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FROM NOW TO NEXT – THREE ESSAYS ON CONSUMER RESPONSES TO INNOVATIVE TECHNOLOGY-DRIVEN BUSINESS MODELS

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Summary

Over the last decades, ongoing advancements in information technology (i.e., Internet and mobile devices) have expanded a firm's ability to communicate and interact with consumers and hence, create the potential of building sustainable relationships. Tailoring offerings through (1) consumer-initiated customization and (2) firm-initiated personalization is considered a key driver of long-term consumer relationships. As technologies continue to evolve, the opportunities for tailored marketing expand and enable new technology-driven business models that help to leverage customization and personalization and strengthen customer relationships in the era of the digital economy. This dissertation investigates consumer responses to two innovative business models in the domains of customization and personalization. Specifically, in the realm of customization, I investigate internal product upgrades (i.e., offering fee-based access to originally built-in, but deliberately restricted, optional features) and its consequences for consumer behavior. In the domain of personalization, I focus on examining an innovative business model that revolves around gathering consumer data and sharing it within a network of at least two commercial firms, which is denoted as Business Network Data Exchange (BNDE).

Despite the huge potential of these innovative technology-driven business models to build and deepen customer relationships and to generate an important competitive advantage, existing marketing research on how consumers respond to these business models in comparison to the status quo is scarce. Across three independent essays, the purpose of this dissertation is to address this gap and to answer the overarching research question of how innovative technology-driven business models versus traditional business models in the domains of customization and personalization influence consumer behavior. Thereby, this dissertation contributes to an understanding of challenges and opportunities of innovative

customization and personalization business models with the ultimate goal of enabling their successful diffusion in the marketplace.

Essays 1 and 2 focus on investigating the consequences of transforming products into so-called dynamic service platforms that can be customized after the product purchase by offering fee-based access to built-in, but deliberately restricted, optional features, which is labeled internal product upgrades. In Essay 1, I use a conceptual approach and develop a framework that comprises findings from extant research on consumer responses to related product feature modifications. Based on these findings, I derive questions for future research on internal product upgrades revolving around the framework's elements. Essay 2 represents a deep dive into how internal product upgrades (compared to established external product upgrades) influence consumer responses in the post-purchase phase. Drawing on research on psychological ownership and normative expectations, seven experimental studies in two different contexts (consumer electronics, automotive) reveal that consumers respond less favorably to internal product upgrades versus external product upgrades. The analyses show that customer-perceived betrayal, which results from increased feature ownership perceptions, drives the effects. Moreover, this research identifies both conceptually meaningful and managerially relevant boundary conditions for the negative effect of internal product upgrades (i.e., upgrading responsibility, upgrade pricing/discount, feature tangibility, and the base product's relevance for consumer identity).

Finally, in Essay 3, this dissertation investigates BNDE, which is an innovative business model in the realm of personalization. In search of new ways to collect consumer data for personalization purposes, many firms increasingly share consumer data within a commercial network of at least two firms (BNDE), which enables personalized offers from more than one firm. Investigating how these data sharing practices influence consumers' data disclosure as compared to traditional

dyadic data exchanges (i.e., between a consumer and a single firm) is important as consumer data is the essence of personalization. Using a dual-processing model, findings of four experimental studies reveal that consumers respond less favorably to BNDE (vs. dyadic) data disclosure practices and that immediate affective reactions are crucial in explaining consumers' privacy-related decision-making in BNDE settings.

Overall, the three essays of this dissertation yield four major insights. First, introducing innovative technology-driven business models to leverage customization and personalization can backfire on firms as compared to the status quo and hence, threaten long-term consumer-firm relationships. Second, I highlight the importance of broadened theoretical perspectives in explaining consumers' reactions to innovative (vs. traditional) business models. Third, this dissertation emphasizes the importance of strategies and boundary conditions that are closely aligned to the peculiarities of the respective innovative business model in order to support its transition away from the status quo. Finally, as innovative business models in the digital economy are increasingly connecting products, firms and other entities, downstream consequences go beyond the focal firm and spill over to business partners in the ecosystem.

Within this dissertation, I make substantial contributions at a more general level to literature on customization and personalization by comparing innovative business models to established ones. At the individual essay level, I extend existing research in the domains of product feature modifications, norm violations, and privacy-related decision making. Moreover, this dissertation provides actionable implications for managers who are facing the decision to transform their established business model into an innovative technology-driven one.

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1.1 Customization 2.0 and Personalization 2.0: Investigating innovative business models in the digital economy

"When digital transformation is done right, it's like a caterpillar turning into a butterfly, but when done wrong, all you have is a really fast caterpillar." — George Westerman, MIT Sloan Initiative on the Digital Economy

Establishing, deepening and nurturing customer relationships is considered a key objective to generate and sustain a competitive advantage for firms in the digital economy[1] (e.g., Rust 2020; Rust et al. 2010). Over the last two decades, ongoing advancements in information technology have expanded a firm's ability to communicate and interact with consumers and hence, create the potential of building long-lasting and sustainable relationships that go beyond single transactions (e.g., Rust and Huang 2014; Rust et al. 2010; Winer 2001). One way for firms to build and deepen relationships is to tailor their marketing mix activities to the wants and needs of individual consumers (Arora et al. 2008; Rust 2020; Rust and Huang 2014). Tailoring manifests itself in two different forms: (1) customization and (2) personalization (Arora et al. 2008; Ng and Wakenshaw 2017). *Customization* refers to a *consumer-initiated* marketing strategy in which consumers engage in designing one or more elements of the marketing mix (Arora et al. 2008). One of the most prominent examples is that of product mass customization. For instance, companies like Dell, BMW, or Adidas offer consumers the opportunity to order products that are manufactured based on an individual consumer's needs. Contrarily, *personalization* implies a *firm-initiated* selection of individualized marketing mix activities, usually based on previously collected consumer data (Arora et al. 2008; Rust 2020). Individualized e-mail communication, banner ads or pricing coupons are prominent examples for a firm's personalization activities.

[1] The term digital economy refers to the economic activity that results from the interconnection among people, businesses, products, machines, and data (Deloitte 2022; Sorescu and Schreier 2021).

However, the era of the digital economy has only just begun (Sorescu and Schreier 2021). Besides now established technologies like the Internet and mobile devices, novel radical technologies like the Internet-of-Things will continue to revolutionize everyday interactions between consumers, firms and products and will have a profound impact on establishing, deepening and nurturing customer-firm relationships (e.g., Rust 2020; Rust et al. 2010; Winer 2001). As technologies evolve further, the opportunities for tailored marketing expand. Accordingly, firms increasingly augment their core businesses with innovative business models that help to leverage customization and personalization in the era of the digital economy (e.g., Kannan and Li 2017; Ng and Wakenshaw 2017; Rust 2020; Sorescu and Schreier 2021).

For instance, the customization of physical products had long been restricted to the (pre-)purchase phase (e.g., Franke et al. 2009; Franke and Schreier 2010) or could only be accomplished by adding external features in the product usage phase (e.g., Bertini et al. 2009; Erat and Bhaskaran 2012). The evolution of the Internet-of-Things now enables manufacturers to evolve physical products into so-called dynamic service platforms that allow for product customization throughout the entire product lifecycle. Thereby, firms can go beyond one-time customization benefits in the pre-purchase phase and have the potential to *continuously* expand and deepen their relationships with consumers after the product purchase and ultimately increase customer profitability (Rust 2020; Rust and Huang 2014). Accordingly, car manufacturers like Audi, BMW, and Daimler augment their core business with technology-driven business models and transform their cars into such platforms that enable consumers to customize their cars after the purchase by paying a fee to unlock built-in, yet deliberately restricted features (e.g., adaptive headlights, digital radio, extra battery power). This innovative business model is referred to as *internal product upgrades*. While there is initial evidence on how consumers respond to

internal product upgrades (e.g., Schaefers et al. 2022; Wiegand and Imschloss 2021), no marketing research has compared this innovative business model to established product modification and customization approaches to identify challenges and opportunities in relation to the status quo.

In the domain of personalization, offering personalized marketing mix activities to individual consumers was traditionally part of a dyadic consumer-firm relationship. That is, consumers disclosed personal data to a single firm and, in return, received personalized promotions, products or services from that single firm (e.g., Dinev and Hart 2006; Smith et al. 2011). While firms usually have a lot of information about consumers with whom they already have an existing relationship, they lack information about consumers of other firms. Hence, data gathering practices concerning other consumers is considered a fruitful avenue for future research (Arora et al. 2008). Enabled and facilitated through advancements in information technology, firms like Spotify, Telefónica, ASOS, and Walmart increasingly engage in networks with other commercial firms and share consumer data within the network to improve personalization. Such practices, where consumer data is gathered by one firm and then exchanged within a network of at least two firms, are referred to as Business Network Data Exchange (BNDE). Sharing and receiving consumer data in BNDE networks and thereupon providing personalized offers could allow firms to (a) deepen their relationships with *existing* customers and (b) create relationships with *new* customers. However, the question arises how consumers evaluate such BNDE practices and whether they would actually be willing to disclose personal information to receive personalized offers not only from the focal firm but also from the network firms. Despite the growing proliferation of the business model of BNDE in the marketplace and its potential to create long-term customer relationships, research lacks an understanding of whether privacy-related decision-making is different in dyadic versus BNDE settings.

In summary, this dissertation identifies and investigates innovative business models that have emerged as a consequence of digital transformation and are likely to have a profound impact on marketing, which is considered a top research priority (Marketing Science Institute 2020). When done right, digital transformation enables firms to take customer relationships to the next level (e.g., Ramaswamy and Ozcan 2018; Rust 2020, Rust and Huang 2014; Winer 2001). However, there is a significant gap in the literature on how consumers respond to such innovative technology-driven customization and personalization business models in relation to the status quo. This dissertation addresses this gap and identifies challenges and opportunities related to innovative customization and personalization business models with the ultimate goal of guiding firms in their digital transformation to generate and sustain competitive advantages. In three independent essays, this dissertation aims to answer the overarching research question:

> *How do innovative technology-driven business models versus traditional business models in the domains of customization and personalization influence consumer behavior?*

1.2 Research objectives and scope

Across three independent essays, the purpose of this dissertation is to answer the overarching research question of how innovative business models in the domains of customization and personalization influence consumer behavior. In Essays 1 and 2 I seek to gain a better understanding of challenges and opportunities for innovative business models in the realm of *customization*. Specifically, I examine how consumers respond to internal product upgrades, an innovative business model that allows for product customization after the purchase. Using a conceptual approach in Essay 1, I develop a framework that comprises findings from extant research on consumers' responses to different product feature modification approaches. Building on these insights, I derive questions for future

research on consumers' responses to internal product upgrades revolving around the framework's elements. Essay 2 represents a deep dive into how internal (vs. external) product upgrades influence consumer responses in the post-purchase phase. Finally, Essay 3 focuses on an innovative business model in the domain of *personalization* and investigates how consumers respond to BNDE (vs. dyadic) data disclosure settings. In the following subsections, I provide a brief overview of these essays.

1.2.1 Essay 1: Forces unite! Product feature modifications and their implications for offering internal product upgrades: A review research agenda

Essay 1 investigates how the innovative business model of internal product upgrades, that is, offering fee-based access to originally built-in, but deliberately restricted, optional features relates to other product feature modification approaches and generates novel insights on how internal product upgrades can influence consumer behavior. From a firm's perspective, internal product upgrades represent a promising product modification strategy. Market experts forecast substantial additional revenues as well as economies-of-scale by producing cars with identical features (Williams 2017). Accordingly, firms anticipate internal product upgrades to provide considerable additional profit.

