trust measurement occurs, there are a range of different challenges to consider when implementing such trust-driven mechanisms. This

[21] These guidelines will be presented in more detail in Chapter 3.4.2, when describing the steps in designing a questionnaire to bivariate trust in e-commerce in the cognitive and affective domains.

dissertation, as it focuses on the study and measurement of trust in the e-commerce domain, has chipped away at the common denominator in the form of the interconnecting challenges facing the investigation of trust, with particular emphasis on the relationship between the e-consumer and the e-commerce enterprise. This was well presented in the work by Kumar Dey et al. (2009), who list the following categories of challenges, the consideration of which influences the building of customer trust in e-commerce enterprises and thus their competitive advantage.

- technological innovation (including in the field of modern interface, effective supply chain management, etc.);
- technical challenges (such as the security of currency transactions, the level of digital skills, or the speed of internet connection – especially in developing countries);
- challenges related to the personality of an individual e-consumer (i.e., propensity to trust is influenced by their personality trait, who have different expectations in terms of user experience, including ease of use, website design, or security issues);
- social challenges, which include:
  - buying habits in brick-and-mortar stores;[22]
  - customer retention problems;
  - low internet penetration;
  - lack of trust in technology due to the risk to be cyber-attacked (resulting from lack of knowledge or ignorance);
- legal compliance issues.

These challenges can be counteracted (or their effects mitigated) through the mediating role of trust-based tools, which are increasingly used in e-commerce units. Trust is the basis for creating conceptual frameworks related to recommendation systems (Cabrera-Sánchez et al., 2020; Deng et al., 2014), in food retail vendor performance

[22]This challenge was especially emphasized during the COVID-19 pandemic and in post-lockdown times (Kubiczek et al., 2021; Pollák et al., 2022).

research (Rampl et al., 2012; Singh & Sharma, 2022), and increasing innovation in the FinTech industry (Stewart & Jürjens, 2018) or mobile banking applications (Tsokota et al., 2020). Modern technologies, such as blockchain (Ferreira da Silva & Moro, 2021; Singh & Sharma, 2022; Werbach, 2018) and neural networks (Grzybowska & Karwański, 2025; Leong et al., 2020), help create these trust-based methodologies to more effectively measure trust among e-customers, in particular taking into account privacy and real-time measurement. In doing so, it should be recognized that while implementing AI-driven approaches in the creation and application of methodologies to measure trust at various levels, AI itself should also be *trustworthy*. This means that *trustworthy AI* must exhibit three key characteristics throughout its entire life cycle (Stawicka & Anderson, 2023):

- it ought to be *lawful*, i.e., be compliant with all the applicable regulations, and laws,
- it ought to be *ethical*, i.e., respect ethical considerations, principles, and values,
- it ought to be *robust*, both technically and socially, as even when deployed with noble intentions, AI systems may have unexpected consequences.

Also, it is worth noting the approach of the U.S. National Institute of Standards and Technology (NIST) to trustworthy AI systems (National Institute of Standards and Technology, 2023), according to which such a system should be: (i) valid and reliable, (ii) safe, (iii) secure and resilient, (iv) accountable and transparent, (v) explainable and interpretable, (vi) privacy-enhanced, and (vii) fair with harmful bias managed. NIST emphasizes that these characteristics should not be analyzed in complete isolation, as there are real trade-offs between, for example, accuracy, privacy, and explainability.

As seen, the integration of AI into trust measurement methodologies brings significant opportunities, but also necessitates careful consideration of AI's own trustworthiness. Ensuring that AI systems follow the above characteristics provided by Stawicka and Anderson (2023) or National Institute of Standards and Technology (2023) is essential to avoid unintended consequences and maintain reliability throughout their application.

Another challenge lies in the risk of misaligned or poorly calibrated trust in AI-based systems. Users may place excessive confidence in algorithmic recommendations because

they perceive them as neutral and precise, while limited explainability may lead them to reject recommendations that are in fact accurate. Trust should therefore not be assessed solely by self-reported confidence or willingness to rely on a system, but also by objective criteria such as reliability, fairness, explainability, privacy and accountability (Kaur et al., 2023a; National Institute of Standards and Technology, 2023). This is particularly important because AI systems operate in dynamic socio-technical contexts, where performance may deteriorate as data distributions change, biased training data may produce uneven outcomes across consumer groups, and responsibility may be difficult to assign among multiple actors. Trust assessment should therefore combine subjective indicators of customer confidence with ongoing monitoring of system performance and safeguards (Lahusen et al., 2024; National Institute of Standards and Technology, 2023).

In conclusion, the integration of trust-based tools and AI-driven methodologies into the e-commerce domain offers substantial potential to improve consumer trust and ensure a competitive edge. However, the identified challenges, ranging from technological and technical obstacles to social and legal considerations, underscore the complexity of building and maintaining trust in this digital landscape. Addressing these multifaceted challenges through resilient and trust-centered strategies will be the key to fostering sustainable growth in e-commerce.

1.5 A new interpretation of trust in e-commerce

Trust, particularly in the e-commerce domain, is defined in a variety of ways, taking into account the diversity of aspects that influence it and depending on the sphere in which this conceptualization is employed (see: Chapter 1.2.1). The issue with trust as a notion is that its definition is still up for debate and there is no agreed-upon method to assess its value (Chang et al., 2014; Gołuchowski & Paliszkiewicz, 2023; Oliveira et al., 2017).

In the context of the rapid development of e-commerce and the growing importance of trust in digital relationships, the dearth of a clear definition of trust in this area is an imminent research gap. In the literature, trust has been widely analyzed in various disciplines such as economics, management, sociology, and psychology, as presented

in Chapter 1.2.1. Each of these fields offers unique insights into the essence of trust, but a unified and integrated definition tailored to the specifics of e-commerce is still lacking, challenging researchers to create a new conceptualization.

This subchapter aims to fill this gap by developing a new interpretation of trust in e-commerce. A key step in this process is to create a theoretical framework that draws on attributes specific to different academic disciplines. Economics, in the electronic commerce realm, offers insights into consumers' rational purchasing decisions, management stresses the role of reputation and business relationships, sociology analyzes the social mechanisms of trust formation, while psychology considers the cognitive and affective aspects of a consumer's interaction with a platform. Only through the integration of these multifaceted angles is it possible to create a definition of trust in e-commerce that responds to the complexity of digital relationships.

The creation of a new interpretation of trust in e-commerce requires a nuanced approach that integrates interdisciplinary perspectives. This is because trust is a concept that is inherently multidimensional (Connolly, 2020; Fischer et al., 2023). The basis of the novel interpretation will be the central attributes of trust drawn from the aforementioned scientific spheres, including its cognitive-affective dimension, relationality, vulnerability to risk, or its "attitudinal" nature. Only a properly constructed definition, serving as the basis for the creation of research tools, will enable an accurate understanding and measurement of this phenomenon in e-commerce, laying the groundwork for analysis in the practical chapters to follow. Thus, this subsection is an important contribution to the literature on the subject and a tool that fills an existing research gap.

1.5.1 Grounding of the conceptualization process

In developing a robust methodological foundation for creating a new definition of trust in e-commerce, it is essential to employ validated scholarly approaches that facilitate a rigorous process of redefining and expanding existing concepts. In this regard, the typology introduced by Köhler et al. (2023), which describes the process of *retheorizing* through a qualitative lens, serves as a valuable framework for this undertaking. Their approach is well-suited for exploring trust in e-commerce due to its focus on restudying and reanalyzing existing definitions and concepts across management,

strategy, and social sciences. Although there is currently no comprehensive definition of trust specifically tailored to the context of e-commerce, the process of constructing a new definition involves critically examining existing definitions of trust and related concepts, making the method of retheorizing both relevant and necessary.

Köhler et al. (2023) propose four types of restudy: (1) *reanalysis*, (2) *revisit*, (3) *revision*, and (4) *repurposing*. Each type is based on the integrative literature review approach, which differs from the more traditional and commonly employed systematic literature review. According to Cronin and George (2023), an integrative review is particularly useful when the literature spans multiple traditions and research communities. This approach synthesizes fragmented knowledge from diverse vocabularies, paradigms, and methodologies, enabling scholars to uncover new insights and create novel frameworks for future research. Unlike a systematic review, which evaluates a more narrowly defined body of research, the integrative review seeks to identify and consolidate disparate sources from various intellectual traditions, making it highly applicable to the interdisciplinary nature of trust in e-commerce. This kind of literature analysis (see subsequent Chapters 1.2–1.4) was used to generate a new definition of trust in e-commerce, highlighting the key components of the interpretation (see subsequent Chapters 1.5.2–1.5.3).

For the purposes of creating a new definition of trust in e-commerce, the two types of restudy chosen from Köhler et al. (2023) are *reanalysis* and *revision*. *Reanalysis* involves reexamining existing theories (including data) from previous studies, utilizing as much of the theoretical/analytical framework preserved as possible, without introducing new perspectives from additional fieldwork. This approach allows for reinterpreting established concepts through a fresh lens while maintaining the integrity of the original theoretical structure (cf. Pina e Cunha et al., 2015; Whiteman and Cooper, 2011). In contrast, *revision* involves applying an alternative theoretical framework to reinterpret the same events or phenomena covered in previous studies. This approach can challenge the original theoretical assumptions, offering rival explanations, and potentially leading to new research questions or conclusions. *Revisions* are often prompted by the discovery of new historical evidence or insights that were not available at the time of the original study (cf. Freeland, 1996; Kramer, 1998).

By integrating these two restudy approaches, the process of retheorizing becomes more comprehensive. *Reanalysis* ensures that previous empirical work is leveraged effectively, while *revision* introduces a critical rethinking of theoretical frameworks, offering a new lens through which to view trust in the digital sphere. This dual approach also allows for the identification of gaps and limitations in existing trust definitions, facilitating the development of a new, more robust conceptualization tailored to the e-commerce environment. Importantly, this process also ensures that the emerging definition is grounded in validated research practices and is supported by a rich body of interdisciplinary literature. This approach not only provides a well-structured methodological pathway, but also contributes significantly to the academic understanding of trust by filling a critical gap in the current literature.

1.5.2 Key components[23]

As mentioned earlier, in order to proceed to the creation of a new definition of trust in e-commerce, it is essential to draw from the axial attributes of trust as such within the paradigms analyzed: economics, management, but also sociology, and (social) psychology. In the provided definitions of trust from the perspective of social psychology, their common characteristic is *expectancy* (e.g., Connolly, 2020; Frost et al., 1978; Özer and Zheng, 2018; Rousseau et al., 1998), and that is why it is decided to be the first element to form a theoretical conceptualization of the definition of trust in e-commerce. The notion of *expectancy* is closely related to the future, but also draws on past experiences ("based on these, I expect actor X to act in the Y way towards me"), which should also be used in the process of forming the definition. The very trust is an *attitude* that occurs in the present (amid incomplete information), but past experiences shape what degree of trust (or lack thereof) will occur in the future.

The presented "*expectancy*-oriented" approach is consistent with the theoretical observations presented in academic studies on trust from a sociological perspective, but

[23]This subsection will *italicize* the elements (axes) that form the basis for the newly created definition of trust in e-commerce. Some of the approaches and insights presented in this subsection have already been presented in previous parts of the dissertation, but it was deemed necessary to outline them again in order to underscore and draw attention to the "tie" between concepts, their foundation in the literature, and the core created of the conceptual theoretical space to design a new interplay of trust in the e-commerce realm.

also from the point of view of economic and management paradigms. This is indicated by the fact that in the definitions cited in Chapter 1.2.1, the *expectancy* facet recurred in almost all perceptions. However, the focus should also be on *attitude*, which, combining this with the observation from the psychological domain (and thus the approach) by Kim and Park, 2013, can be seen as the attribute of trust. In addition, trust in the digital realm is definitionally referred to as "*attitude*" (Corritore et al., 2003). Therefore, noticing trust as an *attitude* should be taken into account when establishing a new definition of trust in e-commerce. Considering also that trust itself in the e-commerce space must also derive from the properties of interactions taking place in the digital realm, this can also be matched with sheer approaches to technology acceptance, such as recognized TRA (Ajzen & Fishbein, 1980), or TAM (Davis, 1989), etc.[24] The *attitude* towards online shopping itself, formed on the basis of previous experiences, is also recognized as one of the principal factors contributing to the level of e-consumer trust (Bylok et al., 2019).

Another aspect that runs through scholarly studies on theorizing trust, particularly in psychology (Özer & Zheng, 2018; Rousseau et al., 1998), sociology (Heimer, 2001), and management (Mayer et al., 1995), is *vulnerability*. It is a core component of trust, without which trust could not continue to exist (Moorman et al., 1993; Özer et al., 2011). Vulnerability, certainly, also arises with online trust (Corritore et al., 2003). Customers place themselves in a position where they are susceptible to potential harm, such as financial loss, data breaches, or unsatisfactory product quality ("trust implies *vulnerability* to harm from a partner," as per Paliszkiewicz, 2013). In an online context, this *vulnerability* is exacerbated by the inability to physically inspect products or directly engage with sellers, making trust an essential prerequisite for any transaction. Therefore, a theoretical definition of trust must incorporate this inherent *vulnerability* as a key driver of trust decisions.

As the concept of *risk* is closely related to *vulnerability* (Mayer et al., 1995), and is crucial in shaping consumers' attitudes towards e-commerce, it is necessary to consider it within the process of creating the new definition of trust in e-commerce. This element refers to the unpredictability of online interactions, where outcomes cannot always be controlled or anticipated, albeit can be estimated. *Risk*, as a quantifiable construct, is

[24] More information on these approaches is presented in Chapter 1.3.1.

also the basis for measuring trust in an economic-digital context (Coleman, 1990). The willingness of a customer to engage in e-commerce is influenced by their perception of *risk* and the degree to which they believe that they can predict the outcomes of their transactions. The impact of *risk* on trust formation is also observed in the work of Metzger, 2006 where it was observed that digital literacy (along with perceived *risk*) directly and proportionally affects trust in the online domain. Within the realm of trust in e-commerce, the perceived level of *risk* is also (negatively) associated with the *attitude* of consumers (Bianchi & Andrews, 2012), hence its non-negligibility in the process of developing a theoretical framework is necessary.

This dynamic aligns with both *cognitive* and *affective* aspects of trust: the *cognitive* dimension allows consumers to rationally assess the probability of favorable outcomes, while the *affective* dimension may help mitigate feelings of uncertainty by fostering emotional connections with brands or vendors (Chowdhury, 2005). Trust plays a key role as a mediator between *affective* and *cognitive* processes, influencing both the intention to maintain a relationship and the tendency to seek further validation or a second opinion (da Silva Terres & Pizzutti dos Santos, 2013). Additionally, *cognitive* trust has a direct positive effect on *affective* trust, which in turn shapes behavioral intentions (McAllister, 1995). This interconnectedness between *cognitive* and *affective* trust (particularly foregrounded in Chapter 1.2.4) highlights the importance of incorporating both dimensions into the formulation of a new holistic definition of trust in e-commerce. Such an interpretation must reflect how these trust dimensions shape customer behavior, particularly in online environments, where the very trust serves as a key factor in decision-making and long-term engagement with e-commerce platforms.

Taking naturally into account the prevailing context for the creation of new definition of trust, i.e., the e-commerce space, existing conceptualizations of trust in the digital sphere should be taken into account. Its most significant elements are outlined in Chapter 1.3.2. Trust in the digital realm is particularly multifaceted, combining elements of *vulnerability*, and *risk* with *cognitive* and *affective* dimensions. E-commerce inherently involves interaction in a virtual space, adding layers of complexity due to the absence of physical presence (Shi & Chow, 2015), making the conceptualization of trust more intricate. The very nature of e-commerce, as a subset of the broader digital economy, requires trust to extend beyond traditional business interactions into

the digital domain. Online trust encompasses not only the transactional elements of e-commerce (Punyatoya, 2019), but also concerns around data privacy, cybersecurity, and the integrity of the digital infrastructure that supports these transactions (Wang & Emurian, 2005; Zarifis & Fu, 2023). Therefore, trust in electronic commerce cannot be fully understood without considering the digital environment in which it operates. In addition, as the inadequate maturity of the concept of digital trust is noted (Pietrzak & Takala, 2021), this also accentuates the imperative for scientific exploration of the issue, including the rationale for the theoretical conceptualization of trust in e-commerce.

Understanding *attitude*, *vulnerability*, along with *risk*, and *cognitive-affective* dimensions provides a holistic framework for analyzing trust in electronic commerce. By integrating these factors into the definition, the complex interplay between rational assessments and emotional responses that underpin consumer trust decisions is addressed. It should be noted that until now there has been no scientific definition of trust in e-commerce considering the present aspects together, holistically and intertwined, in particular, which took into account the diversity of trust (see, e.g., Chapter 1.2.2) in terms of cognitive-affective characteristics shaping and influencing trust toward the e-vendor (see Chapter 1.2.4). Furthermore, acknowledging the *digital* nature of e-commerce ensures that the definition remains contextually appropriate and aligned with the realities of online interactions.

1.5.3 Theoretical conceptualization of trust in e-commerce

The preceding Chapter 1.5.2 highlighted several intersecting concepts that affect the shape and level of trust in the e-commerce sphere. They draw from different scientific paradigms, but only a holistic grasp of them within the framework of the newly created interpretation of trust in e-commerce will allow proper management of further work within the practical part of this dissertation. As a cumulative recap, these key elements are as follows:

- expectancy,
- attitude,
- vulnerability,
- risk,
- cognitive and affective personal attributes,
- digital/online domain.

The last element, that is, the *digital domain*, is the context (space/environment) in which trust-oriented interactions between actors in the e-commerce relationship take place. This may be seen as a sort of distinguishing characteristic of this aspect that differentiates it from the other five (being the "descriptive" characteristics of the trust concept), making it a kind of shell ("wrapper") on which trust-based e-commerce exchanges are carried out.

As presented earlier, the above components draw to varying degrees from the paradigms of social psychology, sociology, economics, and management (see Chapter 1.2.1), and several of these disciplinary foundations overlap. Therefore, it is essential to pay attention to this relationship when constructing a theoretical framework to create a new definition of trust in e-commerce. The links in the conceptualization show the main theoretical associations from the preceding analysis, not a complete mapping of every component across all disciplines, so a missing link does not mean that a component is conceptually unrelated to a given discipline. The illustrated conceptualization of this matter is shown in Figure 1.4.

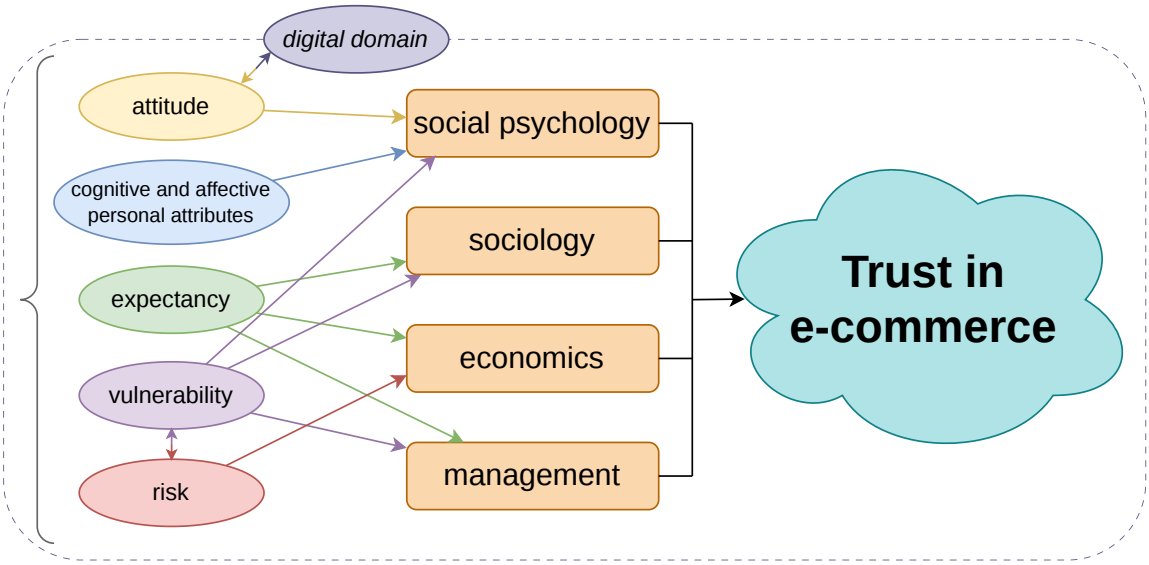


Figure 1.4: Theoretical conceptualization of the new definition of trust in e-commerce

Source: Own elaboration

Building on the above theoretical conceptualization of trust in e-commerce and a thorough thematic literature review, a new interpretation of the concept is now proposed in the following box:

Trust in e-commerce is an attitude (based on personal propensity and cognitive-affective attributes) of vulnerability-driven expectation under risk that the vendor in the e-commerce space (including the digital platform on which the transaction takes place) will honor the terms of the contract, with the goal of deepening the business relationship with the customer.

This definition aligns with existing conceptualizations, such as the one of Mayer et al. (1995) that is widely used and validated, which takes into account benevolence, integrity, and ability, as well as operating under conditions of risk and taking into account personal inclinations. Since the digital aspect is also included, it will also be able to provide a starting point for research based on (or taking into account) existing technology acceptance models, as well as creating a new methodological framework for measuring trust in e-commerce.

Although trust is individual, it can also be quantified by considering the general trust-oriented attitudes of customers toward a particular seller. It is important to note the relevance (importance) of the elements that influence the formation of trust levels in the e-commerce space. This will be the subject of subsequent Chapter 2 of this dissertation. In turn, the theoretical grounding (along with the definition of trust in e-commerce taking into account personal cognitive-affective premises) will allow to take the right direction in further research on trust. Thus, it will provide a rationale for the creation (and subsequent validation) of a new trust-based measurement methodology, which is the axis of this dissertation and fills the existing research gap.

Chapter 2

Cognitive-affective drivers of e-customer trust and behavior

Having already had a robust theoretical background on the concept of trust, it is appropriate at this point to concentrate on the next axis, which constitutes the nucleus of this dissertation. This nucleus involves the behavior of e-consumers in the context of electronic shopping, with a particular focus on cognitive-affective aspects and in the light of various (also emerging) segments of the e-commerce industry. In this chapter, consumer-oriented theories are therefore treated primarily as an explanatory foundation, while the analytical perspective of the dissertation remains focused on the customer–firm relationship and its implications for e-commerce management. This distinction is key to positioning the chapter. The literature on consumer behavior shows how people process information, perceive risk, compare options, and make purchase decisions. In this dissertation, these mechanisms are relevant insofar as they help explain how customers interpret firm-controlled cues, form cognitive and affective trust, and evaluate their e-commerce experience. The chapter thus links consumer-level behavioral mechanisms with organizationally relevant domains that can be systematically influenced through the design and management of e-commerce apparatuses.

The following chapter is devoted to the theoretical discussion of this problem. It builds on the theoretical foundation established in Chapter 1, particularly focusing on the critical concepts of cognitive-affective trust in the e-commerce domain. This chapter seeks to expand on these ideas by exploring their practical implications in specific segments of the e-commerce industry. The analysis presented here uses the

definitional insights introduced in Chapter 1.2.4, where the notion of cognitive-affective trust was conceptually delineated, and the refined definition of trust from Chapter 1.5, which provides a novel interpretation for understanding trust as a multidimensional construct in the e-commerce environment.

Chapter 2.1, entitled *Cognitive and affective drivers impacting purchasing decisions in e-commerce*, examines key technological, consumer-, price-, and service-related factors influencing online purchasing decisions, as well as selected trust moderators. The section also indicates which factors matter for managing the customer–firm relationship. Chapter 2.2, entitled *E-consumers' cognitive-affective desires in different e-commerce segments*, extends the analysis to mobile commerce, social commerce, and live streaming e-commerce, focusing on how trust formation differs across these environments and how this affects trust-building mechanisms. Chapter 2.3, entitled *A trust-supporting model in e-commerce: Organizing theories*, synthesizes previous findings into a structured model of cognitive and affective trust, linking theory to the dissertation's methodological framework. The chapter then shifts toward an organizational perspective. Chapter 2.4 discusses perceived e-service quality as an evaluative outcome of e-commerce performance, connecting it with trust formation. Finally, Chapter 2.5 presents the implementation of trust-centered practices in selected e-commerce companies, focusing on customer-facing mechanisms related to trust and service quality.

Throughout the chapter, the cognitive-affective perspective serves as the principal analytical lens connecting individual-level behavioral mechanisms with firm-controlled features of the e-commerce environment. The aim is not to treat consumer behavior as a separate field, but to use its insights to clarify how customer perceptions and choices can guide the design, evaluation, and managerial improvement of an e-commerce company's operations.

2.1 Factors shaping e-customer purchasing decisions in e-commerce

In today's experience economy, experiential marketing evolves along with digital advances, shaping the concept of online customer experience. This experience reflects the psychological state of a consumer after repeated exposure to a brand online (Rose

et al., 2012). As a result, consumers form brand impressions based on both cognitive and affective elements from websites or social media platforms (McLean, 2017).

In the e-commerce domain, gaining a deep understanding of e-consumers' desires and needs is essential for businesses striving to improve user experience and boost sales. As can be read in the aforementioned Chapter 1.2.4, they can be broadly categorized into cognitive and affective aspects (like in the trust-oriented sphere), both of which significantly influence consumer behavior (Fang et al., 2016; Foroutan et al., 2022; Kacprzak & Hensel, 2023; Shang et al., 2023; Tang et al., 2023). Cognitive aspects and needs in the e-commerce sphere involve the logical and practical considerations customers have, such as product functionality, ease of use, and efficient website navigation. These aspects influence the process of how consumers process information, make comparisons, and ultimately decide on a purchase based on rational evaluation (Lin et al., 2011). The affective aspects and desires of e-commerce (also known as "hedonic"; Desai, 2018), on the other hand, relate to emotional responses, including how consumers feel about a brand, the enjoyment of browsing, and the overall aesthetic and personalized experience offered by an e-commerce platform (Sun & Zhang, 2007). The widely studied affective dimension is often associated with the construct of "perceived pleasure," which is defined as the extent to which an individual experiences happiness or satisfaction (Eroglu et al., 2001). Emotional engagement often fosters brand loyalty and can lead to more impulsive purchases driven by a positive experience.

Cognitive and affective factors, while having an impact on the purchasing decision, do not operate in isolation; rather, they interact with each other, shaping the final purchase decision (Fang et al., 2016; Shang et al., 2023). Both cognitive and affective aspects that influence customer behavior in the e-commerce sphere are critical in the domain of website (e-store) design and user experience (Lorenzo et al., 2007). Together, cognitive and affective factors shape the full spectrum of consumer decision-making, impacting everything from initial interest to final purchase and post-purchase satisfaction. For example, the perceived quality of a website (a cognitive factor) can enhance the enjoyment of shopping (an affective factor), while positive experiences from previous interactions (an affective factor) can strengthen cognitive trust. This interplay underscores the complexity of consumer decision-making, where rational assessments and emotional responses jointly contribute to shaping intentions and choices. This

dynamic also applies to trust, where both cognitive and affective dimensions show a positive correlation with customer satisfaction (Punyatoya, 2019). Therefore, it is of great significance not to treat these aspects as separate entities but to handle (study) them together, which will allow one to address the identified research gap more thoroughly and appropriately. By focusing on both dimensions, e-commerce companies can deliver a more comprehensive user experience that fulfills the rational and emotional needs of customers, ultimately driving greater satisfaction, loyalty, and revenue growth (Fang et al., 2016).

Baubonienė and Gulevičiūtė (2015), drawing on earlier studies of online shopping behavior, organize the factors influencing online purchasing decisions into four broad categories: *technological*, *consumer-related*, *price-related*, and *product/service-related* factors. In this dissertation, two terminological adaptations are introduced to align it with the analytical perspective adopted in this dissertation.[25] Each of these individual factors can be identified as a facet that has a cognitive or affective impact, as well as a mixed one, being a hybrid of a cognitive and affective factor simultaneously. This attribution will be done manually with due care, but with cautionary embedment (attachment) of this attribution in the scientific literature. In such a conceptualization, Chapter 1.2.4 serves as a starting point, where cognitive and affective trust (along with the antecedents that have an impact on its formation) were defined. This approach is acceptable since trust is a key mediator in e-commerce purchase decisions (Choi & Mai, 2018; Kim & Peterson, 2017; Oliveira et al., 2017; Palvia, 2009; Pavlou, 2003; Singh et al., 2024; Tajvidi et al., 2021; Zhai & Chen, 2023; Zhang et al., 2022b), shaping the needs of e-customers at the same time.

2.1.1 Technological factors influencing e-consumers' decisions

In the ever-evolving realm of e-commerce, technological advancements serve as fundamental drivers of consumer purchasing behaviors. The interaction between

[25]Baubonienė and Gulevičiūtė (2015) use the term "consumer-related" factors, which are referred to as *individual factors* to emphasize characteristics, perceptions, and experiences attributable to the individual rather than the role of the consumer itself. The authors also distinguish a joint category "product/service." From a managerial perspective focused on the e-commerce firm–customer relationship, this dissertation emphasizes the service dimension.

consumers and digital platforms is heavily influenced by various elements, such as website quality, information delivery, interactivity, personalization, and secure payment systems. Together, these factors determine how consumers perceive trustworthiness, usability, and satisfaction in their online shopping experiences. The ability of a platform to provide seamless navigation, accurate and clear information, and innovative features that mimic physical shopping interactions can significantly enhance user engagement and decision-making. Furthermore, tackling issues like information overload and leveraging technologies to tailor the shopping experience are of importance for building consumer trust and long-term loyalty. This subchapter delves into these technological influences, exploring how they shape the behaviors, preferences, and satisfaction of e-consumers in their decision-making processes. Each of the factors discussed will also be aligned with either an affective or cognitive impact category, guided by the theoretical considerations outlined in Chapter 1.2.4.

Perceived website quality / usability

The quality of a website, including its usability, aesthetics,[26] and functionality, also affects the customer's trust in the online space. In today's digital landscape, online entrepreneurs must prioritize user-friendly websites that deliver an optimal user experience to remain competitive (Semerádová & Weinlich, 2020). Consumers prioritize the usability of the website, which includes clarity of content, ease of use, and trustworthiness of the information provided (Prastawa et al., 2019). A website that is easy to navigate, along with having a user-friendly interface, facilitates the consumer's ability to find information quickly and efficiently (Engriani & Novaris, 2020). Perceived web quality, particularly in terms of usability, has a strong influence on consumer trust in online shopping platforms (Akbar & Azeemi, 2017; Hsiao et al., 2010). This is consistent with the findings of Elwalda et al. (2016) that indicate that consumers favor websites that enhance their shopping experience, as ease of use is a critical precursor to establishing trust in the online environment. In addition, usability goes beyond simple navigation to include the overall effectiveness of the website in meeting user needs. Research shows that when consumers perceive a website as both useful and easy

[26] A separate section within this subchapter, which can be found later on, is dedicated to the aesthetic aspects and visual design of the website.

to navigate, their trust in the platform increases substantially (Elwalda et al., 2016; Flavián et al., 2006; Tandon et al., 2016).

Is it a cognitive or rather affective aspect? The quality of a website can be assessed in terms of technical solutions that affect perceived usability and ease of use. Due to the perceived quality factors itself, as well as the functionality of the website that has a direct impact on the rational reasoning of e-customers and thus influences their purchasing decisions (Elwalda et al., 2016; Engriani & Novaris, 2020; Tandon et al., 2016), it was decided to classify this factor as ***cognitive***.

Implemented security protocols

Implementing robust security protocols on e-commerce platforms is crucial to safeguarding consumer data and ensuring the integrity of online transactions. By improving security measures, businesses can foster consumer trust and confidence, which are essential for the sustained growth of the digital marketplace. Security measures also affect the overall user experience. If security protocols are too cumbersome or intrusive, they may frustrate consumers and lead to cart abandonment. E-commerce platforms should therefore try to balance adequate security with user-friendly interfaces to maintain consumer engagement (Meskaran & Ismail, 2012). A seamless checkout process that incorporates security features without compromising usability is essential to encourage purchases. There should never be a compromise between operational convenience and security; rather, usability should serve as a guiding principle in the implementation of standards designed to protect consumers. This is supported by the work of Chiang et al. (2018) who emphasized that e-consumers pay attention to privacy, security, and usability issues of the website where they shop online. Balancing user-friendly design on e-commerce platforms with robust protective measures ensures that security protocols are seamlessly integrated into the shopping experience without sacrificing functionality or trust (Tambunan et al., 2018).

Perception of risk is also considered a critical factor in shaping purchasing behavior in the e-commerce domain. Consumers are often concerned about potential threats, such as identity theft, fraud, and data breaches. Effective security measures can alleviate these concerns, leading to a reduction in perceived risk and an increase in purchase intentions (Falahat et al., 2019). For example, platforms that prominently

display security certifications and privacy policies can enhance consumer confidence and encourage transactions (Rane & Meshram, 2012).

Moreover, compliance of the e-commerce website with international security regulations and standards, such as the General Data Protection Regulation (GDPR) in the European Union or Payment Card Industry Data Security Standard (PCI DSS), can enhance customer trust. E-commerce platforms that adhere to these regulations demonstrate a commitment to protecting customer data, which can positively influence purchasing decisions (Kumar et al., 2020b). Consumers are more likely to engage with companies that prioritize compliance and transparency in their security practices. It is important to emphasize that in the e-commerce ecosystem, not only should the website itself adhere to international and local standards, but so too must the third-party partners it collaborates with, such as payment gateway plugins, shipping integration services, and other external solutions. Ensuring compliance across all interconnected components strengthens the overall reliability and security of the platform, fostering trust and consistency in the consumer experience.

Is it a cognitive or rather affective aspect? Technical and legal considerations related to privacy, ensuring transaction security, and data processing do not have an emotional impact, but instead have the effect of increasing rational appeal (Falahat et al., 2019; Kumar et al., 2020b). Hence, it has been assigned to ***cognitive*** factor.

Website aesthetics/appearance

The aesthetic appeal of a website contributes significantly to building affective trust. Visually pleasing websites create a positive first impression, which helps build trust. Research has shown that aesthetic appeal influences how consumers judge product quality and also improves their overall shopping experience (Sivakumar et al., 2023). A thoughtfully designed website with attractive layouts and visuals can convey professionalism and reliability, thus strengthening cognitive trust. Also, emotional responses triggered by aesthetic elements can foster a more positive attitude toward the website and its offerings. Consumers are more inclined to trust a site that appears polished and professional, as it reflects the brand's commitment to quality (Blagoeva et al., 2023). In this context, Hagag et al. (2015) presents significant work that explicitly highlights the need to adjust company websites in terms of optimizing web design and

interface elements, including language, color schemes, contrast, layout, positioning, size, shape, and texture, to improve usability and user-friendliness. Additionally, factors such as aesthetic appeal, consistency, responsiveness, clarity, and conciseness contribute significantly to increasing user engagement with the platform's products and encouraging longer browsing sessions (Mohamed Fadel Bukhari et al., 2013).

The affective needs of e-consumers are also shaped by their desire for tactile interaction and two-way communication. Since physical interaction with products is absent online, some consumers still lean toward traditional shopping. However, e-commerce platforms that offer interactive features such as live chats or augmented reality help bridge this gap, creating a more immersive experience (Kowalczuk et al., 2021; Lee et al., 2017). This interactivity improves information gathering and builds a connection between the consumer and the brand, which is crucial to affective satisfaction. It is also vital to note that consumers who can evaluate the functionality and reliability of e-commerce platforms are more likely to trust these systems and engage in transactions. E-consumers who actively assess and interact with digital interfaces develop a greater sense of control over their shopping experience, positively affecting their purchasing behavior (Lee & Jin Ma, 2012). This capability is crucial in environments where consumers cannot physically inspect products, fostering reduced uncertainty and enhance decision-making in the e-commerce sphere. Furthermore, personalization technologies that tailor the shopping experience to individual preferences can significantly influence consumer decisions. By analyzing consumer behavior and preferences, e-commerce platforms can provide personalized recommendations, improving the likelihood of purchases (Trivedi & Yadav, 2018). This practice and dependency are not only noticeable among younger Internet users, but also take place among middle-aged people, characterized largely by less digital proficiency. This tailored approach not only improves overall user satisfaction, but also helps to enhance customer trust, and hence loyalty, in different sociodemographic groups.

In the context of online shopping, the visual and interactive stimulation provided by a website significantly enhances the perceived pleasure of users (Hsieh et al., 2014; cf. Eroglu et al., 2001). Specifically, more appealing website designs have been shown to amplify this sense of pleasure (Afonso Vieira & Vaz Torres, 2014). Moreover, when

consumers find the design of the page satisfying, a positive correlation emerges between perceived pleasure and their intentions of purchasing (Chen et al., 2020).

Is it a cognitive or rather affective aspect? It is recognized that the visual appeal of an e-commerce website (or more broadly: a web service), encompassing its design, aesthetics, interactivity features, and overall appearance, plays a pivotal role in shaping consumer behavior, including impulsive buying decisions (Zheng et al., 2019), and enhancing their perceived pleasure (Chen et al., 2020; Hsieh et al., 2014). This factor influences users' emotional responses, fostering a sense of comfort and engagement that aligns with the ***affective*** dimensions of trust in e-commerce.

Interactivity

Interactivity is one of the most influential features of e-commerce platforms, shaping both cognitive evaluations and affective responses of online customers. Through elements such as live chats, interactive reviews, or social shopping features, users experience a sense of engagement and participation that strengthens their connection to the platform. The convenience, enjoyment and entertainment derived from interactive encounters contribute to greater satisfaction and pleasure during the shopping process (Bugshan & Attar, 2020; Hettiarachchi et al., 2018; Mou & Benyoucef, 2021). Direct exchanges with peers and immediate feedback foster participation and loyalty (Deng et al., 2023), while the interactive design of a retail website can effectively compensate for the reduced control inherent in online transactions of consumers (Wu, 2019). Perceived interactivity has also been identified as an important determinant of digital trust and e-loyalty (Chu & Yuan, 2013), with higher levels of interactivity generating more favorable attitudes and stronger behavioral intentions towards the platform (Xu & Sundar, 2014).

Is it a cognitive or rather affective aspect? Although interactivity originates from technological design, in this study it is classified as an ***affective*** basis for trust, since it evokes emotional responses such as enjoyment, engagement, and social connection that strengthen the affective attachment of consumers to the platform (Wu, 2019; Xu & Sundar, 2014).

2.1.2 Individual factors influencing e-consumers' decisions

Consumer purchasing decisions in e-commerce are shaped by a variety of personal, psychological, and cultural factors, each influencing the way individuals interact with online shopping platforms. These elements encompass attitudes, personal characteristics, and broader cultural influences that collectively guide consumer behavior. Although convenience and accessibility are hallmark advantages of e-commerce, individual differences such as trust levels, perceived risks, and demographic traits play a pivotal role in shaping purchasing patterns. In addition, factors such as consumer anxiety, information asymmetry, and digital literacy strongly shape the online shopping experience, influencing how easily and confidently consumers make their purchasing decisions. This subchapter explores the multifaceted nature of these consumer-driven influences, examining their implications for trust, satisfaction, and engagement in the e-commerce landscape. Consistent with the previous subchapter, this analysis will also include assigning factors to cognitive or affective dimensions.

Consumer experiences in online shopping

Understanding the factors that shape consumer experiences toward online shopping is essential for e-commerce businesses seeking to build trust and encourage repeat purchases (Huseynov & Yıldırım, 2014). Experiences shape individuals' attitudes toward online shopping, which are in turn influenced by a range of factors, including marketing communications and social influences (Eri et al., 2011). Moreover, perceived risks and the overall shopping environment have an impact on this issue. Positive experiences with e-commerce have been shown to foster favorable attitudes, which in turn increase the likelihood of repeat purchases (Eri et al., 2011; Tzavlopoulos et al., 2019). In contrast, negative experiences can breed skepticism and reluctance to online shopping. However, as consumers become familiar with online shopping processes, their perception of associated risks tends to diminish, contributing to a more favorable view of e-commerce (Kim & Lennon, 2010). This shift in consumer experiences is crucial for e-commerce businesses that seek to build and maintain lasting customer relationships.

Consumers in the e-commerce domain value distinct attributes when evaluating their shopping experiences. This variation requires companies and marketers to investigate the behavior and preferences of online consumers to tailor services and, for example,

improve the quality of delivery (Chiang et al., 2019). As a result, integrating advanced technologies for data collection and analysis on e-commerce platforms has become essential. Providing reliable, high-quality and cost-effective products and services, coupled with trustworthy purchasing and delivery mechanisms, can contribute significantly to strengthening a brand's reputation, fostering customer loyalty, and increasing its market prominence (Rosário & Raimundo, 2021).

Is it a cognitive or rather affective aspect? Identifying consumer experiences as either a cognitive or affective factor in the process of trust formation in e-commerce presents a complex and multifaceted challenge. The influence of the online shopping experience is particularly emphasized (Tzavlopoulos et al., 2019), as it directly affects the cognitive dimension of the development of trust. It is also associated with the potential emergence of consumer anxiety (Bertea, 2015). Moreover, the influential phenomenon of information asymmetry in e-commerce places the seller in a privileged position, affecting both the emotional and cognitive responses of consumers (Tang et al., 2023). Although information asymmetry itself can be classified within both cognitive and affective categories, the very consumer experiences, which are shaped by indirect affective influences, are ultimately assigned to the ***cognitive*** dimension in this context. This is consistent with the findings of Johnson and Grayson (2005), who demonstrated that satisfaction with previous interactions with a given service provider exerts an influence on cognitive trust, but has no effect on affective trust.

Opinions about the vendor (its reputation)

E-customers often use online platforms to gather information about products, compare prices, and read reviews before making a purchase. This exploratory behavior is enabled by abundant online information, empowering consumers to make better-informed decisions (Rangaswamy et al., 2022). The ability to access and evaluate various sources of information enhances consumer confidence and reduces perceived risk, ultimately influencing consumer purchases (Nguyen & Nguyen, 2020).

An important aspect that influences the purchasing decisions of e-customers is the opinions posted online about both the product and the online vendor (the so-called *electronic word-of-mouth*, or *eWOM*). Consumers, when shaping their trust towards the particular e-commerce platform, often rely on the experiences of others when making

decisions (i.e. opinions or recommendations; Hsiao et al., 2010; Jilcott Pitts et al., 2018), highlighting the importance of managing the online reputation and encouraging satisfied customers to share their experiences. Research conducted in the United Kingdom (Obiedat, 2013) has demonstrated that online reviews significantly influence consumer purchasing decisions, as consumers regard them as a crucial source of product information that aids their decision-making process. The quality of these reviews has a particularly strong impact on consumers with high cognitive needs. It means that those who prefer to analyze information thoroughly and critically assess the arguments within the reviews. They also tend to engage in the central route of attitude change, relying on detailed and logical processing. In contrast, the number of online reviews affects consumers with lower cognitive needs more strongly, who are less inclined to engage in detailed analysis and are instead guided by the popularity of a product and the volume of positive feedback (Lin et al., 2011; Obiedat, 2013).