Yet, it is still unclear how consumers react to this innovative business model and how it relates to existing product modification and customization approaches. While research on internal product upgrades is still at its infancy, existing well-established literature on related product modification approaches (i.e., next generation products, product versioning, mass customization, add-on features, and continuous OTA software updates) might generate a valuable impulse for future research on internal product upgrades. To address this gap, Essay 1 uses a

conceptual approach and develops a framework that builds on existing product feature modification literature to elaborate on consumers' product-related responses (e.g., product liking, purchase intentions) and firm-related responses (e.g., repurchase behavior) to internal product upgrades. Moreover, it reveals important (a) marketing strategies (organized around the 5Ps of the strategic wheel of product feature modifications, that is, product, price, promotion, place, process) and (b) consumer-related factors that likely influence consumer responses. Thus, the purpose of Essay 1 is to answer the following research questions:

> *How do internal product upgrades relate to existing product modification approaches (i.e., next generation products, product versioning, mass customization, add-on features, and continuous OTA software updates)?*

> *How do product feature modifications influence consumers' (a) product-related responses and (b) firm-related responses?*

> *How do (a) decisions conceptualized around the 5Ps of the strategic wheel of product feature modifications and (b) consumer-related factors influence consumer responses?*

> *What are fruitful avenues for future research on internal product upgrades?*

1.2.2 Essay 2: You want to sell this to me twice!? How perceptions of betrayal may undermine internal product upgrades

By analyzing how consumers respond to internal product upgrades after the product purchase, Essay 2 constitutes a deep dive into this innovative business model. Existing research has investigated how consumers respond to related product feature modification approaches, like external product upgrades (e.g., Bertini et al. 2009; Erat and Bhaskaran 2012; Liu et al. 2018) or product versioning (e.g., Gershoff et al. 2012). Moreover, there is initial evidence on how consumers evaluate internal product upgrades (e.g., Schaefers et al. 2022; Wiegand and

Imschloss 2021). However, although existing studies provide relevant insights, they do not compare the innovative business model of internal product upgrades to established business models (e.g., external product upgrades). Together with my co-authors, I propose that internal product upgrades are conceptually distinct from established approaches and that consumers may respond differently to internal product upgrades because of key characteristics of the upgrading experience (i.e., features are built in to the product the consumer has purchased, but are deliberately restricted and can (only) be activated after the consumer pays an additional fee). We build on research on psychological ownership and normative expectations and examine how consumers respond to internal (vs. external) product upgrades. To this end, we conducted seven experimental studies in two different contexts (i.e., consumer electronics, automotive) to investigate the following research questions:

> *Will internal (vs. external) product upgrades have negative effects on consumer responses?*

> *Which underlying mechanisms help explain these effects?*

> *How can firms mitigate negative effects of internal product upgrades?*

1.2.3 Essay 3: Privacy-related decision-making in Business Network Data Exchange settings: The role of consumers' immediate affective reactions

In contrast to Essay 1 and 2, which focus on an innovative business model in the context of customization, Essay 3 investigates a business model in the realm of personalization. Traditionally, data exchanges and resulting personalization activities between consumers and firms have been dyadic in nature (i.e., between a consumer and a single firm) and are the focus of extant research on privacy-related decision making (e.g., Dinev and Hart 2006; Smith et al. 2011; Xu et al. 2009). In

search of new opportunities to leverage consumer data for competitive advantage, many firms increasingly engage in *Business Network Data Exchange* (BNDE), where consumer data are collected by one firm and exchanged with a network of other firms. Sharing consumer data in a network provides personalization benefits to consumers and has the potential to enable enduring consumer relationships above and beyond the boundaries of a single company. However, BNDE is also characterized by a high degree of uncertainty about which benefits and risks are to be expected from the entire network. Hence, solely focusing on cognitive evaluations, as is the predominant perspective of established privacy literature (e.g., Dinev and Hart 2006; Li et al. 2010; Xu et al. 2009), might not be ideal in BNDE settings. Across four experimental studies, this research investigates how consumers' privacy-related decision making differs in BNDE (vs. more traditional dyadic) data disclosure settings. Taking a dual-processing approach perspective, we propose that immediate affective reactions play a crucial role in such data disclosure settings. Specifically, the aim of Essay 3 is to investigate the following research questions:

> *Will BNDE (vs. dyadic) data disclosure settings reduce consumers' data disclosure?*

> *How can the interplay of immediate affective reactions and cognitive evaluations explain this effect?*

> *Which strategies help retailers to mitigate consumers' negative immediate affective reactions in BNDE settings?*

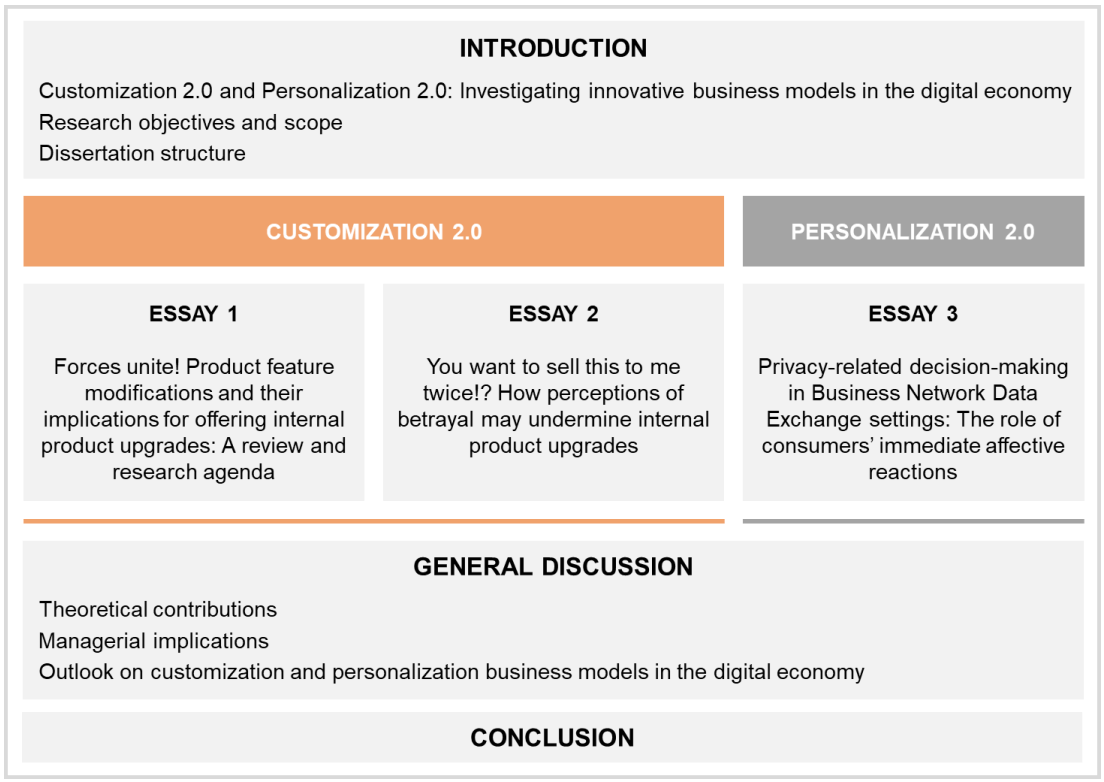
In sum, this dissertation employs different contexts and methods to answer the overarching research question of how the emergence of innovative technology-driven business models in the domains of customization and personalization influences consumer responses and sheds light on related challenges and

opportunities. Thus, the findings of this dissertation are reliable and valid and will make a fundamental contribution to research on innovative technology-enabled business models as well as provide important and actionable implications for marketers.

1.3 Dissertation structure

The remainder of this dissertation is organized as follows. Chapter 2 and 3 focus on investigating how an innovative technology-driven business model in the realm of customization, that is, internal product upgrades, will affect consumer behavior and reveals related opportunities and challenges. Specifically, in Essay 1 (Chapter 2), I provide a conceptual overview of challenges and opportunities of related product feature modification phenomena and derive an agenda for future research on internal product upgrades. Afterwards, Essay 2 (Chapter 3) empirically examines the dark side of internal product upgrades on consumer responses and tests different boundary conditions. Finally, Chapter 4 comprises Essay 3 and investigates the consequences of an innovative business model in the domain of personalization. Specifically, it focuses on practices where consumer data are gathered by one firm and exchanged within a network of other firms (BNDE) to receive personalized offers by more than one firm. This chapter is followed by an overall discussion (Chapter 5), in which I discuss the results of the three essays, present important contributions to research, derive actionable managerial implications and provide an outlook on customization and personalization business models in the digital economy. Finally, Chapter 6 provides a brief conclusion. Figure 1.1 outlines the overall structure of this dissertation.

Figure 1.1. Structure of the dissertation.



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2 Essay 1: Forces unite! Product feature modifications and their implications for offering internal product upgrades: A review and research agenda

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Will be submitted to AMS Review (VHB-Ranking: B)

The era of the digital economy fundamentally changes the way products are produced and used. For instance, static physical products (e.g., cars) are increasingly transformed into so-called dynamic service-platforms, which allow consumers to modify their product over the course of its lifecycle by paying a fee and unlocking both hardware and software features that were previously limited. I refer to this new marketplace phenomenon as internal product upgrades. While research on internal product upgrades is still at its infancy, literature on related approaches to modify an existing base product (i.e., next generation products, product versioning, mass customized products, add-on features, continuous over-the-air software updates) might generate valuable insights. Building on this literature, I develop a framework that illustrates consumers' responses to product feature modifications (i.e., product-related and firm-related responses). Moreover, the framework includes (1) marketing decisions related to 5Ps of the strategic wheel of product feature modifications (i.e., product, pricing, promotion, place, and processes) and (2) consumer-related factors that likely influence consumer responses. Finally, based on research within and beyond product feature modification literature, I outline directions for future research on internal product upgrades around the proposed framework.

Keywords: Product feature modifications, Internal product upgrades, Strategic product feature modification decisions

2.1 Introduction

For decades, a basic premise of physical products (e.g., cars, consumer electronics, household appliances) was that once produced and purchased, a product's integrated features[2] were static and could not easily be adapted to changing consumer needs over the course of their lifecycles. For instance, if consumers bought a car, they carefully had to evaluate at the time of the purchase which extra features (e.g., seat heater, adaptive headlights, more range or engine power) would likely be indispensable during their future product usage, as once purchased, features often could not (easily) be retrofitted. As digital technologies are increasingly embedded in the core of physical products (Kannan and Li 2017; Yoo et al. 2012), they steadily evolve into so-called dynamic service platforms that allow for product modification and customization *after* the purchase (Ng and Wakenshaw 2017). Smartphones and laptops are two prominent examples for products that can be modified after the purchase. By downloading software (e.g., apps and other programs), smartphone and laptop owners modify their purchased base product and customize it based on their needs. For a long time, these post-purchase product modifications have been limited to software features. However, the increasing interconnectivity of everyday products like smartphones, cars, or household appliances evoked by the Internet-of-Things (Ng and Wakenshaw 2017) allows consumers not only to modify purchased products by buying additional software features, but also built-in *hardware* features—a development that will have a profound impact on firms and consumers.

This new business model is labeled *internal product upgrades* and can be defined as fee-based activation of originally built-in, but deliberately restricted, optional features. In 2008, Apple was one of the first companies to integrate a Bluetooth feature in its iPod touch 2G that could be unlocked by customers after

[2] In this research, the terms feature and functionality will be used interchangeably.

paying $10. In search of new ways to remain competitive, to extend the product lifecycle, and to generate additional sales after the product purchase, the automotive industry has started to adopt this new business model (Herzig et al. 2021). Tesla was the first automotive company to offer internal product upgrades for additional battery capacity (DeBord 2017). Within the last years, other major automotive companies like BMW, Audi, Mercedes and Volkswagen followed (Williams 2017).

From a firm's perspective, internal product upgrades represent a promising product modification strategy. Market experts forecast an additional revenue of $184 billion by 2022. Moreover, manufacturers can realize economies-of-scale by producing cars with identical features, which also reduces production costs (Williams 2017). Accordingly, firms anticipate internal product upgrades to provide considerable additional profit. While internal product upgrades seem to be some sort of 'holy grail' for firms, it is still unclear how consumers react to this new business model. Hence, it is important for academia and practice alike to understand how consumers will react to the new business model of internal product upgrades.

While internal product upgrades potentially represent an important milestone in the domain of product feature modifications, research on this particular business model is still scarce. So far, only two notable exceptions have investigated how consumers respond to internal product upgrades (Schaefers et al. 2022; Wiegand and Imschloss 2021). Yet, many questions remain unanswered. Importantly, research on other product feature modification approaches might provide impulses for future research on consumer responses to internal product upgrades.

Existing product feature modification research is fragmented and diverse—it can, for instance, focus on pre-purchase or post-purchase modification approaches or on adding or removing features. Additionally, some product feature modifications are implemented by the firm without any further consumer participation, while others require consumers to take an active role in the modification process. In this

research, I investigate the following related product feature modification approaches: next generation products (e.g., Nowlis and Simonson 1996), product versioning (e.g., Gershoff et al. 2012), mass customized products (e.g., Franke et al. 2009), add-on features (e.g., Bertini et al. 2009), and continuous over-the-air (OTA) software updates (e.g., Foerderer and Heinzl 2017). Importantly, while these related approaches can provide valuable insights, they either focus on (1) *pre-purchase* modifications (e.g., next generation products, product versioning, mass customized products) or (2) post-purchase modification through (a) *detachable* features (add-on features) or (b) *software* modifications (continuous OTA software updates). Contrarily, internal product upgrades represent a disruptive approach of product feature modification as they allow for *post-purchase* modification of *built-in hardware and software* features. Nonetheless, the diversity of the different topics that are investigated by research on related product modification approaches (see Appendix 2.A for a literature review table) can provide an impulse for future research on consumer responses to internal product upgrades. Hence, the goal of this research is to gather insights from related product feature modification literature and other important research streams to derive an agenda for future research on internal product upgrades to leverage its disruptive potential for marketing's traditional beliefs and practices.