When it comes to the number of reviews, quantity also does not always go hand in hand with quality. A large number of positive reviews can indicate a favorable reputation, increasing trust in the store and encouraging purchase (Foroutan et al., 2022). However, it is essential to note that customers are increasingly aware of the potential for review manipulation; therefore, it is crucial that reviews remain authentic and credible. This influences the perceived reputation of the e-store, understood as the degree to which people view the company as trustworthy and attentive to customer needs (Doney & Cannon, 1997). Reputation is considered a key factor in online sales, especially given the lack of sales personnel to guide buyers and the inability for customers to physically inspect, touch, or test products before purchase (San Martín & Camarero, 2009). Furthermore, the reputation of the brand significantly affects the final decision of an e-consumer to make a purchase (Rigo et al., 2024).

Is it a cognitive or rather affective aspect? It is observed that interpersonal influence, which can include communicated product feedback (either electronically - eWOM, or traditionally - verbally), is one of the key factors influencing impulsive buying (Zheng et al., 2019). However, learning about a seller's opinion increases knowledge about them, which affects the e-consumer's reasoning sphere, as studies confirm (Obiedat, 2013). Consequently, this aspect can be counted among both the ***affective*** and ***cognitive*** constituents of trust in e-commerce. Nevertheless, to ensure

a more balanced distribution of affective and cognitive trust factors, vendor-related opinions were classified as ***affective*** for the purposes of this study, while recognizing that they may also contain a cognitive component.

2.1.3 Price-related factors influencing e-consumers' decisions

In e-commerce, pricing strategies such as comparison shopping, dynamic pricing, and promotions drive consumer decisions by balancing perceived value and urgency, positioning platforms as leaders in a competitive market. This subsection focuses on addressing these issues, striving to attribute the aspects in question to cognitive or affective factors shaping the purchasing needs of e-customers.

Price fairness

The convenience of comparison shopping on e-commerce enables consumers to quickly evaluate prices across multiple platforms. However, as Jilcott Pitts et al. (2018) observe, consumers in online environments often exhibit less price sensitivity than in traditional retail settings. This reduced sensitivity is largely due to their reliance on online reviews and recommendations to guide purchasing decisions. However, when consumers compare prices, their choice is typically driven by the option that offers the best perceived value, underscoring the significant role that price comparisons play in shaping final purchase decisions.

The growing adoption of dynamic pricing strategies, in which prices adjust based on demand and various other factors, significantly shapes consumer behavior. Consumers' awareness of such strategies can affect their buying intentions, creating uncertainty about whether they are getting the best deal (Victor et al., 2018). To maintain customer trust, e-commerce platforms must skillfully navigate the complexities of dynamic pricing with transparency and fairness. Nevertheless, when implemented thoughtfully, dynamic pricing can also be considered an effective marketing strategy in the e-commerce domain (Yin & Han, 2021), enabling firms to optimize revenue, respond to market trends in real time, and create a perception of value tailored to consumer demand. It is also worth noting that, in terms of high-performance marketing schemes, consumers perceive a higher transaction value when an online seller uses the sale price of another online

retailer as a reference price for the advertisement compared to using the sale price of an offline competitor (Lo et al., 2013).

Is it a cognitive or rather affective aspect? Price fairness is primarily associated with cognitive processes, as they involve rational evaluation of information, comparison of alternatives, and assessment of economic benefits and fairness (Victor et al., 2018; Yin & Han, 2021). Therefore, these elements are attributed to the ***cognitive*** dimension of trust.

Price attractiveness

Beyond rational assessment of price fairness, consumers also respond emotionally to how prices are presented and promoted. The affective dimension of pricing is reflected in the perception of attractiveness, immediacy, and excitement triggered by discounts or promotional messages.

In the former subsection, it should be noted that price promotions, including discounts and special offers, serve as powerful instruments for attracting consumers in the e-commerce space.[27] According to Fagerstrøm and Ghinea (2011), price often becomes the decisive stimulus at the point of online purchase, outweighing online recommendations. Limited-time offers and discounts, in particular, play a key role in driving customer action by creating urgency and prompting immediate purchasing decisions. By strategically offering time-sensitive incentives, businesses successfully tap into consumers' urge to lock in perceived value, positioning price promotions as an essential element of e-commerce marketing. In a mature market, price is no longer the primary factor in customer decision-making (Liu, 2015; Liu et al., 2017).

Is it a cognitive or rather affective aspect? Strategies related to pricing in an e-commerce environment (particularly promotions and discounts that evoke excitement or urgency) are primarily tied to the ***affective*** layer of consumer behavior, as they stimulate emotions and impulses associated with purchasing decisions (Victor et al., 2018; Yin & Han, 2021).

[27] Promotions are closely related to the pricing aspect, so it was decided that this aspect would be initially addressed here, but more about the marketing activities of e-sellers appear in the following subsection entitled *"Marketing strategy of the vendor"* in the following Chapter 2.1.4.

2.1.4 Service factors influencing e-consumers' decisions

The dynamics of e-commerce underscore the key role of product and service factors in shaping customer trust and decisions. The subchapter explores how key determinants, including non-price-related marketing strategies employed by the vendor, country of origin effects, and corporate social responsibility (CSR) practices, influence e-consumer behavior. By applying affective-cognitive trust frameworks, this analysis examines how these factors shape trust in online transactions. Understanding these elements provides insight into the mechanisms by which vendors can foster customer trust, enhance satisfaction, and ultimately drive sustainable engagement in the digital marketplace.

Marketing strategy of the vendor (non-price-related)

E-commerce platforms offer a centralized space with detailed product listings and information to support user decisions. Unlike traditional marketing, e-commerce gives customers access to extensive information about companies, products, and practices through websites, reviews, and recommendations (Hexin & Jing, 2011). As Yen (2014) highlights, established companies reduce uncertainty and build trust crucial to online transactions. This evolution has made eWOM essential for attracting and retaining customers (Zheng et al., 2013), as mentioned in the previous paragraph. To succeed, companies must focus on providing quality products, superior services, and engaging customer experiences (Rosário & Raimundo, 2021).

An important aspect of building trust in e-commerce is properly targeted advertising. For example, respondents to a survey authored by Aichner and Shaltoni (2017) indicated that they would like to see more advertising on products and services for people with disabilities, as they need more information to compare offers from different providers. The research also found that personalized outreach to potential customers in this case influences the formation of trust in the e-commerce space. This is in line with the research by Montgomery and Smith (2009) (and supported by Wang, 2022), which underscores the effectiveness of personalized marketing strategies, such as customized product recommendations and targeted promotions, in engaging consumers and improving their likelihood of making purchases. Personalization not only improves customer satisfaction, but also cultivates a sense of connection between consumers and the brand, ultimately encouraging repeat purchases.

Is it a cognitive or rather affective aspect? The e-commerce company's marketing strategies are aimed at getting consumers to ultimately make a purchase by influencing their emotions. Consequently, this factor has been allocated to the ***affective*** sphere of trust in e-commerce.

Information transparency

The quality of information also has a direct impact on whether a buyer makes a purchase decision or not. For example, consumers are more likely to engage with platforms and e-stores that offer comprehensive product details and transparent pricing, as these elements reduce uncertainty and improve confidence in decision-making (Xie & Qin, 2011). The quality of the information on the platform, the functionality of the system, and the delivery of services significantly elevate the perceived value of consumers, which in turn increases their purchase intentions, and trust that mediates the relationship between perceived value and intention (Han et al., 2023). Ensuring efficient delivery processes constitute essential components of business strategies aimed at enhancing consumer trust (Chiang et al., 2019; Rosário & Raimundo, 2021). However, while an abundance of information can improve the shopping experience, too much data can lead to cognitive overload because the human capacity to process information is limited (Gao et al., 2012). The interaction between information quantity, information quality, and cognitive processing modes is also relevant to understanding decision-making in information-rich environments such as e-commerce. In addition, unconscious thought emerges as a potential mechanism to address the challenges of information overload, allowing consumers to navigate complex decision-making scenarios with greater satisfaction (Gao et al., 2012).

The availability of diverse and secure payment options can also have a significant impact on consumer decisions. E-consumers are more likely to complete purchases when they have access to multiple payment methods, including credit cards, digital wallets, and buy-now/pay-later (BNPL) options (Sutia et al., 2020). Ensuring that these payment methods are secure and user-friendly is essential to encourage transactions. Choice is not the enemy; rather, it is essential to empower consumers with options, ensuring that they are neither overwhelmed nor compelled to adhere to a prescribed way of engaging with an online e-commerce platform.

Is it a cognitive or rather affective aspect? With the influence of the volume and quality of the available information, which can cause (or hinder) specific cognitively motivated behaviors in the sphere of e-commerce (Gao et al., 2012; Han et al., 2023; Xie & Qin, 2011), it was decided to classify this factor as ***cognitive***.

Country of origin

The provision of the information regarding the country of origin (COO) of an e-commerce vendor has been shown to fulfill consumer rights (including their perceived and factual privacy) and enhance trust, thus positively influencing purchase intentions (Bhattacharya et al., 2023). Consumer perceptions of a seller's reputation (shaped, among others, by its COO) positively influence their attitudes toward both the seller and the e-commerce intermediary, highlighting the critical role of perceived reputation in shaping consumer behavior in online marketplaces (Moriuchi, 2021). In terms of creating trust, it is also important to clearly communicate the origin of products, especially if they come from the EU. This is because it has been shown that among e-consumers, EU-branded products are perceived as better quality, safer, and more reliable (Aichner & Shaltoni, 2017).

After the investigation of scientific literature, it is seen that the role of COO in shaping cognitive and affective trust in e-commerce is underexplored. As e-consumers tend to rely on COO as a key cue for shaping their trust in global online markets, including cross-border selling being an exceptionally fast-growing branch of e-commerce, further research into its impact is essential.

Is it a cognitive or rather affective aspect? Despite the lack of clear indications based on a review of the scientific literature, it was decided to attribute this aspect to ***cognitive*** factors, with attention paid to the importance of the impact of consumer personal characteristics (including culture, economic status, or demographics) along with personal experiences in making purchases from a particular country of origin (which had a decisive influence on this assignation).

CSR practices

Corporate social responsibility (CSR) practices can improve consumer trust in e-commerce platforms. They contribute to a positive brand image that can significantly

influence consumer buying decisions. E-consumers are increasingly sensitive to CSR efforts, and a strong commitment to CSR can enhance the general perception of an e-commerce platform (Bartók, 2018). In addition, effective communication of CSR initiatives can enhance consumer perceptions and influence purchasing decisions (Bartók, 2018). This positive brand image can lead to increased customer loyalty and repeat purchases, as consumers prefer to support brands that align with their values. Moreover, the consistency of the CSR activities carried out by the companies of the e-commerce platform positively impacts the purchases intentions of users (Peng & Hou, 2023). However, a study conducted by Malekian et al. (2023) indicates that the CSR activities of e-commerce websites can have a detrimental impact on the purchase intentions of customers. The diversity of research results highlights the relevance of this thread and confirms the need for a deeper investigation into the matter.

CSR initiatives, which are undertaken by e-commerce companies in different sectors, positively impact both short-term buying intentions and long-term customer loyalty (Anastasiadou et al., 2018; Bianchi et al., 2019; Popa et al., 2022). This result implies that consumers demonstrate a greater propensity to buy from brands that actively participate in socially responsible initiatives. In line with this, research by Liu et al. (2018) emphasizes that consumers' attitudes toward CSR play a crucial role in shaping their purchasing intentions. A favorable perception of a company's CSR activities can, therefore, enhance customers' willingness to make a purchase. Moreover, since CSR requires companies to consider the interests of various stakeholders, their reputation and consumer trust can therefore be improved (Cheng & Ding, 2021; Xiao et al., 2023). This trust is paramount in e-commerce, where consumers often rely on intangible cues to assess product quality and vendor reliability.

In addition, it should be noted that CSR and ethical business conduct go hand-in-hand when it comes to building trust in e-commerce. Practices such as transparent communication, respect for consumer rights, environmental responsibility, and data protection enhance perceptions of integrity and benevolence (cf. Mayer et al., 1995), reinforcing both cognitive and affective trust. By demonstrating a genuine social and environmental commitment, online vendors promote moral credibility that strengthens emotional attachment and rational confidence in their reliability (Kang & Atkinson, 2021; Pérez & Rodríguez del Bosque, 2015).

Is it a cognitive or rather affective aspect? On the one hand, CSR can be seen as a cognitive aspect of trust in e-commerce, as learning about social responsibility mechanisms affects long-term positive perceptions of a company or sales platform (Bartók, 2018). On the other hand, there is the influence of CSR on the intention to purchase (Liu et al., 2018; Malekian et al., 2023; Peng & Hou, 2023), which has an impact on the emotional sphere also shaped by the personal worldview, characteristics of the consumer and their attitudes towards e-commerce (Pérez & Rodríguez del Bosque, 2015). Therefore, the use of CSR practices by an e-commerce company can act as both an affective and cognitive trust-building factor. However, in order to ensure a better balance between the number of trust-based affective and cognitive factors, it was decided that for the purposes of this study, CSR practices would be assigned to the ***affective*** category, however, considering their cognitive setting.

2.1.5 Moderators of trust in e-commerce: A one step further

The factors discussed in the previous sections do not exert the same influence on all e-customers or in every purchasing situation, since their importance can differ according to individual traits, levels of digital competence, psychological characteristics, and the surrounding informational context. The theoretical model is extended by treating selected factors as potential moderators or boundary conditions of trust formation and online purchasing behavior. This subchapter does not specify moderators for the empirical model but highlights conditions under which relationships between customer perceptions, trust, and purchasing behavior may vary in strength or direction, which is managerially relevant and suggests avenues for future research.

Customer personal characteristics

Customer characteristics, including personality traits, demographic factors, and previous shopping experiences, significantly contribute to determining consumer purchase behavior. For example, personality traits have been shown to influence the adoption of online grocery shopping, and certain traits make people more likely to engage in such activities (Piroth et al., 2020; cf. Melnyk et al., 2019). This is consistent with the findings of Anaza (2014), who highlight that personality traits significantly shape customer behavior in online shopping environments. However, despite their evident

impact, the role of personality traits in e-commerce contexts remains underexplored, warranting further investigation.

Consumer behavior is strongly shaped by demographic attributes, including age and financial status. Younger consumers, often characterized by greater technological proficiency, tend to display more positive attitudes towards online shopping compared to older individuals, who may be more hesitant due to limited familiarity with digital tools (McIntosh et al., 2021). However, interestingly, young people, despite using the Internet much more frequently, are less likely to benefit from more advanced online features, such as online shopping and e-government (Serrano-Cinca et al., 2018). Additionally, income levels significantly influence purchasing power and the range of products consumers are willing to buy online. Higher-income individuals are more likely to participate in e-commerce, driven by greater access to technology and higher disposable incomes (Valarezo et al., 2020). In view of the above, customer characteristics, such as the aforementioned age or income, but also gender identity, age, education, or ethnicity, can be closely tied to the phenomenon of the digital divide, as well as levels of digital literacy. Consequently, they significantly influence the decision-making behaviors of e-consumers. Recognizing the importance of these correlations, the subsequent subsection will focus on exploring these characteristics in even greater depth, particularly in relation to the "tech-savviness" of consumers.

Cultural factors also play a significant role in shaping consumer behavior within the e-commerce landscape, as they influence perceptions of trust, risk, and value in online shopping. Consumers of different cultural backgrounds approach online purchasing decisions through different lenses (cf. Hofstede, 1984). For example, individuals in collectivist cultures often prioritize social proof and rely heavily on peer recommendations, while those in individualistic cultures tend to value personal choice and autonomy in their decision-making (Rosillo-Díaz et al., 2019). This aligns with the findings of Jiang and Jones (2014), who emphasize that consumer confidence and preference, which are often rooted in cultural perceptions, directly impact international online shopping behaviors. Recognizing and addressing these cultural differences is crucial for e-commerce platforms aiming to craft targeted marketing strategies and foster deeper consumer engagement.

Is it a cognitive or rather affective aspect? Consumer personal characteristics is a factor that ambiguously corresponds to the cognitive or affective realm of trust in e-commerce, due to the complexity of the concept and the diversity of consumers. In view of this, it was decided that this factor would not be directly attributed to the cognitive or affective category.[28] Nevertheless, its relevance and impact on consumer attitudes and the level of tech-savviness of the e-user is acknowledged.

Tech-savviness of the end user[29]

E-consumers increasingly prefer advanced technologies that enhance their shopping experience, driven by a desire for greater efficiency and convenience. Users, who are more proficient in using modern online technologies, are typically more adept at navigating complex interfaces and leveraging the sophisticated features offered by e-commerce platforms (Butnampetch et al., 2020). They are also more likely to adopt new technologies, seeing them as beneficial to their shopping experience, which boosts engagement, satisfaction, and purchasing decisions. Consumers who are skilled in digital tools are more likely to explore various online shopping options and make informed decisions. Research shows a positive correlation between technological self-efficacy and the willingness to participate in online shopping (Yaoyuneyong et al., 2014). This confidence enables users to navigate e-commerce platforms effectively, assess product details, and take advantage of features such as reviews and ratings, improving trust in the purchasing process (Song et al., 2021).

[28] More in-depth sociocultural research (which is not the focus of this dissertation) is needed to investigate how consumer characteristics shape trust in the cognitive and affective spheres, with particular emphasis on the context of online shopping.

[29] This section of factors influencing purchases in the e-commerce sphere admittedly deals with technological aspects, but they directly relate to the personal attributes of the customer using a given sales platform. Therefore, this section should be considered as one that can be attributed to both technological and individual factors. However, since this subsection focuses on aspects related to individuals (customers), although influenced by technological factors, it was deemed more appropriate to include these "tech-savvy" elements within the section that addresses individual factors.

The above are directly related to the *"perceived ease of use"* attribute,[30] which is considered a critical factor influencing consumer satisfaction and loyalty in online shopping environments (Piroth et al., 2020). Furthermore, as mentioned earlier, efficient interactions with e-commerce websites encourage consumers to return for future purchases, promoting repeat buying behavior (Lee & Jin Ma, 2012). This efficiency is closely tied to the design of the particular website, along with its functionality (cf. Elwalda et al., 2016; Hsiao et al., 2010; Sivakumar et al., 2023; Tandon et al., 2016), which can significantly enhance or impede the shopping experience.

When considering the aspect related to the proficiency of the end user, i.e., the consumer using an online sales platform, it is also essential to keep in mind considerations related to the *digital divide* and *digital literacy*, with their implications on the shopping experience. The digital divide, especially exacerbated after the COVID-19 pandemic outbreak, refers to the gap between individuals who have access to digital technologies and those who do not (Lythreatis et al., 2022). This phenomenon creates disparities in the access to e-commerce, influencing purchasing behavior.[31] Consumers with limited access to the internet or device are less likely to shop online, missing out on benefits, including convenience and product variety (Zhu & Chen, 2012). Research highlights that people of lower socioeconomic backgrounds often face internet access barriers, restricting their purchasing options, and reducing confidence in navigating online shopping platforms (Choi et al., 2022; Zhu & Chen, 2012). The level of proficiency in the use of digital instruments, including the purchase of e-commerce products, is also directly affected by age (McIntosh et al., 2021; Serrano-Cinca et al., 2018; Valarezo et al., 2020; Zhu & Chen, 2012), the region of residence (with a particular distinction between the specifics of urban and rural areas; Choi et al., 2022), the level of education (Jiménez-

[30] *Perceived ease of use* is defined as "the extent to which using a system is free from the additional effort at the users' level of skill and knowledge" (Sarkar et al., 2020; it is an "umbrella definition" based on other definitions). It is observed that *effort expectancy*, as conceptualized in the UTAUT model (Venkatesh et al., 2003, along with its further extensions, introduced in: Venkatesh, 2021; Venkatesh et al., 2012), closely aligns with the concept of *perceived ease of use* and therefore some of the studies (e.g., Khalilzadeh et al., 2017; Shaw and Sergueeva, 2019) have adopted it as a variable in the novel conceptualizations.

[31] It should be noted that the literature distinguishes two orders of the digital divide: the first-order pertains to access to the Internet itself, while the second-order involves the actual use of e-commerce, including aspects such as physical product delivery (Zhu & Chen, 2012).

Rodríguez et al., 2021; Serrano-Cinca et al., 2018), but also the gender (Valarezo et al., 2020; Zhu & Chen, 2012), the size of the household (Valarezo et al., 2020), and even the race or ethnicity (Choi et al., 2022). It is worth citing here the work of Sánchez-Torres, 2019, which examines how digital-divide effects influence the development and adoption of e-commerce, treating the digital divide itself as a moderating factor.

Digital literacy, on the other hand, encompasses the skills needed to effectively use these technologies (Reddy et al., 2020), and is crucial to effective participation in e-commerce. Consumers with strong digital skills are better prepared to navigate online platforms, evaluate product information, and make informed purchasing decisions. Furthermore, higher levels of digital literacy boost confidence in online shopping, leading to greater engagement and greater purchase intentions (O'Brien, 2010). For example, consumers who are proficient in using search engines and assessing online reviews are more likely to trust the information they find, strongly shaping their purchasing decisions (Kwon & Lee, 2014). Digital literacy also empowers consumers to effectively utilize online tools such as price comparison websites and product recommendation systems, significantly enhancing their shopping experience by providing the information necessary to make well-informed decisions (Hsiao et al., 2010). In contrast, people with limited digital skills often struggle to find relevant information or navigate these tools, resulting in discouragement and reducing their probability of making purchases (Sasidharan, 2015).

Is it a cognitive or rather affective aspect? The level of proficiency in using digital tools in the e-commerce sphere, which is influenced by a multitude of sociodemographic factors, including the phenomenon of digital divide, makes it possible to reasonably assess whether an online store is of high quality and thus trustworthy. The level of digital literacy is also directly related to the term "ability," which has its roots in the trust concept developed by (Mayer et al., 1995). Hence, this aspect was assigned to the ***cognitive*** area of trust in e-commerce.

Hedonic motivations and pleasure

Hedonic motivations refer to the pursuit of pleasure and enjoyment in shopping experiences, which significantly influence consumer behavior in the digital marketplace. Research indicates that hedonic motivations are a key driver of consumer attitudes

in mobile commerce (Shaw & Sergueeva, 2019). Consumers often seek enjoyment, excitement, and entertainment during their shopping experiences, which can lead to increased engagement and greater purchase intentions. For example, hedonic values, such as the desire for entertainment and the thrill of finding a good deal, are seen to positively influence consumers' attitudes towards online shopping (Budiharseno et al., 2020). Hedonic motivations are closely related to impulse buying behavior (Zheng et al., 2019), as the enjoyment and emotional satisfaction derived from engaging with a mobile shopping app can lead to spontaneous buying decisions. This aligns with the findings of Indrawati et al. (2022), who emphasize the importance of understanding psychological motivators, including hedonic motivations, to improve online shopping behaviors.

Consumer anxiety

Consumer anxiety represents an important construct in the context of e-commerce, as it has been widely recognized in the academic literature as a significant factor shaping consumers' purchasing decisions. Some individuals experience uncertainty or apprehension due to operating in an environment of perceived risk. Levels of consumer anxiety are often shaped by a lack of adequate digital proficiency, which can, in turn, be correlated with variables such as age or other sociodemographic factors (McIntosh et al., 2021; Valarezo et al., 2020).[32] It should be noted that elevated anxiety levels can significantly hinder purchase decisions, especially when concerns about privacy, security, or product quality arise (Bertea, 2015). Conversely, perceived risks, such as concerns about data security, product quality, and the accountability of external service providers, such as delivery companies, can significantly hinder purchasing decisions (Carvache-Franco et al., 2022).[33] To tackle these issues, it is recommended that e-commerce platforms implement robust security measures and provide transparent information to build consumer trust.

Information asymmetry

Information asymmetry, described as the uneven distribution of information between consumers and vendors, has a notable effect on how different consumer experiences are

[32]See more in the subsection on "tech-savviness" of the end user later in this paragraph.

[33]These elements have been thoroughly addressed in the pertinent sections of this subchapter.

formed in the e-commerce realm (Hadasik, 2024; Mavlanova et al., 2012). This imbalance has an impact on both cognitive and affective dimensions, fostering uncertainty and dissatisfaction among consumers (Tang et al., 2023). Given that users often have limited ability to verify whether product descriptions align with the actual product until after purchase, information asymmetry exacerbates uncertainty. This uncertainty influences cognitive disconfirmation, a negative internal cognitive state, which subsequently contributes to affective dissatisfaction (Liu et al., 2020; Tang et al., 2023). Consumers' positive perceptions of an e-commerce platform diminish when they associate their shopping experience with perceived risks, characterized by a state of uncertainty, as mentioned above (Wu et al., 2020). Cognitive stress caused by information asymmetry forces consumers to put in additional effort to gather reliable information about products and sellers (Shiv & Fedorikhin, 1999). This phenomenon is related to the increased influence of affective or emotional factors in decision-making. The *affect-as-information model* (Glore & Gasper, 2000) provides an explanation for this role of affect, suggesting that in situations where information is insufficient, consumers rely on their affective states as a basis for the formation of beliefs. Furthermore, negative experiences associated with this asymmetry can further provoke adverse emotional reactions, such as distrust and frustration (Punyatoya, 2019). In particular, in low-involvement purchase scenarios, emotional factors can outweigh cognitive reasoning in driving decision-making (Batra & Stayman, 1990; Verhagen & Bloemers, 2017), underscoring the critical interplay between cognition and emotion in consumer behavior.

2.2 Cognitive-affective trust across e-commerce segments

The evolution of e-commerce has significantly transformed the landscape of digital retail, leading to the development of increasingly differentiated forms of online exchange, including mobile commerce (m-commerce), social commerce, and live streaming commerce. This transformation is driven by technological advancement, changing customer preferences, and the growing integration of digital platforms into everyday purchasing activities. As these environments differ in the ways customers interact with firms,

access information, and experience the purchasing process, their implications for trust formation cannot be overlooked.

Importantly, the emergence of these e-commerce segments does not require a separate classification of factors influencing customer behavior and trust. Rather, their distinctive characteristics can be interpreted within the analytical structure adopted in the preceding section, which organizes relevant factors into technological, individual, price-related, and service-related categories based on the framework synthesized by Baubonienė and Gulevičiūtė (2015). At the same time, these factors can be examined through the cognitive-affective perspective developed throughout this dissertation. The segment-specific analysis extends the existing framework by examining how the relevance and expression of specific factors vary across e-commerce environments, without adding new conceptual categories.

From a managerial perspective, different e-commerce segments create different customer touchpoints and can influence the relevance of particular trust-building mechanisms. This subchapter examines how mobile, social, and live streaming commerce affect customer interactions, purchasing decisions, and trust formation.

2.2.1 Mobile commerce

The proliferation of smartphone devices, accompanied by the widespread adoption of mobile applications (commonly referred to as "apps"), has fundamentally transformed the nature of consumer interactions with brands (Fang, 2019; McLean et al., 2020; Ye & Liu, 2021). In 2024, American adults are projected to spend approximately 7 hours and 46 minutes a day engaging in digital media, accounting for about 63.7% of their total daily media consumption (Feger, 2024). Moreover, users now spend nearly 90% of their mobile time within applications, underscoring the dominance of applications over traditional web browsing on mobile devices (Wells, 2023). This technological advancement has not only redefined the mediums through which consumers engage, but also introduced new dimensions of accessibility, personalization, and immediacy in brand-consumer relationships (Muzellec & O'Raghallaigh, 2017).

In this context, the e-commerce sector has had to fundamentally alter traditional business models, creating new opportunities for enterprises to engage customers. The rise of mobile commerce (also known as *m-commerce*), which allows transactions

via mobile devices,[34] has broadened the scope of e-commerce by allowing customers to make purchases at any time and from any location. This shift is supported by the proliferation of smartphones and mobile internet access, which have made online shopping more accessible (Verkijika, 2018). The convenience offered by m-commerce has led to increased consumer engagement and spending, thus improving the overall profitability of businesses that adapt to this model (McLean et al., 2020). Furthermore, the COVID-19 pandemic accelerated the adoption of m-commerce as consumers sought safer shopping alternatives, leading to a notable increase in mobile transactions (Vărzaru & Bocean, 2021).

E-consumers perceive mobile commerce in a diverse and multifaceted manner, influenced by a wide range of factors. These factors encompass both individual preferences and broader contextual elements, which collectively shape the way users engage with and evaluate m-commerce platforms. Such factors influencing the attitudes of the e-consumer include perceived usefulness and value, ease of use of mobile sites, and privacy and security aspects, among others. These determinants are largely consistent with the general ones found for the e-commerce sector as a whole, but have some unique aspects that are characteristic for the mobile commerce branch. The following section outlines some of the key factors relevant to understanding trust in the broader context of e-commerce.

Perceived usefulness and ease of use

Perceived usefulness and ease of use are key factors that influence the acceptance of mobile commerce. Online customers are more inclined to adopt mobile applications when they perceive them as user-friendly and effective tools to facilitate their shopping experience. These dimensions, central to the TAM model (Davis, 1985, 1989), or the UTAUT model (Venkatesh et al., 2003), among others, emphasize that the probability that consumers embrace mobile commerce increases significantly when applications are intuitively designed and provide clear, tangible benefits (Chang et al., 2015). By

[34]To be more specific, m-commerce is defined as "any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access to computer-mediated networks with the help of mobile devices" (Tsu Wei et al., 2009). M-commerce is also described as "buying and selling of goods and services through mobile devices via wireless networks" (Chong, 2013).

streamlining the shopping experience and providing functionalities that meet user needs, mobile applications significantly improve user satisfaction, but also foster long-term engagement, satisfaction, and (ultimately) trust in mobile commerce platforms (Chang et al., 2015; Marinao-Artigas & Barajas-Portas, 2020).

Customers are generally more satisfied with m-commerce services when they perceive these platforms as not only useful but also tools that simplify and improve their daily lives (Marinkovic & Kalinic, 2017). Research on the acceptance of information technology consistently highlights perceived usefulness as a critical determinant of a user's intention to adopt and continue using a technology (Khalilzadeh et al., 2017; Sarkar et al., 2020; Shaw & Sergueeva, 2019). This aspect is crucial in influencing consumer behavior, since people are more likely to engage with systems that offer clear, practical advantages and correspond to their individual needs or objectives.

In addition, it is essential to keep in mind the preferences of consumers shaped by the device they use, including its size. Here, it primarily refers to Responsive Web Design (RWD), which is essential in m-commerce, ensuring compatibility across devices with varying screen sizes and resolutions. As online shopping often involves multiple devices, RWD provides a seamless and consistent user experience, enhancing user satisfaction and engagement (Majid et al., 2015). Beyond traditional fluid grid techniques, designs that align with user preferences and expectations significantly improve processing fluency, making RWD an important consideration in the design of e-commerce websites (Zeng et al., 2014). In particular, with the increasing use of mobile devices for online shopping, the compatibility of e-commerce platforms with mobile technology is crucial. Consumers expect a seamless shopping experience across devices, and platforms that optimize their websites for mobile use can capture a larger audience and drive sales (Susanto & Chang, 2014).

Usefulness and ease of use are especially important in tackling the digital divide, particularly for older adults who lack familiarity with contemporary mobile technologies (Msweli & Mawela, 2020). Additionally, research highlights that general information quality is the most critical dimension of interface quality, followed by product-related information quality, visual appeal quality, and layout quality, in decreasing order of importance (Patel et al., 2020). Furthermore, the quality of the mobile shopping app interfaces directly impacts perceived enjoyment and exerts an indirect influence on

purchase intentions, underscoring the importance of designing intuitive and high-quality user interfaces to enhance both user satisfaction and behavioral results (Patel et al., 2020), ultimately resulting in the so-called *mobile loyalty* (or *m-loyalty*; Kumar et al., 2018b).

It should be noted that both perceived usefulness and perceived ease of use are major factors of acceptance of technology, which are implicit parts of the UTAUT model (Venkatesh et al., 2003), and have a significantly positive relationship with trust in the m-commerce space (Kumar et al., 2018a; Nel & Boshoff, 2017; Sarkar et al., 2020). Similarly to general observations and behaviors of e-consumers in the broader realm of e-commerce, these factors influencing the m-commerce sector exhibit a ***cognitive*** dimension that shapes the rational perception of the willingness of consumers to participate in online shopping.

Mobile marketing

Mobile marketing strategies that cater to hedonic motivations have been shown to significantly influence consumer attitudes. For example, incorporating gamification elements into mobile apps improves perceived enjoyment and user engagement, ultimately increasing the probability of purchasing (Kaur et al., 2023b). Similarly, *triggers* such as personalized promotions and interactive content[35] contribute to a more pleasurable shopping experience, effectively addressing consumers' hedonic preferences (Parker & Wang, 2016; Tak & Panwar, 2017). In particular, hedonic motivation is also considered a key predictor of user behavior intentions to engage with mobile shopping apps (Parker & Wang, 2016; Tak & Panwar, 2017; Zheng et al., 2019). This underscores the importance for marketers to prioritize the development of enjoyable and engaging user experiences as a means of attracting and retaining customers.

As seen, mobile marketing, while being linked to emotional purchasing, can be classified as an ***affective*** aspect of e-commerce, directly influencing consumer emotions, and hence decisions in the e-commerce sphere.

[35]Not to be overlooked here is the role of engaging personalized push notifications to mobile devices (Parker & Wang, 2016), including those supported by artificial intelligence (Behare et al., 2024). Such notifications are considered to be one of the most influential *triggers* that persuade the e-customer to make an online purchase.

Privacy issues

Data privacy and security, especially concerns related to the disclosure of location-related information, represent critical factors influencing the adoption of mobile commerce (Lee & Rha, 2016; Piao et al., 2016; Zhang et al., 2013). Furthermore, perceived risks related to privacy, mobile payments, or regulatory frameworks negatively impact consumers' willingness to adopt mobile commerce. However, privacy-related factors such as attractive guaranties or robust encryption measures mitigate these risks, thus enhancing users' intentions to engage with mobile commerce services (Vasileiadis, 2014).

Privacy concerns in m-commerce require a more nuanced approach compared to e-commerce as a broader sector due to the unique characteristics of mobile devices and their extensive integration with shopping applications. Unlike traditional e-commerce platforms accessed via web browsers, mobile commerce applications operate on devices equipped with multiple components (such as microphones, cameras, GPS modules, and messaging systems) that can interact with the application to enhance functionality and user experience. However, these components inherently expand the scope of privacy considerations by requiring permissions to access sensitive data (Enck et al., 2014).

The management of these permissions is governed not only by the app itself but also by the operating system of the mobile device. It should be noted that certain device operating systems do not fully meet the current demands of mobile commerce due to their limited functionalities (Al-Adwan et al., 2019). Consequently, user trust extends beyond the application to include the device and its operating environment. This interdependence underscores the importance of ensuring security and transparency at both the application and device levels. In this context, trust in device manufacturers and operating system providers becomes particularly important, as these systems control access to sensitive information and play a central role in the enforcement of privacy and security policies (Al-Adwan et al., 2019; Kim, 2014).

Furthermore, the emergence of new mobile payment systems, often integrated into the operating system of the device, adds another layer of complexity. These payment solutions, tightly connected to both the device and the shopping application, facilitate seamless transactions, but also increase the need for robust privacy protections and secure data management (Lee, 2019). The interplay between application functionality, device hardware, and operating system policies creates a distinct privacy landscape

in mobile commerce, necessitating targeted strategies to build and maintain customer trust.

Privacy concerns in online shopping, while rooted primarily in rational evaluation and informed decision-making, can be categorized as a ***cognitive*** aspect of online shopping. These concerns engage consumers' analytical processes, as they assess risks and benefits related to data security, trustworthiness, and the handling of personal information, ultimately shaping their attitudes and behaviors.

***

The factors influencing consumer attitudes, as well as those that moderate them, within the realm of mobile commerce align closely with those observed throughout the broader e-commerce industry. These factors can also be broadly categorized into cognitive and affective drivers, in the same way as in the general e-commerce sector. The similarity in these dynamics between m-commerce and e-commerce in general has been substantiated by the findings of the meta-analysis by Sarkar et al. (2020), which can be juxtaposed and confirmed with the meta-synthetic allegations of the literature review conducted in Chapter 2.1. This juxtaposition has a significant and noticeable common denominator, which is trust, which is a dual emotional-racial construct influenced by all these e-consumer factors. After all, trust can be considered the glue that binds the impact of all consumer attitudes regardless of the level and mode of incidence in the e-commerce branches. This alignment underscores the universality of key determinants, such as the interplay between cognitive evaluations and emotional responses, in shaping consumer behavior across digital commerce platforms.

2.2.2 Social commerce

Social commerce, a specialized subset of e-commerce that integrates social media platforms into the buying and selling process, has experienced significant growth recently. According to projections (''Social Commerce 2024: Definition, Key Trends, and Statistics'', 2024), the global market value of social commerce is expected to reach approximately $1.6 trillion in 2024, representing a substantial increase compared to

previous years. This trend is reflected in user engagement statistics: in the United States, the number of individuals purchasing through social media platforms is steadily increasing, with projections indicating that this figure will reach 108 million by 2025 (Wise, 2024). Platforms such as Facebook, Instagram, and TikTok serve as key drivers of this emerging trend, enabling users to seamlessly explore and purchase products without navigating away from the platform interface. A notable example of this impact is TikTok Shop,[36] which demonstrated substantial growth by generating $100 million in sales in the United States during the 2024 Black Friday period[37] (Whateley, 2024).

Social commerce represents an emerging trend within e-commerce that uses social media platforms to streamline and enhance the purchasing experience for consumers (Hajli, 2014). This approach harnesses the power of social interactions and community-oriented features of platforms such as Facebook, Instagram, and TikTok, enabling users to discover and engage with products through their social networks (Lv et al., 2021). Social commerce is heavily influenced by the principles and functionalities of mobile commerce, primarily due to the dominant role of mobile devices in shaping social media interactions. For example, Instagram, TikTok, or other similar visual-oriented social media platforms are intrinsically designed with mobile users in mind, offering intuitive interfaces and features optimized for (or oftentimes even dedicated to) smartphones and tablets (Hew et al., 2019).

In view of this interaction between m-commerce and social commerce, this chapter will focus exclusively on the distinct elements of social commerce, as the overlap aspects have already been addressed in Chapter 2.2.1, devoted to mobile commerce. Furthermore, much like in mobile commerce and e-commerce as a broader concept, trust plays a pivotal role in shaping the attitudes and behaviors of e-consumers. This finds confirmation in the findings of Chen and Wang (2016), where it is highlighted

[36]TikTok Shop is a social commerce feature that integrates shopping directly into the platform, leveraging TikTok's algorithm and engaged user base to drive seamless product discovery and sales. More: https://business.tiktokshop.com/uk/seller

[37]Black Friday, observed annually on the Friday following Thanksgiving in the United States, marks the unofficial start of the holiday shopping season and is characterized by significant discounts and promotional events. This period holds critical importance for e-commerce sector worldwide, as it drives substantial consumer spending, often resulting in record-breaking sales volumes and increased online traffic.

that trust developed in traditional e-commerce can be transferred to social commerce, significantly affecting consumers' intentions to engage in social commerce activities. The aspects discussed below that influence consumer attitudes in the social commerce domain have an unambiguous impact on shaping trust (like in the whole e-commerce sphere), making it crucial to thoughtfully address these elements to build a reliable online environment. This is even more important given that social media platforms, in order "to be effective, should inspire trust" (Werenowska & Jaska, 2025).

Social media marketing

As seen in all types of e-commerce business, online marketing planning is an important aspect of social commerce activities, in which the marketing strategies of the merchant company must revolve around the social media ecosystem, taking advantage of peer generated content, influencers' cooperation, and engagement elements embedded in the systems. This is a factor that is related to many consumer-based systems in e-commerce but even more specifically, is related to social networks and the effects associated with social networks-enabled commerce. According to the study conducted by Jiang et al. (2018a), eWOM marketing (outlined in more detail in Chapter 2.1.4), which uses social media to promote the product or service in a more interactive manner, can significantly affect consumer decisions, especially when they need to select a product because they often give more credibility to suggestions from fellow customers. It is also emphasized that the effectiveness of social media influencers (SMIs) in influencing consumers has been supported; the purchasing attitudes of these influencers are used to predict the buying intentions of readers (Ki & Kim, 2019; Santiago et al., 2020), which provides a strong case for the inclusion of social media-based strategies in marketing campaigns to promote brands and affect purchasing behaviors in social commerce.

In this regard, it is also important to keep an eye on the connection between intensified social media marketing and the spread of misinformation. It has a notable impact on online shopping and the formation of consumer trust. Deceptive and inaccurate news (the so-called *fake news*) leads to skepticism among e-consumers in a way that promotes their disbelief towards the content they have seen on different social media sites and blogs (Bovet & Makse, 2019; Mahdi et al., 2022). This may also hinder social commerce processes. For example, in the work of Mahdi et al. (2022), the

readers are informed of the difficulties consumers can face in differentiating credible content from misinformation when using social networks sponsored by the company and its impacts on brand trust and perception. Indeed, social networks facilitate the sharing of fake news by encouraging users to spread information regardless of its authenticity, making fake news providers more marketable within the economy of social media (Obadă & Dabija, 2022). In these times, users share fake news due to the instinctive need to construct the self and seek approval from significant others; a phenomenon explained in social identity theory when people tend to share information which they know presumably others would need, want and value even if it is not facts or not true (Mahdi et al., 2022).

Within the realm of social commerce, emotional responses forged by social media marketing can be considered as an ***affective*** facet of consumer behavior. However, this includes reactions of emotions or feelings to certain stimuli, such as invitation graphics, stories, and testimonials that appear genuine from the influencers or brands involved. This emotionalism enjoys an emotive engagement that creates attachment and trust beyond any objective assessment and outlook as purchasing behavior.

Interactivity in social commerce[38]

Social interactions play a significant role in the development of attitudes among e-consumers in engaging and building connections. Convenience, entertainment, and enjoyment in social interactions may lead to general satisfaction during shopping (Bugshan & Attar, 2020; Hettiarachchi et al., 2018; Mou & Benyoucef, 2021). The more consumers perceive social commerce as an important and enjoyable activity, the more they tend to engage in it. Social commerce is, at its core, an interactive activity that allows consumers to share their experiences, ask for advice, and provide feedback, which in turn makes their shopping journey significantly more enjoyable (Hajli et al., 2014; Hettiarachchi et al., 2018). This dynamic interaction develops a feeling of community and relatedness that positively influences the disposition towards brands and products. For example, direct communication with peers and immediate feedback could increase satisfaction and loyalty among consumers (Deng et al., 2023). Moreover, most social

[38]This subsection elaborates on the trust-based factor of "interactivity" (described in the previous subsection 2.1), but in the context of social commerce.

commerce platforms guarantee greater levels of user interaction and participation through the advent of user-generated content, such as reviews and testimonials, which persist in changing consumer attitude and perception (Hajli & Lin, 2015; Salvatori & Marcantoni, 2015). In addition, the gamification elements discussed in Chapter 2.2.1 enjoy paramount importance, since they also find their place in the domain of social commerce, further increasing user engagement and interaction in this area (Kaur et al., 2023b; Tak & Panwar, 2017).

The "interactive" part of social commerce can be considered an ***affective*** aspect, since it promotes human reciprocity and builds community through shared experiences. User-generated content and gamification include the presence of enjoyment and connectedness, which influence the positive formation of e-consumers' attitudes and emotions towards brands, or products, as well as the whole online shopping process.

2.2.3 Live streaming e-commerce

Live streaming e-commerce is often referred to as *live streaming shopping* and comprises a livestream format that exhibits and promotes various products via audiovisual media in real-time to viewers. Viewers are bound to witness the presenters marketing different items and are urged to buy through discounts and special offers. This trend resembles traditional TV shopping programs but incorporates interactive digital features.

The emergence of live streaming has realized a beautiful marriage between entertainment and shopping, influencing the purchasing behavior and attitudes of e-consumers toward buying products. By the success of applications such as OOOOO, Facebook's Live Shopping Friday, and Amazon Live, one can see the increasing emergence of this new form of service provision in e-commerce. It creates a certain kind of immediacy that makes live streaming a genuine element for many consumers in reliability evaluation, thus improving the trustworthiness of consumers with vendors (Li et al., 2023b).

As with social commerce, interactivity plays an important role in affecting the behavior of e-consumers in the live streaming shopping space. However, interactivity here relies on slightly different characteristics. Interactive features create a more engaging and immersive shopping experience through streaming with live streamings' real-time Q&A sessions and the ability to comment and engage with streamers on-the-

go (Guo et al., 2021). This interactive live streaming ecosystem not only facilitates consumers in providing precise information on products, but also allows consumers to express opinions and preferences, which will be able to influence their attitudes towards ingesting elements (Peng et al., 2023).

Due to the "live" nature of live streaming e-commerce and the need for prompt response to make an online purchase, it can be asserted that this is an affective element that shapes consumer attitudes. As confirmation, being able to witness real-time product demonstrations while interacting with a host would generate personal excitement and elation which, in turn, may fuel impulsive buying behavior (Lin et al., 2022). Moreover, rather than being just a transactional activity, live streaming shopping is made more enjoyable with the use of social media-embedded real time streaming by which the online shopping experience turns the whole shopping activity into a more pleasant one. The experience itself increases satisfaction and loyalty among buyers (Liu et al., 2023). However, in this context, there are properties, such as perceived viewing distance (moderated by the length of the live stream or the type of products offered), which affect both the cognitive and the affective aspects of the viewer of the content (Peng et al., 2023). After all, the combination of entertainment and shopping provided by live streaming can be much more emotionally engaging for consumers (Cao et al., 2024; Li et al., 2023b; Zheng et al., 2023). With this in mind, it was decided to allocate factors within live streaming shopping to the ***affective*** aspect influencing the conformation of trust in the e-commerce space.

2.3 A trust-supporting model in e-commerce: Organizing theories

Based on the analysis of factors contributing to the development of e-consumer trust in e-commerce (classified into affective and cognitive categories, as established in the literature), it is now possible to present these factors graphically, together with the particular variables that influence them. Hence, the following chapter builds on the findings discussed in the preceding literature-oriented Chapters 2.1 and 2.2. The main goal is to present a conceptual representation of e-consumer trust, emphasizing the interconnection between its cognitive and affective dimensions. This visual model serves

as a theoretical reference for subsequent methodological stages that seek to distinguish and further clarify the cognitive–affective structure of trust in e-commerce.

Before presenting an illustrated version of this conceptualization, it is worth recapitulating the factors that influence trust in e-commerce (from previous Chapters 2.1 and 2.2), divided into affective and cognitive dimensions. The factors previously discussed in the context of new e-commerce segments (i.e., mobile, social, and live streaming commerce; see Chapter 2.2) have been integrated into these overarching categories, as their mechanisms align with the core cognitive and affective dimensions of trust rather than constituting separate domains. Thus:

- the **cognitive** dimension encompasses the following factors:
  - *security protocols and privacy*;
  - *overall website quality / usability*;
  - *information transparency*;
  - *consumer past experiences*;
  - *country of origin*;
  - *price fairness*;
- the **affective** dimension comprises factors such as:
  - *interactivity*;
  - *website appearance/aesthetics*;
  - *marketing strategy of the vendor*;
  - *CSR practices*;[39]
  - *opinions about the vendor (its reputation)*;[40]
  - *price attractiveness*.

[39]CSR can also be associated with cognitive aspects of trust, not only affective; however, to maintain the conceptual balance between the two dimensions, the present framework emphasizes its affective interpretation, which is consistent with the literature review findings discussed in Chapter 2.1.

[40]Similarly to the "CSR practices" aspect, see the footnote above.

Although the moderating factors identified in the previous Chapter 2.1.5 are recognized as potentially influencing the strength of trust-related relationships, they are intentionally omitted from the present conceptualization to preserve parsimony. Therefore, the following model (Figure 2.1) focuses solely on the fundamental cognitive–affective division of the antecedents, which constitutes the theoretical core of the framework. The model was also organized according to the typology of trust-related factors suggested by Baubonienė and Gulevičiūtė (2015): *technological*, *consumer*, *service*, and *price-related*.[41]

The diagram can be interpreted as follows:

- **central construct** (the large *green oval* labeled "Trust in e-commerce") – represents the culmination of both cognitive and affective assessments. It symbolizes the integrated consumer evaluation that arises from the interplay of these two dimensions;
- **cognitive factors** (displayed in *blue rectangles*) – collectively relate to how consumers reason about the trustworthiness of an online vendor, based on more rational or fact-oriented assessments;
- **affective factors** (illustrated in *red rectangles*) – signify emotionally rooted or experientially shaped judgments that consumers use when deciding whether to trust an online vendor. These factors often relate to the user's feelings about and emotional responses to the vendor's brand, promotional strategies, and interface;
- **dual-domain factors** (marked with a *blue–red gradient rectangle*) – combine both rational and emotional components. Among them, *CSR practices* and *opinions about the vendor (its reputation)* occupy a specific position. As discussed in Chapter 2.1, both factors can evoke cognitive and affective responses; however, in this model, they are assigned primarily to the affective side to preserve the balance between the two dimensions. Their partial cognitive affiliation is indicated by a *dashed line* linking these factors to the cognitive group;

[41] It should be noted that the relationships illustrated in Figure 2.1 represent the most prominent influences identified through the literature review conducted in Chapters 2.1 and 2.2. Their empirical verification will be carried out at a later stage of the study (see Chapters 3–4).

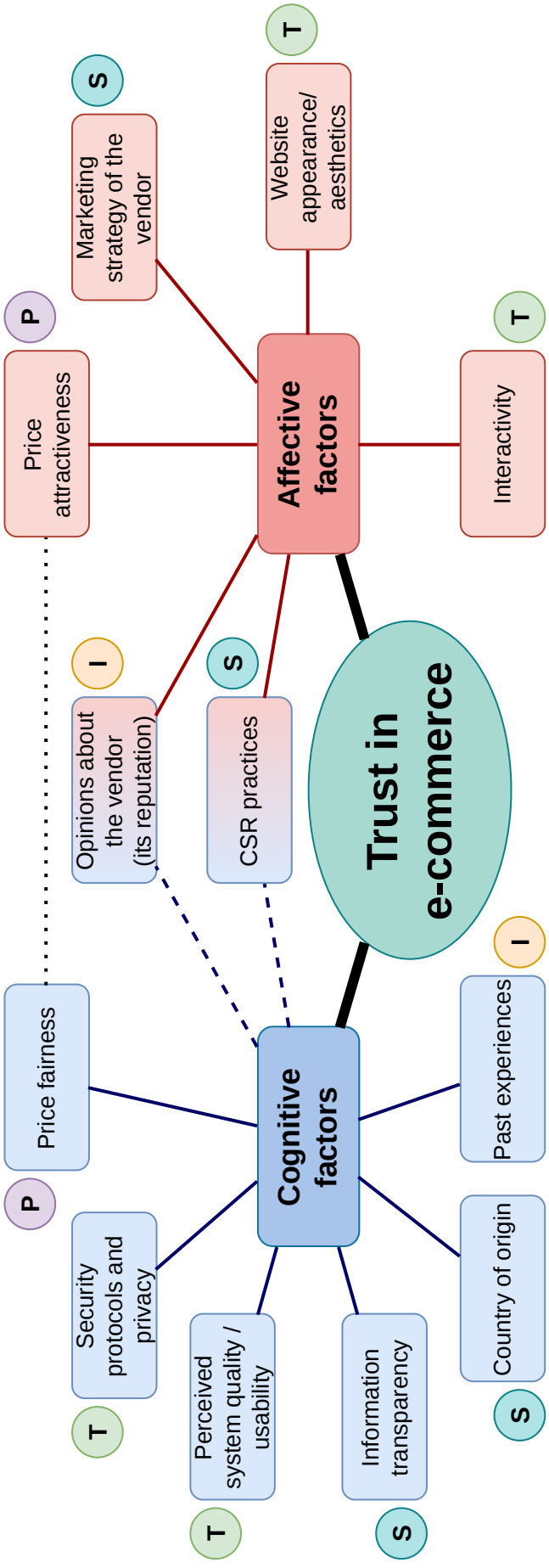


Figure 2.1: The relationships between cognitive and affective factors of trust in e-commerce, along with variables having impact on them

Source: Own elaboration based on extensive literature review from Chapters 2.1 and 2.2

- each factor is further assigned to one of the four categories from the typology of trust-related factors suggested by Baubonienė and Gulevičiūtė (2015): *technological* (T), *individual* (I), *service-related* (S), and *price-related* (P). These categories are marked by *small circular* icons of the corresponding colors next to each element of the diagram, reflecting their theoretical origin and dominant trust-building dimension.

Taken together, these elements form a cohesive conceptual structure in which cognitive and affective mechanisms interact to shape trust formation in online environments. The model thus visualizes both the rational and experiential roots of trust as complementary rather than opposing forces. Embedding the cognitive and affective duality of trust, the proposed conceptual framework organizes the identified factors related to trust within two complementary dimensions, systematically distinguishing between rational and emotional pathways of trust formation. It visually depicts these relationships and acknowledges the presence of mixed or ambiguous influences that can reflect both cognitive and affective components. This structure provides a coherent and adaptable foundation for methodological refinement and to advance the theoretical understanding of trust within the evolving e-commerce environment.

The framework consolidates the most prominent relationships identified in the literature and serves as a conceptual synthesis of cognitive and affective trust mechanisms. Contextual and moderating variables, although acknowledged, remain outside of the current scope and may provide a valuable direction for future research beyond the boundaries of this study.

2.4 Perceived e-service quality in assessing e-commerce company functioning

The assessment of e-commerce company functioning can be approached not only through financial, operational, or web-analytics indicators but also through the way customers perceive the quality of the online service encounter. This is related to the notion of *e-service quality*, which is defined as the "extent to which a website facilitates efficient and effective shopping, purchasing, and delivery" (Parasuraman et al., 2005). Another definition states that *e-service quality* is "an ability of electronic services to

satisfy the needs of customers effectively and efficiently" (Fassnacht & Koese, 2006). In this dissertation, perceived e-service quality is conceptualized as a customer-centered evaluative construct that reflects how effectively an online store supports customers throughout the digital purchasing process. As digital channels increasingly complement or replace traditional brick-and-mortar stores, operationalization and assessment of the quality of e-services have become crucial (Blut et al., 2015), especially in the post-pandemic context (Pollák et al., 2022). This perspective is particularly relevant for trust-oriented research (Kundu & Datta, 2015), since a number of attributes traditionally associated with e-service quality also operate as signals of credibility, reliability, and customer orientation. In this sense, perceived e-service quality may serve as a "soft" indicator of the functioning of the e-commerce company by capturing customer evaluations of the experience of online service and linking them to managerially relevant results such as satisfaction, loyalty, retention, and, indirectly, business performance.

2.4.1 Conceptualizing e-service quality in e-commerce

The literature usually treats e-service quality as a multidimensional phenomenon. Contemporary models on the matter of e-service quality distinguish between several domains of the online service experience. These areas commonly include such facets as: fulfillment, system availability, reliability, privacy, and security, efficiency, customer service, recovery, information quality, price transparency, and interaction-related features. Although terminology differs between frameworks, the main assumption is quite solid: consumers in the digital environment evaluate the quality of online services through a combination of functional, technological, informational, and relational cues.

There has been a clear evolution in models for measuring e-service quality: from an initially technological and website-centric approach, focused primarily on the functionality of the website, towards more complex, hierarchical, and contextual frameworks that take into account the entire customer journey, post-purchase interactions, and other cultural and organizational considerations. This transition is a reflection of a shift in perspective from evaluating the mere quality of the interface itself to a more holistic understanding of the customer experience and the company's strategic ability to generate long-term digital value in the e-commerce environment. A slightly more

detailed overview of selected approaches to measuring and conceptualizing e-service quality is presented below:

- The most widely used model for assessing e-service quality is *SERVQUAL*, developed by (Parasuraman et al., 1988). It is a "classic" service quality model, originally not strictly limited to e-commerce. It focuses on four dimensions: (1) efficiency, (2) reliability, (3) fulfillment, and (4) privacy. In the context of e-commerce, many researchers have revised the original *SERVQUAL* framework to more accurately reflect the distinctive features of online service provision. The models listed below are either direct extensions of the original *SERVQUAL* framework or were, at the very least, inspired by it;

- The *e-SERVQUAL* model (Zeithaml et al., 2000, as per Zeithaml et al., 2002) organized service quality delivery through websites around five core dimensions: (1) information availability and content, (2) ease of use, (3) privacy and security, (4) graphic design, and (5) fulfillment/reliability;

- *WebQual* (Barnes & Vidgen, 2000; Loiacono et al., 2002) is a model that emphasizes the quality of the website from the user's perspective. It focuses on (1) usability, (2) graphic design, (3) information quality, (4) trust, as well as (5) empathy/user interaction. Gounaris et al. (2010) expanded the *WebQual* model by integrating aesthetics and after-sales service, with a particular emphasis on e-service quality, the impact on customer satisfaction, return visits, word-of-mouth communication and intention to repurchase. The most recent revision of the *WebQual* model by Aini et al. (2023) is called *WebQual 4.0 Plus* and pays attention to the following components: (1) usability, (2) information quality, (3) service interaction quality, (4) system availability, and (5) user satisfaction;

- The e-service quality model for online retailers (Pan et al., 2002) is an approach based on an analysis of online stores and product prices. It identifies five dimensions of quality: (1) reliability, (2) shopping convenience, (3) product information, (4) shipping/order fulfillment, and (5) pricing policy;

- *eTailQ* (Wolfinbarger & Gilly, 2003) is the e-commerce quality model, which is based on four main components: (1) customer service, (2) privacy and security,

(3) website design, and (4) order fulfillment and reliability. It places strong emphasis on the hands-on experience of the customer in an online store;

- *E-S-QUAL / E-RecS-QUAL* (Parasuraman et al., 2005) are one of the most widely used models to measure the quality of e-services. *E-S-QUAL* covers the quality of standard online service, including efficiency, order fulfillment, system availability, and privacy. *E-RecS-QUAL*, on the other hand, addresses problem situations and covers responsiveness, compensation, and contact with the company;

- The hierarchical model of e-service quality (Blut et al., 2015) that is based on a meta-analysis identifies four main dimensions of this concept: (1) website design, (2) customer service, (3) security/privacy, and (4) order fulfillment. The model was intended to better explain customer behavior than previous scales (as, for example, *eTailQ*, which may seem similar when it comes to its core elements). Blut (2016) conducted an empirical verification of this model. It was demonstrated that the quality of the e-service can be understood as a higher-order construct composed of dimensions such as website design, fulfillment, customer service, and security/privacy. Also important here is the assumption that overall quality mediates between specific quality dimensions and consumer behavior;

- The model of e-service quality in the online shopping context, that was developed by Vajrapana (2019), comprises eight key dimensions: (1) information quality, (2) privacy protection, (3) delivery system, (4) ease of use, (5) site functionality, (6) customer service, (7) customization, and (8) multi-device compatibility;

- E-service quality model by Rita et al. (2019) consists of four elements that make up the core of the model, i.e., (1) website design, (2) security/privacy (3) fulfillment, and (4) customer service. Unlike the others, this model breaks these constructs down into even smaller sub-elements, building on the lessons learned from previous approaches to e-service quality.

The classic *SERVQUAL* framework for service quality (Parasuraman et al., 1988) proved insufficient for the online environment, as it does not account for interactions between an e-customer and a website/application, or the particularities of distance order fulfillment (Radziszewska, 2018). At the same time, the quality of e-services

(especially in the most recent conceptual developments) is understood as a comprehensive assessment of the customer's experience with an online transaction. Previous research on service quality has shown that consumers can integrate multiple service attributes into a larger global judgment of quality (Cronin & Taylor, 1992). This is also consistent with hierarchical views of e-service quality, in which specific attributes and first-order dimensions contribute to a more general perception of service performance (Blut, 2016; Parasuraman et al., 2005). From this angle, although service quality is inherently multidimensional, it can still be treated as a single, overarching construct when the primary objective is to situate perceived service quality within a more comprehensive theoretical framework. This holds when the goal is not to analyze the individual dimensions of service delivery separately.

This distinction is key to this dissertation. The proposed framework does not aim to create a detailed tool to audit all aspects of e-service quality. Instead, it treats this concept as an overall consumer indicator of how well an e-commerce firm performs from the customer's perspective. From this point of view, e-service quality is seen as the result of a trust-focused e-commerce environment: when an online store is considered reliable, transparent, secure, responsive, and oriented towards customer needs, these trust-related signals typically lead to a more positive overall assessment of service quality. Empirical research indicates that perceptions of e-service quality and e-trust together influence customer satisfaction, loyalty, and behavioral intentions in online shopping (Ashiq & Hussain, 2024; Rita et al., 2019). This reinforces the idea that this concept should be seen as a performance indicator grounded in consumer perceptions, rather than as a purely operational metric. From this perspective, e-service quality may be viewed as a qualitative "input" that converts a company's technological and organizational resources into the value experienced by the customer, aligning it more closely with the function of an indicator of e-commerce performance.

The conceptual overlap between trust and e-service quality is particularly visible in the online retailing sphere. Fulfillment and delivery reliability communicate operational competence. Clear information, transparent prices, and understandable rules reduce uncertainty and thus information asymmetry. Secure payment procedures and visible safeguards strengthen perceptions of assurance. Customer service and recovery mechanisms signal responsiveness and fairness. Interface design, navigability,

and interactivity shape not only usability, but also the perceived professionalism and credibility of the online vendor. Therefore, many attributes of the e-service quality are not simply technical or operational features. They also act as trust-building signals that help consumers decide whether the online store is capable, honest, and sufficiently customer-oriented (Fan et al., 2022; Fu, 2023; Rita et al., 2019).

This mechanism can also be explained through the literature on credibility judgments in digital environments. Online consumers rarely evaluate every cue analytically and in isolation. Rather, they often synthesize various signals into a general impression of credibility and quality. The unified framework of credibility assessment proposed by Hilligoss and Rieh (2008) suggests that online judgments are shaped by multiple cues that users combine into broader credibility evaluations. Similarly, dual-process approaches to online credibility indicate that consumers frequently rely on heuristic shortcuts, especially when motivation, time, or cognitive resources are limited (Metzger & Flanagin, 2013). In this context, interface-related cues, such as modality, agency, interactivity, and navigability, as described in the model called *MAIN* (Sundar, 2008), can influence how consumers form impressions of trustworthiness and quality. Earlier web credibility research also shows that design and look-and-feel cues can play a substantial role in the shaping of credibility assessments (Fogg et al., 2001).

Consequently, perceived e-service quality is particularly valuable within a trust-based framework for evaluating the performance of e-commerce companies. It captures the integrated consumer judgment of the experience of online service, while still theoretically connected to more specific domains such as fulfillment, customer service, security, information quality, and recovery. For the purposes of this dissertation, this makes perceived e-service quality a suitable outcome construct: it reflects how trust-related practices and signals are ultimately translated into the customer's evaluation of company's online performance.

2.4.2 E-service quality as a trust-based outcome of e-commerce performance

Trust (along with its specific derivative, that is, e-trust) is one of the constructs most closely linked to the notion of e-service quality, and the relationship between them involves both conceptual overlap and causal links. Some models explicitly incorporate

elements of trust (such as perceived security, privacy, or vendor reliability) as dimensions of e-service quality (Blut et al., 2015; Wolfinbarger & Gilly, 2003), thereby creating a conceptual overlap between the constructs of e-service quality and trust. On the other hand, many studies treat e-service quality as an antecedent of trust (Ha & Stoel, 2009; Rita et al., 2019; Tran & Vu, 2019), showing that a high-quality online experience builds confidence in the e-vendor's honesty, competence, and benevolence.

Quantitative research consistently indicates that e-service quality has a significant, direct, and positive impact on e-trust and also indirectly influences the behavior intentions of users through mediating mechanisms, particularly trust and satisfaction. In the context of e-banking, e-trust has been demonstrated to act as a mediator in the relationship between service quality and customer satisfaction, contributing to an increase in the level of explained variance in satisfaction within structural equation models (Kundu & Datta, 2015). Concurrent results have been obtained in other studies, which confirm that e-service quality indirectly influences behavioral intentions, through e-trust and e-satisfaction (Tran & Vu, 2019). This points to the pivotal role of trust as a translational mechanism that enables the conversion of perceived service quality into specific customer behavior patterns.

Studies have also been conducted to identify which specific dimensions of e-service quality most strongly build trust. One research showed that privacy and security, responsiveness, accuracy of information, and effective problem-solving have a significant positive impact on consumer trust in the e-commerce environment (Fu, 2023). Another study on online shopping found that website design, security/privacy, and order fulfillment shape the overall assessment of e-service quality, which in turn influences both trust and behaviors such as repeat purchases, recommendations, and return visits to the site (Rita et al., 2019). From the perspective of trust-centered e-commerce, it is possible to refer to a feedback loop: trust reduces perceived risk and increases the propensity to interact with the service (Tran & Vu, 2019), creating the conditions for a positive experience in terms of e-service quality. It also works the other way around: online services that maintain a consistently high level of quality help strengthen and sustain trust over time (Hazeem AlBalushi, 2021).

The empirical literature provides ample evidence for considering e-service quality as an indicator of an e-commerce company's performance, viewed from the customer's

perspective. Research on online electronics stores shows that higher e-service quality leads to greater loyalty, understood as the intention to repurchase and make recommendations, which is directly linked to sales performance and market share (Hossain & Hossain, 2011). Analyses using representative data from the e-tailing[42] market show that, among the various dimensions of service quality, factors related to the ordering procedure and website performance exert the greatest influence on demand (measured by the number of redirects to stores; Hackl and Winter-Ebmer, 2019). This finding indicates that customers' subjective evaluations of service quality are directly and systematically associated with their observed purchasing behavior.

It has been observed that the perceived success of e-commerce operations is strongly associated with the level of e-service quality and the extent to which e-service quality management is integrated into the online channel development strategy. This is consistent with the findings of Doherty et al., 2015, who showed that how successful e-commerce operations are perceived depends not only on the extent of e-commerce adoption, but also on the management's approach to e-service quality. From this perspective, the deployment of digital technologies does not inherently create business value; it must be complemented by organizational practices that convert technological capabilities into a consistent, responsive, and quality-focused customer experience (DeLone & McLean, 2003; Zhu, 2004).

The relationship between e-service quality and e-commerce performance is multidimensional. It extends beyond the website's technical performance or the effectiveness of order processing and is also evident in users' attitudes and behaviors, such as their satisfaction, trust, intention to return to the site, likelihood of spreading positive word-of-mouth, and propensity to make repeat purchases. These customer responses may constitute substantive indicators of the effectiveness with which an e-commerce company structures, communicates, and delivers its online service experience (Blut, 2016; DeLone & McLean, 2003; Gounaris et al., 2010; Zeithaml et al., 1996). The literature emphasizes that the perceived quality of online services remains significantly

[42] *E-tailing* (electronic retailing) refers to the conduct of retail transactions involving the sale of goods to end consumers through online channels (business-to-consumer – B2C). It constitutes a narrower subset of e-commerce, which, in turn, encompasses the full spectrum of electronically mediated commercial activities, including non-retail transactions such as business-to-business (B2B) exchanges and digital service provision.

related to the behavioral intentions of customers, such as the propensity to repurchase, the loyalty to the platform or the recommendation to other users (Gera & Singhvi, 2011; Rahmania et al., 2023), also in terms of e-consumer trust (Alfina et al., 2014). Consequently, this translates into the level of revenue and profitability of the digital channel. It should also be emphasized that in models that jointly consider e-service quality, trust, satisfaction, and loyalty, the quality of online services emerges as a crucial determinant of both users' trust in the platform and their behavioral as well as attitudinal loyalty (Rita et al., 2019). In practice, this implies that e-service quality must be considered as a core management area within an e-commerce strategy, requiring ongoing monitoring and enhancement, since its level directly affects the durability of customer relationships and the long-term economic performance of the online channel. An increasingly dominant view holds that e-service quality is not just one element of a company's digital offering, but a synthetic indicator of e-commerce effectiveness from the consumer's perspective (Zia et al., 2022), reflecting the combined impact of logistics, technology, and trust policies (e.g., security, transparency, complaint procedures). In this study, e-service quality is therefore understood as the customer's perceived result of the overall trust-oriented e-commerce platform.

2.5 Implementing trust-centered practices in e-commerce

In the competitive landscape of e-commerce, as it was underlined a number of times, building and maintaining consumer trust has become a critical determinant of business success. It is important in the face of this not to operate solely on theory but to show examples of the application of actions based on the needs of e-customers in terms of trust in practice. This subchapter analyzes the different practical applications of trust in doing business by showcasing various real-life examples of companies involved in electronic commerce, i.e., Casper (American mattress manufacturer), Gymshark (British fitness brand) and Domotio (Polish lamp company). These actualities provide evidence that specific trust problems that arise when dealing with e-consumers, as per Chapters 2.1–2.2 of this dissertation, for this reason, can be used to improve the organizational measures of marketing and, as a result, its effectiveness. The subchapter

also investigates how these issues might be addressed through firm strategies aimed at mobilizing trust capital to survive and conserve customers and businesses over time.

2.5.1 Casper

Casper transformed its online presence from a mattress factory outlet into a virtual marketplace that assured customers that they were free of any fear of shopping. This customer-oriented e-commerce project changed the perception of clients towards online mattress shopping and improved the company's position in the sector (Lorincz, 2023a). The case of Casper, as one of the largest US players in the mattress industry, is interesting in that sales of large-volume products such as mattresses are mostly made online, rather than in-store.[43]

Transparency and risk implementation

One of the main reasons why the online platform Casper is able to attract and keep customers is how they worry about the welfare of their customers and how they protect them from risk where they have put forward their proposition in the form of the "100-night trial" system. This approach gives customers the opportunity to test and assess the comfort of the mattress for three months with the added advantage of claiming the money back if the product did not meet their expectations in any way. Such simplicity that is present in the underlying effort is bound to help numerous customers appreciate the effort by making the task of making any decision at the point of sales less cumbersome. This is particularly relevant for products such as mattresses that, in real analysis, are usually decided on the basis of testing.

Providing a risk-free guarantee for product testing is in accordance with the general principles of consumer safety (Falahat et al., 2019) while also serving as an innovative strategy to capture customer attention, i.e., a strategy that has been proven effective. Furthermore, Casper consistently emphasizes its commitment to safety by prominently displaying relevant safety certifications on its homepage, reinforcing trust and reliability in the brand (cf. Rane and Meshram, 2012). Providing a hassle-free and high-quality

[43]Casper also operates physical showrooms where customers can experience and test mattresses in person. The e-commerce solutions implemented by Casper to enable customers to test their products are discussed in detail later in this section.

product delivery, without compromising the provision of reliable products, is also part of the trend of business attitudes aimed at increasing customer trust (Chiang et al., 2019; Rosário & Raimundo, 2021).

Referral program

Another strategy used by Casper is the referral program designed to incite the friends and family of the client through the use of the authority and approval of existing clients as a source of trust and satisfaction. The tactic aims to motivate customers to strategize to increase the clientele by providing discounts or other gratifications to those who refer them to such clients (see Figure 2.2). Casper incentivizes its referral marketing program by offering an Amazon gift card to customers who successfully refer their mattress to another user who ultimately makes a purchase. In this way, both customers and the company are beneficiaries. The Casper referral program resulted in a return of investment (ROI) of 700 percent, unlike the average marketing investment (Friendbuy, n.d.), making it a powerful customer acquisition campaign. This approach can be seen as recognition and practical implementation of the eWOM strategy, discussed in Chapter 2.1.4, which has proven effective in building consumer trust and driving customer acquisition (Obiedat, 2013). This is also related to the ***affective*** context of trust in e-commerce, given that eWOM strategies, including referral programs, unequivocally affect the volume of purchases purchased impulsively (Zheng et al., 2019).

Enhanced customer experience

Casper has improved the customer experience on their website by launching a user-friendly quiz that directs shoppers to the mattress that is best suited to their needs. The quiz comprises a series of targeted questions that address key factors such as the customer's preferred mattress size, sleeping position, and budget. Based on the answers provided, the system generates a recommendation for a mattress tailored to the individual's specific preferences and requirements. That innovative feature provides even more personal touch, but the depth in which customers relate to these technologies makes them feel that their needs are completely comprehensible, effectively strengthening ***affective*** trust. At the same time, such a quiz only increases the mark on how Casper seeks to elicit ***cognitive*** trust to use it as a reminder of product

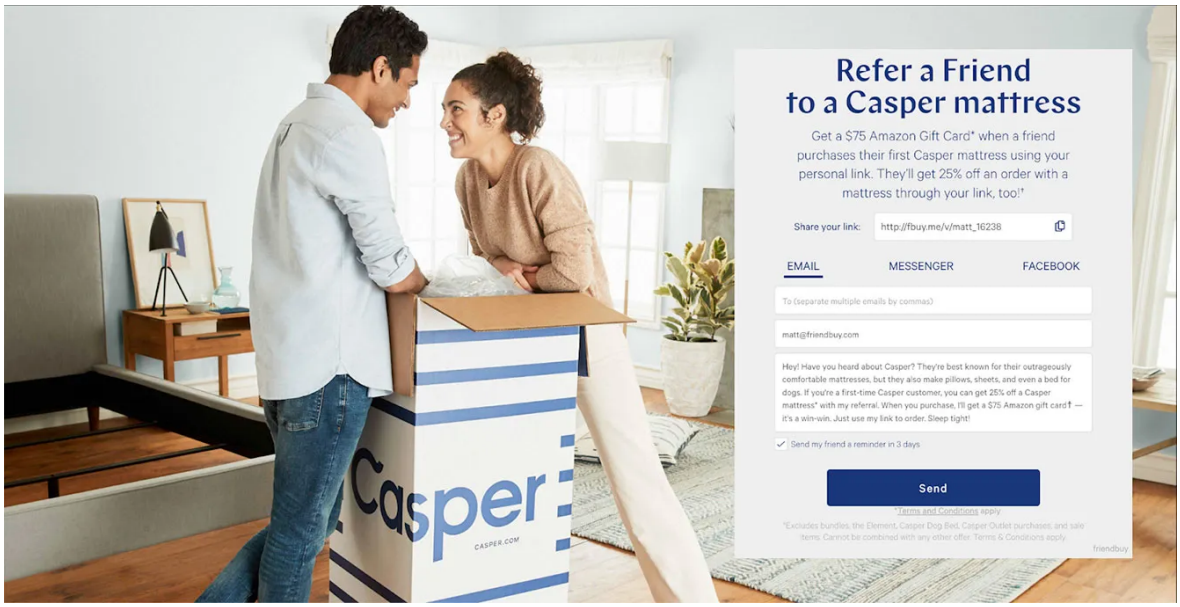


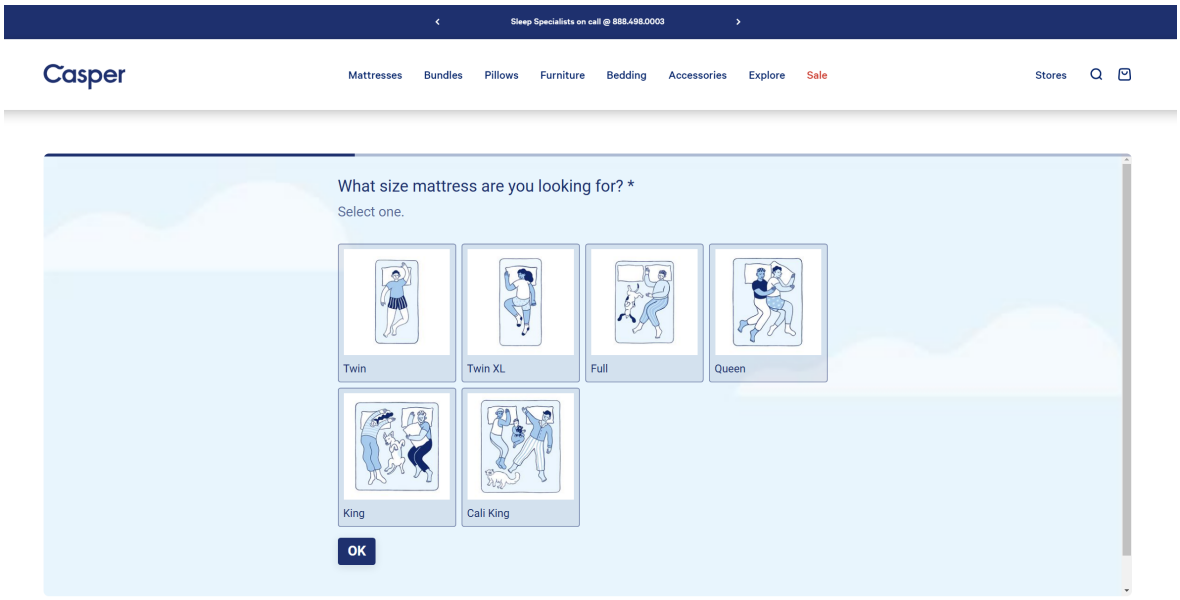
Figure 2.2: Casper referral program page

Source: https://casper.com/friends-mattress (retrieved: Sep 28, 2024)

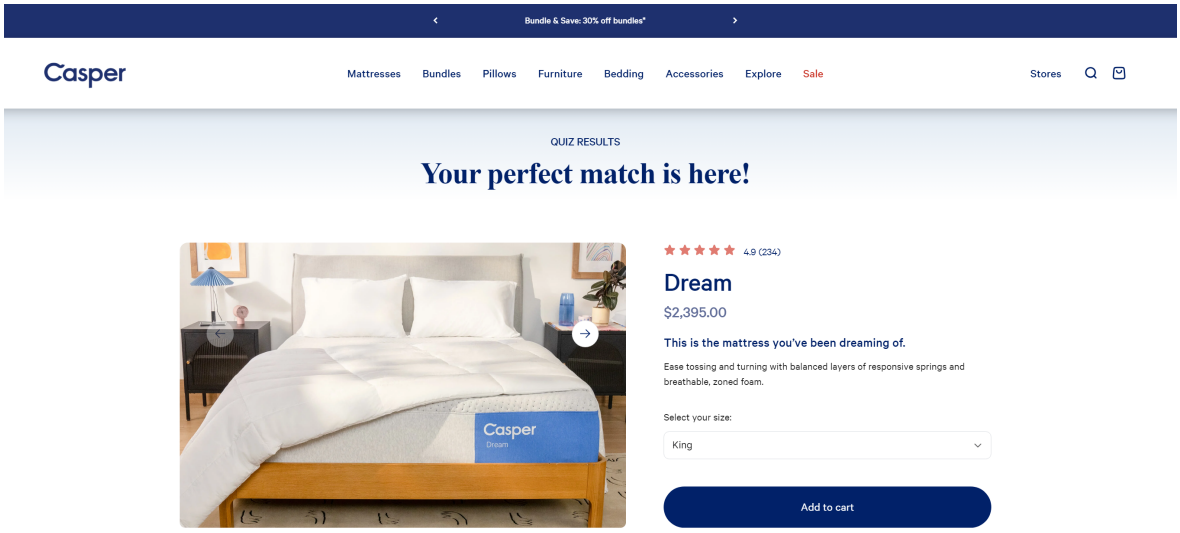
features, while granting a "made-to-measure" product proposition for the particular user. In a sense, Casper makes the prospect "really bespoke" by getting emotional reassurance and also a practical eye that combines into a holistic trust-building system surrounding the delivery of experiences, thus improving the online shopping experience (and thus digital trust) in general. This gamification-like approach, which gives a sense of interactive online interaction with the vendor, is in line with results from, for example, Kaur et al. (2023b), which explicitly say that increased interactivity creates a perception of greater enjoyment of online shopping, translating into increased sales results. Figure 2.3 shows a quiz on choosing the right mattress for the user based on their preferences.

2.5.2 Gymshark

Another example of implementing trust-based human-oriented approaches in online sales facilitation is Gymshark. Founded by a British fitness apparel brand, Gymshark has grown into a global leader through an innovative, digital-first approach. Online primarily, Gymshark's degree of the business model is to have e-commerce at its very core and link the company to a crowd beyond national borders, personalizing customer experience, and building direct relationships with its consumers. Using



(a) Questions part of the quiz



(b) Results part of the quiz

Figure 2.3: Casper's quiz on choosing the right mattress: a gamification-like approach in e-commerce

Source: https://casper.com/pages/mattress-quiz (retrieved: Jan 12, 2025)

the user experience-focused approach, along with the wide use of social media and contemporary marketing solutions, Gymshark has managed to create trust and loyalty, community, making e-commerce the foundation of its billion-dollar success (Lorincz, 2023b). Gymshark's e-commerce success is based on end users through the incorporation

of social networks, collaborations with influencers, and community-building efforts. These aspects will be discussed in more detail in the subsequent subsections.

Social media influencers' impact

In light of their e-commerce strategy, Gymshark primarily focused on influencer partnership with early adopters such as Lex Fitness to target the brand demographic, making early moves to establish trust and connect between the audience and Gymshark. Such athletes are provided with clothing samples and later sponsored to create authentic organic promotion between Gymshark and the athlete. Constraining the exclusive "Gymshark Athlete" program for representatives like Whitney Simmons, and Nikki Blackketter, and Jake Taylor[44] to affinity rather than popularity scores credibility. As a result, this invitation-only means that the program is one of the most wanted status symbols within the fitness community, causing organic exposure when wannabe influencers attempt to tag Gymshark with product use to try and get noticed. By focusing on community building and relationships rather than consumer advertising, Gymshark is creating credible exposure, substantial visibility, and making itself familiar as the leader in fitness apparel today. One of the Instagram posts published by one of the influencers in collaboration with Gymshark is shown in Figure 2.4.

Community-building focus

Another marketing aspect on which Gymshark has placed great emphasis since its beginnings is building a self-sustaining and supportive community. They reach out directly to their customers through live events, meet-ups, and their global tour. An example is the Gymshark World Tour in 2016, where fans could have met and interacted with fitness influencers and brand ambassadors, such as meeting in person. Recording such events on video platforms like YouTube enhances the sense of community among Gymshark's customers. As larger audiences flock to Gymshark, the company has also begun to organize smaller pop-ups around select major cities, such as New York, instead of staging large-scale events. These more modest events still captivate audiences, while

[44]These Instagram fitness influencers have above-average visibility on their social media profiles, reaching more than 4 million, 1.3 million and 225,000 (respectively) followers on Instagram (as of August 25, 2026).

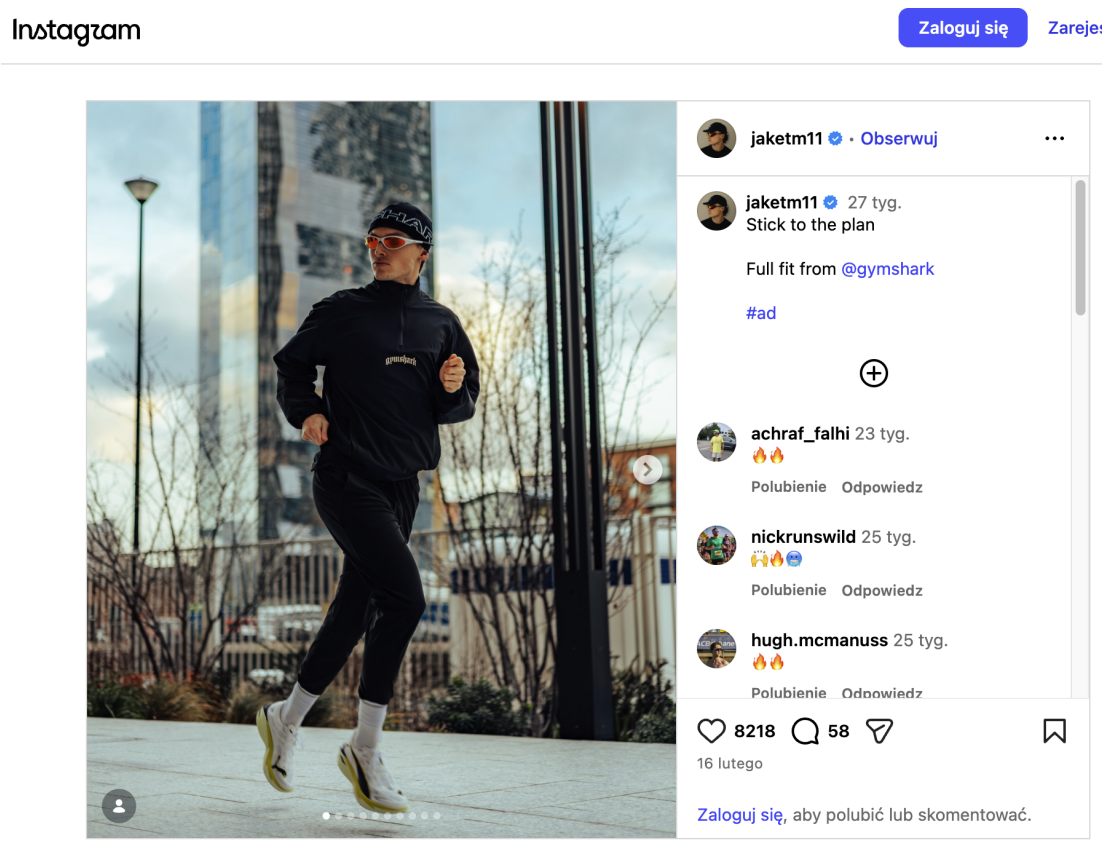
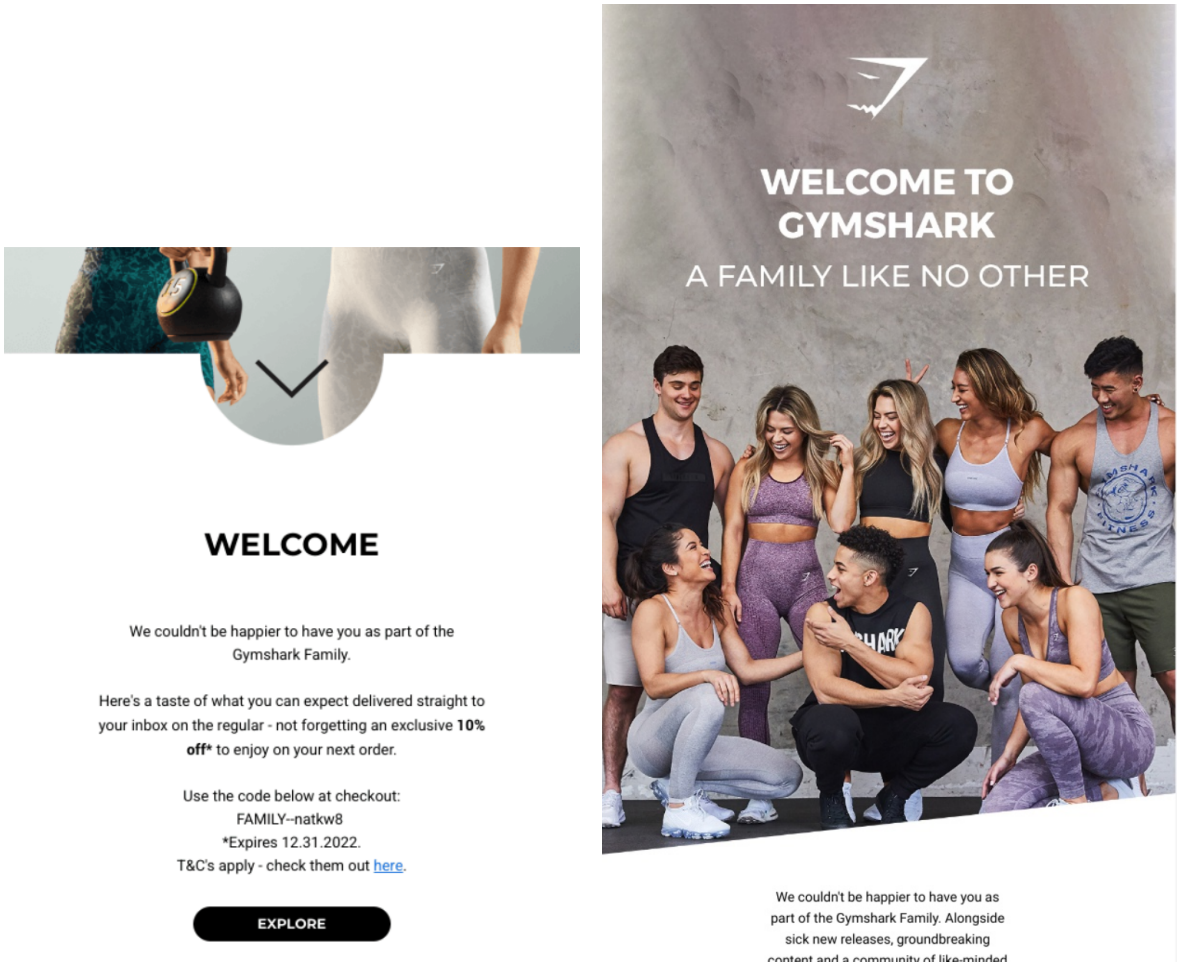


Figure 2.4: The Instagram post by fitness influencer Jake Taylor (@jaketm11) in partnership with Gymshark

Source: https://www.instagram.com/p/DU0Sw_7F18X (retrieved: August 25, 2026; originally published on February 16, 2026)

reassuring Gymshark and its expanding community that things will continue to feel personal and intimate.