To help research and practice understand how internal product upgrades can influence consumer behavior, I answer the following research questions: (1) How do internal product upgrades relate to existing product modification approaches (i.e., next generation products, product versioning, mass customized products, add-on features, and continuous OTA software updates)? (2) How do product feature modifications influence consumers' (a) product-related responses and (b) firm-related responses? (3) How do (a) decisions conceptualized around the 5Ps of the strategic wheel of product feature modifications and (b) consumer-related factors

influence consumer responses? (4) What are fruitful avenues for future research on internal product upgrades?

In answering these questions, this research provides three key contributions beginning with a conceptualization of internal product upgrades as well as the different, related product feature modification approaches (i.e., next generation products, product versioning, mass customized products, add-on features, and continuous OTA software updates). As such, I identify similarities and differences of a fragmented and broad research area, to prepare a foundation and to better situate the findings of existing research and the relationships that have been studied.

Moreover, providing an overarching analysis of research on product feature modification approaches (that can deliver important insights for future research on internal product upgrades) constitutes the second contribution. Specifically, existing findings are organized in a conceptual framework that includes different entities (i.e., the consumer, the product itself, the firm), as well as consumers' (potential) responses. Drawing on existing research on related product feature modification approaches, offering internal product upgrades will likely influence consumers' (1) product-related responses and (2) firm-related responses. Moreover, the framework offers an overview of decisions and actions that revolve around the 5Ps of the strategic wheel of product feature modifications (i.e., product, price, promotion, place, process) that will likely influence consumers' responses and investigates important consumer-related factors (e.g., individual predispositions).

The third contribution unfolds by providing an agenda for future research on internal product upgrades for each of the conceptual framework's elements. Existing knowledge from research on product feature modifications provides substantial insights on a wide range of topics from different perspectives. Yet, existing findings also have to be reassessed and extended for internal product upgrades using other literature streams (e.g., research on psychological ownership, extended self, etc.) in

light of internal product upgrades' peculiarity: consumers modify products they possess by *paying a fee for built-in (and hence theoretically usable) hardware and software* features. This peculiarity distinguishes internal product upgrades from existing product feature modification approaches and might unveil a variety of new research opportunities.

The remainder of this paper is organized as follows. First, I will elaborate on the new marketplace phenomenon of internal product upgrades before presenting the above-mentioned related product feature modification approaches (i.e., next generation products, product versioning, mass customized products, add-on features, and continuous OTA software updates). Thereby, I will also classify the different approaches on the basis of various characteristics, that is, modification implementer (consumer vs. firm), modification direction (adding vs. removing/restricting features), modification time (pre-purchase vs. post-purchase modification) and modification result (enhanced separate product vs. enhanced original product)[3] and thus, identify similarities and differences of related modification approaches and internal product upgrades. Afterwards, I will introduce the conceptual framework that includes consumers' (potential) product-related and firm-related responses to related product feature modification approaches and internal product upgrades. The framework also contains (a) the strategic wheel of product feature modifications which revolves around decisions related to the product, price, promotion, place, and process (5Ps) and (b) important consumer-related factors that will likely influence consumers' responses to internal product upgrades. Finally, I will derive an agenda for future research for each topic.

[3] Importantly, in this context an „*enhanced*" product can include improving, adding and removing existing features. Even if features are removed from a product this can be beneficial for certain customer groups (e.g., those that do not need the feature or cannot afford the same product that has more features).

2.2 Internal product upgrades

Internal product upgrades can be defined as the fee-based activation of originally built-in, but deliberately restricted, optional features. Importantly, internal product upgrades represent a *hybrid* form of product feature modifications, meaning that (1) both the firm and the consumer implement a modification (2) at different stages of the process (i.e., pre-purchase phase vs. product usage phase) (3) in different modification directions (i.e., remove/restrict vs. add): at the pre-purchase stage, the firm implements the product modification by integrating technology-based hardware features (e.g., LED matrix headlights, seat heating) and software features (e.g., driving performance program, remotely locking the car via smartphone) by default into the base product and deliberately restricts (i.e., removes) access to certain features. At the product usage stage, consumers take an active role in the product modification process and can unlock formerly restricted features by paying a fee (Schaefers et al. 2022; Wiegand and Imschloss 2021).

As indicated by the definition above, upgrading a product's hardware is only possible if companies integrate fully functionable, yet deliberately restricted hardware features by default into the base product. This peculiarity is especially relevant as consumers are confronted with the decision to upgrade hardware in a *purchased* product, which likely provides opportunities and challenges for firms offering internal product upgrades.

Despite this peculiarity, internal product upgrades still share key elements with a variety of established product feature modification approaches that might provide important insights for both scholars and practitioners. In the following, I will provide a short overview of the related product feature modification approaches and elaborate more on the key similarities and differences between internal product upgrades and next generation products, product versioning, mass customized products, add-on features, and continuous OTA software updates based on various

characteristics. Specifically, the different approaches can be distinguished on the basis of the modification implementer (consumer vs. firm), modification direction (adding vs. removing/limiting features), modification time (pre-purchase vs. post-purchase modification) and modification result (enhanced separate product vs. enhanced original product). See Table 2.1 for an overview and product examples.

Table 2.1. Overview of internal product upgrades and related product feature modification approaches**.**

	Internal product upgrades	**Next-generation products**	**Product versioning**	**Mass customized products**	**Add-on features**	**Continuous OTA software updates**
General description						
Product category	Technical products	Technical and non-technical products	Technical products	Technical and non-technical products	Technical and non-technical products	Technical products
Feature category	Technical features	Technical and non-technical features	Technical features	Technical and non-technical features	Technical and non-technical features	Technical features
Product (feature) examples	Cars (e.g., engine performance, assistance systems)	Smartphones (e.g., better camera) Running shoes (e.g., improved sole comfort)	Cars (e.g., performance, alarm system) Camera (e.g., exposure features)	Cars (e.g., assistance systems) T-Shirts (e.g., fabric, color)	Camera (e.g., memory, tripod) Smartphones (e.g., memory)	Smartphones (apps) Car (software)
Modification characteristics						
Modification implementer	(1) Firm; (2) Consumer	Firm	Firm	Consumer	Consumer	Firm/consumer
Modification type	(1) Firm: Restricting features; (2) Consumers: Adding features	Adding and removing features	Restricting features	Adding or removing features	Adding or restricting features	Adding and/or removing features
Modification time	(1) Firm: Before the purchase; (2) Consumers: After the purchase	Before the purchase	Before the purchase	During the purchase	During or after the purchase	Firm and consumer: After the purchase
Modification result	Enhanced original product	Enhanced separate product	Enhanced separate product	Enhanced original product	Enhanced original product	Enhanced original product

2.3 Related product feature modification approaches

Next generation products.

When developing new products, firms in many industries (e.g., consumer electronics, automotive, sportswear) mostly aim at offering separate, enhanced versions of existing products by adding, removing or improving features (Urban and Hauser 1993), which are often referred to as “next generation products”. Product modifications for next generation products can involve both technical features (e.g., better performance chip) and non-technical features (e.g., product size). For instance, Apple’s iPhone XS allows for up to 14 hours video playback, has a 5.8-inch super Retina display, and a telephoto and wide-angle camera. The next generation product, that is, the iPhone 11, had some modified features. For example, it enables consumers to watch up to 17 hours of video playback, has a 6.1-inch liquid Retina display, and a wide-angle and ultra-wide-angle camera.

At a first glance, next generation products and internal product upgrades do not have much in common. In contrast to internal product upgrades, developing next generation products occurs at the pre-purchase stage and is a firm-implemented product feature modification approach (i.e., consumers take a passive role and cannot modify products themselves). Moreover, product feature modifications in next generation products are possible for both technical and non-technical features (e.g., Ma et al. 2015; Mukherjee and Hoyer 2001; Nowlis and Simonson 1996; Thompson et al. 2005), while internal product upgrades are limited to technical features. Despite these conceptual differences, research on next generation products can provide valuable insights for internal product upgrades. Existing research in this domain investigates diverse strategic product feature modification decisions concerning adding or improving features of an existing product that might also be applicable for different modification approaches and hence might be relevant for future research on internal product upgrades, as I will elaborate later on.

Product versioning. Product versioning, which is also known as “damaged goods”, is another firm-implemented product feature modification approach which can be defined as a “manufacturing strategy of deliberate subtraction of functionality from a product” (Gershoff et al. 2012, p. 382). This approach is commonly used in the automotive industry and the consumer electronic industry (e.g., for cameras, phones, tablets, printers, and processors). A prominent example of a firm using product versioning is IBM, which offered a superior laser printer with higher printing speed and an inferior one with lower printing speed. The inferior version was produced by adding a special chip or software code in each superior product which cut the printing speed (Deneckere and McAfee 1996). Other global firms that have used product versioning in the past are Sony (PlayStation 3) and Mazda (Mazda 2) (Gershoff et al. 2012). As illustrated above, product versioning occurs at the pre-purchase stage during the manufacturing of the product and consumers take a passive role when being confronted with product versioning, that is, they cannot modify a product by themselves. Hence, consumers might not always be aware of product versioning.

Internal product upgrades are similar to product versioning such that both approaches are based on a deliberate restriction of hardware and software functionalities. However, they also differ on an important element: while under product versioning, restricted features are permanently limited and cannot be activated (Gershoff et al. 2012), internal product upgrades allow a fee-based activation of restricted features over the course of a product’s lifecycle, meaning that features can be added by consumers (Wiegand and Imschloss 2021).

Mass customized products. The term mass customization is used to describe a form of value creation at the manufacturing/assembly stage that creates customized products at mass-production prices and costs (Kaplan and Haenlein 2006). Many firms in various industries offer consumers the opportunity to modify an

existing base product based on one's preferences and needs before the purchase. Typically, the consumer adds/tailors features to/of an inferior base product (e.g., Franke et al. 2009; Franke and Schreier 2010). Mass customization is common for both technical products, like personal computers (e.g., Dell) and cars (e.g., BMW, Audi), and non-technical products, like apparel (Nike) and cereal (e.g., MyMuesli). To facilitate the mass customization process for consumers, companies often use technology-assisted design tools that enable consumers to modify or create a product by adding different features to a base version of the product.

Even though mass customization takes a different perspective as tailoring the product occurs at the pre-purchase stage and consumers are rather modifying a digital representation of the product rather than the actual product, existing research on product mass customization might provide important insights for firms offering internal product upgrades. Mass customized products and products allowing for internal product upgrades share an important characteristic: both product feature modification approaches enable consumers to tailor their product by themselves based on their preferences and are provided through technology that facilitates customization (e.g., Franke et al. 2009; Franke and Schreier 2010; Wiegand and Imschloss 2021). However, creating mass customized products is restricted to the pre-purchase stage (e.g., Franke et al. 2009; Franke and Schreier 2010), while internal product upgrades also allow for product customization after a product's purchase. Moreover, it is important to note that while mass customization allows consumers to customize (1) non-tech products, such as T-shirts or pens and (2) non-tech features, such as design-related features (e.g., color, fabric) or other static features (e.g., panoramic glass roof), internal product upgrades are only available for products and features that can be equipped with sensors connected to the Internet.

Add-on features. Add-on features are defined as features that "have to be consumed with a corresponding base product to provide utility" (Bertini et al. 2009, p. 17; Guiltinan 1987). Firms in various industries (e.g., automotive, consumer electronics) offer add-on features to deliver additional value to their customers. For instance, Sony, Canon or Nikon offer memory cards for their digital cameras to enable consumers to store more pictures and videos. Importantly, while consumers usually purchase add-on features to add functionalities, optional downgrades also enable consumers to remove functionalities (Bertini et al. 2009). Even though firms are responsible for providing the necessary arrangements for product feature modification through add-on features (e.g., producing compatible add-on features for their base products), they represent a consumer-implemented product feature modification approach as consumers themselves can enhance their original base products by purchasing add-on features. Consumers can purchase add-on features either during or after the purchase of the base product (Bertini et al. 2009; Erat and Bhaskaran 2012; Liu et al. 2018).