Gymshark also promotes the concept "family" in its communications, creating a certain kind of environment with their customers. Phrases such as "Gymshark family" are recognized by those who attend their events as having been used in customer interactions. These expressions are also used in marketing communication, such as in bulk email campaigns within newsletters sent to users registered on Gymshark's e-commerce platform (shown in Figure 2.5). That language creates emotional bonds that go beyond those associated with conventional consumer-brand relationships. This approach strengthens customer trust primarily on the ***affective*** axis by increasing through the creation of those social emotional bonds with the brand and the community.



(a) Welcoming personalized email with a name and a discount coupon

(b) Welcoming email with a large cover picture

Figure 2.5: The use of "family" in Gymshark's email communications

Sources: (a) Getsitecontrol.com; (b) Inboxflows.com (retrieved: Jan 13, 2025)

Knowledge-focused customer experience

Just like Casper, Gymshark has further valued the client base using interactive tools, for instance, a bra-fit quiz. This approach, which is in line with the results of major research on the enjoyment of online shopping through interactivity (Bugshan & Attar, 2020; Mou & Benyoucef, 2021), addresses real concerns and builds a customized shopping experience. Similarly to the technique used by Casper, such a quiz supports the ***affective*** as well as ***cognitive*** areas of e-consumer trust – on the one hand, it gives satisfaction from the interaction, and on the other, it provides knowledge about appropriate and fitting products. Other approaches similar to the one established by Casper include the development of a referral program. A system has been developed

by which people can encourage each other to refer others to the brand in exchange for a discount on future purchases from that contact referred upon completing a transaction. Moreover, Gymshark uses the cross-selling technique[45] by advising customers to buy other complementary accessories that match their style or complement the overall functionality, further increasing the perceived value of the purchase.

In addition to all that, Gymshark is actively investing in its blog[46] which serves as a tool for the dissemination of evidence-based advice on healthy living, self-care, and fitness. Integration of content that promotes body positivity with community principles reinforces consumer awareness and builds trust. These engagements are thoroughly enriching ***cognitive*** trust, thus fostering long-term loyalty and reaffirming its status as the authority of choice in the fitness and wellness space. Furthermore, supporting initiatives that are meaningful to the clientele can be considered CSR-related activities, which in turn strengthen consumer trust, according to research (Anastasiadou et al., 2018; Bianchi et al., 2019; Popa et al., 2022).

2.5.3 Domotio

Previous examples have mainly focused on marketing aspects, making it worthwhile to also reach for real-life case that will settle around technical aspects. One of these kinds of example is Domotio: the Polish company which focuses on the production of lighting solutions, incorporating glass sourced from domestic manufacturers and components supplied by local partners. In addition to its stationary sales, the company also operates online, wanting to make its e-commerce sales volume increase beforehand.

Domotio has been harmonizing its internet strategy by discontinuing two different platforms and replacing them with a more functional one (BitBag, n.d.). The company has targeted SEO processes,[47] but the changes also vastly enhance the user experience

[45]Cross-selling is a marketing strategy, especially utilized in the e-commerce industry, that involves encouraging customers to purchase complementary or related products in addition to their initial selection, thus increasing the overall value of the transaction (Tian et al., 2012).

[46]Beyond the conventional text-based blog format, Gymshark is also developing video blogs on platforms such as YouTube and TikTok.

[47]Search Engine Optimization (SEO) is the practice of optimizing a website's content, structure and technical elements to improve its visibility and ranking on search engine results pages, thus increasing organic traffic and increasing user engagement (Almukhtar et al., 2021).

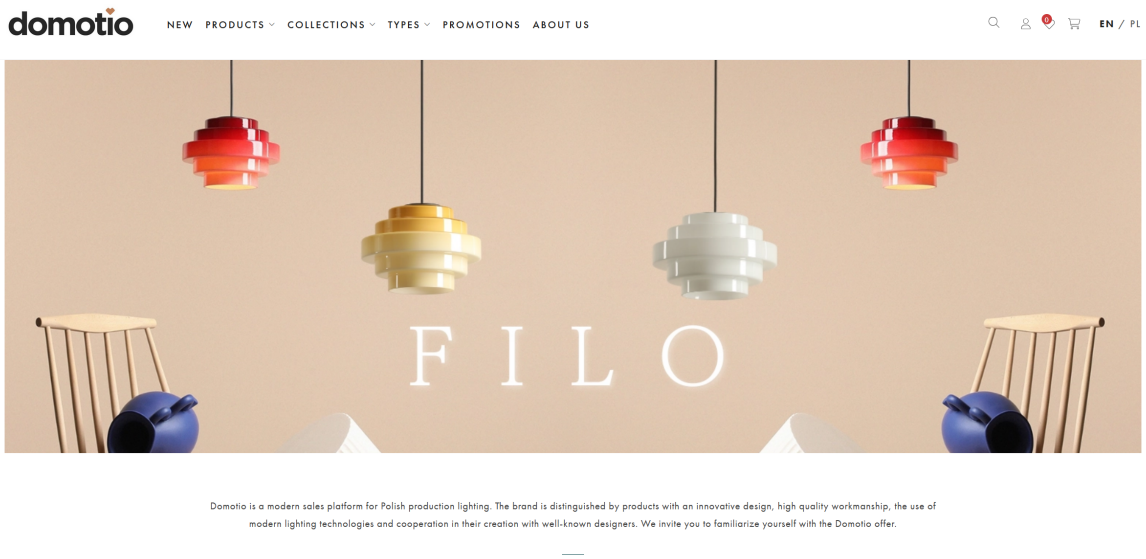


Figure 2.6: Domotio website – homepage

Source: https://domotio.pl/en/ (retrieved: Jan 12, 2025)

on the site while trying to drive increased sales numbers. The company turned its focus toward improved economic efficiency through enhanced back-office data analytics. Ensuring that such transformation involved compliance with new legal regulations, especially the Omnibus Directive (European Parliament and the Council, 2019) on strengthening consumer protection standards, the company sought to ultimately boost customer trust and confidence in the brand itself.

As a result of this transformation, the customer yielded a scalable and flexible platform that is purposely intended for both immediate and future growth in relation to market demands. The new platform of Domotio's online store includes a new user interface element, which makes navigation easier and provides a more straightforward purchasing process. The admin panel is tailored to non-technical users to enable intuitive store management efficiencies. The platform comes with full integration of the entire Google Analytics suite, including Google Merchant, Google Analytics 4, and Google Tag Manager for complete data analysis and monitoring. In addition, it has been developed in an English version with dynamic currency support (Euro), improving the informative clarity of the e-commerce platform for international users and improving cross-border sales. The appearance of the new Domotio online store is shown in Figure 2.6.

The transformation efforts undertaken by Domotio to improve its online sales platform ultimately transformed the brand's online business into a more user-friendly one, increasing sales and the brand's position in the market. This is a practical confirmation of the results of the research (e.g., Chiang et al., 2018; Kumar et al., 2020b), which indicated that taking legislative and technical measures to increase the security of transactions in front of an e-commerce company increases trust in it. In particular, this supports the sphere of ***cognitive*** trust. Similarly, these measures are reflected in scientific research (e.g. Blagoeva et al., 2023; Mohamed Fadel Bukhari et al., 2013; Sivakumar et al., 2023), which indicated increased online sales and increased willingness to use a platform that is more aesthetically pleasing and user-friendly. This is intended to influence the ***affective*** side of e-consumer trust. Taking steps to increase the company's ability to more effectively measure consumer metrics through data analytics using Google software has resulted in the company's current strategies being better aligned to more efficiently read and understand consumer needs.

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These three cases show how trust is a fundamental element of e-commerce domain, as well as the many layers on which it can be approached – from reducing risks to creating a more personalized experience and building relationships with customers. In addition, the interdependence between the cognitive and affective components of trust in practice becomes apparent when different activities performed by businesses can affect both types of trust. Although businesses act in different environments and employ different strategies, the examples provided by these enterprises demonstrate how trust can be viewed as an issue for different areas of the operation of e-commerce companies.

Chapter 3

Methodology

This chapter introduces the methodology and overall research approach adopted in this dissertation. It explains how the theoretical propositions developed in the preceding chapters are translated into measurable constructs, a research model, and an empirically testable trust-based framework. In the first place, the chapter describes the research workflow. Then it presents the research hypotheses and the structural model. Finally, it describes the questionnaire design and the data collection process.

3.1 Research workflow

The Introduction shows how the research plan fits into the picture of the program and connects the purpose of the thesis to the specific tasks and steps needed to complete the study. This part aims to view things through a different lens. It does not revisit the project schedule. Instead, it explains how the theoretical premises of the study were translated into measurable constructs, an empirically validated research artifact, and managerially interpretable findings.

Within the overarching framework of Design Science Research in Information Systems (DSRIS; Hevner et al., 2004), the research process is organized into three distinct but interrelated stages:

1. Theoretical grounding and artifact requirements;
2. Artifact operationalization and empirical validation;
3. Interpretation and translation of knowledge.

The procedure reflects the main methodological dependencies within the study. However, it does not imply a strictly linear process. The theoretical basis of the project was updated and the interpretation of the experimental results required repeated reference to the conceptual framework. Nevertheless, the fundamental analytical order remained unchanged: the construction specification preceded the measurement validation, the measurement validation preceded the estimation of the structural model, and the management interpretation was generated only after the empirical structure of the artifact was established. Figure 3.1 presents this methodological sequence. Unlike the research plan outlined in the Introduction, which focuses on research tasks and milestones, the figure emphasizes the analytical inputs, procedures, and outputs involved in the development and evaluation of the artifact.

Theoretical grounding and artifact requirements

The first stage established the knowledge base of the study and specified the conceptual requirements for the proposed artifact. Its purpose was not simply to summarize previous research, but to determine how e-customer trust should be conceptualized, differentiated, and operationalized in a manner relevant to the evaluation of the functioning of e-commerce company.

The theoretical foundations for solving the problem of creating a trust-based framework that is capable of assessing the quality of company performance consist of several pillars: information theory, theory of customer behavior, including, in particular, the psychological-behavioral approach to the notation of trust. Moreover, as the goal is to create a tool applicable to a specific industry, the history and specificity of this sector, i.e., electronic commerce, are chosen to strengthen the theoretical background. This study operationalizes the requirements of the framework by systematically capturing the trust cues of e-customers and the perceived quality of the online-service, while generating actionable and firm-controllable input for targeted service improvement.

The theoretical analysis was conducted mainly in Chapters 1 and 2. It is a critical and integrated review of the literature that combines theoretical and narrative argumentation (Paré et al., 2015; Sylvester et al., 2013). Thematic components are used to identify the main constructions, predecessors, and relationships related to trust formation in digital exchanges. The narrative component supports the examination of how the concepts

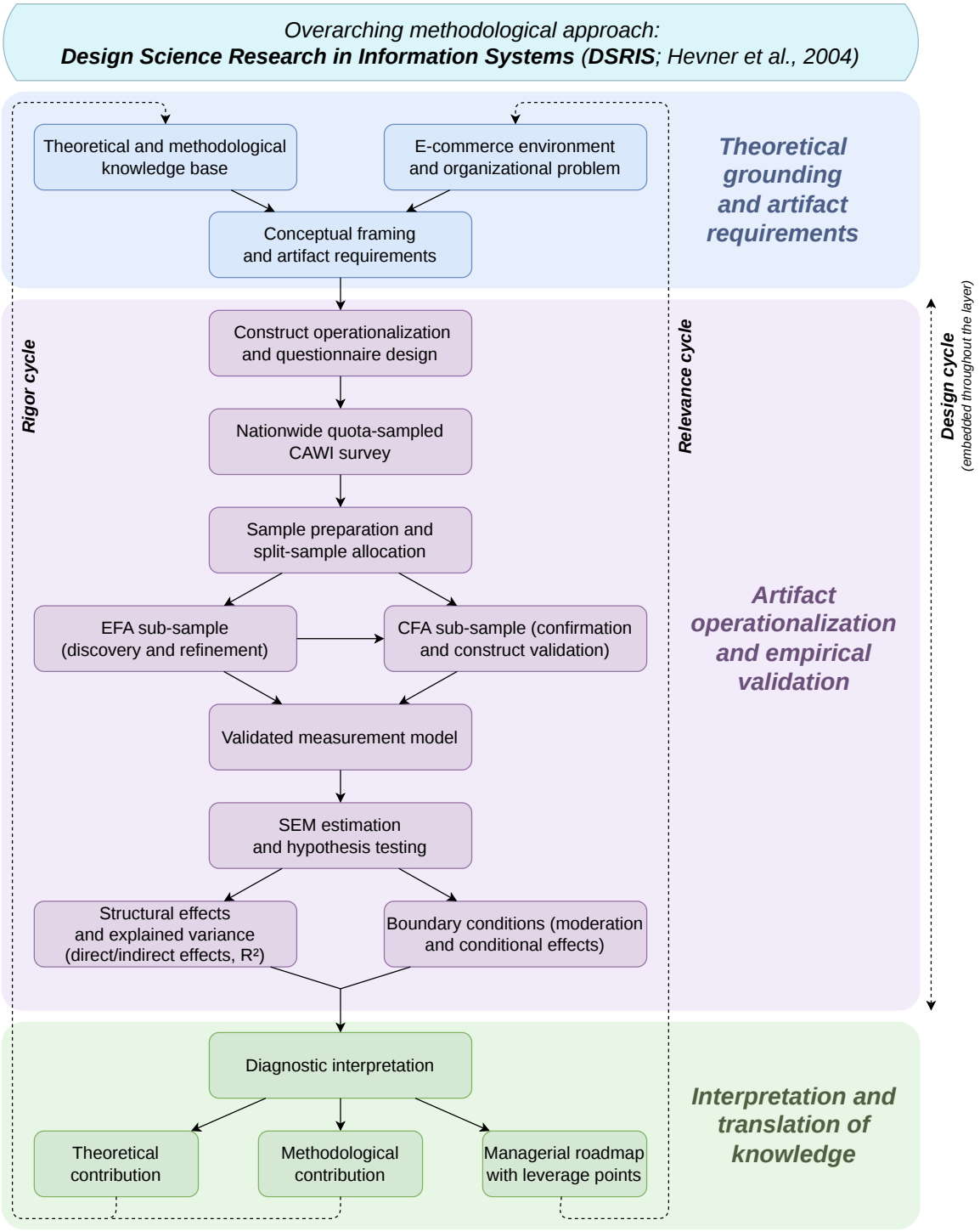


Figure 3.1: The methodological sequence of developing and integrated evaluating trust-based research artifacts

of trust, online consumer behavior, and the quality of electronic services evolved in successive research streams.

From the end of 2024 to the beginning of 2025, the research of the core literature was carried out using Scopus, Web of Science, EBSCO, and ProQuest. Google Scholar serves as a supplementary source of research, especially for cross-disciplinary publications and works that are not easily available through the main databases. The search included articles in peer-reviewed journals, academic monographs, and chapters in edited volumes. Combinations and variants of terms such as *trust*, *e-commerce trust*, *cognitive trust*, *affective trust*, *digital trust*, *consumer trust*, *e-service quality*, *online purchasing behavior*, and *trust measurement* were used to identify both foundational contributions and more recent empirical developments.

This stage led to a conceptual framework for e-commerce with an explicit cognitive and affective basis of trust. It also supports the initial definitions of general trust, the perception of e-service quality, and company-controlled signals and practices that may affect customer trust. These results provide conceptual requirements for the development of questionnaires and define the substantive boundaries of subsequent measurement and structural models.

Artifact operationalization and empirical validation

The second stage constitutes the central design and evaluation cycle of the dissertation. Its purpose was to transform the conceptual requirements into a testable research artifact consisting of a validated measurement structure and a structural model explaining the relationships among firm-controlled trust-building mechanisms, cognitive and affective trust, general trust and perceived e-service quality.

Although Figure 3.1 presents the methodological procedure at a more granular level, the individual steps can be grouped into three broader analytical phases:

1. construct operationalization, instrument design, and data collection;
2. measurement model development and validation;
3. structural model estimation and boundary-condition analysis.

The first phase was to translate the constructs identified in the theoretical analysis into structured questionnaires, which were administered through a nationwide CAWI

survey of Polish adult e-customers (in a representative group of Poles; see Appendix 3.4 for questionnaire design). The instrument captured cognitive, affective, and general trust, customers' perceptions of electronic service quality, and company-controlled mechanisms relevant for trust formation. The purpose of this study is not to assign arbitrary weights to individual practices but to establish consistent empirical representations of the areas needed by the trust framework. The construction of the questionnaire, the operation of the elements, the sampling process, as well as the data collection process are described in Chapter 3.4.

The second phase focused on establishing the measurement structure of the artifact. Exploratory factor analysis was used to examine the latent dimensionality of the relevant questionnaire blocks and to identify items that require reassignment or exclusion. Subsequently, a confirmatory factor analysis was applied to verify the resulting structure and assess its psychometric quality. The evaluation covered indicator loadings, internal consistency, convergent validity, discriminant validity, and model fit. A split-sample process separated the exploration and confirmatory phases and reduces the risk that the final measurement structure will reproduce only the patterns identified in the same subset of observations.[48]

The third phase concerned the estimation of the structural model and the verification of the research hypotheses developed in Chapter 3.2. Structural equation modeling was used to investigate the relationship between the firm-controlled mechanisms that occur in e-stores and cognitive and emotional trust, the relationship between these components and general trust, and the relationship between perceived e-service quality. Direct and indirect effects were estimated in common nomenclature structures, allowing the deduction of the relative importance of individual relationships from standardized model parameters, rather than from externally imposed or *ad hoc* weights. Because this study uses a cross-sectional design, the estimated structural effects within the SEM are viewed as model-based directional relationships rather than evidence of causality.

The analysis was supplemented with moderation tests that addressed certain boundary conditions of structural relationships. The characteristics of the respondents and the channel usage patterns were investigated to determine whether the force of the focal

[48]Further clarification explaining the relationship between the research methods used and Design Science Research is provided in Chapter 3.3.2.

effect varied between the relevant customer and use contexts. These analyzes expand the interpretation of models by not only indicating whether a relationship exists but also under what conditions it becomes stronger or weaker.

Evaluation was embedded throughout the artifact development process. Evidence concerning reliability, construct validity, model fit, explained variance, structural effects, and conditional relationships jointly informed the assessment of the artifact. Consequently, utility evaluation and implementation of the organizational field (focused on practitioners) are considered possible extensions of current research, not components of its quantitative validation process. The complete analysis procedures and their results are presented in Chapter 4.

Interpretation and translation of knowledge

In the final phase, the validated model is translated into theoretical and managerial knowledge. At the theoretical level, the conclusions are interpreted in relation to the cognitive and functional structures of trust, the roles of general trust, and the relationships between trust and the quality of perceived electronic services. The supported and unsupported structural paths are considered together and the study can identify the descriptions and limits of the proposed framework.

At the diagnostic level, interpretation is guided by direct and indirect standardized effects, explained variance, and conditional relationships. Together, these indicators allow for the identification of the most influential mechanisms for trust building, the distinction between stronger and weaker effects, and the determination of the differences between these relationships within different customer groups and distribution channels. Furthermore, the findings at the managerial level are incorporated into a structured framework identifying priority areas and key levers to strengthen trust and improve the quality of electronic services. This framework does not provide general recommendations, but logically organizes empirical evidence into managerial considerations and explains where interventions can have the greatest impact on the scope of estimated models.

The stage culminates in the synthesis of the theoretical, methodological, and managerial contributions of the dissertation, together with its limitations and directions for further research. Conference presentations and scholarly publications serve as

channels for disseminating these outcomes, but do not constitute a separate procedure for validating the artifact.

3.2 Hypothesis development

This subsection focuses on presenting research hypotheses that will serve, on the one hand, to achieve the objectives set out in the Introduction and, on the other hand, as the basis for constructing a structural equation model (SEM), which is the core of the study. The research activities described in the previous Chapter 3.1 enabled the verification of hypotheses and the analysis of relationships between the variables included in the model. The results provided an in-depth picture of key patterns and trends in the data, providing a solid basis for formulating conclusions and recommendations for further research on trust in e-commerce, not only from the consumer side, but also (and perhaps above all) from the managerial side in terms of improving the quality of e-services in the e-commerce domain.

The methodological requirement is that the approach to building SEM, which is based on covariance (so-called covariance-based SEM; CB-SEM), be thoroughly grounded in the literature. The path of the components between the constructs in such a model reflects research hypotheses, which in turn cannot be strictly exploratory in nature, but must confirm the theory, which in turn distinguishes them from the PLS-SEM approach (partial least squares SEM; Dash and Paul, 2021). Due to the fact that the literature on trust, also in the context of e-commerce, as well as the perceived quality of e-services is extensive (as presented in theoretical Chapters 1 and 2), the CB-SEM approach was chosen. However, this was not intended to make the study repetitive, as the relationships between trust-based constructs had not yet been studied in this way and in the context of the perceived quality of the functioning of the e-commerce environment.

The hypotheses presented are closely related to what has been discussed in the preceding Chapters 1 and 2. However, in order to maintain transparency and reflect the basis of a given hypothesis in specific literature sources, abbreviated descriptions will be presented and referenced to a specific hypothesis (or set of hypotheses). However, it is worth adding here that only some of the research hypotheses (i.e., H3-H6) will

be used to create the baseline SEM model, together with those hypotheses (H7-H8) that will extend it with a moderation analysis. Hypotheses H1-H2 are falsified using factor analysis (both exploratory and confirmatory), with the aim of identifying robust constructs (in the context of trust in e-commerce) for SEM analysis.

Cognitive and affective trust as separate constructs

Following the classic distinction proposed by McAllister (1995) and further discussed by Lewicki and Bunker (1996), this dissertation treats trust in e-commerce as a dual construct rather than a single undifferentiated attitude. Theoretically, cognitive trust reflects competence, reliability, and procedural clarity, whereas affective trust reflects benevolence, warmth, and relational cues (Foroutan et al., 2022; Punyatoya, 2019). Importantly, recent work suggests that the boundary between what drives the cognitive versus affective sphere is not always empirically obvious in digital contexts, thereby rendering construct validation a methodological imperative rather than a mere procedural formality (Legood et al., 2023). For that reason, the study develops a measurement approach that explicitly tests whether the two dimensions of trust remain empirically distinguishable within e-commerce contexts, where cues are mediated by interfaces, policies, and transaction routines. This theoretical reasoning provides the basis for Hypothesis H1, which reads as follows:

- **H1.** Cognitive trust in e-commerce is a distinct latent construct separable from affective trust in e-commerce.

Perceived e-service quality as multidimensional construct

Most established e-service quality frameworks conceptualize perceived quality as a multifaceted construct, where distinct domains such as fulfillment, system reliability, privacy/security, information integrity, and recovery contribute to overall judgments (Barnes & Vidgen, 2000; Blut, 2016; Parasuraman et al., 2005; Ribbink et al., 2004). This is also consistent with broader perspectives on service quality that distinguish performance aspects and treat overall quality as an aggregate of separable attributes (Cronin & Taylor, 1992; Parasuraman et al., 1988). On this basis, and given that consumers can evaluate online retail services along multiple operational and interface-

related dimensions, the initial theoretical expectation is that perceived e-service quality should exhibit a multidimensional latent structure. This consideration motivates the assumptions of whether the measurement instrument exhibits the properties attributed to it in the prevailing literature, rather than presuming unidimensionality *a priori*. Therefore, Hypothesis H2 is proposed:

- **H2.** Perceived service quality in e-commerce is a multidimensional construct.

From cognitive and affective trust to general trust

In e-commerce contexts, uncertainty and information asymmetry increase the value of credible signals that mitigate perceived risk and provide clearer expectations about the anticipated course and outcome of the transaction (Handoyo, 2024). Consequently, cognitive trust should contribute positively to general trust because it is anchored in competence and assurance signals that consumers can quickly process from institutional signals and standardized procedures (Foroutan et al., 2022; Hipólito et al., 2025; Punyatoya, 2019). Affective trust is also expected to have a positive impact, as relational cues and perceived benevolence can strengthen a wider trust orientation when consumers are exposed to warmer communication, prosocial brand positioning, or other relational signals in repeated interactions (Fang et al., 2016; Foroutan et al., 2022; Punyatoya, 2019). However, because affective cues are generally more difficult to accurately infer in brief, digitally mediated interactions, the affective route may develop more slowly and become more prominent when richer interactions and experience accumulate (Barari et al., 2020; Wan et al., 2023; Wu et al., 2023). This reasoning motivates H3a and H4a, which read as follows:

- **H3a.** Cognitive trust in e-commerce has a positive effect on general customer trust.
- **H4a.** Affective trust in e-commerce has a positive effect on general customer trust.

Trust as an antecedent of perceived e-service quality

The originality of this work lies in embedding of cognitive and affective trust in e-commerce in the context of e-service quality. Therefore, it is also worth taking this

aspect into account when defining hypotheses and thus a research model. Trust is repeatedly identified as a central mechanism that shapes customer evaluations and downstream results in online commerce (Kim & Peterson, 2017; Salam et al., 2005). When consumers trust an online retailer cognitively, they are more likely to interpret service performance cues through a reliability and predictability lens, which should elevate perceived e-service quality. Affective trust is also expected to improve perceived service quality, as relational confidence can shape the global assessment of interactions, attenuate psychological resistance, and strengthen positive interpretations of e-service encounters (Chai et al., 2015; Johnson & Grayson, 2005; Wu et al., 2023). Therefore, both trust dimensions are expected to relate positively to perceived service quality, which motivates the following reading of Hypotheses H3b and H4b:

- **H3b.** Cognitive trust in e-commerce has a positive effect on perceived e-service quality.
- **H4b.** Affective trust in e-commerce has a positive effect on perceived e-service quality.

In addition, trust (in general terms, i.e., without distinguishing between cognitive and affective aspects) is widely used in e-commerce models as a simple predictor of attitudes and results (Azam et al., 2013; McKnight et al., 2002a; Pavlou, 2003). Conceptually, a stronger overall trust orientation should make consumers more willing to evaluate the service environment as credible and reliable, which should translate into higher perceived service quality. At the same time, when the cognitive and affective dimensions of trust are modeled explicitly, general trust can capture shared variance rather than introduce incremental explanatory power. For that reason, it is assumed that a superordinate trust disposition retains predictive validity once the two-component structure of trust is represented in the model.

The inclusion of general trust as a predictor of quality in the e-commerce domain, in conjunction with specific dimensions, is driven by the heuristic nature of decision-making on the internet. According to dual-process theory (Barrouillet, 2011),[49] consumers do

[49]Dual-process theory serves to justify the distinction between judgments based on in-depth analysis and quick, holistic judgments. In this study, general trust is interpreted as a manifestation of the latter mode, allowing the examination of its independent role in shaping quality perceptions.

not always perform a detailed analysis of attributes (cognition-based analytical path). They often rely on a general "sense of security" or global attitude towards the brand as a mental shortcut (that is, heuristics). The objective is to test whether this general overarching trust attitude has independent explanatory power in shaping the perception of quality, beyond the sum of its cognitive and affective components.

In view of this, Hypothesis H5 is defined as follows:

- **H5.** General customer trust in e-commerce has a positive effect on perceived e-service quality.

Managerial levers as antecedents of trust

Trust in e-commerce does not emerge in a vacuum. Online retailers shape trust primarily through designable and communicable mechanisms that act as signals of reliability, procedural fairness, and user orientation (Urban et al., 2000; Wang et al., 2004). Clear policies, secure and transparent transaction practices, standardized procedures, and credible communication should strengthen cognitive trust because they reduce perceived risk and increase situational normality (Kim et al., 2008). At the same time, the same managerial design space can also stimulate affective trust by conveying benevolence and relational intent through interface cues, supportive service behavior, and prosocial positioning. In this sense, the managerial levers can operate as a trust-oriented design space that organizations can configure, test, and improve, linking concrete interventions to measurable trust outcomes (Koç & Çevik, 2022).

The relationship between management actions and trust is strongly supported by signaling theory (Kirmani & Rao, 2000; Spence, 1973). In a virtual environment characterized by information asymmetry and lack of physical contact, customers are unable to directly assess the intentions of the seller (Hadasik, 2024). The bridge between signaling theory and trust in the e-commerce environment is already noticeable: to enhance user confidence, many online businesses now feature independent assurance seals (so-called "trustmarks") that indicate credibility, reliability, and commitment to trustworthy practices (Aiken et al., 2004). Therefore, the "managerial levers" discussed in this study (which are about to be introduced; such as privacy policy, the quality of the website's interface, and the transparency of procedures) are not only operational elements, but also serve as observable signals. These signals reduce uncertainty and

allow consumers to infer invisible attributes of the seller, such as competence (building cognitive trust) and goodwill (building affective trust).

This logic motivates Hypotheses H6a and H6b, which read as follows:

- **H6a.** Managerial trust-building levers (LEV) exert a positive effect on customers' cognitive trust in e-commerce (COG).
- **H6b.** Managerial trust-building levers (LEV) exert a positive effect on customers' affective trust in e-commerce (AFF).

Why expect demographic moderation in the trust-quality relationship

Demographic characteristics may shape how diagnostic trust becomes for evaluating e-service performance. Age, in particular, can change both experience profiles and the decision strategies consumers apply. In digitally mediated contexts, older online shoppers often constitute a preselected group that has already crossed a competency and participation threshold, which can reduce variance in trust and compress the slope linking trust to perceived quality (Aleti et al., 2025; Cheng et al., 2025; Franco, 2023; Kovalenko, 2020). Moreover, when online shopping environments are already familiar and widely used by consumers, trust tends to function as a prerequisite for participation rather than as an ongoing driver of post-use quality judgments (Blut et al., 2015; Pavlou, 2003). This fosters age-based moderation hypotheses for both trust dimensions, i.e., Hypotheses H7a and H7c, which are as follows:

- **H7a.** The relationship between cognitive trust in e-commerce and perceived e-service quality differs depending on age.
- **H7c.** The relationship between affective trust in e-commerce and perceived e-service quality differs depending on age.

Gender effects are theoretically plausible but empirically ambiguous and context-dependent. Previous work suggests that gender in the e-commerce domain can differentiate the signals to which e-consumers pay attention. However, it does not necessarily alter the mechanism through which general trust shows a stronger predictive relationship with perceived quality at lower usage levels, especially when platform processes

are standardized (Garbarino & Strahilevitz, 2004; Kanwal et al., 2022; Lee, 2019; Lian & Yen, 2014). Consequently, hypotheses H7b and H7d treat gender moderation as an empirical question rather than a stylized fact, and thus:

- **H7b.** The relationship between cognitive trust in e-commerce and perceived e-service quality differs depending on gender.
- **H7d.** The relationship between affective trust in e-commerce and perceived e-service quality differs depending on gender.

Channel-specific contingencies in the trust-service quality relationship

In this study, channel use frequency is treated as a boundary condition that can affect the extent to which general trust in e-commerce informs perceptions of e-service quality, shifting attention from trust formation to post-adoption evaluation. General trust (without splitting into affective and cognitive dimensions) is deliberately used as a superordinate trust orientation commonly used in various e-commerce models (Azam et al., 2013; McKnight et al., 2002a; Pavlou, 2003) and, at the same time, as a parsimonious operationalization: decomposing channel moderation into separate cognitive and affective interactions would multiply the number of tests, increase the overall likelihood of a type I error occurring, and increase interpretive cost, while interaction effects generally require greater statistical power (Banerjee et al., 2009; Kline, 2016; McClelland & Judd, 1993; Midway et al., 2020; Streiner, 2015). The underlying logic is that as channel use becomes more routine, quality judgments increasingly rely on real service delivery and expectation confirmation rather than on baseline beliefs (Bhattacherjee, 2001; DeLone & McLean, 2003; Lee & Sung, 2023), and habit can further reduce the explanatory leverage of belief-based predictors (Limayem et al., 2007; Wood & Neal, 2007).

This mechanism is most visible in the desktop channel, where stable conditions and repeated comparisons foster rotation and make general trust in e-commerce less diagnostic of perceived e-service quality as the purchase frequency increases. In social commerce and live streaming commerce, the pattern is also frequency-dependent, but for a different reason: for infrequent users, higher uncertainty and socially mediated risk

make trust (in general) a strong heuristic that organizes quality impressions (Lim, 2003; Pavlou, 2003), while with increasing familiarity, channel-specific cues (e.g., eWOM, interactivity, perceived social presence, streamer-related credibility, and stream-level experience) increasingly substitute for a global trust position (Busalim & Hussin, 2016; Gvili & Levy, 2023; Luo et al., 2025; Wongkitrungrueng & Assarut, 2020; Zhang et al., 2022b; Zhao et al., 2023; Zhao et al., 2020). By contrast, the mobile channel may be more resistant to moderation, since trust in m-commerce is often tied to post-use outcomes in a relatively stable manner and is systematically supported by quality and security cues at all usage levels (Jimenez et al., 2016; Sarkar et al., 2020). In this way, the channel hypotheses position frequency not as a simple "more is better" effect, but as a contextual factor that reshapes how strongly general trust is translated into perceived service quality in different e-commerce environments. Thus, these hypotheses (H8a-H8d) are formed as follows:

- **H8a.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the desktop e-commerce channel.
- **H8b.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the mobile commerce channel.
- **H8c.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the social commerce channel.
- **H8d.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the live streaming commerce channel.

The research hypotheses defined in this way provide a sound basis for creating a research model that is described in the subsequent Chapter 3.3.

3.3 Research model

Based on the hypotheses developed in the previous Chapter 3.2, this study proposes a comprehensive structural model. To ensure methodological rigor and theoretical coherence, the proposed research model is situated at the intersection of consumer economics and management science, thereby integrating perspectives from both disciplines into a unified analytical framework. Specifically, it draws on the Stimulus-Organism-Response (S-O-R) paradigm and the Design Science Research (DSR) framework.

In this empirical model, cognitive and affective trust serve as two overarching appraisal dimensions to judge the trustworthiness of e-commerce. Instead of being direct indicators of dependence on a particular seller, the respective constructs represent the ways customers assess the trust-related elements of the e-commerce environment from both cognitive and affective perspectives.

Within the defined S-O-R and DSR frameworks, the research model comprises five key latent constructs specific to the e-commerce environment:

- **managerial trust-building levers (LEV):** represents tangible and intangible interventions implemented by e-commerce vendors (such as transparent policies, interface design features, and security guaranties) acting as signals within the e-commerce environment that enhance credibility and reduce perceived risk;
- **cognitive trust (COG):** refers to the rational reliance of the customer on the e-seller based on an assessment of competence, reliability, and functional ability to fulfill transaction obligations.
- **affective trust (AFF):** captures emotional and relational confidence in the e-vendor, grounded in perceptions of benevolence, care, warmth, and user-centricity.
- **general trust (GEN):** defines the overall synthetic stance of the customer to depend on the e-vendor, integrating both rational calculations and emotional intuitions into a unified attitude.
- **perceived service quality (QUAL):** represents the global judgment regarding the superiority and excellence of the e-service delivery and platform functioning, serving as the primary performance outcome in the model.

The operationalization of these constructs was conducted using a specific set of questionnaire items (measurement scales). The specific design, the process of adapting the literature-based scales, and the validation of the survey instrument are presented in subsequent Chapter 3.4. However, as mentioned before, to keep things simple and consistent throughout this theory, it was decided to call these constructs cognitive trust (COG) and affective trust (AFF), and define them based on how the appraisal-based operationalization described above interprets them.

3.3.1 S-O-R framework

The structural relationships between the constructs are organized according to the classic S-O-R framework (Eroglu et al., 2001; Mehrabian & Russell, 1974; Vieira, 2013). This paradigm assumes that platform-related cues function as stimuli that influence an individual's internal states, which in turn shape behavioral and evaluative responses. In the context of this research:

- ***S**timulus:* represented by *managerial trust-building levers (LEV)*. These are the designable external interventions and environmental cues (policies, interface features, communication standards) controlled by the e-commerce organization.
- ***O**rganism:* represented by the multidimensional construct of trust (*cognitive and affective trust*, i.e., *COG* and *AFF*, respectively), as well as a unified one (*GEN*). These variables reflect the internal processing of a consumer (both rational and emotional) resulting from exposure to stimuli.
- ***R**esponse:* represented by *perceived service quality (QUAL)*. This is the outcome variable, reflecting the consumer's evaluation judgment of the performance of the e-commerce environment.

This structure allows for analyzing how tangible actions undertaken by e-commerce companies (S) translate into intangible assets like e-consumer's trust (O), ultimately resulting in a measurable assessment of service quality in the e-commerce domain (R). The ultimate goal is to provide e-commerce companies with a tool that aims to improve the quality of their operations based on the affective and cognitive trust of e-customers who make purchases on their websites.

The SEM model proposed in this paper, together with the direction of flows, is based not only on the S-O-R approach itself, which forms a kind of shell around it, but also on the literature, which is in line with the guidelines of Dash and Paul (2021). Institutional mechanisms and "hard" practices (such as the use of certificates, seller verification, privacy policies, payment integrity, and usability of the website) create assurances that limit transaction risk and signal ability/integrity, the core of cognitive trust. In e-commerce, this is a canon: institution-based trust directly increases trust in the environment and trading entities (Pavlou & Gefen, 2004). In turn, relational and experiential elements in e-commerce (social presence, empathetic service, recovery fairness, community, brand communication, CSR mechanisms) build warmth and closeness, which translates into the affective component of trust. Research has shown that social presence and the design of service relationships strengthen trust and the pleasure or comfort of using a given online store (Cyr et al., 2007). In this work, LEV is a comprehensive set of levers that address both channels: cognitive (assurances, competence) and affective (relationality, social presence) of trust in the e-commerce domain. This is also consistent with the ability–benevolence–integrity approach (Mayer et al., 1995), on which much of the literature on trust is based. This also gives a basis for the $LEV \rightarrow COG$ and $LEV \rightarrow AFF$ paths.

Furthermore, LEV can be understood as an organization's overall ability to deliver "what the customer expects." This is comparable to general measures of service quality used in IS and e-service research, where quality is often treated unidimensionally (like in the proposed model in this dissertation) and used as an antecedent of user attitudes and behaviors. This approach is consistent with, e.g., the SERVQUAL concept (Parasuraman et al., 1988) (based on a global quality score), DeLone and McLean's information systems success model (DeLone & McLean, 2003), as well as with other research on service and website quality, where globally perceived quality is an antecedent of satisfaction and trust (Barnes & Vidgen, 2000; Blut, 2016).

Cognitive and affective trust are considered two complementary components of relationship assessment; both contribute to a more unified (underlying) trust in the provider (e-store) and the e-commerce environment itself. Johnson and Grayson (2005) show the parallel influence of both cognitive and affective trust in e-commerce on generalized attitudes and evaluations in e-service relationships. In e-commerce, trust

measures are often constructed from cognitive and affective components that converge into more general trust, providing a rationale for the $COG \rightarrow GEN$ and $AFF \rightarrow GEN$ paths.

Trust can shape quality assessments through an interpretive effect, i.e., *halo effect*: prior trust reduces uncertainty and leads customers to interpret ambiguous quality signals more favorably, which, in turn, translates into higher ratings of perceived service quality.[50] Trust plays a central role in service relationships and precedes value, satisfaction, and loyalty (Sirdeshmukh et al., 2002); logistics and service studies have even shown that trust predicts perceived quality (e.g., courier services; Ejdys and Gulc, 2020). This is particularly true in the context of implementing the S-O-R approach: in e-commerce, stimuli (LEV) shape states of trust (COG/AFF/GEN), which, in turn, modulate the assessment of the quality of the market and a specific service. In the literature, the role of trust as a mediator and "colorizer" of assessments is widely accepted. As a result, the $COG \rightarrow QUAL$, $AFF \rightarrow QUAL$, and $GEN \rightarrow QUAL$ paths are conceptually and empirically justified (Sirdeshmukh et al., 2002). A discussion of the relationship between trust constructs (COG, AFF, GEN) and e-service quality (QUAL) can be found in Appendix C.

The visualization of the proposed research model is presented in Figure 3.2.

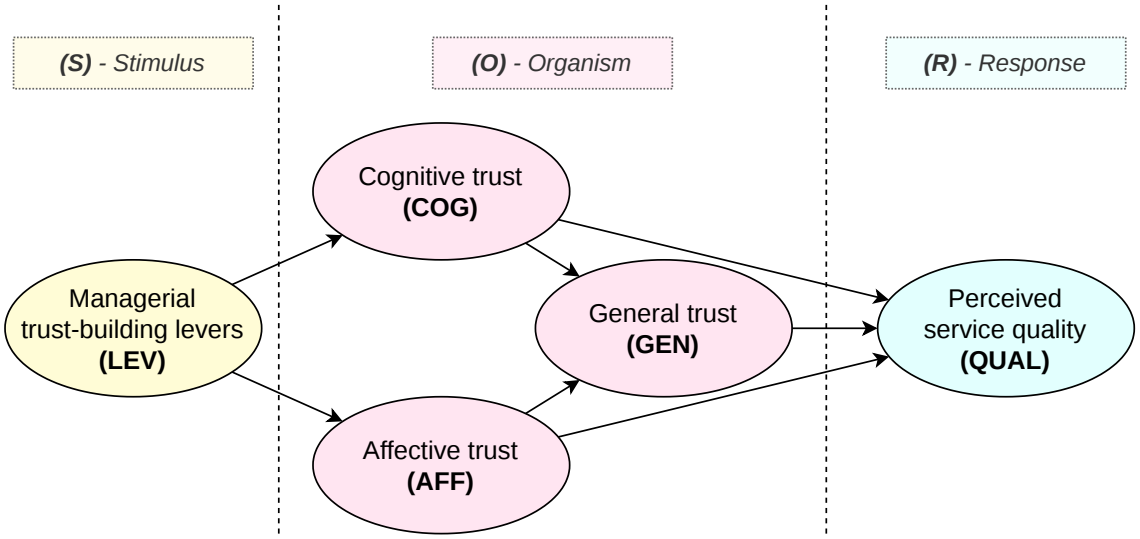


Figure 3.2: The proposed research model (within S-O-R framework).

[50] See the work by Wirtz and Bateson (1995) on *halo effects* in attribute-level satisfaction measures, as well as subsequent studies on *halo effects* in trust, e.g.: Natarajan (2008).

3.3.2 A Design Science Research perspective

Although the S-O-R framework explains the psychological mechanism, the relevance of this model to the management and Information Systems (IS) discipline is grounded in Design Science Research (DSR). Following the guidelines of Hevner et al., 2004 and Gregor and Hevner, 2013, research in the IS and e-commerce domain should bridge the gap between "behavioral science" (explaining phenomena) and "design science" (creating utility). In this study, *managerial trust-building levers* (i.e., the LEV construct) are treated as the *"instantiation"* or *"artifact"*; the set of solutions designed by managers to achieve a specific goal. The SEM model serves as the rigorous evaluation method (the "Justification" phase in DSR cycles), verifying whether these designed levers produce effectively the desired utility (trust and perception of quality). Thus, the model not only describes consumer behavior but also (and foremost) validates the effectiveness of managerial design in reducing uncertainty.

The development of a trust-based framework for assessing e-commerce company functioning requires a methodological approach that supports both artifact design and its systematic evaluation. It was decided to use the methodology of Hevner et al., 2004 because it complies with commonly accepted standards in the field of design science, and it is also based on a combination of behavioral aspects with IS constructs. This methodology entails the systematic design and rigorous evaluation of research artifacts that represent practically relevant solutions to explicitly identified organizational problems. The DSRIS perspective allows this study to unite strong explanatory foundations with the creation of an artifact that is relevant in practice. This integration is especially crucial in the current context, where trust arises from behavioral and social dynamics but is shaped and manifested through technology-mediated interactions. There is also a justified need to base the newly created framework on a methodology combining these two aspects and the aforementioned paradigms utilized in IS, which this dissertation seeks to bridge. This is because purchasing (customer) behavior is a sub-discipline of behavioral sciences (Petty & Cacioppo, 1996) (and so is trust), and as e-commerce relies on information delivery to the end user, it might be described as some kind of an IS derivative. Furthermore, since the field of information systems research lies at the crossroads of people, organizations, and technology (Davis & Olson,

1985; Lee, 1999), it is assumed that the use of IS constructs could lead to the correct achievement of the main research goal and the correct verification of the hypotheses.

In order to design the framework, it is necessary to use design science tools. Design science is based on an iterative build–evaluate cycle, in which the artifact is both the result of research and a tool to solve a real organizational problem (Hevner et al., 2004). In this dissertation, the artifact is a statistically verified measurement and structural model of e-customer trust, including:

- exploratory and confirmatory factor analysis (EFA/CFA) – to establish and confirm the measurement structure of trust (including the cognitive-affective distinction);
- structural equation modeling (SEM) with moderation analysis (where justified) – to estimate the structural relations between trust components and perceived e-service quality.

The artifact is evaluated through an *embedded* (built-in) quantitative validation logic consistent with the *build-evaluate* cycle (as seen in Hevner et al., 2004): reliability and construct validity criteria, global and local model fit, and robustness checks of the obtained structure and relations (e.g., split-sample EFA/CFA and stability across key segments). In this sense, evaluation is an integral component of artifact construction rather than a separate additional phase. Thus, the study meets all the DSR guidelines described by Hevner et al., 2004: artifact (1) solves the identified problem of measuring trust, (2) is of practical importance for quality management, and (3) its development and verification maintain the rigor of quantitative methods.

Design can be conceptualized as a search process aimed at creating an effective artifact that addresses the stated research objectives. In this study, the process initially relies on two complementary perspectives on how trust is formed in e-commerce: a social perspective and a technological perspective. The social perspective includes customer experience, communication, customer service, online reputation, and interactions in digitally mediated environments. The technological perspective relates, among other aspects, to website usability, payment and delivery systems, security measures, and the functional design of the e-commerce interface. While these perspectives overlap and do not exhaust all possible influences on trust, they provide a useful starting point for identifying company-controlled signals that can shape customer trust.

Following Walls et al. (1992), design is understood both as a process of developing a solution and as the resulting artifact. In this dissertation, the overall process comprises the construction specification, the development of the measurement instrument, and its empirical evaluation, whereas the artifact is constituted by the validated measurement instrument and the underlying structural framework. The conceptual requirements of the artifact were translated into five interrelated measurement domains:

1. *cognitive trustworthiness appraisal*, reflecting generalized cognitive evaluations of security, transparency, usability, reliability, and prior experience;
2. *affective trustworthiness appraisal*, reflecting generalized affective and relational evaluations of emotionally salient e-commerce cues;
3. *general trust* in the broader institutional and transactional environment of e-commerce;
4. *perceived e-service quality* as an evaluative outcome of the customer experience;
5. firm-controlled *trust-building mechanisms* that represent actionable managerial leverage points.

Together, these five domains provide a comprehensive conceptual structure for the artifact, which forms the theoretical foundation for the development, operationalization, and empirical validation of the proposed measurement instrument.

3.4 Questionnaire design & build

The literature research conducted in Chapters 1 and 2 indicated what trust itself is (distinguishing between cognitive and affective aspects), how it is measured in different realms (in particular, e-commerce and new ramifications within this domain) and what shapes e-consumer trust. The review pointed to the crux of the chosen problem, but due to the very nature of the review, it is not feasible to indicate the co-occurrence of aspects impacting trust, the strength of their effect, and, by extension, how these aspects are cumulatively measured to improve the performance of the e-commerce enterprise. In addition, the division between cognitive and affective aspects within the formation of trust in various e-commerce areas is limited in literature studies. However,

there are some that take this division into account (e.g. Fang et al., 2016; Foroutan et al., 2022; Kowalczuk et al., 2021; Shang et al., 2023), but among them the focus on a specific or narrow number of influential aspects predominates. To the best of the author's knowledge, to date, there has also been no work that focuses on a combination of all the above aspects and, moreover, a specific bridge between economic (consumer) and management sciences (including effective business management).

Accordingly, it was decided to conduct a new survey as a foundation for developing a newly created trust-based tool for measuring the quality of an e-commerce enterprise's performance. Due to the diversity of consumer behavior, which differs due to, among other things, gender, age, education, or technological accessibility (proficiency), and thus differing trust-oriented needs,[51] it was decided to conduct a cross-sectional survey. Consequently, this part of the survey will be quantitative and based on a questionnaire completed by respondents online (CAWI method). Due to the cross-sectional nature of the survey, representative groups of respondents, selected by quota and categorized by gender, age, and education, will be included. The survey, including the designed questionnaire, will be based on four axial aspects, which are the result of the literature review from Chapters 1 and 2:

1. consideration of the trust-based needs of different groups of e-consumers,
2. examining the strength of trust-oriented aspects with cognitive-affective dualities,
3. examining e-consumer trust in the desktop channel and contemporary ramifications of e-commerce: m-commerce, social commerce, or live streaming commerce,
4. analysis of how e-consumer trust shapes perceptions of the operational quality of online retail environments.

Together, these four aspects provide a basis for examining e-customer trust and its relationship with perceived e-service quality, while also considering factors that can be influenced by e-commerce companies. By bringing together consumer-centered trust dynamics and managerial considerations within a single analytical framework, the proposed approach seeks to contribute to a better understanding of the functioning of e-commerce companies from a trust-based perspective.

[51] See Chapter 2.1, where factors influencing purchasing decisions in e-commerce were discussed.

3.4.1 Questionnaire as an artifact in design science

The research presented in this study is grounded in the Design Science Research (DSR) paradigm as defined by Hevner et al. (2004), which underlines the creation and evaluation of artifacts designed to address identified organizational and social problems, as outlined in the Introduction of this work. In line with this approach, the development of a trust-based tool to assess the quality of the performance of e-commerce enterprises is conceived as the primary objective and contribution of this research. Within the framework of the DSR, the designed questionnaire constitutes an initial artifact. This questionnaire is not merely a data collection instrument, but serves a dual role, since it:

1. enables empirical insight into the trust-related needs, behaviors, and perceptions of diverse groups of e-consumers, and

2. serves as a foundation for the further development of a trust-based assessment tool supporting management evaluation of the functioning of e-commerce companies.

The research process follows key DSR guidelines (outlined in the Introduction) by:

- addressing a relevant problem (the growing need for trust measurement in complex e-commerce environments – cf. Guideline 2 “Problem Relevance”),

- creating an innovative artifact (a trust-based evaluation instrument – cf. Guideline 1 “Design as an Artifact”),

- employing rigorous methods for both design (based on a literature review and theoretical grounding) and evaluation (through empirical testing via a representative sample – cf. Guideline 5 “Research Rigor”), and

- aiming to provide practical value for managers and contribute to the literature on trust and e-commerce functioning (cf. Guideline 7 “Communication of Research”), a rarely explored intersection.

As such, this research adopts a holistic view of trust in e-commerce, integrating consumer-level trust dynamics with enterprise-level performance assessment, i.e., an approach that, to the best of current knowledge, constitutes a novel contribution to both management and information systems research.

3.4.2 Questionnaire design process

To ensure the methodological correctness of the questionnaire tool design process in question, the OECD Guidelines on Measuring Trust (OECD, 2017b)[52] were used, indicating recommendations for the creation of instruments such as questionnaires themselves. These would serve to set the appropriate direction in the formulation of questions, along with determining their order, grouping, or choosing their right type.

According to the aforementioned OECD guidelines, the survey shall be conducted online to ensure participant anonymity and confidentiality, encouraging more honest responses and reducing the risk of socially desirable answers, which are more common in interviewer-led formats. The CAWI method chosen for this survey meets these recommendations. All participants would give their informed consent after receiving clear information about the purpose of the study, voluntary participation, data confidentiality, and their right to withdraw at any time (in line with the principles of the General Data Protection Regulation, GDPR). The study was carried out according to the Declaration of Helsinki and the general guidelines of the Human Subject Research Ethics Committee of the University of Economics in Katowice (Rector's Orders No. 40/22 and No. 41/22).

The questionnaire consists of questions about both interpersonal trust (such as with e-commerce vendors) and institutional trust (such as with online sales platforms), which is in line with the distinction pointed out by Tislar et al. (2014). The OECD guidelines themselves also point to this distinction, indicating that for consumers, both types of trust are important, but that the questionnaire should first include questions on interpersonal trust and only then on institutional trust due to the stronger influence of the latter on subsequent responses. As with other types of survey research, the OECD recommendations also point to the need to ask general questions before specific, more in-depth ones.

To minimize errors and bias in statements, according to OECD recommendations, numerical scales of 0-10 (11-point Likert scale) were used for quantitative questions, along with verbal descriptions at the extremes (e.g., "not at all" - "completely") instead of "yes / no" or "agree / disagree" questions. This allowed the respondent to avoid the

[52]In the following sections of this subchapter, wherever the OECD guidelines/recommendations are mentioned, they are intended to refer to the OECD Guidelines on Measuring Trust (OECD, 2017b).

need to agree with statements or questions, even when the respondent expresses doubt (the so-called phenomenon of acquiescence bias; Kam and Meyer, 2015). Qualitative questions that would allow the respondents to have some freedom of expression are also expected to be included in the questionnaire. Care and attentiveness were placed on the construction of questions or formulations that are simple, understandable, and free of concepts associated with prudence (e.g., not including in the questionnaire the suggestion that one must be cautious of salespeople, as this was assumed to lower the level of reported trust). Questions that relate to e-customers' shopping experiences regarding trust can evoke emotions, so they would be preceded by neutral questions about the respondent's demographics. This is in line with OECD guidelines and will facilitate the selection of the survey quota.[53] Furthermore, control questions were included in the questionnaire to verify the consistency and attention of the respondents, ensuring the reliability of the data.

The survey respondents were selected by quota with respect to their gender, age, and level of education; however, other demographic characteristics were also collected, such as place of residence, size of the household, and perceived financial situation, as these factors were proven to influence trust formation in the e-commerce domain (e.g., Anaza, 2014; Melnyk et al., 2019; Piroth et al., 2020; Serrano-Cinca et al., 2018; Valarezo et al., 2020). The author of the survey is aware of the potential differences in responses due to beliefs and cultural background (Hofstede, 1984; Jiang and Jones, 2014; Rosillo-Díaz et al., 2019; also indicated in the OECD recommendations), but given the spatial scope of the survey, which is Poland, and the resulting cultural homogeneity of the country's society (population), it was decided not to collect data on beliefs and ethnicity of the respondents. However, following OECD guidelines, issues that shape online trust will be examined, such as the level of online shopping experience (including feedback on after-sales care or complaints; see: Carvache-Franco et al., 2022), the level of familiarity with technology (see: Butnampetch et al., 2020), and privacy and data protection preferences (see: Falahat et al., 2019), among others.

[53] In the quota sampling, demographic questions can be incorporated at the beginning of the survey, especially online, to assess the eligibility of the respondents, ensuring that only those within the quota proceed, thus improving the usefulness and quality of the sample (Futri et al., 2022; Moser, 1952).

The OECD recommendations also point to conducting a pilot study before testing on a proper sample, which was also accommodated. This pilot study, which was conducted in May 2025, aimed to preliminarily validate the questionnaire's internal consistency and usability. The pilot sample consisted of 218 young adult respondents who had recently made purchases on international e-commerce platforms. The same items and scales as in the final questionnaire were used during the pilot phase. However, this pilot study revealed minor linguistic errors, so some editorial adjustments to the item wording had to be made before launching the full study. Based on responses and question blocks (identical as in the actual study), three indices were calculated: cognitive trust (Cronbach's $\alpha = 0.86$), affective trust (Cronbach's $\alpha = 0.88$) and general trust (Cronbach's $\alpha = 0.75$) - all demonstrating satisfactory levels of reliability (Cronbach, 1951; Lance et al., 2006). Although the pilot confirmed the overall structural soundness of the instrument, it was limited by the use of a purpose sample and the exclusion of structural modeling, which may constrain generalizability and causal inference. Nevertheless, the pilot results provided valuable insight into the fine-tuning of the questionnaire and its readiness for large-scale implementation. The results are published as a scientific article in: Hadasik and Ryczko (2026).

3.4.3 Scope of the study, sampling, and data collection

The purpose of the study was to investigate the trust-related needs, perceptions, and behaviors of e-consumers, with the aim of building a trust-based decision-support model to improve the quality of the functioning of the e-commerce enterprise. This objective determined the scope of the investigation as follows:

- subjective scope – cognitive and affective aspects that have an influence on trust in e-commerce;
- objective scope – individuals representing households (e-consumers);
- temporal scope – year 2025;
- spatial scope – Poland.

The questionnaire was cognitively validated prior to the main study and subsequently administered online via the CAWI method. The survey was carried out in July 2025

by the *Opinia24* research agency on a representative sample of 1067 adult Polish respondents[54,55] selected using quota sampling. The quotas ensured representation across key demographic variables: gender, age, education, and place of residence. The sample structure was based on the National Population and Housing Census 2021 data provided by Statistics Poland, allowing the generalization of the findings to the adult population of the country (see more in: Kubiczek and Hadasik, 2022).

All participants gave their informed consent prior to participation. The study was carried out according to the Declaration of Helsinki and the applicable standards of the Human Subject Research Ethics Committee of the University of Economics in Katowice, as specified in Rector's Orders No. 40/22 and 41/22. Full compliance with GDPR regulations was ensured throughout the data collection process.

Before the analysis, the dataset was cleaned to ensure data quality. Response time was not recorded due to technical limitations, while OECD guidelines discourage reverse-coded items in trust measurement, limiting certain consistency checks. Nevertheless, an a *posteriori* quality filter was applied to detect careless response. Specifically, a "straightlining" flag was introduced for each of the seven Likert-type item blocks (ranging from 3 to 18 items per block),[56] where attention will be focused on describing the different parts of the questionnaire. A respondent was flagged if they gave identical answers across all items within a block. Cases with straightlining behavior in at least 5 out of the 7 blocks were excluded from the dataset, which corresponds to 51 respondents (4.8% of the full sample).[57]

[54]A sample size of 1067 respondents ensures representativeness for the adult population of Poland at a 95% confidence level with a margin of error below 3%, assuming random sampling. In this study, quota sampling based on key socio-demographic variables (gender, age, education, and place of residence) was used to mirror the structure of the general population, in accordance with the National Population and Housing Census 2021 in Poland.

[55]The survey was administered in Polish and all items and response options cited or discussed in this dissertation have been translated into English by the author for reporting purposes.

[56]These blocks will be described in Chapter 3.4.4.

[57]This threshold is consistent with current best practices in survey data quality control. Ward and Meade (2023) indicate that the typical exclusion rate for careless responding ranges from 5% to 15%. A meta-analysis published by Pokropek et al. (2024) confirms that eliminating fewer than 10% of cases based on such criteria carries minimal risk of selection bias. The applied threshold (4.8%) is therefore methodologically sound and conservatively chosen.

In addition to quality filtering, a conceptual inclusion criterion was applied: only respondents who had made at least one online purchase (via desktop/laptop or mobile device) within the past 12 months were retained for analysis. As a result, 50 respondents were excluded.

Due to the imposition of the filters mentioned above, 966 people were admitted to the actual analysis phase of the study. Characteristics of the research sample is presented in Table 3.1.

The cleaned sample consisted of respondents whose demographic profile is in agreement with national population data. Women represented 52.2% and men 47.8% of the sample. All age groups were covered, with the highest share in the 35–44 (19.5%) and 65+ (24.8%) cohorts. The educational levels varied, with 33.5% having completed secondary education and 28.8% having a university degree. In terms of settlement size, 38.7% of respondents lived in rural areas and 36.3% in cities of over 50,000 residents. Most of the participants assessed their financial situation as average (37.2%) or good (42.6%), and nearly half (47.2%) reported access to both mobile and landline internet at home. This demographic diversity allows for further trust-related analyzes across socio-economic and digital access segments.

3.4.4 Questionnaire composition

The questionnaire consisted of eight thematic sections, each capturing different dimensions of trust formation and online shopping behaviors. Its structure followed the recommendations of the OECD for question ordering and formulation, progressing from general to specific constructs to minimize contextual and order-related bias. Accordingly, the questionnaire began with socio-demographic profiling, followed by general trust, cognitive and affective antecedents, trust in emerging e-commerce formats, perceived service quality, and finally outcome-related behavioral indicators. The structure of the survey questionnaire (along with block titles, their abbreviations, and number of questions in a single block) was structured as follows:

- **part I:** *Socio-demographic profile* (*MET*) – captured key background variables (metrics) of the respondent (e.g., gender, age, education level, settlement size, household composition, perceived financial situation) needed for quota sampling and further subgroup analysis;

Table 3.1: Socio-demographic characteristics of respondents (N=966)

Characteristic	Count	Percent (%)
Gender		
woman	504	52.17
man	462	47.83
Age group		
18–24 y/o	80	8.28
25–34 y/o	138	14.29
35–44 y/o	188	19.46
45–54 y/o	175	18.12
55–64 y/o	145	15.01
65+ y/o	240	24.84
Level of education		
primary/lower secondary	132	13.66
vocational	232	24.02
secondary	324	33.54
higher	278	28.78
Settlement size		
rural/village	374	38.72
town $<$ 50k inhabitants	241	24.95
city 50–200k inhabitants	167	17.29
city $>$ 200k inhabitants	184	19.05
Household financial situation (perceived) (*)		
very good	114	11.80
good	411	42.55
average	359	37.16
poor	69	7.14
very poor	13	1.35
Home internet type		
landline and mobile	456	47.20
landline only	323	33.44
mobile only	187	19.36

(*) Original wording of the response options (translated from Polish): *very good* – "we have enough money for everything without any sacrifices"; *good* – "we have enough for almost everything, but need to save for bigger purchases"; *average* – "we can afford basic needs (food, clothing, bills), but not larger purchases"; *poor* – "we barely afford the basics and need to forgo some expenses"; *very poor* – "we do not have enough money even for basic needs."

- **part II:** *Internet access and making online purchases* (*PUR*) – included questions on types of home internet, frequency of device usage, social media use, digital skills self-assessment, and experience with different forms of e-commerce (e.g., mobile, social, live streaming);

- **part III:** *General online trust* (*GEN*, 9 items) – assessed baseline levels of interpersonal and institutional trust online. The questions were informed by OECD guidelines and existing trust measurement frameworks;[58]

- **part IV:** *Cognitive trustworthiness appraisals* (*COG*, 8 items) – focused on consumers' cognitive evaluations of trust-relevant characteristics of online shopping, including usability, transparency, privacy, technology familiarity, and previous experience;

- **part V:** *Affective trustworthiness appraisals* (*AFF*, 7 items) – captured affectively and relationally salient evaluations of trust-relevant cues, including visual design, marketing communication, peer-related signals, interactivity, and corporate social engagement;

- **part VI:** *Trust in new e-commerce ramifications* (*NEW*, 3 items) – measured trust toward newer forms of online shopping (mobile commerce, social commerce, live shopping);

- **part VII:** *Perceived service quality in e-commerce* (*QUAL*, 10 items) – included questions referring to past shopping experiences and perceptions of reliability, efficiency, and user experience on online platforms;

- **part VIII:** *Behavioral and outcome measures* (*OUT*, 18 items) – captured trust-related outcomes, such as abandoned purchases due to lack of trust, and ratings of potential interventions that could increase trust in e-commerce services.

[58] As a result of supplementary evaluations of the questionnaire design conducted during the data analysis phase, it was decided that 8 out of the 9 items (GEN1–GEN8) would be included in the construct of *General online trust (GEN)*. Item GEN9 pertains to a positive attitude towards online shopping and, therefore, does not directly reflect the core dimension of general trust. Nevertheless, GEN9 may serve as a significant mediator or moderator at the stage of structural equation modeling.

All attitudinal blocks (parts III to VIII) used 0–10 Likert-type scales, consistent with the OECD methodological guidelines on reducing acquiescence bias. The final section included an open-ended "other factors" option, allowing respondents to suggest additional elements that improve trust (in their opinion) beyond the predefined list.

This paper assumes that customer-declared expectations of e-commerce (OUT block) can be operationalized as managerial trust-building levers (LEV). This is consistent with established service quality management frameworks, which define quality as the degree to which the service provided meets customer expectations and identify a set of organizational gaps that can be closed by managerial decisions (in terms of design, standards, communication; Johnson and Grayson, 2005; Parasuraman et al., 1988; Zeithaml et al., 2000). In the context of trust in e-commerce, the literature is supplemented by institutional mechanisms (e.g., certificates, verification, or the reputation of e-sellers), which are implementable interventions that build trust, and thus practical instruments that respond to consumer expectations regarding security and transparency (Ba & Pavlou, 2002; Pavlou & Gefen, 2004).

All questionnaire elements were grounded in the previous scholarly literature on trust in digital environments. Each thematic block reflects the notation discussed in Chapters 1 and 2. The complete questionnaire formula, along with references to the origin of the items, is provided in Appendix A.

3.5 Analysis plan

Hypotheses H1-H2 – factor analysis

Hypotheses H1-H2, described in detail in Chapter 3.2, will be verified using a two-stage approach, including an independent training sample ($N = 483$), in which exploratory factor analysis (EFA) will be performed, and a testing sample ($N = 483$), used for confirmatory factor analysis (CFA). Both samples were balanced in terms of age and gender, which ensured the comparability of the estimated measurement models. In addition, their size met the criteria to achieve optimal statistical power at a level of $1 - \beta = 0.80$.

Due to the design of new tools (constructs) used to measure cognitive trust (COG), affective trust (AFF), general trust (GEN), and perceived service quality (QUAL)

in e-commerce, a sequential approach was adopted to assess the structure of latent variables. This sequential procedure, i.e., EFA for new or adapted scales and CFA for overall validation), is widely used in social sciences (e.g., López-Lemus, 2024; Marsh et al., 2009; Punyatoya, 2019) and provided a robust foundation for the development of the final trust-based framework.

In the first stage, the EFA was performed in accordance with the methodological recommendations presented by Watkins (2021). The number of factors to be extracted was determined based on parallel analysis and Kaiser's criterion (> 1), while the suitability of the data for factor analysis was assessed using the Kaiser–Meyer–Olkin sampling adequacy measure (KMO > 0.70) and Bartlett's sphericity test (Kaiser, 1974). The quality of the elements was assessed on the basis of factor loadings, with a threshold of ≥ 0.50 adopted as the acceptability criterion. For each model, maximum likelihood extraction with Direct Oblimin rotation was applied.

In the second stage, confirmatory models corresponding to the structures obtained in the EFA analyzes will be estimated, according to the recommendations of Kyriazos (2018). The assessment of the fit of the CFA model will be based on a set of goodness-of-fit indices, including:

- standardized chi-square ($\chi^2/df \leq 5$),
- the Comparative Fit Index ($CFI \geq 0.90$),
- the root mean square error of approximation ($RMSEA \leq 0.10$), and
- the standardized root mean square residual ($SRMR \leq 0.08$).

Additionally, in order to assess the convergent validity and reliability of the constructs, Average Variance Extracted ($AVE \geq 0.50$) and Composite Reliability ($CR \geq 0.70$) values will be calculated, with a requirement for factor loadings of at least 0.50. In the case of multi-factor models, the convergent validity of constructs will be additionally verified using HTMT (heterotrait-monotrait) indicators, with a threshold set to < 0.90.

Hypotheses H3-H6 – structural equation modeling

Verification of hypotheses H3-H6 will be carried out within the framework of structural equation modeling (SEM) on the full sample of respondents ($N = 966$) admitted to the analysis. To perform the verification in a reliable way, a covariance-based approach (CB-SEM) was used, according to the methodological criteria proposed by Dash and Paul, 2021. In the first step, a complete measurement model will be estimated, covering all latent constructs included in hypotheses H3-H6, i.e., cognitive trust in e-commerce (COG), affective trust in e-commerce (AFF), general consumer trust in e-commerce (GEN), perceived quality of e-commerce services (QUAL), and managerial trust-building mechanisms in e-commerce (LEV). This model will be evaluated using confirmatory factor analysis within SEM, while maintaining the same fit and measurement quality criteria that were used in the second stage of the analysis for hypotheses H1-H2. This means that the adequacy of the measurement model will be assessed based on values of:

- standardized chi-square ($\chi^2/df \leq 5$)
- $CFI \geq 0.90$,
- $RMSEA \leq 0.10$, and
- $SRMR \leq 0.08$.

At the same time, the convergence validity and the reliability of the construct will be verified using the values of AVE (≥ 0.50) and CR (≥ 0.70), while maintaining a minimum factor loading threshold of ≥ 0.50 and HTMT < 0.90. It should be noted that identical thresholds were chosen during the factor analysis described in the previous Chapter 3.5.

After obtaining a satisfactory fit of the measurement model and confirming the quality of latent measures, the next step will be to estimate the structural model, allowing for direct verification of hypotheses H3-H6. The relationships between cognitive trust in e-commerce (COG) and affective trust in e-commerce (AFF) and general consumer trust in e-commerce (GEN) and perceived quality of e-commerce services (QUAL) will be tested, as well as the impact of managerial trust-building mechanisms in e-commerce (LEV) on both types of specific trust. The evaluation of the structural model will be based on the same goodness-of-fit indicators as the measurement model, ensuring

consistency of interpretation criteria throughout the analytical process. The significance and direction of structural effects will be determined based on standardized path coefficients and corresponding levels of statistical significance, allowing an unambiguous assessment of empirical support for hypotheses H3a-H6b.

Hypotheses H7-H8 – moderation analysis

Verification of hypotheses H7-H8 will be carried out using moderation models estimated within the PROCESS approach (Hayes, 2022). These analyzes focus on assessing the variation in the strength of relationships between key constructs of the model depending on moderating variables, i.e., age, gender, and type of e-commerce channel. These moderations are treated as an extension of the previously estimated structural model. For hypotheses H7a-H7d, the moderating role of age and gender in the relationships between cognitive (COG) and affective (AFF) trust in e-commerce and the perceived quality of e-commerce services (QUAL) will be tested. In the case of hypothesis H8, the moderating role of the type of e-commerce channel (desktop, m-commerce, social commerce, live commerce) in the relationship between general consumer trust in e-commerce (GEN) and the perceived quality of e-services (QUAL) will be assessed.

For age and e-commerce indicators, a division into groups was adopted according to percentiles for three categories: 16, 50, and 84. All moderation models will be estimated on the complete sample of respondents ($N = 966$), assuming the previously confirmed adequacy of the measurement model. The analytical procedure for each of the moderation models will be sequential and consist of four stages:

1. In the *first* step, the main effects of the predictors and the moderating variables will be estimated, allowing the assessment of direct relationships between the latent variables and the dependent variable.

2. In the *second* stage, the interaction effect between the predictor and the moderator will be introduced into the model, forming the basis for empirical verification of the moderation hypotheses.

3. If a statistically significant interaction effect is obtained, in the *third* step, a conditional effects analysis will be performed to interpret the nature of the moderation

by estimating the strength of the predictor-dependent variable relationship at specific levels of the moderator or in its individual categories. If the interaction effect proves insignificant, the analytical procedure proceeds directly to stage four.

4. The final (*fourth*) stage of the analysis of each moderation model will be the evaluation of the degree of explanation of the variance of the dependent variable, expressed by the coefficient of determination R^2. Comparing the R^2 values between the models will allow the evaluation of the increase in explained variance resulting from the inclusion of interaction effects and will allow a comprehensive assessment of the predictive utility of the models tested.

The procedure defined in this way ensures a consistent assessment of the main and moderating effects and their significance to explain the perceived quality of e-commerce services in the theoretical model under study.

Data analysis tools and software environment

To empirically verify the proposed model and the associated hypotheses, a multi-stage data analysis process was employed. Preliminary data processing, cleaning, and coding were conducted using Microsoft Excel and IBM SPSS Statistics 29. These tools were used for descriptive statistics and missing data analysis.

For core structural analysis, including factor analysis and structural equation modeling, the study utilized JASP software (version 0.95) (Love et al., 2019). JASP was selected for its robust implementation of covariance-based SEM algorithms (CB-SEM), as well as for smooth data analysis in other fields. It is important to note that JASP operates as a graphical user interface built on top of the R statistical computing environment. Specifically, SEM analyzes in JASP are powered by the `lavaan` R package (Rosseel, 2012), which is considered the gold standard in open-source structural modeling. In terms of using the JASP software and performing factor analysis with it, including SEM, the guidelines proposed by Rogers (2024) were followed. This ensures that the reported results are computationally consistent with the most recent statistical standards in the social sciences.

Chapter 4

Results

This chapter reports the empirical results of the various stages of the quantitative analysis. Starting with the assessment of the measurement structure through exploratory and confirmatory factor analysis, the chapter then moves to estimating structural relationships and examining selected moderation effects. Combined, these analyses establish the empirical foundation for the trust-based framework and its quantitative validation. The chapter concludes with a summary of the hypothesis-testing results; however, their theoretical and managerial implications are developed in the subsequent Chapter 5 with a discussion.

4.1 Factor analysis

Exploratory and confirmatory factor analyses (EFA and CFA, respectively) were applied to validate the measurement model. Despite the grounding of the items in the literature (see Chapter 3.4.4), it was necessary to empirically verify that the attitudinal parts of the questionnaire (III–V and VII) reflect the intended constructs to be used in SEM. EFA was first conducted for the attitudinal blocks that were newly developed or adapted for this study (GEN, COG, AFF, QUAL, and OUT), including those whose reliability had been preliminarily confirmed in the pilot study.[59] A joint EFA of COG and AFF (i.e., on a COG+AFF auxiliary meta-construct) was performed to corroborate the expected two-factor (cognitive–affective) structure, using oblique rotation (Direct

[59]The pilot study covered reliability testing (specifically, Cronbach's α; Hadasik and Ryczko, 2026) but did not address construct validity.

Oblimin) to account for their theoretical correlation. Subsequently, CFA was conducted on the attitudinal constructs GEN, COG, AFF, and QUAL to confirm their factorial validity and establish the full measurement model. This sequential procedure (i.e., EFA for new or adapted scales and CFA for overall validation) is widely used in social sciences (e.g., López-Lemus, 2024; Marsh et al., 2009; Punyatoya, 2019) and provided a robust foundation for the development of the final trust-based framework.

4.1.1 Analysis criteria for factor analysis

As outlined earlier, EFA was conducted for those attitudinal blocks that are new or adapted in this study (GEN, COG, AFF, QUAL, OUT – operationalized as LEV),[60] whose structure had been theoretically defined and previously verified in terms of reliability. This allowed the intended item–block assignments (outlined in Chapters 2.1–2.2) to be empirically assessed and independently validated using a split-sample procedure. EFA was conducted exclusively in the training subsample ($n = 483$), while CFA was subsequently conducted in the independent validation subsample ($n = 483$). In conducting the EFA, this research applied the guidelines outlined in the work by Williams et al. (2010).[61] The criteria used to conduct the EFA, together with the rationale behind them, are presented below:

- **Measurement scale**: attention must be paid to the questionnaire scale and the nature of the studied blocks when conducting EFA. The questionnaire analyzed specifies that the 0-10 scales are quasi-continuous scales, which is consistent with the OECD guidelines on trust measurement (OECD, 2017b).
- **Data imputation**: no missing data imputation was required in this study. The questionnaire enforced complete responses for all questions, resulting in a dataset with no missing values. All EFA procedures were therefore conducted on complete cases.

[60] Accordingly, throughout the remainder of this dissertation, these firm-controlled and actionable trust-building mechanisms are referred to as managerial trust-building levers (LEV).

[61] The author of this dissertation has slightly adapted the guidelines to illustrate the process in the clearest way possible. Similar adapted procedures can be found in the articles by Punyatoya (2019), or Grabowska et al. (2025).

- **Method of extraction and rotation**: given the large size of the sample and mainly ordinal items in the questionnaire, Maximum Likelihood (ML) was used for EFA due to its robustness to moderate non-normality and compatibility with CFA and SEM (Brown, 2015; Fabrigar et al., 1999). Direct Oblimin rotation was applied, anticipating correlated factors.

- **Factor retention and loading thresholds**: to determine the number of retained factors, a parallel analysis (PA) was used, with the eigenvalue > 1 rule (so-called Kaiser's criterion) serving as a secondary reference. This was also verified with the use of Cattell's scree test criterion, aimed at identifying the number of factors based on the "elbow" point in the scree plot. The following thresholds were adopted for item retention: factor loadings ≥ 0.50 (as recommended by Tabachnick and Fidell, 2019) and cross-loadings ≤ 0.30.

Before proceeding with the analytical phase of the study, it is first necessary to assess whether the assumed latent structure of the attitudinal questionnaire blocks (parts III-V and VII-VIII) holds in the data. EFA, as discussed earlier, can help achieve this. This analysis tests whether the items within each block form a unidimensional construct or reveal a multidimensional structure. The results of EFA guide the definition of the measurement construct. For instance, if a block turns out to contain two distinct factors, it will be modeled as two separate constructs. Only after this structural assessment can the internal consistency of each construct be meaningfully evaluated using Cronbach's α, followed by composite reliability (CR) and average variance extracted (AVE), according to established recommendations (Losh, 2017). Although the reliability of certain scales (GEN, COG, AFF) was preliminarily confirmed during the pilot study (with Cronbach's α exceeding the 0.7 threshold; see Chapter 3.4.2), the final version of the questionnaire introduced new or extended blocks (NEW, QUAL, LEV) whose dimensionality and reliability require full-sample validation.

Before factor extraction, the suitability of each dataset block for EFA was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity (Kaiser, 1974). The respective KMO and Bartlett's test results are reported for each construct below and are subsequently summarized in Table 4.1.

4.1.2 Analysis of factor models used in research tools

Exploratory factor analysis

In the first stage, the eigenvalues of each latent variable were assessed based on a parallel analysis conducted to estimate the maximum number of factors that could be extracted from the individual questionnaires used in the study. The results are presented in Figure 4.1.

The analysis presented in Figure 4.1 indicates that only in the case of perceived quality of e-commerce services did the simulated factor structure clearly confirm the one-dimensional nature of the tool. With regard to the other constructs, a parallel analysis suggested the possibility of identifying a second factor. However, in the case of general trust and its two components, cognitive trust and affective trust, the eigenvalues of the second factor remained below the Kaiser criterion, indicating limited internal consistency of these hypothetical additional dimensions. In the case of constructs related to building managerial trust (so-called *managerial trust-building levers*), the possibility of identifying a second factor was observed, but its eigenvalue was only as low as 1.18, suggesting a small contribution of this dimension to explaining variance and limited interpretive usefulness. Consequently, for all tools analyzed, a single-factor measurement structure was adopted as the most consistent and theoretically justified. The adopted one-dimensional models were characterized by a satisfactory ability to explain the variance of the constructs under study. Detailed results of the analyzes, including factor loadings for individual items and indicators of model fit to empirical data, are presented in Table 4.1.

Table 4.1: Factor loadings and fit indices of exploratory models for tested latent variables

Factor	Item	Loading (λ)	Uniqueness	Explained variance	KMO	Bartlett's Test
General Trust	GEN7	0.77	0.39	0.50	0.90	$\chi^2(28) \approx 1781$; $p < 0.001$
	GEN8	0.73	0.45			
	GEN3	0.73	0.45			
	GEN9	0.73	0.46			
	GEN2	0.72	0.46			
	GEN5	0.72	0.47			
	GEN4	0.60	0.64			

Continued on next page

Factor	Item	Loading (λ)	Uniqueness	Explained variance	KMO	Bartlett's Test
	GEN1	0.57	0.66			
Cognitive Trust	COG4	0.82	0.32	0.62	0.94	$\chi^2(28) \approx 2497$; $p < 0.001$
	COG3	0.82	0.32			
	COG8	0.81	0.33			
	COG2	0.80	0.34			
	COG5	0.79	0.37			
	COG1	0.76	0.41			
	COG9	0.73	0.46			
	COG6	0.71	0.48			
Affective Trust	AFF1	0.81	0.33	0.58	0.88	$\chi^2(15) \approx 1512$; $p < 0.001$
	AFF2	0.81	0.33			
	AFF4	0.77	0.40			
	AFF3	0.74	0.45			
	AFF6	0.72	0.47			
	AFF5	0.67	0.54			
Perceived Service Quality	QUAL1	0.84	0.28	0.63	0.95	$\chi^2(45) \approx 3523$; $p < 0.001$
	QUAL9	0.81	0.33			
	QUAL2	0.81	0.34			
	QUAL3	0.80	0.34			
	QUAL5	0.80	0.35			
	QUAL8	0.79	0.36			
	QUAL6	0.79	0.37			
	QUAL4	0.76	0.41			
	QUAL7	0.76	0.42			
	QUAL10	0.72	0.48			
Managerial trust-building levers	LEV16	0.81	0.33	0.54	0.96	$\chi^2(104) \approx 655$; $p < 0.001$
	LEV6	0.80	0.34			
	LEV4	0.80	0.35			
	LEV10	0.79	0.36			
	LEV8	0.78	0.38			
	LEV7	0.77	0.40			
	LEV3	0.77	0.40			
	LEV5	0.75	0.43			
	LEV18	0.75	0.43			
	LEV1	0.72	0.48			
	LEV2	0.70	0.51			
	LEV12	0.67	0.54			
	LEV11	0.63	0.59			
	LEV15	0.63	0.60			
	LEV13	0.62	0.60			
	LEV9	0.61	0.62			

Note. Factor loadings and item uniqueness, Eigenvalue, KMO, and Bartlett's test refer to single-factor EFA solutions for each scale.

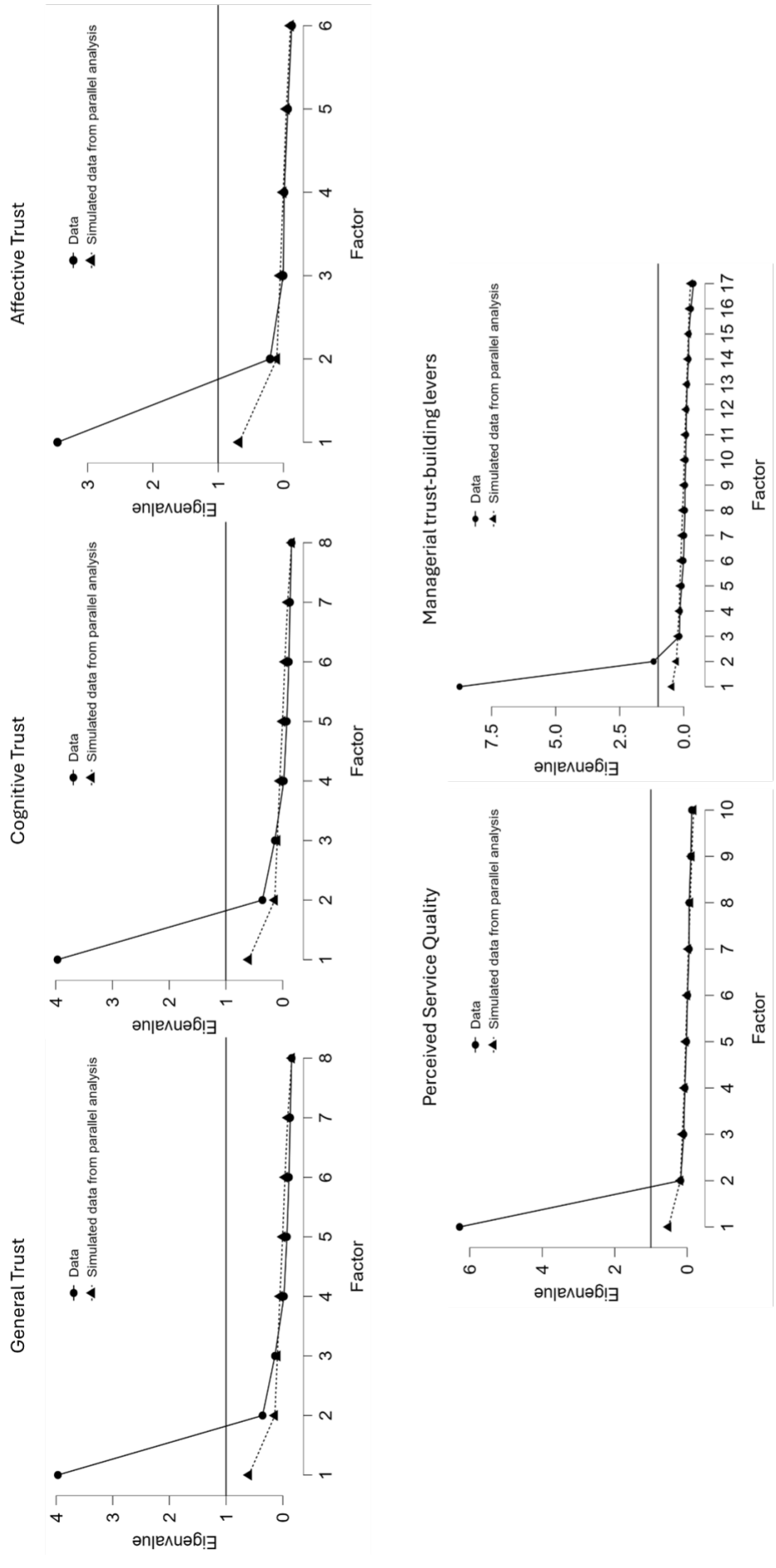


Figure 4.1: Results of parallel analysis for individual factor models

Note. Calculated using Oblimin rotation. The continuous line indicates the Kaiser criterion > 1 for the eigenvalue of the factor.