There is an important overlap between internal product upgrades and add-on features. Add-on features allow for post-purchase product modifications of an existing base product (e.g., Bertini et al. 2009; Ma et al. 2015), which is also a key criterion of internal product upgrades (Schaefers et al. 2022). Despite these similarities, add-on features and internal product upgrades differ in an important way: while add-on features are detachable accessories that are not deliberately restricted by firms (Bertini et al. 2009; Ma et al. 2015), internal product upgrades are already built-into the product the consumer owns and deliberately restricted-by-design in their function (Schaefers et al. 2022).

Continuous OTA software updates. Continuous OTA software updates are typically used in the consumer electronics industry to describe software updates that are rolled out in regular instances by developers and publishers of mobile apps to

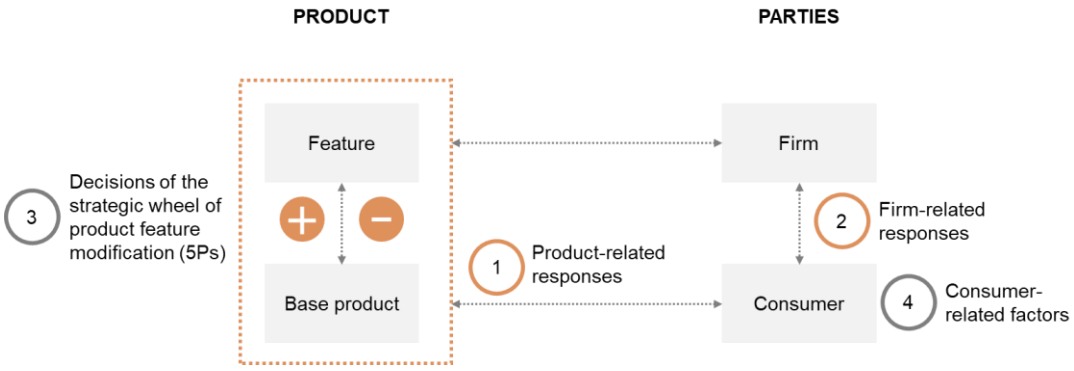
improve the software itself (by adding or removing certain functionalities), fix bugs, close security issues or adapt the software design (Fleischmann et al. 2016; Foerderer and Heinzl 2017; Franzmann et al. 2019a; Franzmann et al. 2019b). For instance, smartphone manufacturers like Apple, Samsung or Huawei and app developers like Snapchat, Facebook or YouTube continuously evolve their software and, hence, offer continuous OTA software updates. Only recently, car manufacturers (e.g., Tesla) have started to adopt this practice and continuously improve software to enhance digital features and hardware features at an incremental level (Wiegand and Imschloss 2021).

Although closely related, internal product upgrades differ from continuous OTA software updates in a meaningful way. Continuous OTA software updates are enhancements of the base product that are not available from the beginning, but are rather based on continuous software improvements by firms that become available periodically (Fleischmann et al. 2016; Foerderer and Heinzl 2017; Franzmann et al. 2019b; Wiegand and Imschloss 2021). In contrast, internal product upgrades are product enhancements that are based on unlocking built-in features that are theoretically fully usable, yet deliberately restricted (Wiegand and Imschloss 2021).

2.4 A framework for internal product upgrade research

The proposed framework for research on internal product upgrades (see Figure 2.1) is organized around different entities, that is, the *product* itself (consisting of the existing base product and the feature), the *firm* offering internal product upgrades, and the *consumer*, as well as consumers' potential responses to internal product upgrades.

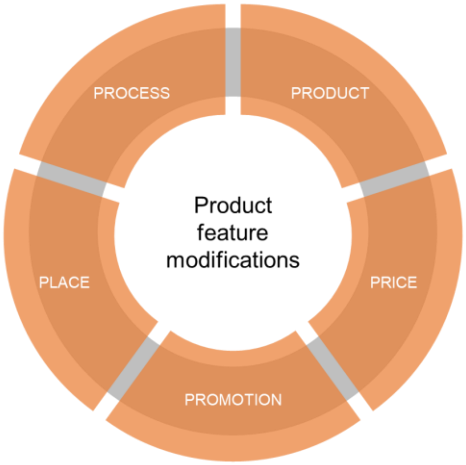
Figure 2.1. Conceptual framework for research on internal product upgrades.



Drawing on existing research on related product feature modification approaches, offering internal product upgrades will likely influence consumers' (1) product-related responses (e.g., Bertini et al. 2009; Foerderer and Heinzl 2017; Franke and Schreier 2010; Gershoff et al. 2012; Thompson et al. 2005) and (2) firm-related responses (e.g., Bharadwaj et al. 2009; Gershoff et al. 2012). Importantly, in this context, consumer responses refer to any attitudinal and behavioral consequences product feature modifications might induce (e.g., product or firm liking, attitude towards the product or firm, product valuation, product-self-categorization, perception by other consumers etc.).

Moreover, the framework includes (3) strategic decisions regarding internal product upgrades derived from existing literature. Strategic decisions by firms are commonly organized around the elements of the marketing mix (e.g., Grewal et al. 2021; Kannan and Li 2017). Building on this notion, I conceptualize the decisions related to product feature modifications that will likely influence consumers' product-related and firm-related responses around the strategic wheel of product feature modifications which revolves around the 5Ps, that is, product, price, promotion, place, process (see Figure 2.2).

Figure 2.2. The strategic wheel of product feature modifications revolving around the 5Ps.



Decisions related to the *product* involve all decisions that relate to developing the offer that is being sold to the target market (Homburg 2020; Kotler 2016; Perreault et al. 2021). In general, typical strategic decisions concern the physical good, services, features, accessories, quality level, or branding. In the context of product feature modifications, those decisions involve the feature itself as well as the base product to (from) which a feature is added (removed). For instance, strategic product-related decisions that have to be considered by firms modifying features incorporate the number of total features of a product (low vs. high) or feature alignability (i.e., whether added features improve an existing capability or introduce a new one; Bertini et al. 2009).

The second element of the strategic wheel of product feature modifications is the *price*. This element of the marketing mix comprises all decisions regarding the payment to be made for a product by the customer (Homburg 2020; Kotler 2016). Typical pricing decisions include setting the prices for new products, changing prices of existing products, price differentiation and designing the discount and bonus system (Homburg 2020). Prices are important external cues for consumers as they can serve as a quality signal (Yoo et al. 2000). In the case of product feature

modifications, a special focus lies on the pricing of the feature and its impact on the base product and vice versa (e.g., Erat and Bhaskaran 2012; Wiegand and Imschloss 2021).

Third, decisions that relate to the *promotion* policy deal with the design and transmission of promotional messages to influence consumers in line with the company's objectives (Homburg 2020). Besides decisions regarding the communication channel, the promotional message to target and persuade consumers to buy a product or a feature is of key importance (Kotler 2016) and will also be the focus of this research.

Fourth, *place* refers to any decisions that affect the "[…] activities that make the product available to target consumers" (Kotler 2016, p. 50). While decisions regarding the place are typically very broad and revolve around the channel type, intermediaries, location of stores, transportation, storing, and managing channels, the focus within product feature modifications will lie on the sales channel through which modified products are sold.

Finally, *process* decisions encompass the "procedures, mechanisms and flow of activities by which the service is operationalized and delivered" (Bitner 1991, p. 25). Although decisions related to the process are typically not part of the traditional marketing mix for physical products but rather the services marketing mix, this element should also be considered for product feature modifications. In this context, process comprises any decisions related to the manufacturing process or the delivery of product feature modifications.

In addition to strategic decisions that can (at least partly) be controlled by firms, consumers' perceptions of internal product upgrades as well as downstream consequences will likely be influenced by (4) individual consumer-related factors (e.g., sociodemographic factors). These factors can serve as an important basis to

develop consumer segments and target those that respond more vs. less favorably to internal product upgrades.

In the subsequent sections, I will illustrate relevant insights from the above-mentioned product feature modification approaches and their consequences for consumer behavior. Based on these and additional insights from other literature streams, I will derive potential avenues for further research in the context of internal product upgrades. The analysis of the different product feature modification approaches will be organized around the proposed conceptual framework in Figure 2.1.

2.5 The impact of internal product upgrades on consumers' product-related responses

2.5.1 Key insights from research on related product feature modification approaches

Most research on product feature modification approaches has investigated how the respective feature modification influences consumers' product-related responses. Aside from some exceptions, this stream of literature largely focuses on consumers' product-related responses *during the product purchase*. Product feature modifications can have an impact on consumers' willingness-to-pay for a product (e.g., Franke et al. 2009; Franke and Piller 2004; Franke and Schreier 2010), purchase intentions of the (base) product (e.g., Bertini et al. 2009; Foerderer and Heinzl 2017; Gershoff et al. 2012), the incremental product value (Gill 2008), and product evaluations (e.g., Mukherjee and Hoyer 2001). Importantly, existing studies investigated the consequences of *adding* features (e.g., Bertini et al. 2009; Franke and Schreier 2010) as well as *removing* features (e.g., Bertini et al. 2009; Gershoff et al. 2012) for consumers' product-related responses and find varying effects.

The impact of adding features on consumers' product-related responses. Research on the impact of adding and/or tailoring product features on

consumers' product evaluations (e.g., Bertini et al. 2009; Franke and Schreier 2010; Wiegand and Imschloss 2021) primarily focuses on consumers' evaluations of the base product during the purchase and mainly finds a positive effect. For instance, research on add-on features shows that offering features that introduce new capabilities have a positive impact on a consumers' base product evaluations (Bertini et al. 2009). Likewise, the availability of continuously innovated upgrades increase consumers' attitude and purchase intentions for the product as compared to standard products (Wiegand and Imschloss 2021). Importantly, while the authors find a positive effect in general, they also point out that continuous OTA software updates are evaluated less favorably than continuously innovated external *hardware* upgrades.[4] Moreover, offering mass customized products (vs. standard products) has a general positive effect on consumers' willingness-to-pay for the product (Franke et al. 2009; Franke and Piller 2004; Franke and Schreier 2008, 2010).

While these findings suggest that adding internal features likely have a positive overall impact on consumers' base product evaluations at the time of the purchase, some studies, however, indicate that adding features can also affect consumers' product-related responses in a negative manner. For example, Foerderer and Heinzl (2017) find that while offering continuous OTA software updates attracts new consumers, it also leads to a decrease in existing consumers' product ratings. Also, positive consumer evaluations of added features can shift over time. As research by Thompson et al. (2005) suggests, consumers' (expected) product utility and product satisfaction before product use (i.e., in the purchase situation) are higher for feature-rich vs. feature-poor products, while there is no difference after product use (i.e., after product purchase). This indicates that during the purchase, consumers give more weight to product capability (which is increased with a higher number of features) and less weight to product usability (which is

[4] Continuously innovated hardware upgrades correspond to (external) add-on features.

reduced with a higher number of features) even though they do not maximize their satisfaction during product usage, which might ultimately decrease consumers lifetime value. However, the favorability of adding features can depend on various decisions in the strategic wheel of product feature modifications (Bertini et al. 2009; Gill 2008; Ma et al. 2015; Mukherjee and Hoyer 2001), which will be elaborated below.

The impact of removing features on consumers' product-related responses. Most product feature literature investigates how adding functionalities that have not been included in a base product before affect consumers' base product evaluations (e.g., Bertini et al. 2009; Foerderer and Heinzl 2017; Thompson et al. 2005; Wiegand and Imschloss 2021). There is, however, some research that examines the impact of removing functionalities that have previously been part of a product (Bertini et al. 2009; Gershoff et al. 2012). Again, prior research shows mixed results of removing functionalities from an existing product on consumers' base product evaluations. For instance, Gershoff et al. (2012) find that offering an inferior version of the product by having a target brand intentionally restrict the functionality of a superior product (i.e., product versioning) compared to a regularly produced inferior product offered by a competitor results in lower purchase intentions of the target brand's product as consumers perceive product versioning as a violation of an exchange norm. In contrast, research in the domain of add-on features finds that providing consumers with the option to restrict existing feature capabilities has positive effects on their base product evaluations (Bertini et al. 2009). Taken together, these findings suggest that, in situations where features are removed, product evaluations are contingent on the entity removing the feature (i.e., firm or consumer) and hence, that consumer control might play a crucial role.

In summary, the existing literature has already extensively addressed how (different approaches of) product feature modifications with different directions of

feature modification (i.e., adding and removing features) affect consumers' product evaluation—mainly at the pre-purchase stage. Only two notable exceptions deal with the consequences on product evaluations in the product usage phase (Foerderer and Heinzl 2017; Thompson et al. 2005). The mixed results regarding the consequences of adding and removing features on consumers' product-related responses indicate that no overall statements can be made regarding the benefits or drawbacks of the direction of the modification. Rather, their favorability depends on the concrete product feature modification as well as strategic decisions and actions of different elements of the strategic wheel of product feature modifications, which I will describe in section 2.7.