Analysis of Table 4.1 revealed that the adequacy of the data for factor analysis was confirmed in all cases by high Kaiser-Meyer-Olkin (KMO) values (KMO = $[0.88; 0.96]$), exceeding the accepted criterion of KMO > 0.70, and statistically significant results of Bartlett's sphericity test ($p < 0.001$). These results clearly indicate the validity of the factor analysis. The number of factors to be extracted was determined on the basis of parallel analysis and Kaiser's criterion (eigenvalues > 1). In each case, the solutions obtained indicated a single-factor structure of the tools analyzed, which was consistent with both the results of the parallel analysis and the theoretical assumptions. For all models, maximum likelihood extraction with Direct Oblimin rotation was used.

An analysis of individual models (Table 4.1) showed that in the case of general trust (GEN), a single-factor model was obtained that explained 49.6% of the variance. All items achieved acceptable factor loadings ($\lambda = [0.57; 0.77]$), meeting the accepted criterion of $\lambda \geq 0.50$. Uniqueness values indicate that a significant part of the variance in the items was explained by a common factor while maintaining the diversity of individual indicators.

For cognitive trust (COG), a single factor was identified, which explained 61.7% of the variance. The factor loadings were high ($\lambda = [0.71; 0.82]$), and the uniqueness levels were relatively low, indicating a strong representation of the common latent construct by the individual items. These results confirm the good internal consistency of the scale.

Similarly, in the case of affective trust (AFF), a single-factor solution was obtained that explained 57.7% of the variance. All items met the minimum factor loading criterion ($\lambda = [0.67; 0.81]$), indicating satisfactory psychometric quality of the tool and homogeneity of the measured construct.

For the perceived quality of e-commerce services (QUAL), factor analysis clearly confirmed a single-factor structure, which explained 62.8% of the variance. The factor loadings obtained were high and homogeneous ($\lambda = [0.72; 0.84]$), and the low specificity values indicate a strong saturation of the items with a common latent factor.

Regarding managerial trust-building levers (LEV), a single-factor solution was also adopted, which explained 51.5% of the variance. Factor loadings ranged from 0.61 to 0.81, meeting the accepted criterion of acceptability. Although preliminary analyzes

suggested the possibility of identifying an additional factor, its limited eigenvalue and low contribution to explaining variance justified the adoption of a single-factor model.

In summary, all the scales analyzed met the accepted psychometric quality criteria at the exploratory factor analysis stage. The single-factor solutions obtained were characterized by an adequate level of explained variance, high factor loadings, and satisfactory data adequacy, which provided the basis for further verification of the measurement models in confirmatory analyzes.

Confirmatory factor analysis

In the next stage, confirmatory factor analysis was performed using the structures obtained in the exploratory analysis (see Table 4.1). The analyzes showed satisfactory results, which confirm the structural validity of each tool without the need to reduce the number of test items. The model fit is presented in Table 4.2, and the exact factor loadings for each tool are presented in Appendix B.

Table 4.2: Model fit indices

Construct	**χ^2 test**	**Std. χ^2**	**CFI**	**GFI**	**RMSEA [90% CI]**	**SRMR**	**AVE**	**CR**
GEN	$\chi^2(14) = 87.68^*$	6.26	0.95	0.95	0.10 [0.08; 0.13]	0.04	0.50	0.87
COG	$\chi^2(20) = 73.82^*$	3.69	0.98	0.97	0.08 [0.06; 0.09]	0.03	0.58	0.92
AFF	$\chi^2(9) = 103.31^*$	11.48	0.93	0.92	0.15 [0.12; 0.17]	0.05	0.55	0.87
QUAL	$\chi^2(35) = 159.73^*$	4.56	0.96	0.93	0.09 [0.07; 0.10]	0.03	0.60	0.94
LEV	$\chi^2(54) = 219.56^*$	4.07	0.95	0.93	0.08 [0.07; 0.09]	0.04	0.54	0.93

Note. GEN – General Trust; COG – Cognitive Trust; AFF – Affective Trust; QUAL – Perceived Service Quality; LEV – Managerial trust-building levers. χ^2 test – chi-square test of model fit; Std. χ^2 – standardized chi-square value (χ^2/df); CFI – Comparative Fit Index; GFI – Goodness-of-Fit Index; RMSEA – Root Mean Square Error of Approximation [90% confidence interval]; SRMR – Standardized Root Mean Square Residual; AVE – Average Variance Extracted; CR – Composite Reliability; * – $p < 0.001$

An analysis of Table 4.2 revealed that the confirmatory models for general trust (GEN), cognitive trust (COG), perceived service quality (QUAL) and managerial trust-building levers (LEV) were characterized by a fit that remained consistent with the accepted criteria and indicated an adequate reflection of the data by the structures of the tested factors. In these cases, the obtained picture of the constructs remained stable and interpretable in terms of the assumed dimensions. A slightly different pattern was observed for the affective trust measurement tool (AFF). In this model, the fit did not fully correspond to the data structure, suggesting that the affective component of trust may have been more complex or less homogeneous in terms of indicators than assumed at the exploratory stage.

Summary of factor analysis results

The purpose of the analyzes was to empirically verify the factor structure of key theoretical constructs and to assess the validity of three research hypotheses (H1-H2) regarding the organizational aspects of the trust of the e-consumer and the perceived quality of e-commerce services. The verification of the hypotheses was based on the sequential application of exploratory and confirmatory factor analysis, supplemented by hierarchical model analysis.

Hypothesis H1, assuming that cognitive trust (COG) is a separate latent construct, empirically distinguishable from affective trust (AFF), was clearly confirmed by the results obtained. Both exploratory and confirmatory analyzes showed that the items on the COG scale form a coherent, homogeneous, single-factor structure, characterized by high factor loadings and a satisfactory level of explained variance. Additionally, the differential validity assessment, conducted using the HTMT index, indicated that the relationship between COG and AFF remains below the recommended thresholds, which confirms the empirical distinguishability of both constructs. These results support the theoretical assumption that the cognitive and affective components of trust represent qualitatively different, yet interrelated, aspects of customer relationships.

Hypothesis H2, according to which the perceived quality of e-commerce services (QUAL) is multidimensional, was, in turn, rejected. Parallel analysis clearly indicated the validity of isolating a single factor, and both exploratory and confirmatory factor analysis confirmed the homogeneity of the scale structure. The factor loadings obtained

were high and homogeneous, and the model was characterized by a good fit to the data and high reliability. These results indicate that the perceived quality of e-commerce services is a consistent latent construct that can be treated as a uniform dimension in further model analyzes.

In summary, hypothesis H1 was confirmed, while hypothesis H2 was rejected. The analyzes indicate that e-customer trust has a complex hierarchical structure in which the cognitive and affective components are clearly distinguished, that have varying degrees of impact on the general trust factor, while the perceived quality of the electronic commerce services functions as a one-dimensional construct. The results provide a solid psychometric basis for further analysis of the relationships between the variables studied within structural models.

4.2 Analysis of structural equation models

In the next stage of the investigation, hypotheses H3-H6 were verified, referring to structural relationships between cognitive trust (COG), affective trust (AFF), general consumer trust (GEN), perceived quality of electronic commerce services (QUAL) and managerial trust-building mechanisms (LEV). The analyzes were conducted on the entire sample (N = 966) using structural equation modeling (SEM) with a covariance-based approach (CB-SEM), which enabled simultaneous assessment of the quality of latent construct measurement and testing of hypothesized structural relationships.

In the first step, a complete measurement model was estimated, covering all constructs included in hypotheses H3-H6. This model was subjected to a confirmatory factor analysis within SEM, verifying its fit to the data and the validity and reliability of the measures used. The adoption of uniform criteria for the evaluation of the quality of the fit and measurement, consistent with previous analyzes, ensured the comparability of the results in the subsequent stages of the study. The results of the analyzes are presented in Tables 4.3 and 4.4.

Table 4.3: Measurement model of structural equation modeling

Factor	**Item**	**Factor loading**	**AVE**	**CR**
Managerial trust-building levers	LEV1	0.71	0.56	0.94
	LEV2	0.75		
	LEV3	0.80		
	LEV4	0.79		
	LEV5	0.74		
	LEV6	0.77		
	LEV7	0.78		
	LEV8	0.80		
	LEV10	0.77		
	LEV11	0.62		
	LEV16	0.77		
	LEV18	0.73		
Cognitive Trust	COG1	0.76	0.60	0.93
	COG2	0.81		
	COG3	0.81		
	COG4	0.83		
	COG5	0.78		
	COG6	0.72		
	COG8	0.80		
	COG9	0.70		
Affective Trust	AFF1	0.83	0.56	0.88
	AFF2	0.81		
	AFF3	0.71		
	AFF4	0.79		
	AFF5	0.65		
	AFF6	0.69		
General Trust	GEN2	0.72	0.51	0.88
	GEN3	0.72		
	GEN4	0.65		
	GEN5	0.70		
	GEN7	0.73		
	GEN8	0.73		
	GEN9	0.75		
Perceived Service Quality	QUAL1	0.83	0.61	0.94
	QUAL2	0.79		

Continued on next page

Factor	Item	Factor loading	AVE	CR
	QUAL3	0.79		
	QUAL4	0.78		
	QUAL5	0.80		
	QUAL6	0.79		
	QUAL7	0.78		
	QUAL8	0.77		
	QUAL9	0.82		
	QUAL10	0.70		

Note. AVE – Average Variance Extracted; CR – Composite Reliability. All factor loadings were significant at $p < 0.001$.

Table 4.4: HTMT and reliability coefficients for constructs tested in the measurement model

ω	Variable	LEV	COG	AFF	GEN	QUAL
0.94	LEV	1.00				
0.92	COG	0.84	1.00			
0.88	AFF	0.77	0.82	1.00		
0.86	GEN	0.69	0.84	0.73	1.00	
0.92	QUAL	0.87	0.83	0.73	0.74	1.00

Note. ω – McDonald's omega; GEN – General Trust; COG – Cognitive Trust; AFF – Affective Trust; QUAL – Perceived Service Quality; LEV – Managerial trust-building levers.

The measurement model (Table 4.3) comprising five latent constructs: managerial trust-building mechanisms (LEV), cognitive trust (COG), affective trust (AFF), general consumer trust (GEN), and perceived quality of e-commerce services (QUAL), was estimated using confirmatory factor analysis in the CB-SEM approach, applying the maximum likelihood (ML) estimator:

- The fit of the factor model to the empirical data was statistically significant ($\chi^2(850) = 3212.36; p < 0.001$), which, given the sample size, was consistent with the expectations of complex measurement models.
- The relative fit assessment indicated good agreement between the model and the data (standardized $\chi^2 = 3.78$).

- The values of the comparative indices exceeded the minimum acceptability criteria (CFI = 0.92), confirming the suitability of the proposed measurement structure.
- The approximation error measures also indicated a good fit of the model: RMSEA = 0.05; 90% $CI : [0.05; 0.06]$, with a low standardized residual value (SRMR = 0.04).
- The GFI index reached a moderate level, which was consistent with the nature of the model that covered a large number of observable items.

The overall profile of indicators confirmed that the measurement model satisfactorily reproduced the empirical covariance structure. Additionally:

- The analysis of parameter estimates showed that all test items loaded significantly on their assigned latent factors.
- The loadings of standardized factors were positive, high, and statistically significant ($p < 0.001$) on all scales, confirming the theoretical consistency and internal homogeneity of the measured constructs.
- The loading values were within ranges considered at least good, and their confidence intervals did not include low values, indicating the stability of the estimates.
- The results confirmed that each of the scales analyzed adequately represented its corresponding latent construct.
- The convergent validity assessment showed that the average variance extracted (AVE) for all constructs exceeded the recommended threshold of 0.50.

This means that the observable variables were explained to a greater extent by the latent factors assigned to them than by the measurement error variance. At the same time, the reliability of the constructs, assessed on the basis of composite reliability (ω) and Cronbach's α coefficient, achieved high values for all scales, which confirmed the high precision of measurement and internal stability of the tools used. The differential validity between the constructs was assessed using the HTMT index (Table 4.4). This analysis indicated that despite the significant and theoretically justified links between the constructs under study, their empirical distinctiveness was preserved, which confirms the validity of further testing of the structural relationships between them.

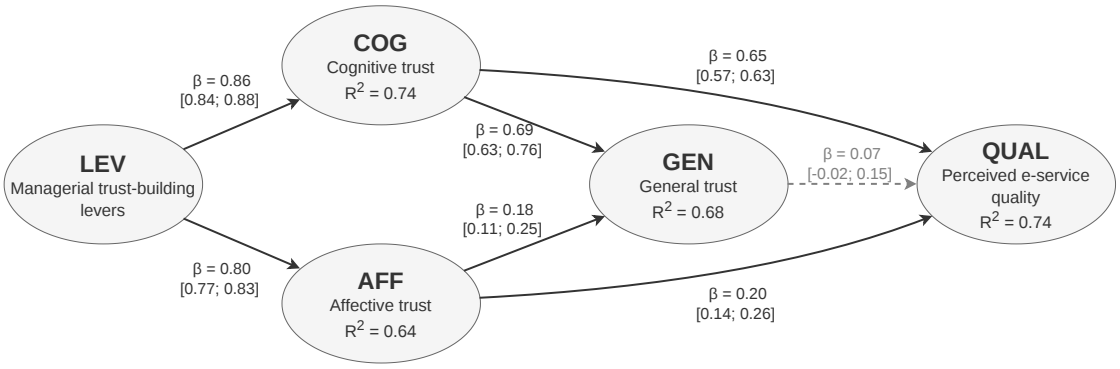


Figure 4.2: Analysis of structural equations

Note. The figure presents standardized path coefficients (β) and their 95% confidence intervals. The statistically non-significant path ($p > 0.05$) is shown as a gray dashed line.

In summary, the results of the confirmatory factor analysis clearly confirmed the good quality of the measurement model. All constructs were characterized by satisfactory fit, high reliability, and preserved convergent and discriminant validity. Thus, the prerequisites for moving on to the next stage of analysis, involving the estimation and interpretation of the structural model used for direct verification of hypotheses H3-H6, were met. The results are presented in Figure 4.2.

The fit of the structural equation model (Figure 4.2) was assessed based on a set of standard goodness-of-fit indices, analogous to those used in earlier stages of the analysis:

- The global model fit test proved statistically significant ($\chi^2(853) = 3552.00; p < 0.001$), indicating a slight discrepancy from the ideal model (standardized $\chi^2 = 4.16$). However, the relative fit of the model to the data can be considered acceptable: the CFI value = 0.91 exceeded the minimum threshold recommended in the literature, indicating satisfactory agreement between the model and the empirical data.

- The approximation error measures confirmed the good quality of the fit (RMSEA = 0.06; 90% $CI : [0.06; 0.06]$), with a low value of standardized residuals (SRMR = 0.05).

- The GFI index reached a moderate level, which was consistent with the number of estimated parameters and the complexity of the model.

- Additionally, the fit assessment using the T-size fit indices confirmed the adequacy of the model in the context of the sample size. The CFI obtained (0.90) was between poor-fair (0.89) and fair-close (0.94), while the RMSEA value = 0.06 was clearly lower than the poor-fair threshold (0.10) and close to the fair-close threshold (0.06).

This set of results, at a significance level of $\alpha = 0.05$, indicates that the fit of the structural model should be assessed as at least good, which justifies a further interpretation of the estimated structural relationships.

Summary of structural equations' analysis

The analysis of structural relationships in the structural equation model (see Figure 4.2) provided a clear basis for verifying the hypotheses H3-H6. First, the significant positive impact of managerial trust-building mechanisms (LEV) on both cognitive trust and affective trust in the e-commerce domain was confirmed. This means that managerial activities aimed at strengthening the credibility, transparency, and reliability of e-commerce entities effectively translate into both components of trust in e-commerce. These results provide complete empirical support for hypotheses H6a and H6b.

Next, general customer trust (GEN) was more strongly predicted by cognitive trustworthiness appraisals (COG) than by affective and relational appraisals (AFF), which confirms hypothesis H3a. At the same time, affective trustworthiness appraisals (AFF) was found to significantly influence general trust (GEN); however, the strength of this influence was clearly weaker than in the case of the cognitive component. This result confirms hypothesis H4a and indicates that general customer trust in e-commerce is based more on rational assessments of competence and predictability than on emotional reactions, which nevertheless remain significant.

An analysis of the factors leading to the perceived quality of e-commerce services showed that both cognitive trust (COG) and affective trust (AFF) had a significant and positive impact on the assessment of the quality of e-commerce services (QUAL). These results fully confirm hypotheses H3b and H4b and indicate that the perceived quality of services in the e-commerce environment is shaped simultaneously by cognitive trustworthiness appraisals related to functional, security, transparency, usability, and

experience-based cues, as well as by an affective component referring to the sense of security and relational comfort.

A different effect was obtained in the case of the direct impact of general trust (GEN) on the perceived quality of e-commerce services (QUAL). This relationship did not reach statistical significance, which does not allow for empirical confirmation of hypothesis H5. This result suggests that the impact of general trust on the assessment of service quality is indirect and is realized through its cognitive and affective components, rather than in the form of a direct effect.

This model explained nearly 75% of the variance in perceived e-commerce service quality, indicating the significant explanatory value of the tested model. In summary, the results confirmed hypotheses H3a, H3b, H4a, H4b, H6a, and H6b, while hypothesis H5 did not find empirical support. The structure of relationships presented in Figure 4.2 indicates the central role of cognitive trust as a key mechanism linking managerial actions with the formation of general trust and the evaluation of the quality of e-commerce services, with the complementary importance of affective trust.

4.3 Moderation analysis

In the final stage of the empirical analysis, the hypotheses H7-H8 were verified, referring to the conditional nature of the relationship between trust and the perceived quality of e-commerce services. These hypotheses were verified using moderation models estimated in the PROCESS approach, which made it possible to assess whether the strength of previously identified relationships differs depending on selected contextual and demographic variables. These analyzes were an extension of the structural model, focusing on identifying interactive effects rather than re-estimating the full latent structure. For hypotheses H7a-H7d, moderation models were estimated in which interactions between cognitive and affective trust and moderating variables in the form of age and gender were tested. The purpose of these analyzes was to determine whether the impact of both components of trust on perceived service quality differs depending on the demographic characteristics of consumers (Chapter 4.3.1). For hypothesis H8, a similar moderation approach was used with respect to the relationship between general consumer trust and perceived service quality, with the type of e-commerce channel as

the moderator, treated as a categorical variable reflecting different shopping contexts (Chapter 4.3.2).

4.3.1 Age and gender moderation

The results of the moderation analysis of the demographic characteristics of the consumer (i.e., age and gender) on the relationship between both affective and cognitive trust and perceived service quality in electronic commerce (aimed at verifying the hypotheses H7a-H7d) are presented in Table 4.5.

Table 4.5: Customer gender and age as moderators of the relationship between cognitive and affective trust and perceived e-commerce service quality

Hypothesis	**Predictor**	**Moderator**	**Effect**	**b**	**SE**	**95% CI**		β	R^2
						LL	**UL**		
H7a	COG → QUAL	Age	Main effect: COG	**0.95**	**0.03**	**0.90**	**1.00**	**0.76**	0.61
			Main effect: age	**0.08**	**0.02**	**0.04**	**0.13**	**0.08**	
			COG × Age	**-0.01**	**0.001**	**-0.01**	**-0.001**	**-0.05**	
			Conditional: ≤ 31 years	**1.01**	**0.04**	**0.93**	**1.08**	**0.81**	
			Conditional: 32–65 years	**0.95**	**0.03**	**0.90**	**1.00**	**0.76**	
			Conditional: ≥ 66 years	**0.88**	**0.04**	**0.80**	**0.96**	**0.71**	
H7b	COG → QUAL	Gender	Main effect: COG	**0.94**	**0.03**	**0.87**	**1.00**	**0.75**	0.60
			Main effect: gender	**-1.46**	**0.71**	**-2.84**	**-0.07**	**-0.08**	
			COG × Gender	0.06	0.05	-0.05	0.16	0.04	
			Conditional: men	**0.94**	**0.03**	**0.87**	**1.00**	**0.75**	
			Conditional: women	**0.99**	**0.04**	**0.92**	**1.06**	**0.80**	
H7c	AFF → QUAL	Age	Main effect: AFF	**1.05**	**0.04**	**0.98**	**1.12**	**0.66**	0.48
			Main effect: age	**0.16**	**0.03**	**0.11**	**0.21**	**0.15**	
			AFF × Age	**-0.01**	**0.00**	**-0.01**	**-0.001**	**-0.06**	
			Conditional: ≤ 31 years	**1.15**	**0.06**	**1.04**	**1.26**	**0.73**	
			Conditional: 32–65 years	**1.05**	**0.04**	**0.98**	**1.12**	**0.66**	
			Conditional: ≥ 66 years	**0.94**	**0.06**	**0.83**	**1.05**	**0.59**	
H7d	AFF → QUAL	Gender	Main effect: AFF	**1.07**	**0.05**	**0.97**	**1.17**	**0.67**	0.45
			Main effect: gender	-1.53	0.83	-3.15	0.10	-0.09	
			AFF × Gender	-0.02	0.08	-0.16	0.13	-0.01	
			Conditional: men	**1.07**	**0.05**	**0.97**	**1.17**	**0.67**	
			Conditional: women	**1.05**	**0.06**	**0.94**	**1.16**	**0.66**	

Note. COG – Cognitive Trust; AFF – Affective Trust; QUAL – Perceived Service Quality; b – unstandardized regression coefficient; SE – standard error; β – standardized regression coefficient; CI – 95% confidence interval for unstandardized effects; R^2 – explained variance. The statistically significant results at $p < 0.05$ are marked in **bold**.

Verification of the hypotheses H7a-H7d (Table 4.5) showed that the moderation models explained the variation in the perceived quality of e-commerce services to

varying degrees. The highest level of explained variance was obtained in models based on cognitive trust, which explained approximately 61% (H7a) and 60% (H7b) of the variance in service quality. This means that the cognitive component of trust is a strong and stable predictor of perceived service quality, regardless of the moderating variables. Models that included affective trust were characterized by a lower, but still significant, level of predictive fit.

In the case of age moderation (H7c), the model explained approximately 48% of the variance in perceived service quality, while when gender was included as moderator (H7d), the level of explained variance was approximately 45%. These results indicate that the affective component of trust, although important for the assessment of service quality in e-commerce, has a relatively lower ability to explain individual differences compared to the cognitive component. At the same time, analysis of interaction effects showed that significant moderation occurred only in models that included age as a moderating variable.

In both cases, the relationship between cognitive and affective trust and perceived service quality weakened systematically with increasing age of the respondents, indicating a decreasing strength of this relationship in older age groups. However, in models in which gender was the moderator, no significant moderation effect was confirmed. The relationships between trust and perceived service quality remained positive and comparable in both women and men.

In summary, the results suggest that models based on cognitive trust offer higher predictive utility in explaining the perceived quality of e-commerce services than models based on affective trust. At the same time, only age, not gender, acted as a significant moderator of these relationships, confirming the importance of developmental and generational differences in shaping the relationship between trust and service quality assessment in the e-commerce environment.

4.3.2 E-commerce channel moderation

The results of the moderation analysis of the e-commerce usage channel (i.e., desktop or “traditional” commerce, mobile commerce, social commerce and live streaming commerce) on the relationship between general trust and perceived service quality in e-commerce (aimed to verify hypotheses H8a-H8d) are presented in Table 4.6.

Table 4.6: E-commerce channels as moderators of the relationship between general trust and perceived e-commerce service quality

Hypothesis	**Moderator**	**Effect**	**b**	**SE**	**95% CI**		β	R^2
					LL	**UL**		
H8a	Desktop	Main effect: trust	**0.80**	**0.03**	**0.74**	**0.86**	**0.63**	0.41
		Main effect: channel	**2.04**	**0.31**	**1.42**	**2.65**	**0.16**	
		Trust × channel	**-0.07**	**0.02**	**-0.11**	**-0.03**	**-0.07**	
		Conditional: low level	**0.88**	**0.04**	**0.80**	**0.95**	**0.69**	
		Conditional: medium level	**0.81**	**0.03**	**0.75**	**0.87**	**0.64**	
		Conditional: high level	**0.74**	**0.04**	**0.67**	**0.82**	**0.59**	
H8b	M-commerce	Main effect: trust	**0.81**	**0.03**	**0.75**	**0.87**	**0.64**	0.41
		Main effect: channel	**1.64**	**0.28**	**1.10**	**2.19**	**0.15**	
		Trust × channel	0.00	0.02	-0.04	0.04	0.00	
		Conditional: low level	**0.81**	**0.05**	**0.71**	**0.91**	**0.64**	
		Conditional: medium level	**0.81**	**0.03**	**0.75**	**0.87**	**0.64**	
		Conditional: high level	**0.81**	**0.05**	**0.71**	**0.91**	**0.64**	
H8c	Social commerce	Main effect: trust	**0.80**	**0.03**	**0.74**	**0.86**	**0.63**	0.43
		Main effect: channel	**2.11**	**0.24**	**1.64**	**2.58**	**0.22**	
		Trust × channel	**-0.05**	**0.02**	**-0.08**	**-0.02**	**-0.07**	
		Conditional: low level	**0.95**	**0.06**	**0.84**	**1.06**	**0.75**	
		Conditional: medium level	**0.74**	**0.04**	**0.67**	**0.82**	**0.59**	
		Conditional: high level	**0.74**	**0.04**	**0.67**	**0.82**	**0.59**	
H8d	Live commerce	Main effect: trust	**0.80**	**0.03**	**0.74**	**0.86**	**0.63**	0.43
		Main effect: channel	**2.57**	**0.31**	**1.96**	**3.18**	**0.20**	
		Trust × channel	**-0.09**	**0.02**	**-0.13**	**-0.04**	**-0.09**	
		Conditional: low level	**0.91**	**0.04**	**0.83**	**0.99**	**0.72**	
		Conditional: medium level	**0.74**	**0.04**	**0.67**	**0.81**	**0.58**	
		Conditional: high level	**0.74**	**0.04**	**0.67**	**0.81**	**0.58**	

Note. b – unstandardized regression coefficient; SE – standard error; β – standardized regression coefficient; CI – 95% confidence interval for unstandardized effects; R^2 – explained variance. Results statistically significant at $p < 0.05$ are marked in **bold**.

Verification of the hypotheses H8a–H8d showed that the strength of the relationship between general consumer trust and perceived quality of e-commerce services differed depending on the type of purchasing channel (Table 4.6). In the case of hypothesis H8a, concerning the desktop channel, the moderation model explained approximately 41% of the variance in perceived service quality. The results indicate that the type of desktop channel significantly differentiated the strength of the relationship between general trust and service quality, with the strength of this relationship weakening as the intensity of use of this channel increased. This result confirms hypothesis H8a and suggests that in the desktop environment, the importance of general trust for the

evaluation of service quality in e-commerce is not uniform at all levels of channel usage intensity.

Similarly, hypothesis H8b, related to the m-commerce channel, was analyzed. In this model, the level of explained variance was approximately 41%, but no moderating effect was confirmed. This means that no statistically significant moderation by m-commerce use intensity in the relationship between general trust and perceived service quality was observed. Thus, hypothesis H8b was not empirically confirmed, and m-commerce did not differentiate the strength of the analyzed relationship.

Regarding hypothesis H8c, which covers the social commerce channel, the moderation model explained approximately 43% of the variance in perceived service quality in e-commerce. The results indicated a significant variation in the strength of the relationship between general trust and service quality depending on the intensity of use of this channel. As in the case of the desktop channel, a weakening of the analyzed relationship was observed with an increase in the intensity of social commerce use. These results confirm hypothesis H8c and point to the specificity of the social context of online shopping, in which the role of general trust changes with the nature of interactions in the channel.

The last of the hypotheses analyzed, H8d, was concerning the live streaming commerce channel. This model was characterized by an explained variance of approximately 43% and, as in the case of desktop and social commerce, showed a significant moderating effect. The results suggest that in the live commerce environment, the strength of the relationship between general trust and perceived service quality also weakens as the intensity of use of this channel increases, confirming hypothesis H8d.

In summary, hypotheses H8a, H8c, and H8d were empirically confirmed, indicating that the type of e-commerce channel can moderate the relationship between general trust and perceived service quality. However, hypothesis H8b was not confirmed, as no statistically significant moderation by the intensity of m-commerce use was detected. Within the present sample, the analysis therefore provides no evidence that the GEN–QUAL relationship systematically varies with the frequency of m-commerce use. The pattern of results obtained emphasizes the importance of the technological and interactive context of e-commerce channels in shaping the role of general trust in the evaluation of service quality.

4.4 Summary of hypotheses verification

The purpose of this chapter was to provide a summary of the results of the verification of all research hypotheses formulated in the study, covering both the measurement structure of the constructs under study, the structural relationships between them, and the conditional effects resulting from the moderating role of demographic characteristics and the context of the e-commerce channel. This summary integrates the results of factor analyzes (H1-H2), structural equation modeling (H3-H6), and moderation analyzes conducted using the PROCESS approach (H7-H8), allowing an unambiguous assessment of the degree of empirical support for each of the theoretical assumptions (Table 4.7).

Table 4.7: Summary of hypothesis testing results

Hypothesis	**Hypothesis statement**	**Verification**
H1	Cognitive trust in e-commerce (COG) is a distinct latent construct separable from affective trust in e-commerce (AFF).	confirmed ✓
H2	Perceived service quality (QUAL) is a multidimensional construct.	rejected ✗
H3a	Cognitive trust in e-commerce (COG) has a positive effect on general customer trust (GEN).	confirmed ✓
H3b	Cognitive trust in e-commerce (COG) has a positive effect on perceived e-service quality (QUAL).	confirmed ✓
H4a	Affective trust in e-commerce (AFF) has a positive effect on general customer trust (GEN).	confirmed ✓
H4b	Affective trust in e-commerce (AFF) has a positive effect on perceived e-service quality (QUAL)	confirmed ✓
H5	General customer trust in e-commerce (GEN) has a positive effect on perceived e-service quality (QUAL).	rejected ✗
H6a	Managerial trust-building levers (LEV) exert a positive effect on customers' cognitive trust in e-commerce (COG).	confirmed ✓

Continued on the next page

Hypothesis	Hypothesis statement	Verification
H6b	Managerial trust-building levers (LEV) exert a positive effect on customers' affective trust in e-commerce (AFF).	confirmed ✓
H7a	The relationship between cognitive trust in e-commerce (COG) and perceived e-service quality (QUAL) differs depending on age.	confirmed ✓
H7b	The relationship between cognitive trust in e-commerce (COG) and perceived e-service quality (QUAL) differs depending on gender.	rejected ✗
H7c	The relationship between affective trust in e-commerce (AFF) and perceived e-service quality (QUAL) differs depending on age.	confirmed ✓
H7d	The relationship between affective trust in e-commerce (AFF) and perceived e-service quality (QUAL) differs depending on gender.	rejected ✗
H8a	The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the desktop e-commerce channel.	confirmed ✓
H8b	The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the mobile commerce channel.	rejected ✗
H8c	The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the social commerce channel.	confirmed ✓
H8d	The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the live streaming commerce channel.	confirmed ✓

As can be seen, the vast majority of hypotheses were confirmed by the data (Table 4.7). With regard to hypotheses H1-H2, the results obtained clearly confirmed the correctness of the adopted conceptualization of latent variables. Cognitive and affective trust in e-commerce functioned as empirically distinguishable, yet related components of trust, while general trust was modeled as a separate endogenous construct

predicted by both cognitive and affective trust. At the same time, the perceived quality of the e-commerce services proved to be a one-dimensional construct, psychometrically consistent and stable. With regard to H1 and H2, the findings supported the distinction between cognitive and affective trust (H1), but the hypothesis that perceived e-service quality is a multidimensional construct was not supported (H2). With the current sample and item set, a one-factor model of perceived e-service quality provided the most reliable empirical results.

The structural equation analysis provided strong support for most of the relational hypotheses (H3-H6). Both cognitive and affective trust played an important role in shaping the overall trust and perceived quality of e-commerce services, with the cognitive component being more central to the relationship structure. Managerial mechanisms for building trust in e-commerce effectively strengthened both dimensions of specific trust (i.e., affective and cognitive). The GEN $\rightarrow$ QUAL path was not statistically significant, showing that the study did not yield evidence of a unique direct contribution of general trust to perceived e-service quality when the other predictors in the model were taken into account.

The results of the moderation analyzes (H7-H8) revealed the conditional nature of some of the relationships. In the case of hypothesis H7, it was confirmed that consumer age plays a significant moderating role in the relationships between trust (both cognitive and affective) and perceived service quality, with the strength of these relationships decreasing with age. However, the moderating effect of gender was not confirmed, which indicates the stability of the relationships analyzed in both gender groups. With regard to hypothesis H8, it was shown that the type of e-commerce channel differentiates the importance of general trust for the evaluation of service quality in the case of desktop, social commerce, and live commerce channels, while this relationship remains unchanged in the m-commerce environment.

Chapter 5

Discussion

Having presented the empirical results, the next step is to interpret their broader meaning. The purpose of this chapter is to frame the findings within a wider theoretical and managerial context. Rather than focusing only on statistical significance, the discussion seeks to clarify what these results imply for both academic understanding and managerial practice. At this point, an important question emerges: what do the findings enable us to understand and how might they influence decision-making in e-commerce organizations? Answering this question moves the analysis beyond description and begins to establish directions for action. Nevertheless, given that this study employed a cross-sectional design, the structural relationships explored subsequently ought to be interpreted as model-based directional associations and predictions instead of evidence of causality.

5.1 Key insights explained

As early as 2005, Salam et al. (2005), writing in *Communications of the ACM*, suggested that "managers need a long-term approach to managing trust and generating a positive consumer experience from each Internet transaction." Indeed, the concept of trust plays an important role in organizational studies (Bunker et al., 2004; Gołuchowski & Paliszkiewicz, 2023; Mayer et al., 1995; Paliszkiewicz, 2013). Interestingly, the analyses carried out in this study support the validity of that claim, even in the face of significant technological transformations that have reshaped the digital landscape. Based on the proposed analytical tool, which uses SEM models and full psychometric

validation, trust becomes a measurable operational element of the competitive strategy in e-commerce, not merely a theoretical construct. In this sense, the framework developed here offers a practical response to the challenge identified by Salam et al. (2005) in the first decade of this century.

Trust in e-commerce should therefore not be treated as a passive or abstract concept. It might even be best to actively develop and manage it strategically. Similar conclusions were reached by Saw and Inthiran (2022), who emphasized the need for proactive measures to reduce consumer mistrust. The results referred to in the previous chapter indicate that managerial trust-building levers emerged as strong positive structural predictors of both cognitive and affective trust. The measurement of trust, in general, based on the cognitive and affective trust dimensions, emerged as statistically significant predictors of perceived e-service quality within the structural model. This shows that trust is meaningfully related not only to transactional evaluations but also to broader assessments of the e-commerce experience. Such mechanisms may therefore represent relevant areas for managerial action aimed at supporting positive customer experiences and competitive positioning. A meta-analysis conducted by Handoyo (2024) is consistent with this view, as it shows that trust has the strongest positive impact on consumer purchasing decisions in e-commerce.

As a result, it is reasonable to expect that such practices may be conducive to a greater willingness to shop online, particularly when customers reinforce perceptions of reliability and trustworthiness. These mechanisms not only facilitate the flow and ultimate success of online transactions. They help reframe the online environment as safe, reliable and worthwhile for meaningful participation. Thus, it can be concluded that trust is not just an advantageous feature, but a highly associated strategic asset with consumer evaluation and behavioral intentions.

Several recurrences in the relations were found to exceed the descriptive results of evidence. First, the structure of e-consumer trust is shown to rest on two interrelated yet empirically separable components: a cognitive layer grounded in competence, reliability, and procedural clarity, and an affective layer reflecting warmth, benevolence, and relational cues. This clear division, together with the components of these trust constructs, is reflected in the works of McAllister (1995), as well as in those of Lewicki and Bunker (1996). General trust is a distinct endogenous factor that is predicted by

both cognitive and affective trust, and the cognitive path is much stronger. Second, perceived service quality appears to be formed as a coherent, unified judgment rather than as a multidimensional construct, indicating that consumers integrate various service cues into a single overarching evaluation. Third, managerial trust-building levers consistently operate as the first point in any trust formation process: they show strong positive structural relationships with both cognitive and affective trust. An alignment of these insights depicts trust as not just a peripheral attitude that consumers have. Rather, it encompasses a main theme that informs consumer assessments and the features of customers' actions toward online retailers. A broader perspective on these key insights from this work, also in the context of other works or scientific research, as well as a more detailed look at other hypotheses, will be discussed later in this chapter.

A more comprehensive analysis of the research shows that the study's contribution goes further than merely confirming individual paths. The study uses a design-based analytical tool that has been developed as a validated measurement model and a structural model, which functions as an artifact in the sense of Hevner et al. (2004), i.e., it follows the principles of the DSRIS approach. It is not only explanatory, but also generative; thus, it facilitates organizations in figuring out the source of trust, the ways it works, and the managerial levers that identify firm-controlled areas strongly linked to higher levels of trust within the proposed model. This twofold function, linking the scientific requirement with the business use, positions the framework as an instrument that is both a rigorous tool and a strategic guide of trust-based management in the e-commerce domain.

5.2 A closer look into hypotheses

This subsection aims to discuss in more detail the hypotheses that have been confirmed or rejected in the course of the empirical analysis (i.e., hypotheses H1-H2 cover the very factor analysis phase, and hypotheses H3-H7 pertain to the very SEM phase). They will be put into context by shedding light on other studies, and other complementary issues that need to be addressed to fully understand their meaning will be highlighted. The titles of the subsections are abbreviated ("headword") versions of the full research hypotheses – this is to increase the readability and clarity of the work.

5.2.1 Cognitive and affective trust in e-commerce as two separate constructs

Hypothesis H1 (*"cognitive trust in e-commerce is a distinct latent construct separable from affective trust in e-commerce"*) is supported by both exploratory and confirmatory evidence. This trust division has been in place since 1995, when McAllister (1995) introduced this distinction in the context of organizational trust. Nevertheless, to confirm this model in the sphere of e-commerce based on cognitive-affective trust, it was necessary to perform a similar verification of this component using factor analysis to identify any specific differences for this digitally structured field. It has also been observed that there is no clear and empirically proven distinction between what actually influences the affective sphere and what influences the cognitive trust sphere, particularly in the context of e-commerce (Legood et al., 2023). However, it was no surprise that this division is consistent with the dual construct of affective-cognitive trust originally proposed by McAllister (1995). In turn, the empirical results indicate how trust-relevant evaluations are organized empirically into distinct cognitive and affective appraisal dimensions, which indirectly contribute to filling this recently noted research gap by Legood et al. (2023).

And so, according to the questionnaire structure described in the Appendix A, the cognitive appraisal dimension is reflected in evaluations concerning security measures, privacy and data-processing information, clarity of content and prices, ease of use, seller-related cues, and prior positive e-commerce experience. The affective appraisal dimension is reflected in evaluations of visually, communicatively, socially, and relationally salient cues, including website design, marketing communication, interactive features, and CSR-related signals. Almost all factor loadings in relation to the questionnaire confirmed the assumptions of the study. However, it is important to bear in mind the factor of family or friends' opinions about a given online store. This factor was originally assigned to affective factors, but preliminary calculations within EFA (see Appendix B for factor loadings) indicated that it loaded more strongly on the cognitive appraisal dimension (COG) construct. Therefore, all further analyzes take into account the assignment of the factor of opinions about a given e-store to the COG construct. This should not be considered an error in the design of the research tool. The original assignment to the affective aspect was due to the fact that interpersonal influence

is understood to play a substantial role in shaping impulsive purchasing tendencies, as individuals often respond to product feedback transmitted digitally in the form of eWOM or through direct verbal communication (Zheng et al., 2019). In this case, the results are consistent with a large number of studies that consider opinions about an e-store as a factor within cognitive trust in e-commerce (Alfina et al., 2014; Obiedat, 2013). Nevertheless, it should be emphasized that this factor has the lowest factor loading of the COG loading factors, as well as the highest and slightly deviating residual variance estimator. This means that despite treating opinions of an e-store as part of the cognitive trust construct, its potential ambivalence and low explanatory power in describing the entire COG construct should be taken into account. This does not change the fact that the acquisition of opinions about a given e-store, including eWOM, has a very strong impact on purchasing intentions and trust in e-commerce itself (Gvili & Levy, 2023; Sudaryanto et al., 2025; Zhao et al., 2020), regardless of the area of digital trust (affective or cognitive) to which it is assigned.

The results of the factor analysis indicate that the factor analyses supported coherent single-factor representations of both trust dimensions, which is supported by robust factor–item loadings and satisfactory sampling adequacy indices. However, the CFA fit profile for affective trust was less satisfactory than for cognitive trust. The cognitive dimension shows a consistently coherent structure encompassing functional, assurance-related, transparency, and experience-based evaluations. The affective appraisal dimension, grounded in emotionally and relationally salient cues, also demonstrates an acceptable model fit; however, one of the fit indices (i.e., RMSEA) indicates a potential localized misfit, which is theoretically plausible given the more nuanced, context-dependent, and labile nature of affective, relational, and emotional signals. Affective trust, rooted in emotions and interpersonal cues, is inherently more difficult to measure with precision than cognitive trust. Emotional responses tend to fluctuate more readily with momentary psychological states, situational context, or unrelated external factors, which naturally introduces greater variability in this dimension (Dunn & Schweitzer, 2005). High inter-item correlations within affective trust measures may introduce redundancy (Fischer et al., 2023), a pattern also observed in studies using a scale by McAllister (1995). At the same time, affective trust often correlates more strongly with cognitive trust than theory anticipates, which can create unintended

cross-loadings in CFA and contribute to localized misspecifications that weaken the overall fit of the model, especially RMSEA (Hu & Bentler, 1999). Collectively, the results obtained in the study provide robust and internally consistent evidence for the validity of the proposed measurement model and strongly support the conclusion that cognitive and affective trust operate as empirically distinguishable latent constructs rather than manifestations of a single underlying factor.

Returning to the theory-based dichotomy between cognitive and affective trust, in the context of e-commerce, this distinction is of particular importance. Empirical research consistently shows that cognitive and affective trust function as distinct dimensions of consumer judgment. Although the two are positively correlated (Farid et al., 2020), they influence consumer behavior through different psychological pathways (Punyatoya, 2019). For example, utilitarian value tends to strengthen cognitive trust, while hedonic value primarily enhances affective trust (Nghia et al., 2020). However, studies conducted with e-commerce consumers further show that cognitive and affective trust significantly influence customer satisfaction and loyalty intentions, though often through different causal pathways (Foroutan et al., 2022; Punyatoya, 2019). This pattern reinforces the view that the two are not synonymous or interchangeable constructs but genuinely distinct dimensions of trust.

5.2.2 Perceived service quality as a unidimensional construct

For this sample and the set of items, the analyzes suggested that QUAL is unidimensional, which contradicts the hypothesis of a multidimensional structure. Hypothesis H2 (*"perceived service quality in the e-commerce sector (QUAL) is a multidimensional construct"*) has therefore been rejected during the empirical phase. Although most studies consider the quality of e-service from a multidimensional perspective of perceived online service quality (see models such as WebQual by Barnes and Vidgen, 2000, E-Quality by Ribbink et al., 2004, E-S-QUAL / E-RecS-QUAL by Parasuraman et al., 2005, or E-Service Quality by Blut, 2016), this research points to the focused unidimensional construct. The item questionnaire was meticulously chosen to reflect the main domains that appear in the literature (these are fulfillment, customer service, system reliability/security, information/price integrity, interactivity), consistent with the dimensional map of models introduced by Blut (2016) or Parasuraman et al. (2005),

even though EFA/CFA analyzes do not partition them into separate factors. Although this finding might suggest that the respondents consolidated several service cues into one overall assessment, the design of this study is not able to conclusively prove that e-service quality is a unidimensional construct. Previous research (Blut, 2016; Cronin & Taylor, 1992; Parasuraman et al., 2005) has already found that perceptions of service quality can display a hierarchical structure, where individual attributes and primary dimensions contribute to the overall quality assessment. This suggests that a one-dimensional general factor may often dominate the measurement error and obscure separable facets in factor-analytic tests.

Importantly, the solution found in the unidimensional model aligns with the construct definition of the current scale. It was deliberately designed with ten items in mind, representing the two critical facets of operational and transactional nature in online retailing. They are closely related to the majority of the domains identified in widely used e-service quality frameworks (Blut, 2016; Parasuraman et al., 2005), with a particular focus on fulfillment and customer service, along with additional consideration of system availability and transactional security (e.g., payment reliability). Indeed, despite this, a few areas responsible for the stability of multidimensional structures, such as privacy and the website's ease-of-use/efficiency/usability, were purposefully underemphasized to maintain the questionnaire's clarity and minimize the burden on the respondents as much as possible.

Yet another methodological consideration relates to measurement design. A small number of indicators (e.g., interactivity features) representing a few but theoretically distinct domains could reduce the precision needed to separate first-order latent factors. In this circumstance, the' general evaluative sentiments of the respondents towards the interactions may take a more major role in determining the relationship of the items; hence, the observed correlations between the domains could be higher due to halo effects (Wirtz & Bateson, 1995). This may be particularly prevalent when all items are phrased positively (which, incidentally, is recommended by OECD, 2017b) and are measured in a single questionnaire. Consequently, a one-dimensional latent structure may emerge as the most stable and replicable representation in SEM estimation.

However, many investigations have resorted to perceiving the quality of e-service as a single but global dimension (see, e.g., Hanaysha et al., 2025; Junedi et al., 2022).

The focus of this line of work is usually far less on diagnosing specific subcomponents of online service performance and more on positioning the perceived service quality within the more extensive nomological network, where a single parsimonious score might be satisfactory for theory testing in SEM. In this scenario, e-service quality might not be exclusively evaluated; however, its links persist among many other constructs. This contrasts with studies (e.g., Kassim and Asiah Abdullah, 2010; Lin et al., 2016; Mahdikhani and Yazdani, 2020) that explicitly aim to decompose e-service quality into separable facets and, therefore, apply established multidimensional instruments, including SERVQUAL (Parasuraman et al., 1988), SERVPERF (Cronin & Taylor, 1992), or scales specific to e-services such as E-Quality (Ribbink et al., 2004), where service quality is modeled as a multifaceted construct by design.

Two considerations further contextualize the current result. First, the questionnaire was intentionally comprehensive and did not focus exclusively on gauging the quality of e-service; it also considered beliefs and cues related to trust that together compose the perceived credibility of online retailing and shape the overall image of online retailing. Respondents in this kind of setting might feel more inclined to create a global evaluation that weaves signals into one single judgment; notably, this fits with the observed unidimensional structure of the factor. Second, although the present scale was developed by the author, its content domain was anchored in widely used e-service quality frameworks. In substantive terms, the items are assigned to the core domains emphasized in prior work, including fulfillment, customer service and recovery, system availability, and transactional assurance (e.g., payment reliability), as well as information and price integrity (Blut, 2016; Parasuraman et al., 2005), even if the empirical factor structure does not separate these domains into distinct first-order latent dimensions.

In this context, in order to maintain transparency and extract the most far-reaching conclusions and recommendations possible from the study, it would be worthwhile in the future to use other, more extensive, and established scales, as described in the previous paragraphs. The use of a proprietary scale to measure the quality of e-services, although based on similar theoretically grounded elements, necessitated treating this construct as one-dimensional; however, this resulted in greater transparency and purposefulness in the study.

The perceived unidimensionality of service quality may be interpreted as the harmony between theoretical frameworks and consumers' general evaluation mechanisms in information-heavy online environments. In lieu of breaking down various attributes of the service into individual analytical judgments, customers usually synthesize different cues into a single overall evaluation that serves as decision support in practice. The unified framework for credibility proposed by Hilligoss and Rieh (2008) is particularly applicable in this context, as it accentuates that online assessments tend to rely on heuristic shortcuts, forming a general impression of credibility instead of systematically examining each cue. Two-pronged approach models in digital contexts also endorse this argument by demonstrating that when consumers have limited cognitive resources and low motivation, they will resort to cue-based shortcuts in the assessment of information and trustworthiness online (Metzger & Flanagin, 2013). From an applied perspective, the specific properties of the interface (e.g., modality, agency, interactivity, navigability; as conceptualized in the MAIN model by Sundar, 2008)[62] may be the basis for the operation of such heuristics, while traditional web credibility studies prove that design and "look-and-feel" cues are of disproportionately high importance in forming credibility impressions (Fogg et al., 2001). The one-factor solution is therefore in line with global or heuristic evaluation mechanisms, whereas more comprehensive multidimensional instruments would be necessary to test separate quality domains directly.

5.2.3 General trust and its cognitive and affective dimensions

The research process in this study yielded two hypotheses concerning the influence of cognitive trust (COG) and affective trust (AFF) on trust in its general form (GEN), which read as follows:

- **H3a.** Cognitive trust in e-commerce (COG) has a positive effect on general consumer trust (GEN).

[62]The MAIN model (Modality-Agency-Interactivity-Navigability) explains credibility judgments in digital environments as cue-based and heuristic-driven: interface affordances related to presentation format (*modality*), perceived source attribution (*agency*), opportunities for user input/feedback (*interactivity*), and ease of finding and structuring information (*navigability*) provide cues that trigger cognitive shortcuts, shaping perceived credibility and quality (Sundar, 2008).

- **H4a.** Affective trust in e-commerce (AFF) has a positive effect on general consumer trust (GEN).

Both of these hypotheses have been confirmed. What should be noted is the strength of the impact of these two factors on general trust in e-commerce. The analytical findings of Chapter 4 showed that the cognitive trust construct plays a greater role in explaining the GEN construct than the affective trust construct. In the process, the structural pattern means that this kind of apparent asymmetry is present in the 'duality' of general trust. Cognitive trust is the stronger structural predictor of general trust, although affective trust also makes a statistically significant contribution within the model. In particular, it follows a coherent multilayer approach that identifies and integrates themes based on competence, assurance, and (to a lesser extent) affection (Mayer et al., 1995).

Why might this be the case? In the e-commerce industry, perceived uncertainty and information asymmetry require consumers to look for indications that are expected to alleviate hazards and provide clarity on the conditions under which the transaction will be carried out as guaranteed. It is still a fact that online purchasing is largely determined by trust, which might result from the perception of risk (Handoyo, 2024). On the practical side, when firms implement safety and security measures and policies (e.g., easy returns and customer rights), these are considered signals of risk-reduction to customers. Therefore, the customer naturally tends to rely on the information processing route and trust the e-commerce company (Hipólito et al., 2025).

In addition, the signals of competence, reliability, and "situational normality" are usually clearer in online communication than those of benevolence, which are more challenging to decipher from a short digital interaction. Recently, in social shopping, cognitive and affective trust have been explicitly modeled as parallel mechanisms, and it was revealed that the same structural "readable" indicators, such as conformity, familiarity, or a trustworthy context, are essential in the early stage of trust building, while emotional trust is highly based on signals from richer interactions (Wu et al., 2023). The literature also draws a distinction between utilitarian and hedonic values, as mentioned earlier in Chapter 2.1.5 utilitarian value is one of the factors that consolidates cognitive trust, whereas hedonic value is the one that triggers affective trust more straightforwardly (Nghia et al., 2020).

Affective trust is usually not a major factor in consumer relationships unless consumers build up some experience and see how the seller behaves in "moments that matter," for example, complaints and service recovery incidents. Research done on online-to-offline platforms shows that it is very likely that public reactions to negative reviews, such as apologies in ordinary language, can lead to a higher level of trust, both cognitive and affective, improve downstream intentions, and create an utterly positive image (Wan et al., 2023). Furthermore, another study shows that after failure, the consumer's focus is on cognitive evaluations (i.e., "can I trust this seller?"; Barari et al., 2020). That, among other things, also helps in understanding why the relationship between affective trust and other variables may be weak in cross-sectional models; the latter is an aspect that is very commonly overlooked in the literature, instead of being progressively built through detached episodes of interaction.

5.2.4 Cognitive and affective trust as predictors of perceived quality in e-commerce

The SEM analysis showed that both cognitive and affective trust significantly and positively predicted perceived e-service quality within the proposed structural model. This is indicated by the confirmation of hypotheses H3b and H4b, which read as follows:

- **H3b.** Cognitive trust in e-commerce (COG) has a positive effect on perceived e-service quality (QUAL).
- **H4b.** Affective trust in e-commerce (AFF) has a positive effect on perceived e-service quality (QUAL).

It should be emphasized here that both "components" of trust (affective and cognitive) not only influence purchase intentions in e-commerce (Alfina et al., 2014; Kowalczuk et al., 2021; Punyatoya, 2019), and the very perception of e-commerce services, but also this influence has a clearly positive direction and connotation. This has been demonstrated in various studies (Chai et al., 2015; Johnson & Grayson, 2005; Wu et al., 2023). In addition, cognitive trust emerged as the stronger predictor of perceived e-service quality than affective trust, as reflected in its substantially larger standardized path coefficient. This trend has also been evidenced by a number of other

studies (Chai et al., 2015; Foroutan et al., 2022; Sha, 2021). It is worth noting that website design directly influences users' e-trust by shaping perceptions of usability and reliability, which are fundamental cognitive antecedents of trust (Shaouf & Lu, 2022).

There are no conflicting research results that would indicate a lack of significance between affective/cognitive trust and consumer perceptions in the sphere of e-commerce (and therefore the willingness to make a purchase), given that it has been repeatedly emphasized that trust is, in itself, one of the most essential factors shaping consumer attitudes towards the e-commerce sector (Kim & Peterson, 2017; Salam et al., 2005). However, treating the above hypotheses independently, without considering the result of the falsification of hypothesis H5, may be short-sighted and lacking discernment. Hypothesis H5 posited that "general customer trust in e-commerce has a positive effect on perceived e-service quality," but it was not supported. In the structural model, no evidence could be found for a unique, statistically significant direct effect of general trust on perceived e-service quality when the other predictors were taken into account. This result should not be read as proof that the two constructs have no relationship. Rather, the estimated direct effect in the specific model and for the sample could not be confidently separated from zero, so its direction is not certain.

This result takes on greater meaning when considering the evidence for cognitive and affective trust's impact on perceived e-service quality. Though general trust might still serve as a broad measure of how a customer feels about an e-commerce vendor, the findings indicate that after incorporating cognitive and affective trust into the model, general trust does not add a statistically significant unique direct contribution to explaining perceived e-service quality. Thus, when taken together, the fact that H3b and H4b were supported while H5 was not suggests that there's empirical value in distinguishing between these cognitive and affective components of trust when examining its link to perceived e-service quality. For managers, breaking down trust in this way might help them better pinpoint areas where trust-building efforts will pay off. This interpretation lines up with Chai et al. (2015), who observed that when studying service relationships, it is methodologically appropriate to conceptualize cognitive and affective trust as distinct constructs when examining their respective roles in e-service quality evaluations and the development of customer loyalty.

The mediation analysis supports this conclusion. The study did not find a statistically significant indirect effect of cognitive or affective trust on perceived e-service quality through general trust, because the confidence intervals included zero. Consequently, in the estimated model, general trust did not function as an intermediate mechanism linking the two specific trust components to perceived e-service quality. The statistically significant paths show that cognitive and affective trust have a direct effect on perceived e-service quality, but the additional indirect effect through general trust is unclear. This result matches the distinction between competence-based and benevolence-based beliefs reported by Chen and Dhillon (2003), although this study does not confirm that these are the only factors that influence how customers perceive quality in the e-commerce domain. Other indirect effects with general trust as mediator were not statistically significant. Overall, these findings suggest that general trust can still be a useful measure of a consumer's overall trust, but our study does not find evidence that it has any additional direct or mediating effect on perceived e-service quality once cognitive and affective trust are specifically included in the model. Thus, separating these components might be more helpful for identifying specific trust-related areas for managerial focus than using a general trust measure.

5.2.5 Managerial trust-building levers as predictors of cognitive and affective trust

The results provide strong support for hypotheses H6a and H6b, which read as follows:

- **H6a.** Managerial trust-building levers (LEV) exert a positive effect on customers' cognitive trust in e-commerce (COG).
- **H6b.** Managerial trust-building levers (LEV) exert a positive effect on customers' affective trust in e-commerce (AFF).

In other words, based on the above successful falsification: e-commerce decision-makers should support the development or improvement of mechanisms (here: managerial levers / LEV construct) aimed at strengthening trust among consumers: both current and prospective ones. These mechanisms (forming the core questions of the

research questionnaire) constitute an accurate representation of the practices that online sellers should implement and communicate through their formal policies, operational procedures, store interface design, stringent security and privacy measures, delivery options, and return policies, as well as their overall approach to customer relations. Viewing it through the design science lens, the LEV construct can be seen as a trust oriented design space of actionable procedures, where different configurations can be experimented with, improved, and connected to measurable trust results (as seen similarly in Koç and Çevik, 2022).

Nevertheless, these mechanisms provide robust and compelling empirical support for both the cognitive and affective sides of trust in e-commerce (the differences between the corresponding standardized path coefficients on both spheres of trust are minor). The significance lies in the fact that the two standardized structural coefficients are of similar magnitude, which implies that LEV emerges as a strong structural predictor of both cognitive and affective trust, rather than through a single isolated psychological pathway. Although the two paths exhibit slight deviations, they do not affect the core finding that the model provides strong empirical evidence that managerial trust-building levers are systematically related to both trust dimensions. It has been observed that a shared set of organizational factors (such as clearly articulated policies, consistent and standardized procedures, secure and transparent transactional practices, and persuasive yet credible communication) systematically underpins both the development of competency-based evaluations and the establishment of relational confidence, and does so through closely analogous mechanisms (Kim et al., 2008). It is argued that establishing trust in online commerce is neither an isolated effort nor an easy process. Rather, it is a decision-critical area where business decisions regarding operations and communication strategies work together to improve consumers' perceptions of the trustworthiness of the retailer and strengthen their general confidence in the company (Urban et al., 2000). This is because trust emerges as a consequence of information signals transmitted by the e-seller (in the initial, pre-purchase phase), both through the design of the website and the manner of communication, and (from a broader relational perspective) through the way services are delivered and operational processes are carried out (Wang et al., 2004).

In addition to the direct effects of trust, the mediation analysis identified statistically significant indirect effects of managerial levers on perceived e-service quality

through cognitive and affective trust (i.e., LEV → COG → QUAL; LEV → AFF → QUAL). The indirect effect mediated by cognitive trust exhibits the greatest magnitude, exceeding that of the pathway mediated by affective trust, although both indirect effects are statistically significant. Among the managerial levers (applied by e-commerce companies, according to the utilized research questionnaire) that represent firm-controlled mechanisms and are strongly linked to cognition-based trust, the following are distinguished, inter alia: assurance mechanisms such as information clarity, privacy protection, security safeguards, and the reliability of transactions. As a result, higher evaluations of these managerial levers correspond to higher levels of cognitive trust within the estimated model, and, indeed, this follows from evidence showing that cues related to the quality of the website and its functioning serve as central antecedents to the formation of online trust (Kim et al., 2008; Koç & Çevik, 2022).

The asymmetry of these two mediation paths corresponds to the way consumers usually develop their perceived quality of service in e-commerce. This perceived quality, from the customer's point of view, is a downstream integrated evaluation of how well the e-commerce service performs and is often based on expectations of competence and reliability (Blut, 2016). In service contexts, trust formed through cognition is typically related to perceived expertise and the quality of service, whereas trust based on emotions tends to relate more to relational cues and personal warmth (Johnson & Grayson, 2005). In simpler terms, affective trust is still important, but it is usually not a strict criterion for quality evaluations, unless customers have built a sort of bonding with a brand, e.g., through repeated interactions over time or as a result of satisfactory service recovery following a service failure. This interpretation is corroborated by the results of recent studies, which, when reviewing the affective and cognitive bases of trust as distinguishable constructs, have stressed that the two models are separate (Foroutan et al., 2022; Legood et al., 2023; Punyatoya, 2019).[63] However, they vary in strength when it comes to the formation of trust, with cognitive trust being the stronger of the two (Chai et al., 2015). In addition, it was shown that there is a complex mix of cognitive and emotional factors that determine the perceived value of the retailer and

[63]However, this statement should be viewed in a broader context, which was highlighted in Chapter 5.2.1, forming part of the discussion and addressing various issues and dilemmas related to the dichotomy of the construct of trust in e-commerce, divided into the cognitive and affective spheres.

the intention to repeat the purchase. This combination can occur in countless ways, all of which are equally probable, but none can be singled out as the cause or deemed appropriate (Fang et al., 2016).

Finally, when it comes to the very website design of an online store, which is worth mentioning when discussing the above hypotheses, current research shows that e-commerce companies can go both ways, but not always to the same extent. What is meant by this? E-commerce organizations can actively shape their customers' decision-making pathways and cultivate trust from the initial point of contact through user interaction with the website's design components, including its navigational structures, information display mechanisms, and overall visual layout (Shaouf & Lu, 2022). However, based on the study, the structural model indicated that perceived e-service quality is more strongly predicted by cognitive trust than by affective trust, suggesting that reliability, usability, and predictability assessments are more closely related to overall customer quality assessments than affective responses (Anser et al., 2023; Hanaysha et al., 2025; Shaouf & Lu, 2022).

5.2.6 Demographic differences in the trust–service quality relationship

The earlier Chapter 5.2.4 has already discussed important issues related to the impact and power of affective and cognitive trust on the perceived quality of service in e-commerce. However, this was of a general nature, focusing on the phenomenon itself rather than on distinctions within, for example, consumer demographics. To further explore this issue, the effects of gender and age moderation on the relationship between cognitive/affective trust and the perceived quality of e-service by consumers were also measured. The aim of this is to check whether such a moderated relationship, and thus whether the mechanisms for building service quality in e-commerce, require a differentiated management approach. The results obtained can serve as a basis for designing more tailored e-service management strategies, particularly in terms of communication personalization, interface design, and the selection of tools that strengthen trust in different demographic segments. This chapter is therefore devoted to discussing hypotheses H7a-H7d, which are as follows:

- **H7a.** The relationship between cognitive trust in e-commerce and perceived e-service quality differs depending on age.
- **H7b.** The relationship between cognitive trust in e-commerce and perceived e-service quality differs depending on gender.
- **H7c.** The relationship between affective trust in e-commerce and perceived e-service quality differs depending on age.
- **H7d.** The relationship between affective trust in e-commerce and perceived e-service quality differs depending on gender.

Hypotheses H7a and H7c (i.e., those concerning age effects) were confirmed, while hypotheses H7b and H7d (i.e., those concerning gender effects) were rejected. This chapter is divided into two sections that focus on age and gender dimensions, respectively.

The role of age

Confirmation of hypotheses concerning gender-moderated effects (i.e., H7a and H7c) can be interpreted to mean that, according to the moderation results, the positive relationship between trust and perceived e-service quality becomes weaker at higher levels of age. This is true, but to fully understand this conclusion, this interpretation must be placed in the proper context. First, this does not mean that trust is "irrelevant" for older people, but rather that with age, trust becomes less "diagnostic" in assessing service quality (i.e., quality is more often assessed based on other premises or a narrower set of experiences). Secondly, it is worth placing this reading on two "meta-levels": (a) *e-service quality* as a highly "performance-oriented" construct that is sensitive to transactional experiences (Blut et al., 2015), and (b) *online trust* as a mechanism to reduce uncertainty; its strength may depend on context, experience, and sample heterogeneity (Kim & Peterson, 2017).

Given the nature of the electronically distributed survey (CAWI) and the subject matter (trust in online shopping), older e-consumers in the sample are often already a "prefiltered" group. In practice, older respondents who actually shop online are more likely to be digitally competent, cautious, and selective (e.g., they shop on a few trusted platforms; Cheng et al., 2025). It should be noted that among older people, digital

skills play a significant role in the frequency (engagement) of digital device use (Aleti et al., 2025), which may also be reflected in the incidence of online shopping. This selection narrows the variability of both trust and quality assessments (i.e., everyone in this group has "passed the entry threshold"). Such selection may partly account for the flatter estimated relationship observed at higher ages. This mechanism is frequently emphasized in critical evaluations of the literature on older adult consumers and their interactions with technology (Franco, 2023; Kovalenko, 2020).

In many mature e-commerce contexts,[64] trust acts as a prerequisite for transactions, but not necessarily as the main factor differentiating quality assessment after the fact (as in the QUAL construct). In such cases, older consumers can treat trust more as a "zero-one" variable: if the platform meets the minimum credibility threshold, the quality assessment is based more on the experience of the service than on the strength of previous trust. This logic is well supported by (a) meta-analyzes showing that relationships in e-service models are highly contextual and dependent on the type of experience (Blut et al., 2015), and (b) studies on the role of routine/habit in online decisions (where habit can weaken the influence of beliefs on evaluations and intentions; Chiu et al., 2012; Fang et al., 2016), especially in the context of the elderly (Berg & Liljedal, 2022). However, it must be acknowledged that established behavioral routines, particularly among older e-consumers, can increase their susceptibility to fraudulent targeting (and eventual victimization) in e-commerce environments, primarily due to reduced vigilance, inattention, distraction, or poorer digital skills (Chen et al., 2025).

Age is also often correlated with other types of consumer experience (including those outside the online context): older buyers are more likely to simplify the decision-making process through fixed supplier selection heuristics (i.e., buying proven brands or on familiar platforms, relying on family recommendations, following tradition), which reduces the importance of trust as a "continuous" variable in explaining quality (Franco, 2023; Lian & Yen, 2014). In this sense, the decline in the strength of the relationship

[64] "Mature e-commerce context/channel" here refers to an environment where online shopping is commonplace and routine, and key elements of the process (payment, delivery, returns, disputes) are standardized and supported by buyer protection mechanisms. In such conditions, trust tends to act as a threshold condition for participation rather than a key factor differentiating service quality assessments (see more in: Pavlou, 2003).

between types of trust and the QUAL construct may be a consequence of decisions that are less exploratory and more optimized to minimize risk and cognitive effort.

Research on online purchasing decisions shows that older consumers may be less likely to use aggregated social signals (e.g., average ratings) and, at the same time, more likely to react strongly to individual negative information (von Helversen et al., 2018). This provides a plausible explanation for the weaker estimated relationship between cognitive/affective trust and perceived quality in e-commerce ("COG/AFF → QUAL"): if quality is assessed more by specific episodes or negative signals than by the overall perspective (trust having dual form), the relationship weakens. In addition, recent studies on digital risks among older users emphasize increased perceived vulnerability and error costs, which encourage protective strategies (limiting retailers, payment channels, and the choice of marketplaces where purchases are made; Aleti et al., 2025). When behavior is strongly "secured," the impact of trust on quality assessment (QUAL) can decrease, as quality depends more on service delivery within a trusted ecosystem.

When it comes to building trust in e-commerce, it is also worth paying attention to generational differences and what people focus on depending on their age. A recent study by Mičík et al. (2025) shows that these differences clearly affect how trust is perceived in the decision-making process. Older consumers (Generation X) view trust as a decisive factor between service quality and purchasing decisions. Slightly younger (middle-aged) consumers (Generation Y), on the other hand, respond more directly to signals related to social engagement, such as online reviews and interactions. This means that age does not make trust less important, but it does affect how it works. For older consumers, the trust assessment is more rooted in established cognitive patterns. Also, in their study, Mičík et al. (2025) state that "[its results] suggest that older consumers prioritize trust-building mechanisms."[65] This points to the fact that improving service quality is less of a "new" psychological stimulus for them and is less likely to lead to a change in attitudes or behavior. This interpretation deserves consideration when discussing the results of this study, particularly in the context of making managerial decisions that may be challenging on the one hand but crucial on the other, bearing in mind the adaptation of elements that increase trust in e-commerce for older people.

[65]It should be emphasized that the study by Mičík et al. (2025) strictly concerns the context of social commerce and not the broader field of "general" e-commerce.

The role of gender

As mentioned above, hypotheses concerning the indirect effects of gender on the relationship between affective/cognitive trust and perceived quality of e-commerce (H7b and H7d) were rejected. The connection between perceived e-service quality and either cognitive trust or affective trust was not significantly moderated by gender. Within this model and sample, gender does not appear to exert a substantial moderating effect on the strength of these associations. This is indicated by studies showing that gender differences in e-commerce are ambiguous and highly context-dependent (Garbarino & Strahilevitz, 2004; Kanwal et al., 2022; Lee, 2019; Lian & Yen, 2014). They often relate more to what shapes beliefs (e.g., risk sensitivity, privacy, social norms) than to how strongly those beliefs themselves translate into quality assessments. This is consistent with the finding that the "COG/AFF → QUAL" relationships are not significantly moderated by gender. While gender might influence the initial concerns or trust-related perceptions of customers, the current findings do not provide evidence that, in mature e-commerce contexts,[66] the strength of these structural relationships differs by gender.

On mainstream platforms, some experience-related elements (e.g., payment process, delivery, returns handling on marketplaces) are now highly standardized. The more predictable the "system" (i.e., e-store, marketplace, etc.) behaves, the more the relationship between trust and quality assessment is general in nature and less dependent on demographic characteristics. This is consistent with the findings of Blut et al. (2015), which indicate that the strength of the trust-outcome relationship is sometimes determined by conditions of uncertainty and context, and not necessarily by demographics *per se*. In this sense, trust can serve as a "universal" mechanism to reduce uncertainty, and demographics do not need to differentiate its impact on the perceived quality of the functioning of electronic commerce services. The observed age effects are more likely to result from selection, experience, and the "diagnostic" nature of signals than from different evaluation mechanisms across genders.

However, there are differences in terms of what representatives of a given gender place their trust in. Men and women are seen to pay attention to different aspects when purchasing online. Men more often emphasize customer service, while women point out the appearance and functionality of the platform, as well as fulfillment processes.

[66] See the previous footnote on understanding the "mature e-commerce context/channel."

However, security and privacy issues are important for both genders (Teo et al., 2025).[67] Another study indicates that men are more likely to be guided by the perceived quality of a website and its ease of use, while women's decisions are primarily influenced by security issues, economic factors, convenience, and social impact (Alfanur & Kadono, 2022). There is some heterogeneity here, which may be due, among other things, to cultural differences between the samples studied. In either case, it should be emphasized that the subject of the relationship between gender and trust in e-commerce is still underexplored and deserves further investigation (Mumu et al., 2021).

5.2.7 E-commerce segment differences in the trust–e-service quality relationship

Hypotheses H8a-H8d concern whether the strength of the structural relationship between general trust and perceived e-service quality varies with the frequency of use of each e-commerce channel (desktop – "traditional,"[68] mobile,[69] social, and live streaming). Hypotheses H8a-H8d are as follows:

- **H8a.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the desktop e-commerce channel.
- **H8b.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the mobile commerce channel.
- **H8c.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the social commerce channel.

[67] The study by Teo et al. (2025) also measured trust, but it should be emphasized that the structural model proposed by the authors treated "trust" not as a mediator but as a predictor on par with customer service, fulfillment, platform design, and security/privacy. Therefore, it was concluded that the conclusions of this study in the context of trust can give a distorted picture when compared to the model proposed in this dissertation.

[68] For the purposes of this study, the desktop channel ("traditional") includes both PCs and laptops.

[69] For the purposes of this study, the mobile channel includes both smartphones and tablets.

- **H8d.** The relationship between general trust in e-commerce (GEN) and perceived e-service quality (QUAL) differs depending on the frequency of use of the live streaming commerce channel.

Hypotheses H8a, H8c and H8d (with respect to the mediating effect of desktop, social commerce, and live streaming commerce channels) were confirmed, while hypothesis H8b (with respect to the mobile commerce channel) was rejected due to the lack of evidence to support it.

As can be seen, hypotheses H8a-H8d, unlike hypotheses H7a-H7d (discussed in the previous Chapter 5.2.6), operate on the construct of general trust in e-commerce (GEN) rather than on the dual approach of distinguishing between affective trust (AFF) and cognitive trust (COG). This was done deliberately. In hypotheses H8a-H8d, the focus shifts from the question of the mechanisms of trust formation to the question of the boundary conditions in which the strength of the GEN–QUAL relationship varies across different levels of channel use. In this sense, GEN is the most "functional" construct from an analytical point of view, i.e., it represents a synthetic, superordinate level of trust, which in the e-commerce literature is sometimes used as a key predictor of attitudes and outcomes of the evaluation of the shopping experience (Azam et al., 2013; McKnight et al., 2002a; Pavlou, 2003).

At the same time, the operationalization of H8 based on GEN is methodologically justified. Breaking down channel moderation (desktop/mobile/social/live streaming commerce) into two dimensions of trust (cognitive and affective) multiplies the number of interactions tested, thereby exacerbating the problem of multiple testing and increasing the cumulative risk of *type I error*.[70] This is a classic argument in favor of parsimony in designing a set of hypotheses and limiting the number of parallel tests (Midway et al., 2020; Streiner, 2015). Furthermore, moderations are empirically more difficult to detect than main effects and usually require greater statistical power (due to measurement error, moderator distribution, and limited variance in groups, among other reasons), which becomes increasingly relevant when interactions are multiplied in the model (McClelland & Judd, 1993). Finally, from a modeling perspective (including SEM), excessive expansion of the dependency structure reduces parsimony and increases interpretive

[70] A type I error in statistics is a situation in which a true null hypothesis (H_0) is incorrectly rejected, i.e., an effect or relationship is claimed to exist when in fact it does not (Banerjee et al., 2009).

cost, as the number of parameters and potential competing explanations increases, making it difficult to provide an unambiguous narrative in the discussion (Kline, 2016). Since this dissertation tests moderations for two dimensions of trust separately under hypotheses H7, hypotheses H8 serve a meaningful function as a "contextual layer" in this arrangement, showing when general trust (GEN) becomes more or less diagnostic of perceived e-service quality (QUAL) depending on the intensity of use of the shopping channel.

Returning to the hypotheses H8a-H8d, concerning the importance of purchase frequency in various e-commerce channels for the relationship between trust and perceived service quality in online shopping, moderation analyzes show that channel-use intensity conditions the GEN–QUAL relationship for some, but not all, e-commerce channels. This pattern is consistent with the perspective after adoption, in which quality assessments after transactional experience are increasingly determined by "expectation confirmation" and the course of service delivery, and relatively less by general attitudes and beliefs. In the literature on information systems and electronic commerce, this mechanism is well organized by the Expectation Confirmation Model (ECM; Bhattacherjee, 2001, and its further extensions, e.g., Lee and Sung, 2023): after the first experiences, it is the confirmation of expectations and satisfaction that become key predictors of evaluations and follow-up behaviors, rather than the initial beliefs alone. Similarly, in terms of the performance of information systems (e.g., according to the DeLone–McLean's information systems success model; DeLone and McLean, 2003), the quality of the system/information/service is directly related to user satisfaction, suggesting that as the channel becomes more routine, strictly performance-related factors become more important for quality perception.

The following considerations are divided into three subsections: the first relates to the desktop channel, the second concerns the mobile commerce channel, and the third (due to overlapping interpretations) combines discussions of both the social commerce channel and live streaming commerce.

Desktop channel

The observation that estimated GEN–QUAL slope becomes weaker as desktop-channel use increases can be interpreted as an effect of the "professionalization" and

routinization of shopping behavior. Firstly, as the frequency of purchases increases, consumers typically have more opportunities for comparison, which raises the benchmark for quality and fosters a more critical evaluation of the process (e.g., sensitivity to delays, ambiguity of procedures, or service errors). This is in line with the ECM approach mentioned earlier (Bhattacherjee, 2001): the more established the expectations are, the more attention evaluators pay to minor deviations in service delivery when judging service quality (QUAL) while "baseline" trust becomes less influential.

Secondly, frequent use of the desktop channel (i.e., a classic PC or laptop) in a stable environment[71] promotes decision automation and an increase in the role of habit. The literature shows that habit limits the "explanatory power" of intentions and beliefs in continuing behaviors (Limayem et al., 2007; Wood & Neal, 2007). As a result, overall trust may remain positively correlated with quality, but it ceases to strongly differentiate ratings as the share of routine responses and ratings based on the actual effects of service delivery increases. In addition, e-commerce studies have shown that habit can weaken trust-based relationships in the area of repetitive behavior, which makes this direction of moderation theoretically credible in the model presented in the study as well (Chiu et al., 2012).[72]

Mobile commerce

The lack of significant interaction for the mobile channel can be justified by the fact that in m-commerce, trust tends to be a relatively "stable" evaluation mechanism, linked to a wide range of outcomes (satisfaction, attitude, loyalty, and intentions; Jimenez et al., 2016). A meta-analysis of m-commerce studies indicates that trust has consistently positive relationships with post-use outcomes and is supported, among other things, by the quality of the system/information/service and security, which makes the trust–outcomes relationship quite resistant to changes in context (Sarkar

[71] A stable environment is understood here as a context characterized by high repeatability of channel usage conditions, low variability of the interface and operating rules, and predictability of results (e.g., regular purchases on the same e-commerce platform, reordering of the same products, using saved payment methods and delivery addresses).

[72] It should be emphasized that in the proposed SEM model, the explained variable is QUAL, i.e., the perceived quality of e-commerce services, and not the behavior of repeat purchase itself, as in the research by Chiu et al. (2012).

et al., 2020). In practice, this may mean that regardless of the intensity of mobile use, consumers still "pass" quality assessment through a relatively similar filter of general trust, and QUAL differentiation occurs more at the level of experience characteristics (e.g., usability, UI quality, security) than at the level of the strength of the GEN → QUAL relationship itself.

Social commerce and live streaming commerce

For both social commerce and live streaming commerce, the GEN–QUAL relationship appears to be stronger among less frequent users of these channels. This means that for people who rarely shop online through these channels, trust (in general) translates more strongly into the perceived quality of e-commerce, while for those who use these channels more often, this relationship weakens, but remains positive. This pattern fits well with the nature of social channels (such as social media and live streaming services), where uncertainty and transactional risk tend to be more prominent (the important role of user content, intermediaries, influencers/streamers, dynamic persuasive stimuli; Lăzăroiu et al., 2020; Zhang et al., 2025), so for "newbies," general trust acts as a particularly strong heuristic that reduces risk and organizes quality evaluation. The leading "classic" works on the acceptance of e-commerce indicate that trust and risk are intertwined and together organize decisions and assessments in the online transaction environment (Lim, 2003; Pavlou, 2003).

At the same time, reviews and original articles on social commerce demonstrate that as the channel becomes more familiar to the e-customer, the role of mechanisms specific to the social environment (i.e., interactivity, social presence, eWOM, peer content) is growing, which can "take over" some of the explanatory functions related to purchasing and quality results (Busalim & Hussin, 2016; Gvili & Levy, 2023; Zhao et al., 2023; Zhao et al., 2020). In view of the above, it can be concluded that among regular social commerce users, general trust continues to favor positive quality assessments but is becoming less diagnostic as consumers learn about the channel and increasingly base their assessments on situational factors (e.g., quality of information, credibility of the seller, fulfillment process, and procedures). A similar interpretation can also be applied to live streaming commerce, but it is also worth pointing out a similar mechanism that occurred in the case of the desktop channel.

The literature on live streaming commerce additionally emphasizes that trust in this environment occurs on many levels (e.g., a distinction is made between trust in the streamer selling a given product and trust in the product itself) and is shaped by simultaneous social and technical factors (live interactivity, synchronicity, two-way communication, personalization/visibility), and then translates into follow-up behavior (i.e., "post-streaming" actions; Luo et al., 2025; Zhang et al., 2022b). Such behaviors may include purchase intentions and decisions, repeated participation in live streams, and ongoing engagement with the streamer or the brand.

Research also shows that trust is essential to retain customers in live streaming commerce. This is due to the very nature of live sales and the fact that viewers often feel a personal connection with the broadcaster (streamer). Therefore, people who are new to this channel rely heavily on general trust to assess quality. However, more experienced users are less likely to rely solely on trust, since they already have their own ways of assessing quality and making more informed decisions (Wongkitrungrueng & Assarut, 2020; Zhang et al., 2022b).

5.3 Recommendations and implications of the trust-based framework

The results of this study confirm the theories of associations between trust-related constructs and the perception of e-commerce service quality. The study also provides the foundation for developing the trust model into practical managerial recommendations. This subchapter outlines a roadmap of recommendations for managerial practice derived from the results of the trust-based framework. Furthermore, this set of recommendations is explicitly framed and understood within the broader paradigm of Design Science Research in Information Systems (DSRIS; Hevner et al., 2004), thus clarifying its theoretical underpinnings and illustrating its practical relevance.

5.3.1 Trust-based framework as a managerial artifact

The managerial implications derived from this study need to be interpreted and applied in accordance with the underlying conceptual reasoning of DSRIS (Hevner et al., 2004). Rather than serving solely as an explanatory statistical model, the framework

proposed by the author of this dissertation constitutes an empirically assessed SEM-based analytical artifact that transforms e-consumer cognitive-affective trust into a measurable, diagnosable, and actionable notion that can be applied within managerial decision-making processes. Its practical relevance lies in identifying which trust-related domains warrant managerial attention and in showing how the aggregate managerial trust-building lever construct relates to cognitive and affective trust.

Through the lens of the DSRIS perspective, the study's primary outcome extends beyond simply confirming or refuting individual hypotheses empirically. The research seeks to design and evaluate a trust-based analytical framework that can be regarded as a design science artifact (in accordance with the guidelines of Hevner et al., 2004). This artifact comprises an original conceptualization of trust in e-commerce (introduced in Chapter 1.5.3), an empirically supported measurement model, a structural model that captures the relationships among managerial trust-building *levers*, cognitive trust, affective trust, general trust, and perceived service quality, as well as a set of managerial recommendations derived from the empirical model (as described in the subsequent Chapter 5.3.2). In this regard, the framework has both explanatory and decision-support significance. On the explanatory side, it shows how trust is organized in e-commerce and how its elements are structurally related to perceived service quality. On the prescriptive side, it identifies managerial areas needing attention based on the strength of their modeled links to trust and perceived e-service quality. This dual function aligns with the DSRIS premise that a research artifact must be both theoretically grounded and practically applicable (Hevner et al., 2004; Jones & Gregor, 2007).

It is worth mentioning again here the newly established original interpretation of trust in e-commerce. This definition (which draws on various theoretical conceptualizations of this concept), initially presented in Chapter 1.5.3, plays an important role in this process. It functions as the conceptual kernel of the artifact, as it specifies the constructs to be assessed, the dimensions along which trust should be decomposed, and the manner in which these dimensions can be operationalized into specific managerial actions. By conceptualizing e-commerce trust as a composite cognitive and affective orientation toward an online vendor (constituted by perceived competence, reliability, transparency, benevolence, and relational assurance; see Legood et al., 2023; McKnight et al., 2000; Özdemir and Sonmezay, 2020) the study avoids treating trust as a vague or exclusively

reputational construct. Instead, trust is framed as a structured analytical domain that can be operationalized and subjected to empirical psychometric and structural evaluation, as well as systematically linked to managerial levers.

To clarify this positioning, the framework developed in this dissertation can be mapped to the main components of the DSRIS model proposed by (Hevner et al., 2004). In this model, design science research is situated between the practical *environment*, which defines organizational problems, opportunities, and requirements, and the *knowledge base*, which provides theoretical foundations, methodological rigor, and prior expertise. These two domains are connected through the *relevance cycle* and the *rigor cycle*, while the central *design cycle* concerns the iterative building and evaluation of the artifact itself. The following Table 5.1 thus illustrates how the trust-based framework fits with these elements of the DSRIS logic. Instead of functioning solely as a descriptive classification, it is intended to demonstrate that the proposed framework is concurrently anchored in a concrete managerial issue, established scientific knowledge, and an empirical process of artifact design and assessment. This mapping also forms the foundation for the managerial roadmap outlined in the next Chapter 5.3.2.

Table 5.1: Mapping the trust-based e-commerce framework onto the DSRIS model

DSRIS model component	**Corresponding element in this dissertation**	**Interpretation in the context of the study**
Environment: application domain	E-commerce firms, online retail platforms, e-consumers, and digital shopping contexts, including desktop commerce, m-commerce, social commerce, and live commerce.	The study is embedded in a real e-commerce environment in which customer trust functions as an important predictor of evaluations of online shopping experiences and perceived e-service quality.
Environment: people	E-consumers participating in online purchasing processes, as well as managers and decision-makers responsible for e-commerce strategy, UX, security, communication, customer service, and service quality.	The framework connects the consumer and managerial viewpoints: consumers form judgments about trust and quality (Ashiq & Hussain, 2024; Tran & Vu, 2019), while managers can create and refine mechanisms that influence these judgments (Qalati et al., 2021; Salam et al., 2005).