2.5.2 Key insights from research on internal product upgrades and avenues for future research

First empirical evidence by Wiegand and Imschloss (2021) shows that consumers' attitude and their purchase intentions for the product during the initial purchase situation are higher for products for which firms offer continuous OTA product updates (vs. standard products). However, it remains unclear whether these findings can be transferred to internal product upgrades, where consumers merely unlock built-in (and thus theoretically usable), yet restricted features. One could argue that consumers value the increase in convenience (i.e., the chance to upgrade the product effortlessly only by paying a fee) and flexibility (i.e., their ability to postpone their decision-making of whether or not to buy a feature from the purchase to the usage phase). On the other hand, consumers might not appreciate restricted features (as shown by Gershoff et al. 2012) even if they can be unlocked by paying a fee. Hence, I encourage future research to investigate the overall favorability of internal product upgrades (e.g., in terms of consumers' base product attitude and purchase intentions). Moreover, even if there is overall a positive effect,

Thompson et al. (2005) found that favorable effects during the purchase can also be altered in the product usage phase. What seems beneficial at the time of the purchase under non-ownership (i.e., tailoring a product's hardware and software features after the purchase in a convenient and often flexible way), could change when consumers actually possess the product. Product possession induces subjective feelings of ownership (e.g., Reb and Connolly 2007) and experiencing on a daily basis that one cannot access a feature without paying an extra fee even though it is physically proximate and part of the purchased product, might reduce product usage enjoyment or even lower their perceived base product ownership. This could ultimately affect product evaluations (e.g., product liking) in the product usage phase negatively. Hence, future research could explore, for example, the following research questions (see Table 2.2 for an overview):

- How do internal product upgrades influence consumers' purchase intentions for the base product? Are consumers willing to pay more for the increase in convenience and flexibility they get in case of internal product upgrades?
- Are there any differences in product liking before vs. after the purchase of the base product? Do consumers give more weight to product flexibility and less weight to product usage enjoyment during the initial purchase? Are consumers overwhelmed by the numerous options they have if they want to upgrade their product after purchase?
- How do internal product upgrades change consumers' personal connection to the product after purchase? For instance, do locked features dilute consumers' base product ownership perceptions?

Importantly, internal product upgrades might not only change the consumer's evaluation of a product, but can also influence a consumer's perception of the self. Existing research outside the product feature modification literature states that possessions in general enable consumers to develop and maintain unique identities (e.g., Belk 1988), which is a fundamental motivation by individuals (Kleine et al. 1995). On the one hand, internal product upgrades might have the ability to strengthen identity expression, as (selected) features can be adapted to changing needs and preferences (Merle et al. 2010). On the other hand, paying for built-in

features in a purchased product might be seen as a possession loss that can damage a consumer's self-concept (Belk 1988). In case of internal product upgrades, one could argue that consumers cannot lose something they do not legally own. However, mere product possession creates strong feelings of ownership (Reb and Connolly 2007), which could cause consumers to think of fee-based access to built-in features as a loss. Accordingly, future research could examine the following research questions:

- How do internal product upgrades influence consumers' self-identity? Do they strengthen or weaken self-identity?
- Do locked features cause a sense of incompleteness in consumers?

2.6 The impact of internal product upgrades on consumers' firm-related responses

2.6.1 Key insights from research on related product feature modification approaches

Surprisingly, very little research investigates how product feature modifications influence consumers' firm-related responses, even though having the potential for changing consumers' loyalty (e.g., word-of-mouth, repurchase, cross-buying, paying a price premium) or attitude towards the firm. One of the few exceptions is the paper by Bharadwaj et al. (2009) showing that customization has a positive effect on loyalty intentions. Moreover, one could argue that a positive impact on consumers' base product evaluations might also have a positive effect on how they perceive the firm, but this might not necessarily be the case. Accordingly, Foerderer and Heinzl (2017) find that offering free software updates for apps increase the number of new customers while at the same time decrease existing customers' product evaluations, which might ultimately lead to a decrease in loyalty.

In the context of product versioning, Gershoff et al. (2012) show that deliberate feature restrictions by the firm increase consumers' preferences for a

non-versioned product from a competitor. The authors ascribe the negative effects of product versioning to consumers' perceptions of unfairness of the production method. Further supporting this notion, anecdotal evidence shows that product versioning results in negative word-of-mouth. Hence, even though Gershoff et al. (2012) primarily focused on consumers' purchase intentions and on how consumers evaluate the product instead of the relationship to the firm, it is likely that the relationship to the firm is affected as well.

2.6.2 Key insights from research on internal product upgrades and avenues for future research

So far, no research has investigated how internal product upgrades influence consumers' firm-related responses. On the one hand, one could assume that a fee-based access to deliberately restricted features can heal the negative effects of product versioning (Gershoff et al. 2012). On the other hand, it is also possible that consumers still see a norm violation by the firm as they have to pay for features that are built-in and theoretically already usable. Hence, future research could examine the following question:

- How do internal product upgrades (compared to standard products or other product feature modification approaches) influence consumer-firm relationships (e.g., in terms of their attitude towards the firm, loyalty, word-of-mouth)? Do they have a positive or negative overall effect on firm-related outcomes?

Moreover, again building on Thompson et al. (2005) who show that consumers' evaluations during the purchase and after the purchase can shift, one could ask:

- Is there a difference in consumers' evaluation of the firm offering internal product upgrades during the base product purchase vs. after the base product purchase, that is, does actual base product ownership change consumers' evaluations of the firm?

2.7 The impact of product feature modification decisions centered around the 5Ps

While in the preceding sections, I illustrated how different product feature modification approaches can affect consumers' (1) product-related responses and (2) firm-related responses, I will now outline strategic decisions firms should consider when offering product feature modifications as they, in turn, potentially also influence consumers' responses when offering internal product upgrades. The strategic product feature modification decisions presented below revolve around the 5Ps of the strategic wheel of product feature modifications (i.e., decisions, actions and strategies related to the product, price, promotion, place, and process).

2.7.1 Product-related decisions

Key insights from research on related product feature modification approaches. As product feature modifications are product related-strategies in itself, most marketing research has addressed strategic decisions or actions related to this category of the strategic wheel of product feature modifications. Existing studies have investigated a wide variety of factors and examined their influence on consumers' evaluations of the feature (e.g., Gill 2008), the base product (e.g., Bertini et al. 2009) or the entire product (base product and feature; e.g., Ma et al. 2015). When modifying products, firms should be aware that (1) feature-related factors, like feature locus (detachable vs. integrated; Ma et al. 2015) and feature innovativeness (incremental vs. radical; Ma et al. 2015) can influence consumers' responses to the product and/or the feature. Moreover, it is also important to consider (2) the characteristics of the base product itself, such as the number of total features a base product has (low vs. high; Thompson et al. 2005; Thompson and Norton 2011) and whether a feature is added to (a) a base product with inferior or superior quality/features (Nowlis and Simonson 1996) or (b) introduces new versus enhances existing capabilities (Bertini et al. 2009). Finally, firms should take

into account (3) characteristics of the base product in combination with modified features, for instance, whether the features added are goal congruent with the base product (Gill 2008) or whether products with removed features are (un)observably different from the existing product (Gershoff et al. 2012).

Feature characteristics. For instance, Ma et al. (2015) find that detachable features lead to higher purchase intentions of the entire product than (fully useable) integrated features. However, this effect is contingent on the innovativeness of a given feature. Detachable (vs. integrated) features are favorable if the feature is perceived as highly innovative (e.g., phone charger that generates power from kinetic energy), but not for incrementally innovative features (e.g., enhanced power management for phones).

Base product characteristics. Even though investigating feature characteristics is important in this context, considering characteristics of the base product should not be neglected. Prior research shows that adding a new feature increases the value of a product more, if it is added to a product that (1) has relatively inferior (vs. superior) existing features as well as (2) is of low (vs. high) quality (Nowlis and Simonson 1996). Moreover, Mukherjee and Hoyer (2001) find that innovative product features increase a product's utility only in case of base products with low (vs. high) complexity. In addition, Bertini et al. (2009) show that consumers' overall utility of a base product (i.e., perceived quality, probability of liking the product and fit with personal needs) as well as their willingness-to-pay for the base product depends on the alignability of a feature. Specifically, a product is evaluated less favorably when a firm offers alignable features that enhance existing capabilities (e.g., memory card or zoom lens for a camera) than when there is no add-on feature. In turn, offering non-alignable features that introduce new capabilities (e.g., tripod or portable photo printer for cameras) (vs. no add-on features) increases consumers' utility perceptions of the base product. Finally, the

number of features in a product is also of key importance. As outlined above, findings on how the number of total features in a product influences consumers' product evaluations are context-dependent and shift over time. Thompson et al. (2005) find that products with more (vs. less) features (i.e., feature-rich vs. feature-poor products) increase consumers' perceptions of capability, while at the same time decreasing their perceptions of usability. Importantly, consumers' (expected) product utility and product satisfaction before product use (i.e., in the purchase situation) are higher for feature-rich vs. feature-poor products; however, there is no difference after product use (i.e., after product purchase). During the purchase, consumers give more weight to product capability and less weight to product usability even though they do not maximize their satisfaction during product usage, which might ultimately decrease consumers lifetime value. While choosing feature-rich products might be suboptimal at the individual consumer level (Thompson and Norton 2011), this decision is better understood when considering the social context in which the decision was made. Thompson and Norton (2011) find that when consumers are expected to be evaluated by other individuals, they are more likely to choose feature-rich (vs. feature-poor) products in order to be perceived more positively, more tech savvy and more open to new experiences.

Feature and base product characteristics. Gill (2008) goes even further and suggests that it is crucial to simultaneously consider the base product and the added feature, in terms of their hedonic vs. utilitarian natures. Specifically, the incremental value of a product with a utilitarian base and an added, hedonic feature is greater than the incremental value of a product with a hedonic base and an added, utilitarian feature. Moreover, for utilitarian base products, the incremental value is higher when an incongruent, hedonic feature (vs. a congruent utilitarian feature) is added. Contrarily, the incremental value of a hedonic base product is lower when adding an incongruent, utilitarian (vs. a congruent, hedonic) feature.

In order to actively reduce the negative consequences of product versioning on purchase intentions, Gershoff et al. (2012) propose to use product strategies that aim at decreasing the similarity of the superior and inferior product. Using a different color for inferior (vs. superior) products (observable differentiation) or physically removing (vs. keeping) the restricted part of the feature (unobservable differentiation) can help to attenuate the negative effects on consumers' product evaluations.

Key insights from research on internal product upgrades and avenues for future research. While the studies above focus on investigating the impact of product-related decisions on the evaluation of the base product or the entire product, existing research by Schaefers et al. (2022) shows that product-related decisions also influence consumers' intentions to purchase the *feature itself* (i.e., the internal product upgrade). Specifically, the authors investigate the impact of feature tangibility and find that consumers have a lower likelihood of purchasing hardware (vs. software) upgrades. However, there are still opportunities for further research.

Some of the findings from related product feature modification research on different feature-related factors (feature alignability, feature innovativeness, utilitarian vs. hedonic nature of a feature) and base product-related factors (utilitarian vs. hedonic nature of the base product, number and quality of existing features) could also be investigated for internal product upgrades. In this regard, it might be interesting to see how these factors relate, for instance, to consumers' perception of psychological ownership for built-in, yet restricted features and how they ultimately influence the favorability of internal product upgrades. Finally, while following the exact same strategy as Gershoff et al. (2012) (i.e., differentiating products based on product color or keeping vs. removing parts), is only possible in case of two separate products (which is not the case for internal product upgrades), future research could investigate related product differentiation strategies (e.g.,

adapted infotainment design in case of upgrades related to the infotainment system). Consequently, future research could investigate the following questions:

- Which types of feature-related factors (e.g., feature alignability, feature innovativeness) strengthen/weaken the favorability of internal product upgrades for consumers' base product and feature evaluations?
- How does the nature of the base product (e.g., hedonic vs. utilitarian; feature-rich vs. feature poor) influence purchase outcomes for internal product upgrades? Do consumers' responses to internal product upgrades and related feature ownership perceptions differ for utilitarian and hedonic features?