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Table 5.1 – continued from previous page

DSRIS model component	**Corresponding element in this dissertation**	**Interpretation in the context of the study**
Environment: organizational systems	Privacy policies, service procedures, delivery and return processes, complaint handling, customer communication, reputation management, CSR activities, and service recovery practices.	Managerial trust-building *levers* are interpreted as organizational practices that can be designed, implemented, monitored, and improved by e-commerce enterprises (Kim et al., 2008; Koç & Çevik, 2022).
Environment: technical systems	E-commerce platforms, user interfaces, payment systems, visible security mechanisms, privacy-related information architecture, mobile interfaces, social commerce tools, and live commerce functionalities.	Features of technical systems constitute theoretically relevant predictors of trust, particularly insofar as consumers perceive their reliability, safety, and ease of use (Elwalda et al., 2016; Engriani & Novaris, 2020; Falahat et al., 2019).
Environment: problems and opportunities	The challenge of converting e-consumer trust into concrete managerial actions, the danger of viewing trust as one broad, undifferentiated attitude, and the necessity of determining which trust-building mechanisms genuinely merit managerial investment.	The artifact tackles a practical issue: although e-commerce companies may understand that trust is crucial, they often do not have a systematic approach to identify which specific trust dimension needs to be addressed.
Relevance cycle: requirements	The need for a framework that measures managerial trust-building *levers*, cognitive trust, affective trust, general trust, and perceived service quality, while explaining relationships between these constructs.	The artifact responds to a practical requirement: it should not only describe trust, but also help managers identify its sources and translate empirical findings into decision-oriented recommendations.

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Table 5.1 – continued from previous page

DSRIS model component	**Corresponding element in this dissertation**	**Interpretation in the context of the study**
Relevance cycle: field testing[73]	Survey-based empirical assessment using data from actual e-commerce purchasers.	The artifact was empirically grounded in the e-commerce application context through data collected from actual e-customers. This assessment did not involve organizational implementation or post-development testing of the completed artifact in managerial practice.
Design science research: artifact	A trust-based analytical framework composed of the proprietary conceptualization of e-commerce trust, empirically assessed measurement constructs, a structural SEM model, and managerial recommendations derived from empirical findings.	The artifact constitutes an analytical construct rather than an implemented software system. It is introduced as an empirically assessed analytical framework that aids in diagnosis, interpretation, and decision-making within the field of e-commerce management.
Design cycle: build	Development of the conceptual structure of the framework, including the decomposition of trust into cognitive and affective dimensions, the positioning of general trust, the operationalization of perceived service quality, and the reinterpretation of managerial trust-building *levers*.	The building stage transformed theoretical assumptions about trust into an operational research framework that could be empirically tested and translated into managerial implications.

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[73]The term "field testing" is retained here to preserve the terminology of the DSRIS framework proposed by Hevner et al. (2004). In this dissertation, it refers to survey-based empirical assessment conducted in the actual e-commerce application context among e-consumers, rather than to post-development implementation or organizational field testing of a deployed artifact.

Table 5.1 – continued from previous page

DSRIS model component	**Corresponding element in this dissertation**	**Interpretation in the context of the study**
Design cycle: evaluate	Evaluation through EFA, CFA, SEM, reliability and validity assessment, hypothesis testing, and moderation analysis.	The artifact was evaluated empirically rather than only conceptually. The evaluation provided evidence regarding the factorial structure, internal consistency, construct validity, model fit, and structural relationships represented in the artifact. It did not, however, assess temporal stability, external criterion-related validity, or organizational utility through field implementation.
Knowledge base: scientific theories and methods	Theories of cognitive and affective trust, trustworthiness, e-commerce trust, perceived e-service quality, DSRIS, psychometric measurement, and structural equation modeling.	The rigor of the artifact is grounded in established theoretical and methodological knowledge, adapted to the specific problem of trust-based e-commerce management.
Knowledge base: experience and expertise	Domain knowledge concerning e-commerce practice, online consumer behavior, UX, security, privacy, customer service, service recovery, digital communication, and channel-specific shopping environments.	The artifact goes beyond mere statistics. Its value for managers stems from linking empirically supported constructs to concrete e-commerce mechanisms that companies can shape through their strategy, design choices, and operational activities.
Knowledge base: meta-artifacts	The empirically assessed trust-based framework, measurement structure, SEM-based relationship model, and recommendation roadmap for e-commerce decision-makers.	The study contributes a reusable analytical structure that may be adapted in future research or transformed into diagnostic scorecards, maturity models, dashboards, or decision-support tools.

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Table 5.1 – continued from previous page

DSRIS model component	**Corresponding element in this dissertation**	**Interpretation in the context of the study**
Additions to the knowledge base	Empirical confirmation of the distinction between cognitive and affective trust; positioning of general trust as a higher-level orientation; confirmation of perceived service quality as a coherent evaluation; evidence for the role of managerial trust-building *levers*; and rejection of the direct GEN → QUAL path.	The study shows that the managerial value of trust measurement lies in decomposing trust into actionable components. General trust alone may be useful as a broad signal, but cognitive and affective trust provide more precise guidance for intervention.

Table 5.1 situates the proposed framework within the core elements of the DSRIS model. This mapping illustrates how the study progresses from the practical challenge of managing trust in e-commerce, through the theoretically informed development of constructs, to an analytically focused artifact that is empirically assessed. The following paragraphs synthesize this placement along the three key DSRIS cycles: *relevance*, *rigor*, and *design*:

- The *relevance cycle* is evident in its link to the real-world e-commerce context, where companies must convert consumer trust into concrete managerial actions. In the absence of a decomposed framework, managers might understand that trust is crucial, yet remain unsure whether a trust-related issue stems from weak cognitive assurance, inadequate emotional reassurance, ambiguous procedures, ineffective service recovery, or low perceived reliability. The framework addresses this challenge by linking measurable trust constructs to specific managerial trust-building *levers*.

- The *rigor cycle* encompasses the theoretical and methodological underpinnings of the framework. The study is based on cognitive and affective trust theory, trustworthiness models, research on trust in e-commerce, and scholarship on perceived e-service quality. From a methodological point of view, the artifact is based on psychometric validation and structural equation modeling. The measurement model demonstrated an acceptable fit (CFI = 0.92, RMSEA = 0.05,

SRMR = 0.04), and the structural model also showed an acceptable fit (CFI = 0.91, RMSEA = 0.06, SRMR = 0.05). Thus, the artifact is supported by both conceptual reasoning and empirical evidence.

- The *design cycle* is reflected in both the construction and the assessment of the artifact. The building phase involved defining the concept of trust in e-commerce, differentiating between cognitive and affective trust, positioning general trust as a separate endogenous construct predicted by cognitive and affective trust, and translating managerial trust-building *levers* into measurable elements. The assessment phase comprised EFA, CFA, SEM, and moderation analyses. The empirical evaluation confirmed the measurement and structural suitability of the artifact and showed that it could be useful for managerial interpretation: managerial trust-building *levers* showed strong positive structural paths to cognitive trust ($\beta = 0.86$) and affective trust ($\beta = 0.80$), and the estimated direct effect of cognitive trust on perceived e-service quality ($\beta = 0.65$) was substantially greater than the corresponding direct effect of affective trust ($\beta = 0.20$). At the same time, the non-significant direct effect of general trust on perceived service quality ($\beta = 0.07$; 95% CI [-0.02; 0.15]) suggests that general trust, by itself, does not provide a sufficient foundation for managerial intervention. Hence, the findings suggest it makes sense to separate the cognitive and affective facets of trustworthiness while continuing to view general trust as a standalone global concept.

The artifact further enriches the knowledge base by presenting a trust-based perspective on e-commerce management. It shows that cognitive and affective trust can be empirically separated, that general trust functions as an overarching, integrative orientation, and that the perceived quality of the e-commerce service can be represented as a unified general assessment. From a design science perspective, the study's primary contribution is the translation of trust from an abstract consumer attitude into a domain of e-commerce management that is measurable, open to diagnosis and accessible to targeted interventions.

Consequently, Chapter 5.3.2 transforms the evaluated artifact into a set of managerial recommendations. These recommendations reflect the empirically validated structure of the artifact and should be interpreted within the context and limitations of the study.

5.3.2 Trust-driven roadmap for decision-makers

Trust, as a concept, is critical not only for researchers, but also for practitioners (McKnight et al., 2002a). Collectively, the results provided in Chapter 4 support the managerial interpretation that trust is not just the result of market presence, but is also a construct strongly linked to firm-controlled trust-building levers, making these mechanisms relevant areas for purposeful managerial attention. The practical implications of this are multilayered. Initially, it is important for retailers to position the assurance mechanisms correctly and ensure that they are straightforward to verify; measurable components such as data integrity, security protocols, privacy clarity, and seamless navigation play crucial roles in establishing initial cognitive trust during interactions. The next phase would be to strengthen and solidify the existing connection using techniques that show their goodwill. For example, this would occur by offering transparent service recovery, communicating in a courteous way, and sending credibility signals that make the psychological gap smaller. This recommendation comes from the fact that both the affective and cognitive aspects of trust are important in increasing purchasing power in online stores, but it is the cognitive component that plays a more significant role here.

The above is in line with academic research (e.g., McKnight et al., 2000), in which trust development has been seen as a two-step process, including (i) the exploration stage *exploration* and (ii) the commitment stage *commitment*. Initially, in the first phase of *exploration*, trust is built through reputation cues and endorsements from a third party. On the other hand, in the *commitment* stage, it is based on knowledge that comes from experience and behavioral intentions. The quality and reputation of the website are seen as the most important trust-building levers in both phases, as they are the main triggers that activate the cognitive assessments of trustworthiness before affective attachment occurs: website quality and reputation signals. The logical flow of this argument corresponds to real-world insights, highlighting that high confidence indicators are needed to foster well-established trust, especially among smaller businesses with limited brand presence (Koç & Çevik, 2022). Furthermore, this aligns with empirical evidence derived from the literature on the service-profit chain, indicating that upstream quality configurations may exert a significant influence on more general processes of consumer adoption and subsequent patterns of product use (Rehman et al., 2022).

Based on the findings discussed in Chapter 4 (which were thoroughly examined and contextualized in relation to other scientific studies in Chapter 5.2), a number of implications and recommendations can be drawn for managerial practice. Together, they form a roadmap (serving as a palpable artifact in accordance with the DSRIS approach, as outlined in Chapter 5.3.1), which is presented in Table 5.2. It contains suggestions for decision-makers in the e-commerce industry on how trust- and SEM-based output artifact can be put into practice and how to translate the cognitive-affective trust of e-consumers into even greater improvements in the performance of e-commerce enterprises. Because the roadmap is derived from the empirically assessed SEM-based artifact, it reflects the empirically confirmed relationships in the model rather than relying on isolated managerial intuition. Its role is to aid in managerial diagnosis and prioritization by indicating which trust dimensions are most strongly associated with perceived e-commerce service quality and which trust-building levers are likely to warrant particular managerial attention. At the same time, the roadmap should be regarded as a structured decision-support tool whose concrete use depends on the company's business model, customer segment, channel setup, technological infrastructure, and competitive environment.

In this framework, latent constructs are distinguished from their indicators. Cognitive and affective trustworthiness appraisals (COG and AFF, respectively) encompass total cognitive and affective trust assessments, whereas managerial trust-building levers (LEV) constitute a wide variety of activities designed to build trust with the e-commerce enterprise. As a result, LEV is modeled as an aggregate latent construct encompassing numerous firm-controlled activities and service cues, which means that its structural coefficients relate to the construct in its entirety rather than to individual practices. Although the practices used to measure LEV can guide managerial review, the model does not classify them or estimate their separate effects on cognitive or affective trust. In the same way, COG and AFF are latent appraisal dimensions rather than the direct effects of any single cue on their measurement blocks. In this way, the framework enables the prioritization of constructs and the diagnosis of items: SEM shows which trust dimensions and general management areas need to be addressed, while specific LEV items can be used to identify areas for managerial review.

The roadmap, which is illustrated in Table 5.2, identifies three main implications, in general. First, the primary implication for management concerns the critical role of cognitively based trust. This is consistent with the observation of McAllister (1995), who demonstrated that the presence of cognitive trust in an organization (even at a minimal level) is essential for affective trust to emerge (see more in Krot and Lewicka, 2016). On the one hand, this can be seen in the strong structural path from managerial trust-building *levers* to cognitive trust. However, it can be traced in the rather high correlation between cognitive trust and perceived e-commerce service quality. Secondly, affective trust should be seen as a supplementary but indispensable relational component. It remains a statistically significant positive predictor of perceived e-service quality, although its standardized coefficient is smaller than that of cognitive trust. However, its role should be conceptualized as complementary to the reliability and credibility established through cognitively based trust mechanisms. Thirdly, the non-significant path of GEN → QUAL shows that general trust does not provide any statistically significant additional benefit in predicting perceived e-service quality when the other trust dimensions are also included in the model.

In summary, it should be mentioned that the significance of the framework is mainly determined by the opportunities for managerial prioritization that it allows. In other words, the model is useful not only because it provides empirical support for the relevance of trust in e-commerce but also because it shows which parts of the phenomenon in question are more relevant for perceived service quality and which trust dimensions and broader managerial areas warrant particular attention. In this way, the roadmap brings together the implications discussed in relation to individual hypotheses, offering a more integrated perspective on the findings.

Table 5.2: Managerial roadmap derived from the trust-based framework

Empirical finding	**DSRIS-based interpretation**	**Managerial implication**	**Indicative direction for practice**
LEV → COG: $\beta = 0.86$; $R^2_{\text{COG}} = 0.74$	In the designed artifact, LEV (i.e., managerial trust-building levers) represents a broad bundle of firm-controlled practices in e-commerce that strongly predicts cognitive trust at the construct level.	Cognitive trust is a key diagnostic area when purchasers try to gauge how reliable and predictable an e-commerce site is.	Evaluate the practices highlighted within LEV, covering aspects such as pricing transparency, terms and conditions, security protocols, privacy communications, and policies regarding delivery, returns, and payment methods. Rather than prioritizing these practices individually, view them as potential focal points for intervention.
LEV → AFF: $\beta = 0.80$; $R^2_{\text{AFF}} = 0.64$	As artifact demonstrates, LEV's significant structural correlation with relational dimension of trust suggests that the overarching pattern of firm-managed trust-building strategies plays a role in the relational aspect of trust.	When affective trust is becoming fragile, managers can look into customer-facing methods regarding communication, service interactions, reassurance, and customer experience.	Within the broader realm of trust-building, customer-service tone, complaint handling, brand communication, visual presentation, interactive features, and CSR-related signals are all pertinent practices. The model did not calculate their individual effects.
COG → QUAL: $\beta = 0.65$	The model identifies the strongest path through which trust contributes to perceived e-commerce service quality.	Cognitive trust is the strongest direct predictor of perceived e-service quality.	Strengthen the shopping experience through competence, reliability, transparency, procedural clarity, and consumer control over the transaction process.
AFF → QUAL: $\beta = 0.20$	The artifact indicates a complementary, rather than substitutive, role of affective trust.	Affective trust is a significant positive predictor of perceived e-service quality, although its structural coefficient is smaller than that of cognitive trust.	Improve communication tone, perceived benevolence, relational comfort, emotional reassurance, and the human character of customer service.
GEN → QUAL: $\beta = 0.07$; 95% CI [-0.02; 0.15]	The model reveals the limitation of treating trust as a one-dimensional construct.	While general trust could be a useful indicator, the model did not find a statistically significant unique direct GEN → QUAL path.	Treat overall trust scores as broad diagnostic signals and complement them with separate assessment of cognitive and affective trust, as these components indicate more precise areas for managerial intervention.

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Table 5.2 – continued from previous page

Empirical finding	**DSRIS-based interpretation**	**Managerial implication**	**Indicative direction for practice**
$R^2_{\text{QUAL}} = 0.74$	The artifact demonstrates high explanatory utility in relation to perceived e-commerce service quality.	The model provides a strong explanation of how strongly trust-related constructs predict customers' evaluations of e-commerce service quality within the model.	The framework can be applied as a diagnostic instrument for assessing trust-related aspects of e-store functioning from the consumer's perspective.
COG → GEN: $\beta = 0.69$; AFF → GEN: $\beta = 0.18$	The artifact shows the structural relationships linking cognitive and affective trust to general trust.	General trust is more strongly rooted in cognitive premises than in emotional ones.	Reputation-building should be grounded first in evidence of competence, reliability, and predictability, not only with image-oriented or emotional communication.
COG/AFF → QUAL: age moderation significant; gender moderation not significant	The artifact supports segmentation based on functional and experiential differences, rather than stereotypical demographic assumptions.	Recommendations should be differentiated by age and digital experience rather than by gender.	For older consumers, increase readability, predictability, procedural clarity, customer support, and reduction of complexity across the shopping process.
GEN → QUAL: desktop, social-commerce, and live-commerce moderation significant; m-commerce moderation not significant	The artifact demonstrates the contextual utility of trust across different e-commerce channels.	Trust-building strategy should depend on the channel and the intensity of its use.	For less experienced users of social and live commerce, strongly expose the credibility of the seller, product, transaction process, and service conditions.

Note. The roadmap presents evidence-based managerial directions derived from the evaluated SEM-based artifact. The proposed directions are intended to support diagnosis and prioritization, while their specific implementation depends on the organizational, technological, market, and customer context of a given e-commerce company.

Concluding remarks

In the literature on organizational management (both classical and contemporary) trust is consistently presented not as a concept of marginal importance, but as one of the fundamental pillars of business operations. This stems from the fact that trust is a prerequisite for establishing and maintaining relationships with customers, and thus influences their willingness to purchase the products and services offered. Organizations therefore cannot risk losing the trust of potential customers, as a lack of trust can lead to decreased demand and a weakened competitive position.

In the context of digital market relationships, with particular emphasis on e-commerce and its contemporary forms (such as m-commerce, social commerce, and live streaming commerce), customers often evaluate sellers (companies) not based on direct contact with the organization, but through a set of indicators that reflect their credibility, quality, and professionalism. Such signals may include: transparency of information, transaction security, quality of service, reliability of the delivery process, ease of returns, reputation, and previous experiences. Indeed, customers largely interpret the operations of an e-commerce company based on their level of trust in these signals.

The dissertation shows that e-customer trust is more than just an attitude toward an online shop, and thus not only a psychologically based phenomenon, but also a construct that can be used for diagnostic as well as managerial purposes. In this light, trust becomes a mechanism through which customers interpret the functioning of an e-commerce enterprise and identify which aspects of its operations are perceived as reliable, secure, transparent, and of high quality.

The primary objective of this dissertation was accomplished through the development and empirical validation of an analytical framework for assessing the perceived functioning of an e-commerce company from the standpoint of e-customers' cognitive

and affective trust and its associations with perceived e-service quality. The resulting framework, together with the managerial roadmap derived from it, offers insight not only into the structural relationships among trust, managerial practices, and the evaluation of the shopping experience, but also into prospective directions for advancing trust management practices in e-commerce organizations. The application of the Design Science Research in Information Systems (DSRIS) approach enabled the model to be conceived as more than a mere representation of statistical associations; instead, it was positioned as an analytical instrument that integrates managerial mechanisms, customer trust, and the assessment of e-commerce performance.

The findings suggest that the cognitive component of trust is especially important in evaluating the quality of operations of an e-commerce company. Customers place great importance on elements that can be rationally assessed: security, transparency of information, clarity of pricing, ease of use, past experiences, and technological reliability. However, affective trust in e-commerce should not be viewed as less important, but rather as a distinct yet complementary mechanism. It encompasses the emotional, relational, and image-related dimensions of interaction with a company. Its importance is revealed especially when the evaluation of an online store goes beyond purely technical criteria and encompasses, among other things, aesthetics, communication, interactive elements, and the sense that the e-store aligns with the customer's expectations. Interestingly, the findings did not provide evidence that general trust makes an additional direct contribution to how e-service quality is perceived, beyond the effects of cognitive and affective trust. The implication is that a general propensity to trust the online shopping environment does not automatically translate into an evaluation of a specific company. For managers, this implies that trust in the e-commerce domain must be approached as a multifaceted and holistic construct (encompassing both cognitive and affective components that emerge from concrete experiences, situational cues, and organizational arrangements) rather than being reduced to a vague general liking of online shopping. Hence, the results obtained indicate that trust is not exclusively a result of the efficient performance of an e-commerce business, but also a factor that shapes the way customers perceive, interpret, and evaluate its operations.

The dissertation also helps to advance the state of the art in the study of trust in e-commerce from a managerial perspective. Its contribution is threefold:

1. The **theoretical contribution** of this dissertation is to demonstrate that cognitive, affective, and general trust should not be treated as interchangeable or homogeneous categories. The results confirm the need to distinguish their functions in the process of evaluating an e-commerce company.

2. The **methodological contribution** consists of developing and validating a multidimensional measurement framework that integrates the constructs of trust, perceived quality, and manageable trust-building mechanisms into a single empirical model.

3. The **practical contribution** lies in demonstrating that managerial activities in e-commerce can be assessed not only through traditional metrics such as sales volume, conversion rates, or overall (simplified) customer satisfaction, but also by how they strengthen the cognitive and affective foundations of e-customer trust.

The proposed framework should also be interpreted in light of the operational choices made in this dissertation. The study captures the perspective of Polish e-customers and is based on declared perceptions of trust and e-service quality. This is not incidental, as the framework was designed to assess the functioning of an e-commerce company through the way customers actually interpret it. At the same time, this perspective suggests a straightforward avenue for additional validation across other markets, as well as in studies that integrate perceptual indicators with behavioral or operational data, such as repurchase activity, complaints, returns, conversion, retention, or service response times.

It should also be noted that the proposed artifact was only evaluated using a quantitative survey. This study showed information on the factorial structure, internal consistency, construct validity, structural model fit, and relationships between constructs. However, it did not examine how the measurement structure changes over time, its ability to predict behavior or organizational outcomes, or how useful the final framework is for e-commerce companies. In order to move the evaluation cycle forward, future research should assess the framework over time, against external performance indicators, and explore its practical application by managers within their organizations.

The further development of the framework may also concern its very design. The dissertation adopted an original measurement approach tailored to the diagnostic and

managerial logic of the DSRIS-based approach. Future studies could therefore confront the proposed measures with established trust and e-service quality scales. They could also test hybrid specifications that preserve the diagnostic orientation of the framework while drawing on already validated measurement traditions, enabling the model to be examined not merely as a standalone artefact but as an active, integrative component within a broader, ongoing research discourse on trust and e-service quality.

The role of perceived e-service quality in the model is another promising avenue to explore. In this dissertation, it is treated as an evaluative outcome of the e-commerce experience. Future research could introduce certain quality-related cues at earlier points in the specified structural sequence, turning them into antecedents of cognitive and affective trust. That shift would make it clear whether the mechanisms now framed as managerial trust-building *levers* can be operationalized more directly as service quality signals that shape trust. The current model should thus be seen not as a closed structure but as a empirically assessed starting point for further theoretical and empirical refinement. An analogous pattern is observable with respect to the mechanisms through which managers cultivate and maintain trust (i.e., the aforementioned managerial trust-building *levers*). In the original model, they were treated as single latent constructs to keep the SEM model coherent and parsimonious. Future research could empirically assess whether disaggregating these levers into functional, relational, technological, service-related, and reputational categories yields additional explanatory power. That kind of work would clarify when a compact construct is enough for managerial diagnosis and when a more detailed map of trust-building practices is needed.

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The study conducted confirms that e-customer trust is a key factor in understanding how an e-commerce business operates. It is not merely an idealistic attitude toward online shopping, but rather the result of the customer's interaction with specific elements of the company's offerings, technology, communication, customer service, and reputation. Cognitive trust, rooted in a rational assessment of security, transparency, and reliability, is especially important; however, a more complete picture of the customer's relationship with the company also requires consideration of the affective dimension.

In this sense, the dissertation indicates that trust management in e-commerce should be understood not as a public relations effort, but as an element of the management of the company's operations. Trust reveals which organizational, technological, and communication solutions are perceived by customers as credible and which require improvement. The analytical framework developed and verified in this study can therefore serve as a basis for further research and as a reference point for the management of companies operating in the digital environment.

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Appendix A

Questionnaire design

Table A.1: List of questionnaire items, response scales and literature references

ID	Question	Response options / scale	Reference
Part I. Socio-demographic profile / respondents' metrics (MET)			
MET1	What is your gender?	Woman; Man; Non-binary; Other (specify); Rather not say	Lindqvist et al. (2021)
MET2	What is your age?	18–24; 25–34; 35–44; 45–54; 55–64; 65+	National Population and Housing Census 2021
MET3	Please select your highest achieved level of education	Primary/lower secondary; Vocational; Secondary; Higher	Based on: National Population and Housing Census 2021
MET4	What is your place of residence?	rural/village; town 50k inhabitants; city 50-200k inhabitants; city 200k inhabitants	Based on: National Population and Housing Census 2021
MET5	How many people reside in your household, including yourself?	Numerical field	National Population and Housing Census 2021

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ID	Question	Response options / scale	Reference
MET6	Which of the following best characterizes the financial situation in your household?	"we have enough money for everything without any sacrifices"; "we have enough for almost everything, but need to save for bigger purchases"; "we can afford basic needs (food, clothing, bills), but not larger purchases"; "we barely afford the basics and need to forgo some expenses"; "we do not have enough money even for basic needs."	Based on: Taylor (2011)
Part II. Internet access and making online purchases (PUR)			
PUR1	What kind of Internet access is in your home?	landline and mobile; landline only; mobile only[74]	Own study
PUR2	How often do you use the following internet-connected devices?	several times a day or more often; once a day; several times a week; several times a month; less than several times a month; don't use/doesn't own[75]	Own study, based on: Conrad et al. (1998)
PUR2_1	Desktop computer	see: PUR2	
PUR2_2	Laptop	see: PUR2	
PUR2_3	Smartphone	see: PUR2	
PUR2_4	Tablet	see: PUR2	
PUR2_5	Television with smart TV function	see: PUR2	
PUR2_6	Gaming console (e.g. PlayStation, Xbox, Nintendo Switch)	see: PUR2	
PUR2_7	Media player (e.g. Chromecast, Apple TV)	see: PUR2	
PUR2_8	Wi-Fi enabled printer	see: PUR2	
PUR2_9	Smart home devices (e.g., surveillance cameras, smart sockets/light bulbs)	see: PUR2	

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[74] *Note for a respondent*: landline internet (e.g., via Wi-Fi or network cable) – mobile internet (e.g., cellular data on your phone)

[75] These response options do not apply to this item itself, but only to the individual items listed below.

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ID	Question	Response options / scale	Reference
PUR2_10	Smart home appliances (e.g., refrigerator, washing machine, vacuum cleaner connected to the internet)	see: PUR2	
PUR2_O	Other internet-connected devices (which ones?)	see: PUR2	
PUR3	How often do you use social media?	several times a day or more often; once a day; several times a week; several times a month; less than several times a month; don't use social media[76]	Own study, based on: Conrad et al. (1998)
PUR4	How well do you cope with the daily use of digital devices, including the use of the Internet? Rate on a scale of 0–10.	11-point Likert scale (0 = "I don't cope with technologies at all", 10 = "I cope with technologies excellently")	Yaoyuneyong et al. (2014); Butnampetch et al. (2020)
PUR5	How often have you shopped online in the past year using...	several times a day or more often; once a day; several times a week; several times a month; less than several times a month; didn't do online shopping[77]	Own study, based on: Conrad et al. (1998)
PUR5_1	desktop computer / laptop	see: PUR5	
PUR5_2	smartphone / tablet	see: PUR5	
PUR5_3	social media (e.g., Facebook Marketplace, Instagram, TikTok Shop)	see: PUR5	
PUR5_4	live streaming on the Internet (so-called live shopping)	see: PUR5	
Part III. General online trust			
GEN1	I trust other users on the Internet	11-point Likert scale	Punyatoya (2019)
GEN2	I trust institutions that protect consumers on the Internet (such as the Office of Competition and Consumer Protection, the Office of Personal Data Protection)	11-point Likert scale	Adapted from: Kumar et al. (2020b)

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[76] *Note for a respondent*: social media, i.e. sites and applications that are used to share content and connect with others (e.g. Facebook, Instagram, TikTok, WhatsApp).

[77] These response options do not apply to this item itself, but only to the individual items listed below.

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ID	Question	Response options / scale	Reference
GEN3	I trust that the law effectively protects my personal information when I shop online	11-point Likert scale	Kumar et al. (2020b)
GEN4	I am aware of my rights as a consumer on the Internet	11-point Likert scale	Parimala and Ramachandran (2022)
GEN5	Payments on the Internet (via BLIK, PayU, PayPal, etc.) are trustworthy	11-point Likert scale	Lee (2019)
GEN6	If I lost my wallet with a card used for online payments, I trust the finder(s) to return it	11-point Likert scale	Bianchi and Andrews (2012)
GEN7	Most online stores on the Internet are trustworthy	11-point Likert scale	Bianchi and Andrews (2012)
GEN8	Most sellers on online sales platforms (e.g. Allegro, Amazon, OLX) are trustworthy	11-point Likert scale	Soleimani, 2022
GEN9	I have a positive attitude towards online shopping	11-point Likert scale	Bianchi and Andrews (2012)
Part IV. Cognitive trustworthiness appraisals			
COG1	The online shopping service uses visible security certificates (e.g., "green padlock" in the browser address bar)	11-point Likert scale	Rane and Meshram (2012); Tambunan et al. (2018)
COG2	The online shopping service clearly informs about privacy policy and use of personal data	11-point Likert scale	Chiang et al. (2018); Falahat et al. (2019)
COG3	The content presented on the online shopping service website is clear and understandable	11-point Likert scale	Engriani and Novaris (2020)
COG4	The prices offered by the online shopping service are given in a clear and understandable manner	11-point Likert scale	Lo et al. (2013)
COG5	The website of the online shopping service is easy to use	11-point Likert scale	Piroth et al. (2020)
COG6	Personal trust in the country of origin of the online shopping service where I shop	11-point Likert scale	Bhattacharya et al. (2023)
COG7	My familiarity with the technology	11-point Likert scale	Yaoyuneyong et al. (2014); Butnampetch et al. (2020)

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ID	Question	Response options / scale	Reference
COG8	Previous positive experience with a particular online shopping service	11-point Likert scale	Bylok et al. (2019)
COG_X	Which of the following factors do you consider most important when it comes to your trust in online shopping sites? (showing COG1–COG8 randomly)	Select 2 at most	As above (COG1–COG8)
Part V. Affective trustworthiness appraisals			
AFF1	The website of the online shopping service has a pleasant, attractive or aesthetic design/layout	11-point Likert scale	Blagoeva et al. (2023)
AFF2	Products on the online shopping site are presented with attractive photo galleries	11-point Likert scale	Blagoeva et al. (2023)
AFF3	The marketing message of the online shopping service (e.g., ads, banners, promotions, etc.) evokes positive emotions in me	11-point Likert scale	Aichner and Shaltoni (2017)
AFF4	The prices offered by the online shopping service are attractive to me	11-point Likert scale	Yin and Han (2021)
AFF5	The online shopping service has interactive features (e.g., chat, live reviews)	11-point Likert scale	Hsieh et al. (2014)
AFF6	I notice the online shopping service's commitment to another person, society or the environment	11-point Likert scale	Bartók (2018)
AFF7	I have good feedback about a particular online shopping service from other users, including family/friends	11-point Likert scale	Zheng et al. (2019)
AFF_X	Which of the following factors do you consider most important when it comes to your trust in online shopping sites? (showing AFF1–AFF7 randomly)	Select 2 at most	As above (AFF1–AFF7)
Part VI. Trust in new e-commerce ramifications			
NEW1	purchases made through smartphone/tablet apps?	11-point Likert scale	McLean et al. (2020)

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ID	Question	Response options / scale	Reference
NEW2	purchases made through social media sites/apps, including those recommended by influencers (e.g., Facebook Marketplace, Instagram, TikTok Shop)?	11-point Likert scale	Lv et al. (2021)
NEW3	purchases made through live streaming on the Internet?	11-point Likert scale	Lin et al. (2022); Li et al. (2023b)
Part VII. Perceived service quality in e-commerce			
QUAL1	purchases run smoothly and without serious technical errors.	11-point Likert scale	Akbar and Azeemi (2017)
QUAL2	customer service responds promptly.	11-point Likert scale	Carvache-Franco et al. (2022)
QUAL3	customer service helps resolve any problems.	11-point Likert scale	Carvache-Franco et al. (2022)
QUAL4	possible return or complaint procedures run smoothly.	11-point Likert scale	Carvache-Franco et al. (2022)
QUAL5	shipments arrive within the time specified by the store.	11-point Likert scale	Rosário and Raimundo (2021)
QUAL6	products are well packaged and arrive undamaged.	11-point Likert scale	Rosário and Raimundo (2021)
QUAL7	online payments (e.g. PayU, BLIK, PayPal, etc.) work flawlessly.	11-point Likert scale	Lee (2019); Sutia et al. (2020)
QUAL8	descriptions and photos of products reflect their actual condition.	11-point Likert scale	Tang et al. (2023)
QUAL9	presented prices are clear and final, i.e. they do not include hidden fees.	11-point Likert scale	Fagerstrøm and Ghinea (2011)
QUAL10	online shopping services have interactive features, such as chat and photo galleries.	11-point Likert scale	Hsieh et al. (2014)
Part VIII. Behavioral and outcome measures			
OUT1	More good reviews and ratings from other customers	11-point Likert scale	Dai et al. (2018)
OUT2	Ability to easily return products	11-point Likert scale	Carvache-Franco et al. (2022)
OUT3	Accurate and clear product/service descriptions with high-quality photos	11-point Likert scale	Dai et al. (2018)
OUT4	Ability to purchase products/services from verified or official sellers	11-point Likert scale	Sathyanandani and Sreedharan (2017)

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ID	Question	Response options / scale	Reference
OUT5	Use of security certificates (e.g., "green padlock" in the browser address bar) by the online shopping service	11-point Likert scale	Rane and Meshram (2012); Tambunan et al. (2018)
OUT6	Provision of diverse delivery options	11-point Likert scale	Chiang et al. (2019)
OUT7	Guaranteed/timely shipping of ordered products on the next business day	11-point Likert scale	Chiang et al. (2019)
OUT8	Efficient and easily accessible customer support.	11-point Likert scale	Carvache-Franco et al. (2022)
OUT9	Ability to see the product live (e.g. via streaming video)	11-point Likert scale	Li et al. (2023b)
OUT10	Greater transparency on privacy and data protection policies	11-point Likert scale	Falahat et al. (2019)
OUT11	Having a mobile app through an online shopping service	11-point Likert scale	Zarifis and Fu (2023)
OUT12	Greater interactivity of the site or app (e.g., live chat, virtual advisors)	11-point Likert scale	Hsieh et al. (2014)
OUT13	Greater involvement of the online shopping service in environmental issues or social activities	11-point Likert scale	Bartók (2018)
OUT14	Involvement of famous people (including influencers) to promote the online shopping service	11-point Likert scale	Ki and Kim (2019); Santiago et al. (2020)
OUT15	Credible and engaging marketing campaigns of the online sales service (e.g., ads, banners, promotions, etc.)	11-point Likert scale	Aichner and Shaltoni (2017)
OUT16	Easier operation of online shopping services	11-point Likert scale	Butnampetch et al. (2020)
OUT17	Better familiarity with daily use of digital devices, including operation of the Internet	11-point Likert scale	Butnampetch et al. (2020)
OUT18	Clearer information about the country of origin of the online sales service	11-point Likert scale	Bhattacharya et al. (2023)
OUT_O	Other (which?)	11-point Likert scale	n/a
OUT_19T	How many purchase transactions have you abandoned in the past year due to a lack of confidence in a particular online shopping service?	0; 1–2; 3–5; > 5; Don't remember	Own study

Appendix B

Factor loadings of models conducted using confirmatory factor analysis

Table B.1: CFA standardized factor loadings for General Trust (GEN)

Factor	**Indicator**	β	**SE**	Z	p	**95% CI**	
						LL	**UL**
General Trust	GEN2	0.76	0.02	32.59	< 0.001	0.71	0.81
	GEN3	0.76	0.02	32.76	< 0.001	0.72	0.81
	GEN4	0.68	0.03	24.13	< 0.001	0.62	0.74
	GEN5	0.63	0.03	20.14	< 0.001	0.57	0.69
	GEN7	0.68	0.03	24.32	< 0.001	0.63	0.74
	GEN8	0.72	0.03	27.39	< 0.001	0.66	0.77
	GEN9	0.70	0.03	25.78	< 0.001	0.65	0.75

Note. β – standardized regression coefficient; SE – standard error; Z – Wald z statistic; p – significance level; 95% CI – 95% confidence interval; LL/UL – lower/upper limit of the confidence interval.

Table B.2: CFA standardized factor loadings for Cognitive Trust (COG)

Factor	**Indicator**	β	**SE**	Z	p	**95% CI**	
						LL	**UL**
Cognitive Trust	COG1	0.76	0.02	35.90	< 0.001	0.72	0.80
	COG2	0.80	0.02	43.62	< 0.001	0.77	0.84
	COG3	0.82	0.02	47.27	< 0.001	0.79	0.85
	COG4	0.84	0.02	52.54	< 0.001	0.81	0.87
	COG5	0.74	0.02	33.01	< 0.001	0.70	0.79
	COG6	0.72	0.02	29.58	< 0.001	0.67	0.76
	COG8	0.80	0.02	42.29	< 0.001	0.76	0.83
	COG9	0.62	0.03	20.74	< 0.001	0.56	0.68

Note. β – standardized regression coefficient; SE – standard error; Z – Wald z statistic; p – significance level; 95% CI – 95% confidence interval; LL/UL – lower/upper limit of the confidence interval.

Table B.3: CFA standardized factor loadings for Affective Trust (AFF)

Factor	**Indicator**	β	**SE**	Z	p	**95% CI**	
						LL	**UL**
Affective Trust	AFF1	0.86	0.02	51.32	< 0.001	0.82	0.89
	AFF2	0.78	0.02	36.83	< 0.001	0.74	0.82
	AFF3	0.74	0.02	30.73	< 0.001	0.69	0.79
	AFF4	0.77	0.02	35.36	< 0.001	0.73	0.82
	AFF5	0.62	0.03	20.07	< 0.001	0.56	0.68
	AFF6	0.67	0.03	23.55	< 0.001	0.61	0.72

Note. β – standardized regression coefficient; SE – standard error; Z – Wald z statistic; p – significance level; 95% CI – 95% confidence interval; LL/UL – lower/upper limit of the confidence interval.

Table B.4: CFA standardized factor loadings for Managerial trust-building levers (LEV)

Factor	**Indicator**	β	**SE**	Z	p	**95% CI**	
						LL	**UL**
Managerial trust-building levers	LEV1	0.72	0.02	30.51	< 0.001	0.67	0.77
	LEV2	0.76	0.02	35.46	< 0.001	0.71	0.80
	LEV3	0.80	0.02	44.39	< 0.001	0.77	0.84
	LEV4	0.74	0.02	32.72	< 0.001	0.69	0.78
	LEV5	0.72	0.02	31.01	< 0.001	0.68	0.77
	LEV6	0.70	0.03	27.99	< 0.001	0.65	0.75
	LEV7	0.76	0.02	37.07	< 0.001	0.72	0.81
	LEV8	0.81	0.02	46.50	< 0.001	0.78	0.84
	LEV10	0.75	0.02	35.12	< 0.001	0.71	0.79
	LEV11	0.63	0.03	21.99	< 0.001	0.58	0.69
	LEV16	0.73	0.02	31.21	< 0.001	0.68	0.77
	LEV18	0.73	0.02	31.32	< 0.001	0.68	0.77

Note. β – standardized regression coefficient; SE – standard error; Z – Wald z statistic; p – significance level; 95% CI – 95% confidence interval; LL/UL – lower/upper limit of the confidence interval.

Table B.5: CFA standardized factor loadings for Perceived Service Quality (QUAL)

Factor	**Indicator**	β	**SE**	Z	p	**95% CI**	
						LL	**UL**
Perceived Service Quality	QUAL1	0.82	0.02	49.20	< 0.001	0.79	0.85
	QUAL2	0.77	0.02	37.33	< 0.001	0.73	0.81
	QUAL3	0.76	0.02	36.90	< 0.001	0.72	0.80
	QUAL4	0.81	0.02	47.00	< 0.001	0.78	0.85
	QUAL5	0.80	0.02	43.84	< 0.001	0.76	0.83
	QUAL6	0.78	0.02	41.00	< 0.001	0.75	0.82
	QUAL7	0.78	0.02	40.72	< 0.001	0.75	0.82
	QUAL8	0.74	0.02	32.78	< 0.001	0.69	0.78
	QUAL9	0.83	0.02	50.97	< 0.001	0.79	0.86
	QUAL10	0.65	0.03	23.33	< 0.001	0.60	0.70

Note. β – standardized regression coefficient; SE – standard error; Z – Wald z statistic; p – significance level; 95% CI – 95% confidence interval; LL/UL – lower/upper limit of the confidence interval.

Appendix C

Elaboration on the relationship between trust and e-service quality

This appendix delves into the relationship between the constructs of trust (affective – AFF, cognitive – COG, and general – GEN) and e-service quality (QUAL) as depicted in the proposed research model, which is based on the S-O-R framework (Figure 3.2). The relationships, along with their directions (i.e., $COG \rightarrow QUAL$, $AFF \rightarrow QUAL$, and $GEN \rightarrow QUAL$ paths), are also reflected in the design of the SEM model, which forms the core of this study. It is important to identify the antecedent–dependent relationships among the constructs.

The literature generally supports the opposite view to that assumed by the author, namely: e-service quality → e-trust (Iffan et al., 2024; Kundu & Datta, 2015; Qalati et al., 2021; Rita et al., 2019; Tran & Vu, 2019), which is the dominant empirical paradigm. Trust often acts as a mediator or moderator between service quality and outcomes (e.g., satisfaction, loyalty, intention to purchase), also in the e-commerce environment. Nonetheless, it is important to stress that most of these studies focus primarily on economic and consumer outcomes – more specifically, on how the quality of services provided in the e-commerce channel influences the development of trust among online customers.

However, the author of this dissertation intends to explore a different area in order to capture a more synthetic and "global" approach to e-service quality. As a result, trust-related constructs serve as predictors of e-service quality in this regard. This is

consistent, among other things, with the conceptual framework presented in the paper by Ejdys and Gulc (2020).

It is worth addressing issues related to the halo effect at this point. Research on this phenomenon shows that an overall positive attitude (e.g., trust in an e-commerce company) "spills over" into evaluations of individual service attributes, especially when the service is complex and difficult to assess objectively (Natarajan, 2008; Wirtz & Bateson, 1995). A high level of trust causes customers to interpret quality signals more favorably, and individual quality lapses are more easily forgiven. Also, research on the quality of relationships shows that trust and relational commitment modify the impact of individual service interactions on overall quality ratings and satisfaction (Mohamed Ali, 2020). A customer who trusts the seller will rate the same experiences (e.g., delivery time, clarity of communication) higher than a customer with a low level of trust. In other words, trust provides a benchmark for evaluating e-service quality. Finally, it is worth noting that in the online environment, risk and uncertainty are ever-present; therefore, trust serves as a heuristic that helps "fill information gaps." If a customer trusts the platform or the e-commerce sector as a whole, they are more likely to interpret ambiguous signals (e.g., a delay, a system error) as incidental rather than as evidence of poor service quality. This, in turn, increases the perceived overall quality of the e-service (Mofokeng, 2023; Qalati et al., 2021).

From this perspective, perceived e-service quality is not only a function of the objective delivery of the service, but also a function of the prior level of trust that has been built through managerial trust-building mechanisms (i.e. levers – LEV). Trust serves as an interpretive filter for subsequent online service experiences and thus influences how customers evaluate the various dimensions of e-service quality.