Product-related decisions in light of internal product upgrades might also involve important ethical considerations (Gershoff et al. 2012) that go beyond economic considerations. While firms *can* potentially restrict consumer access to Internet-connected features and offer fee-based access, the question is whether they *should.* This is especially relevant in the automotive industry and in the case of features that directly or indirectly have an impact on consumers' safety. Currently, car manufacturers not only offer internal product upgrades for non-security features, like smartphone integration, hard disc navigation, and seat heating, but also for security-features, like LED-matrix packages, parking assistant, or car monitoring. However, this raises the question whether regulations are needed, as accidents or other threats to consumers' lives might have been avoidable if the feature (e.g., LED-matrix package, additional range) was not deliberately restricted until consumers pay a fee. On a related note, consumers might blame the firm, which could have a lasting negative effect on the relationship between the firm and consumers. Future research could examine:

- Should internal product upgrades be allowed for any features or should they be restricted to non-security features?
- Who do consumers blame in case of accidents that might have been prevented or other harmful events (e.g., hurricanes) which they could have escaped from more easily if certain features (e.g., LED matrix package, parking assistant, more range) were unlocked? How does this affect their relationship to the firm?

2.7.2 Price-related decisions

Key insights from research on related product feature modification approaches. Strategic price decisions related to product feature modifications revolve around the question of how (1) base product and/or (2) feature pricing influences consumers' product and/or feature purchase behavior.

For instance, Erat and Bhaskaran (2012) examine how a *base product's* price impacts consumers' intentions to purchase an add-on feature. The authors find that consumers are more likely to purchase an add-on feature if a base product has a high (vs. low) price. Similarly, Nowlis and Simonson (1996) find that adding a new feature to a product increases its entire value more if it is added to a higher (vs. lower) priced product. In contrast, existing research on the effect of *feature pricing* does not focus on the level of a feature's price (low vs. high), but rather on price presentation (Dellaert and Stremersch 2005) or feature consumption mode (Wiegand and Imschloss 2021). Particularly, in the context of mass customized products, Dellaert and Stremersch (2005) find that displaying prices at the individual feature level and the product level (vs. only at the product level) decreases product utility. Moreover, Wiegand and Imschloss (2021) find that consumers respond more favorably to products with continuous OTA software updates that are offered for a one-time fee (i.e., permanently) vs. for rent (i.e., temporarily).

Key insights from research on internal product upgrades and avenues for future research. In the context of internal product upgrades, there is initial empirical evidence on the influence of different feature pricing schemes on both product purchase intentions in the purchase stage (Wiegand and Imschloss 2021) and feature purchase intentions in the usage stage (Schaefers et al. 2022). In contrast to the findings for continuous OTA software updates, Wiegand and Imschloss (2021) find that offering internal product upgrades for a one-time fee vs. for rent has no impact on product purchase. In terms of feature purchase, Schaefers

et al. (2022) show that flat rate pricing for features has a more positive influence on consumers' feature purchase intentions than pay-per-use pricing.

While existing research on internal product upgrades has already examined how different *feature* pricing and consumption modes affect consumers' purchase intentions of the product (Wiegand and Imschloss 2021) or the feature (Schaefers et al. 2022), future research could investigate how different *base product* consumption modes (purchase, leasing/renting, short-term sharing) influence consumer responses to internal product upgrades. On a related note, testing for the favorability of different combinations of base product consumption mode and feature consumption mode (e.g., purchase/purchase, purchase/flat rate, pay-per-use/pay-per-use) might represent another fruitful avenue for future research:

- How do different base product consumption modes (purchase, leasing/renting, short-term access-based consumption) influence consumer responses to internal product upgrades? Is there a congruency effect such that base product consumption mode and feature consumption mode should be aligned or are other combinations more effective?

Another important topic related to pricing decisions for internal product upgrades that has not been addressed so far, is that of pre-purchase and post-purchase feature pricing, which is especially salient in case of permanently sold features with a one-time fee. Current industry practice shows different strategies: while Tesla charges a higher fee after the purchase than during the initial purchase situation in which the consumer could have also purchased the feature, Daimler does not require an extra surcharge. To increase post-purchase take rates, firms could also think about offering internal product upgrades at a lower price than during the purchase situation. These different pricing strategies will likely affect consumers' evaluations of the firm and purchase intentions of features both pre- and post-purchase. Summing up, research questions in this context include:

- Should internal product upgrades in case of permanent purchases be priced lower, equally or higher as during the initial purchase situation? How do these different pricing strategies affect feature take-rates during the initial

purchase and afterwards? What consequences do these different pricing strategies have for firm evaluations?

Finally, while Erat and Bhaskaran (2012) find that consumers are more likely to purchase add-on features if a base product has a high (vs. low) price, it is conceivable that this effect may even be reversed in the case of internal product upgrades as consumers might expect to have access to features in a more expensive (vs. cheaper) base product without paying an extra fee. Hence, future research could investigate the following question:

- How does base product pricing (low vs. high) influence consumers' purchase intentions of internal product upgrades as well as their evaluations of the firm?

2.7.3 Promotion-related decisions

Key insights from research on related product feature modification approaches. To the best of my knowledge, research on promotional messages to influence consumers' responses with a special focus on product feature modification is scant. One notable exception is the research by Gershoff et al. (2012) in the context of product versioning. The authors investigate a strategy that puts the product feature modification approach itself at the center of the message to mitigate negative effects of feature removal. They show that informing consumers that product versioning is a normative standard in the marketplace can reduce perceptions of unfairness and ultimately increase their purchase intentions of the product.

Key insights from research on internal product upgrades and avenues for future research. To date, no marketing research has investigated promotional strategies in the context of internal product upgrades, which opens up room for further research. Instead of framing the entire product feature modification approach to increase consumers' product purchase intentions, future research could also

investigate a strategy at the intersection between promotion strategies and product strategies. Building on research by Schaefers et al. (2022), who found that internal product upgrades for intangible (vs. tangible) features are perceived more favorably, one could test whether framing a focal feature, for instance, by emphasizing its intangible vs. tangible aspects, could help to enhance the favorability of internal product upgrades. Additionally, the ongoing developments in the era of the Internet-of-Things would allow for a new form of firm communication based on the increasing equipment with Internet-connected constituents that enable real-time data flow (Ng and Wakenshaw 2017). Following the example of location-based marketing in mobile advertising (e.g., Fong et al. 2015), firms could approach consumers that are, for instance, on their way to a ski trip to the mountains and offer them an upgrade for the LED-matrix package or seat-heating. On the one hand, consumers could be more prone to purchase the upgrade as they see the concrete need, however, they could also feel a privacy intrusion—which creates the classic tension between feeling served vs. exploited by technology (Puntoni et al. 2021). Important questions are:

- How can internal product upgrades be advertised to increase feature upgrade take-rates after the purchase? Can feature framing (emphasizing intangible vs. tangible aspects) help to increase the favorability of internal product upgrades? Can situation-specific offers based on consumer location/driving data help to increase upgrade take-rate in the product usage phase or would consumers have feelings of intrusiveness?

By equipping products with Internet-based constituents and sensors, the product itself might also be able to communicate with consumers and hence, become an important promotional channel in the product usage phase. Building on research on product anthropomorphism (e.g., Guthrie 1993, 1997), future research could, for instance, investigate whether upgrade take-rates can be increased if the consumer is approached by the product (vs. the firm).

- Can the product itself (e.g., car, refrigerator) become a promotional tool for internal product upgrades in the usage phase? For instance, does it make a

difference, if the product (vs. the firm) makes consumers aware about an upgrade option?

2.7.4 Place-related decisions

Key insights from research on related product feature modification approaches. To the best of my knowledge, there is very little research on how decisions related to the distribution of (1) products with feature modifications (in case of feature modifications that are coupled to the base product, like product versioning, mass customized products or next generation products) or (2) feature modifications itself (in case of decoupled feature modifications, like add-on features, continuous OTA software updates, or internal product upgrades) affect consumer evaluations. In the context of product versioning, where feature removal results in a separate, inferior product, Gershoff et al. (2012) showed that offering inferior and superior products at different stores reduces the negative effects on purchase intentions of the inferior product. However, this strategy is not applicable to internal product upgrades, as the superior and inferior product are one product, not two separate ones.

Key insights from research on internal product upgrades and avenues for future research. So far, no research on internal product upgrades has investigated how strategic place decisions can influence consumer responses. However, there might be an interesting research opportunity as equipping products with Internet-based constituents might not only enable products to become a promotional channel, but at the same time a distribution channel. Future research could investigate the following questions:

- Can the product itself (e.g., car, refrigerator) become an important sales channel for internal product upgrades or should upgrades be offered via smartphone apps/web interfaces? Is there a difference in take-rates between the different sales channels?

2.7.5 Process-related decisions

Key insights from research on related product feature modification approaches. There is some research on how the process of manufacturing and or delivering product feature modifications influence consumer responses. In the context of product versioning, Gershoff et al. (2012) find that restricting a functionality at earlier (vs. later) stages of the production of the product mitigates the negative effects of product versioning on consumers' product purchase intentions. Moreover, the way a product feature modification is presented during its delivery also influences consumer responses. In the context of product mass customization, Valenzuela et al. (2009) find that consumers show lower levels of experienced difficulty, greater satisfaction, and higher purchase intentions for a customized product using a by-attribute (sequential configuration process) vs. by-alternative (choice from a set of fully assembled alternatives) customization interface. On a related note, Wiegand and Imschloss (2021) reveal that consumers' attitude and purchase intentions of the base product differ when multiple continuous OTA software updates (vs. external upgrades) are offered separately (vs. as a bundle). Specifically, continuous OTA software updates are perceived more favorably when they are presented as a bundle.

Key insights from research on internal product upgrades and avenues for future research. Building on Wiegand and Imschloss (2021), future research could examine whether offering several internal product upgrades as a bundle could also be a viable strategy to promote sales. Moreover, future research could investigate whether different design options of the upgrading process (e.g., displaying progress bars or gear wheels as consumers pay and unlock internal product upgrades) have an influence on consumers' tangibility perceptions and downstream responses. Hence, further studies could address the following questions:

- Can providing internal product upgrades as part of a bundle help to promote sales?
- How should the process of upgrade delivery be designed (e.g., does it make a difference if firms display progress bars, gear wheels etc.)?

2.8 The impact of consumer-related factors

Key insights from research on related product feature modification approaches. It is inevitable that most existing research focuses on factors related to decisions along the strategic wheel of product feature modifications that are controlled by the firm. However, extant research also provides some insights on individual consumer-related factors (e.g., individual predispositions) that influence their responses to different established product feature modification approaches. For instance, consumers with a high product expertise respond more favorably to product mass customization (in terms of reduced complexity and higher product utility) than consumers with a low expertise (Dellaert and Stremersch 2005). On a related note, Bharadwaj et al. (2009) find that consumers' responses to customized (vs. standardized) products depend on their preference insights. The authors show that consumers with a higher confidence in their preferences have higher repatronage intentions when purchasing a customized versus standardized system. Additionally, existing research shows that culture has an influence on different mass customization toolkits (de Bellis et al. 2019). Presenting the same information isolated (by-attribute) to consumers from Western cultures but contextualized (by-alternative) to consumers from Eastern cultures has a positive effect on product satisfaction, purchase likelihood and the amount of money spent on the product.

Key insights from research on internal product upgrades and avenues for future research. To date, there is no research on internal product upgrades investigating consumer-related factors. However, existing studies on established product feature modifications and beyond might serve as a suitable starting point for

future research on the influence of consumer-related factors on the evaluation of internal product upgrades. As outlined above, perceptions of ownership might play a key role for consumers' evaluations of internal product upgrades. There might be consumer groups based on sociodemographic factors, like age (Belk 1988), gender (Rudmin 1994), or culture (de Bellis and Venkataramani Johar 2020), that might not place as much importance on control and ownership and hence, perceive offering fee-based access to built-in hardware features more favorably. Additionally, psychographic factors, such as consumers' preference insights and product expertise (Bharadwaj et al. 2009; Dellaert and Stremersch 2005) could also be examined in the context of internal product upgrades. Thus, future research could investigate the following questions:

- Which sociodemographic factors (e.g., age, gender or culture) play a role in consumer responses to internal product upgrades? For instance, do cultures that assign lower importance to ownership perceive internal product upgrades more positively than cultures for which ownership is important?
- Which psychographic factors (e.g., preference insights and product expertise) play a role for consumers' evaluations of internal product upgrades?

Moreover, internal product upgrades might not only be relevant in business-to-consumer relationships, but represent an important use case in business-to-business markets. For instance, internal product upgrades could be offered for production machines or car fleets. In a business-to-business context, perceptions of ownership might rather play a subordinate role, which might enhance the favorability of internal product upgrades. Future research could investigate the following questions:

- How do internal product upgrades influence B2B relationships? Do B2B customers also have subjective feelings of ownership for internal product upgrades?

2.9 Conclusion

Driven by the era of the Internet-of-Things, physical products have become reconfigurable after the product purchase which allows firms to offer internal product upgrades, that is, a fee-based activation of restricted features throughout their lifecycle. This new business model offers a plethora of new opportunities and challenges for firms. The purpose of the current research is to illustrate how internal product upgrades relate to other product feature modification approaches and to generate insights on how internal product upgrades could influence consumers' (1) product-related responses and (2) firm-related responses by building on existing literature inside and outside the domain of product feature modifications. Moreover, this research presents a number of factors that can influence the proposed responses. Using the strategic wheel of product feature modifications, I highlight key areas of strategic decision making that are important in the context of product feature modifications, including product, pricing, promotion, place and processes. Moreover, different consumer-related factors might also influence consumers' evaluations of internal product upgrades. Finally, I offer suggestions for future research on internal product upgrades in each of these areas. The insights provided by this research reveal that product feature modifications are fragmented and complex and that firms have to consider various strategic decisions that are sometimes interrelated. However, extant literature can provide important impulses for studying internal product upgrades and researchers can draw inspiration from the research directions and questions raised in this paper.

Table 2.2. Exemplary future research questions for research on internal product upgrades.

Consumers' product-related responses	• How do internal product upgrades influence consumers' purchase intentions for the base product? Are consumers willing to pay more for the increase in convenience and flexibility they get in case of internal product upgrades? • Are there any differences in product liking before vs. after the purchase of the base product? Do consumers give more weight to product flexibility and less weight to product usage enjoyment during the initial purchase? Are consumers overwhelmed by the numerous options they have if they want to upgrade their product after purchase? • How do internal product upgrades change consumers' personal connection to the product after purchase? For instance, do locked features dilute consumers' base product ownership perceptions? • How do internal product upgrades influence consumers' self-identity? Do they strengthen or weaken self-identity? • Do locked features cause a sense of incompleteness in consumers?
Consumers' firm-related responses	• How do internal product upgrades (compared to standard products or other product feature modification approaches) influence consumer-firm relationships (e.g., in terms of their attitude towards the firm, loyalty, word-of-mouth)? Do they have a positive or negative overall effect on firm-related outcomes? • Is there a difference in consumers' evaluation of the firm offering internal product upgrades during the base product purchase vs. after the base product purchase, that is, does actual base product ownership change consumers' evaluations of the firm?
Strategic decisions Product	• Which types of feature-related factors (e.g., feature alignability, feature innovativeness) strengthen/weaken the favorability of internal product upgrades for consumers' base product and feature evaluations? • How does the nature of the base product (e.g., hedonic vs. utilitarian; feature-rich vs. feature poor) influence purchase outcomes for internal product upgrades? Do consumers' responses to internal product upgrades and related feature ownership perceptions differ for utilitarian and hedonic features? • Should internal product upgrades be allowed for any features or should they be restricted to non-security features? • Who do consumers blame in case of accidents that might have been prevented or other harmful events (e.g., hurricanes) which they could have escaped from more easily if certain features (e.g., LED matrix package, parking assistant, more range) were unlocked? How does this affect their relationship to the firm?

Strategic decisions Price	• How do different base product consumption modes (purchase, leasing/renting, short-term access-based consumption) influence consumer responses to internal product upgrades? Is there a congruency effect such that base product consumption mode and feature consumption mode should be aligned or are other combinations more effective? • Should internal product upgrades in case of permanent purchases be priced lower, equally or higher as during the initial purchase situation? How do these different pricing strategies affect feature take-rates during the initial purchase and afterwards? What consequences do these different pricing strategies have for firm evaluations? • How does base product pricing (low vs. high) influence consumers' purchase intentions of internal product upgrades as well as their evaluations of the firm?
Strategic decisions Promotions	• How can internal product upgrades be advertised to increase feature upgrade take-rates after the purchase? Can feature framing (emphasizing intangible vs. tangible aspects) help to increase the favorability of internal product upgrades? Can situation-specific offers based on consumer location/driving data help to increase upgrade take-rate in the product usage phase or would consumers have feelings of intrusiveness? • Can the product itself (e.g., car, refrigerator) become a promotional tool for internal product upgrades in the usage phase? For instance, does it make a difference, if the product (vs. the firm) makes consumers aware about an upgrade option?
Strategic decisions Place	• Can the product itself (e.g., car, refrigerator) become an important sales channel for internal product upgrades or should upgrades be offered via smartphone apps/web interfaces? Is there a difference in take-rates between the different sales channels?
Strategic decisions Process	• Can providing internal product upgrades as part of a bundle help to promote sales? • How should the process of upgrade delivery be designed (e.g., does it make a difference if firms display progress bars, gear wheels etc.)?
Consumer-related factors	• Which sociodemographic factors (e.g., age, gender or culture) play a role in consumer responses to internal product upgrades? For instance, do cultures that assign lower importance to ownership perceive internal product upgrades more positively than cultures for which ownership is important? • Which psychographic factors (e.g., preference insights and product expertise) play a role for consumers' evaluations of internal product upgrades?

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2.11 Appendices

Appendix 2.A. Overview of essential product feature modification literature.

STUDY	OUTCOME	EVALUATION SITUATION	DECISIONS ORGANIZED AROUND THE STRATEGIC WHEEL OF PRODUCT FEATURE MODIFICATIONS	KEY FINDINGS
NEXT-GENERATION PRODUCTS				
Nowlis and Simonson (1996)	Product value, product choice	Purchase situation	• Product: Existing features (inferior vs. superior), Quality reputation (low vs. high) • Price: Price of base product (lower vs. higher)	Adding a new feature increases the value of a product more if it is added to a product that (1) has relatively inferior (vs. superior), (2) is perceived as low (vs. high) quality and (3) has a higher (vs. lower) price.
Mukherjee and Hoyer (2001)	Product utility	Purchase situation	• Product: Base product complexity (low vs. high)	Adding innovative features to a product increases product utility only for low complexity base products, but not for high-complexity base products.
Thompson et al. (2005)	Product utility, product satisfaction (expected & experienced)	Purchase situation & usage situation	• Product: Number of total features (low vs. high)	During the purchase, consumers give more weight to product capability and less weight to product usability and choose products with more (vs. less) features even though this does not maximize their satisfaction during product usage.
Gill (2008)	Incremental value of the feature	Purchase situation	• Product: Nature of base product (hedonic vs. utilitarian), Nature of feature (hedonic vs. utilitarian)	Adding a hedonic feature to a product with utilitarian base adds greater incremental value than adding a utilitarian feature to a hedonic base product. Moreover, for utilitarian products, the incremental value is higher when an incongruent, hedonic feature (vs. a congruent utilitarian feature) is added. Contrarily, the incremental value of a hedonic product is lower when adding an incongruent, utilitarian feature (vs. a congruent, hedonic one).

STUDY	OUTCOME	EVALUATION SITUATION	DECISIONS ORGANIZED AROUND THE STRATEGIC WHEEL OF PRODUCT FEATURE MODIFICATIONS	KEY FINDINGS
NEXT-GENERATION PRODUCTS				
Thompson and Norton (2011)	Product choice	Purchase situation	• Product: Number of total features (low vs. high)	When consumers are expected to be evaluated by other individuals, they are more likely to choose products with a high (vs. low) number of features as they are perceived more positively, more tech savvy and more open to new experiences.
Ma et al. (2015)	Adoption intention of product + feature	Purchase situation	• Product: Feature locus (detached vs. integrated), Feature innovativeness (incremental vs. radical)	Detachable features lead to higher product purchase intentions than (fully useable) integrated features. However, this effect is contingent on the innovativeness of a given feature. Detachable (vs. integrated) features are more favorable for really innovative features, but not for incrementally innovative features.
PRODUCT VERSIONING				
Gershoff et al. (2012)	Product choice / preference / purchase intentions	Purchase situation	• Product: Meaningless (a) observable differentiation (same vs. different color) (b) unobservable differentiation (kept vs. removed feature) • Promotion: Normative standard (control vs. norm) • Place: Spatial differentiation (same vs. different distribution channel) • Process: Temporal differentiation (feature reduction at earlier vs. later stage)	Product versioning results in lower purchase intentions for the product. The negative effects can be reduced by framing versioning as a normative standard and by increasing the differentiation between standard and versioned products.

STUDY	OUTCOME	EVALUATION SITUATION	DECISIONS ORGANIZED AROUND THE STRATEGIC WHEEL OF PRODUCT FEATURE MODIFICATIONS	KEY FINDINGS
MASS CUSTOMIZED PRODUCTS				
Franke and Piller (2004)	WTP for product	Purchase situation	• None	Consumers have a higher WTP for customized (vs. standard) products.
Dellaert and Stremersch (2005)	Usage choice	Purchase situation	• Product/process: Number of mass customizable features (low vs. high) • Price: feature pricing (individual vs. combined)	Usage of mass customized products is influenced by product utility and configuration complexity (which also influences product utility). Different factors influence complexity and product utility: A high (vs. low) number of mass customizable features increases product utility. Moreover, individual (vs. combined) pricing of features decreases product utility and increases complexity. Product expertise is an important consumer-related moderator.
Bharadwaj et al. (2009)	Repatronage intention	Purchase situation	• None	Consumers' intentions to return to the firm are higher for customized (vs. standardized) offerings. This effect only holds for consumers with high preference insights.
Franke et al. (2009)	Product WTP, purchase intentions, attitude; Delta WTP for product	Purchase situation	• None	Consumers have a higher WTP, higher purchase intentions, and a higher product attitude for customized (vs. standard) products. The effects are enhanced by consumer-related factors (i.e., preference insights and ability to express preferences).
Valenzuela et al. (2009)	Choice difficulty, satisfaction, purchase intentions	Purchase situation	• Process: By-attribute vs. by-alternative interface	Consumers show lower level of experienced difficulty, greater satisfaction, and higher purchase intentions for the customized option using a by-attribute (vs. by alternative) customization.

STUDY	OUTCOME	EVALUATION SITUATION	DECISIONS ORGANIZED AROUND THE STRATEGIC WHEEL OF PRODUCT FEATURE MODIFICATIONS	KEY FINDINGS
MASS CUSTOMIZED PRODUCTS				
Franke and Schreier (2010)	Delta WTP for product	Purchase situation	• None	Consumer valuation of a customized product is higher for consumers that perceive a higher preference fit and higher process enjoyment. Moreover, in case of high (low) preference fit, perceived process effort has a positive (negative) effect on valuation. Process enjoyment has a positive effect even under low preference fit, even though the effect is strengthened under high fit.
de Bellis et al. (2019)	Product satisfaction, purchase intention, money spent	Purchase situation	• Process: By-attribute vs. by-alternative interface	Consumers from Western cultures respond more favorably if information is presented isolated (by-attribute), while consumers from Eastern cultures show more favorable responses if information is contextualized (by-alternative).
ADD-ON FEATURES				
Bertini et al. (2009)	Product utility, WTP for product	Purchase situation	• Product: Feature alignability (alignable vs. non-alignable features)	Product are evaluated less favorably when a firm offers alignable add-on features (vs. control). In turn, offering non-alignable add-on features (vs. control) increases product utility. Offering downgrades for alignable features has a positive effect on product utility.
Erat and Bhaskaran (2012)	Feature purchase intentions	Usage situation	• Price: Base product price (low vs. high)	Feature purchase intentions are higher if a base product has a high (vs. low) price.

STUDY	OUTCOME	EVALUATION SITUATION	DECISIONS ORGANIZED AROUND THE STRATEGIC WHEEL OF PRODUCT FEATURE MODIFICATIONS	KEY FINDINGS
CONTINUOUS OTA SOFTWARE UPDATES				
Foerderer and Heinzl (2017)	Product downloads, product ratings	Purchase situation & usage situation	• None	Feature updates increase the number of new customers. Moreover, feature updates decrease existing customers' product evaluations.
Wiegand and Imschloss (2021)	Attitude and purchase intention of the product	Purchase situation	• Price: Feature pricing (permanent purchases vs. temporary rent) • Process: Feature bundling (no vs. yes)	Continuously upgradeable products (vs. standard products) have a positive effect on consumers' base attitude and purchase intention of the base product. However, products that allow for continuous OTA software updates are perceived less favorably than continuous external hardware upgrades. This effect is attenuated if OTA software updates are offered as a bundle. Moreover, temporary (vs. permanent) OTA software updates are evaluated less favorably.
INTERNAL PRODUCT UPGRADES				
Wiegand and Imschloss (2021)	Attitude and purchase intention of the product	Purchase situation	• Price: Feature pricing (permanent purchases vs. temporary leasing)	There is no difference in consumers' attitude and purchase intentions of the base product if internal product upgrades are offered permanently vs. temporarily.
Schaefers et al. (2022)	Feature purchase intention	Usage situation	• Product: Feature tangibility (tangible vs. intangible) • Price: Feature pricing (pay-per-use vs. flat-rate)	Offering fee-based access to tangible (vs. intangible) features lowers purchase intentions of the feature. Moreover, consumer purchase intention is higher for features that are offered under flat-rate (vs. pay-per-use) pricing.

3 Essay 2: You want to sell this to me twice!? How perceptions of betrayal may undermine internal product upgrades

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Revising for Third Review at the Journal of the Academy of Marketing Science (VHB-Ranking A)

Physical products (e.g., cars, smartphones) increasingly evolve into dynamic service platforms that allow for customization through fee-based activation of restricted add-on features throughout their lifecycle. The authors refer to this emerging phenomenon as “internal product upgrades”. Drawing on normative expectations literature, this research examines pitfalls of internal product upgrades that marketers need to understand. Seven experimental studies in two different contexts (consumer-electronics, automotive) reveal that consumers respond less favorably to internal (vs. external) product upgrades. The analyses show that customer-perceived betrayal, which results from increased feature ownership perceptions, drives the effects. Moreover, this research identifies four boundary conditions: it shows that the negative effects are attenuated when (1) the company (vs. the consumer) executes the upgrading, (2) upgrades are offered at a discount, and (3) consumers upgrade an intangible (vs. tangible) feature. Finally, consumers react less negatively when (4) the base product is less relevant to their self-identity.

Keywords: Dynamic service platforms, Product modifications, Internal product upgrades, Consumer betrayal, Normative expectations, Psychological ownership

3.1 Introduction

"The concept of product is undergoing a rapid transformation in the digital age."
(Kannan and Li 2017, p. 31)

Driven by the Internet-of-Things (IoT), physical products are not static anymore. Rather, they evolve into dynamic service platforms that allow for customization throughout their lifecycle (Ng and Wakenshaw 2017). For instance, carmakers like Tesla, Daimler, and Audi increasingly transform their cars into such platforms: they sell vehicles with built-in add-on features that are deliberately restricted-by-design in their function (e.g., deactivated adaptive headlights; restricted extra-battery power); notably, for an additional fee, consumers can reconfigure their cars by activating those features over the course of their ownership.[5] We refer to this emerging phenomenon as *"internal product upgrades"* and define it as *fee-based activation of originally built-in, but deliberately restricted, optional features*. Internal product upgrades challenge the traditional way of product reconfiguration[6] through external add-ons, hereafter referred to as *external product upgrades* (e.g., Bertini et al. 2009; Erat and Bhaskaran 2012). Internal and external product upgrades are similar such that in both cases an existing base product (e.g., a car) is enhanced by adding a feature (e.g., digital radio receiver). However, they differ in terms of the locus of that added feature: in the case of *external* product upgrades, the focal feature is physically detached and sold separately from the base product; in contrast, in the case of *internal* product upgrades, the focal feature is already built-in to the product the consumer has purchased, but it is deliberately restricted and can (only) be activated after the consumer pays an additional fee. Against this conceptual background, we propose that internal (vs. external) product

[5] For instance, Tesla's 60 kWh vehicles were originally equipped with a 75 kWh battery that was deliberately restricted in its functionality via software by the company. Customers who owned the 60 kWh vehicle had the option to pay an extra fee of $2,000 to unlock the additional 15 kWh capacity after purchasing the vehicle.

[6] In our context, product reconfiguration means that a product's functionalities can be extended *after* the product is purchased. Thus, product reconfiguration is hereafter referred to as post-purchase product modification.

upgrades——although they ultimately result in the same functionality——trigger distinct consumer responses, which marketers need to understand as they consider offering internal or external upgrades to customers.

Internal product upgrades originated in the consumer-electronics industry (e.g., for laptops or cell phones), but are now increasingly employed across industries (O'Donnell 2017). Indeed, as Table 3.1 illustrates, internal product upgrades are forecasted to grow into a multi-billion-dollar business. For example, carmakers are expected to earn an additional €155 (= $184) billion by 2022 (Williams 2017) by offering consumers the opportunity to enhance their vehicle over its lifecycle. Notably, internal product upgrades also reduce production costs, as manufacturers can realize economies-of-scale by producing cars with identical features (Williams 2017); accordingly, firms anticipate internal product upgrades to provide considerable additional profit.

Table 3.1. Use of internal product upgrades in the marketplace and exemplary consumer reactions.

Firm	Product	Internal product upgrade	Source
Automotive industry			
Tesla	Tesla Model S	Additional battery capacity, Autopilot	The Guardian (2017); Current Automotive (2019)

Exemplary consumer reactions (www.engadget.com, 2017)

- "WTF?! No. I'm now going to be charged to be able to use MY CAR?! I'm already paying you a crap ton of money. I OWN the car. I also OWN everything inside the car. Unless you can prove there's a clause in the title that says I don't. The fact they have now openly proven they are limiting the capabilities of my vehicle after I have bought it is B.S."
- "What the hell? I feel like the real news story here is that Tesla intentionally hobbles the capabilities of their cars so they can sell you more expensive ones that have basically the same guts. How is this okay? You're paying thousands of dollars to essentially buy the same car only without the built-in virus. […]"

Exemplary media quotes

- "On the one hand, it's arguably nice to have the ability to "add" these hardware features after the fact (even with the post-purchase $500 fee above what it would have cost "built-in" to a new car), but there is something that doesn't seem right about intentionally disabling capabilities that are already there." (Vox Media)
- "Starting in 2016, Tesla produced a run of Model S and X cars equipped with battery packs built to have 75 kilowatt-hours of capacity but constrained by software to have access to only 60 to 70 kilowatt-hours of power." (The New York Times)

- "Tesla's cheaper models, introduced last year, have the same 75KwH battery as its more costly cars, but software limits it to 80% of range. Owners can otherwise buy an upgrade for several thousands of dollars." (The Guardian)

Audi	Audi e-tron	Matrix LED headlights, Seats with massage function, Digital radio	Audi (2019); Spiegel (2016)
Daimler	Mercedes A-Class	Digital radio, Hard disc navigation, Smartphone integration	Mercedes Benz (2019) digitaltrends.com (2019)
Porsche	2019 Porsche 911	Navigation and infotainment, Car remote functions	Porsche (2019)
BMW	BMW 530e iPerformance	Intelligent personal assistant, Infotainment, Real time traffic information	BMW (2019)
Opel	Opel Adam	Emergency call, WiFi feature	Opel (2019)
KTM Sport	KTM Motorcycle	1290 Super Adventure Navigation	KTM (2019)
Consumer electronics industry			
Intel	Pentium G6951 dual-core LGA1156	CPU features	Gershoff et al. (2012); ZDnet

Exemplary consumer reactions (www.techpowerup.com, 2010)

- "What a waste of resources, putting out disabled yet fully working chips is just rubbish to be honest. You pay for hardware you should have access to the hardware."
- "[…] i for one am not in the habit of buying something only to have someone sell me the rest of the features on the object i just bought."

Exemplary media quotes

- "Intel designed the G6951 to support "hardware feature upgrades" by purchasing them and enabling them using a software, so users with this processor installed can upgrade their systems by enabling that are otherwise locked for the SKU. The $50 upgrade fetches support for HyperThreading Technology, enabling four threads on the processor; and unlocks the disabled 1 MB of the L3 cache (Clarkdale has 4 MB of L3 cache, of which 1 MB is disabled on the Pentium SKUs)." (TechPowerUp)

Apple	iPod touch 2G	Bluetooth feature	ZDnet

Exemplary consumer reactions (www.zdnet.com, 2009)

- "While the $10 is not a huge deal, I still think the charge is rather stinky. What's next, a $20 upgrade to unlock secret GPS? I paid for the hardware and the ability to use it should be a given in every sense of the word."
- "And that's why I don't buy anything Apple. I can understand paying for something you want in addition to the device, but to include a feature on an expensive device and then demand payment to turn on that feature is nuts !"

Exemplary media quotes

- "[…] Apple's Greg Joswiak confirmed that Bluetooth was present on the iPod touch 2G and that the next $10 upgrade would activate it for users. Now, I don't begrudge any company charging for things, but Apple does seem to go to some crazy lengths to milk customers. The issue isn't that Bluetooth wasn't on the spec sheet in the first place, it's that everyone's who has bought an iPod touch has already paid for the hardware, and is now having to pay again to unlock hardware that they've already paid for." (ZDNet)

Motorola	Xoom	WiFi feature	Gershoff et al. (2012)
Amazon	Amazon Kindle Fire HD	Camera feature	Computerbild (2013)
Electronics industry (B2B)			
Lenovo	System x3250 M5 Rack Server	Emulex VFA5.2 10GbE SFP+ Adapter Integrated Management Module II Remote Presence feature	Lenovo (2017)

Despite the emerging importance of internal product upgrades in the marketplace, research on how consumers respond to having to pay for activating deliberately restricted features in a physical product they have already purchased, and which they therefore own, is scarce. As Table 3.2 shows, prior research on product modifications has focused on phenomena such as *external* product upgrades through *add-on features* (i.e., separate discretionary benefits to a corresponding base product; e.g., Bertini et al. 2009; Erat and Bhaskaran 2012; Ma et al. 2015; Ülkü et al. 2012), *product versioning* (i.e., deliberately subtracting functionality from a product in the manufacturing process; e.g., Deneckere and McAfee 1996; Gershoff et al. 2012), and *product upgrading* (i.e., replacing an existing product with an enhanced version of the product; e.g., Okada 2001; 2006). Finally, some research has examined product upgrades via 'Over-the-Air' updates (*OTA updates*) (e.g., OTA updates to dispense 'bug fixes' and other software improvements; Foerderer and Heinzl 2017; Wiegand and Imschloss 2021). Although these approaches (add-on features, product versioning, product upgrading, OTA updates) are related phenomena, internal product upgrades are conceptually distinct such that consumers may respond differently because of key characteristics of the internal upgrade (i.e., internal features are deliberately restricted by-design, but can be activated after buying the base product by paying an additional fee; internal upgrades relate to a consumer's product/feature enhancement decision rather than a product replacement decision).[7] Finally, marketing research has recently started to examine consumer responses to internal product upgrades. However, extant research has either focused on consumers' pre-purchase responses (Wiegand and

[7] Research outside the marketing discipline has begun examining OTA updates. However, existing studies (e.g., conducted in information systems research) investigate operational aspects (e.g., Bauwens et al. 2020) or focus on consumer reactions to *external software* feature updates (e.g., Foerderer and Heinzl 2017, Franzmann et al. 2019a, Franzmann et al. 2019b); but they do not examine fee-based upgrades of *built-in* features, which is a key characteristic of internal product upgrades. Moreover, our conceptualization of internal product upgrades encompasses software *and* (even more important) hardware features. Investigating both feature types is important, though, as (a) upgrading hardware features becomes increasingly relevant in practice and (b) our studies also reveal that consumers react differently to upgrading software versus hardware features.

Imschloss 2021) or investigated consumers' feature purchase intentions for non-permanent internal product upgrades depending on (a) feature tangibility and (b) feature pricing, yet without comparing them to established post-purchase product modification (Schaefers et al. 2022). Thus, the question of how consumers react to permanent internal product upgrades in the post-purchase phase in contrast to the so far established way of external product upgrades remains unanswered.

To address these gaps and to support the diffusion of internal product upgrades, we examine consumer responses to internal (vs. external) product upgrades by building on research on normative expectations in exchange relationships (e.g., Aggarwal 2004) and psychological ownership (e.g., Reb and Connolly 2007). We theorize that consumers respond negatively to internal (vs. external) product upgrades because consumers may feel betrayed when they are expected to pay an additional fee to gain access to a feature that is already built into *their product* (i.e., their legal and/or perceived property). In short, we suggest that internal product upgrades can backfire on companies despite their potential benefits for stakeholders (i.e., firms and consumers) (note that Table 3.1 also illustrates this idea with anecdotal evidence of consumers responding (very) negatively to internal product upgrades).

Table 3.2. Illustrative review of related product modification phenomena in the literature.

Source	Example base product (modified feature)	Study characteristics	Key purpose	Key findings
Bertini et al. (2009)	Digital camera (memory card, zoom lens); Laptop computer (processor and hard drive upgrade/reduction)	• Base product not owned • External feature locus • No artificial feature limitation • No post-purchase configuration • No replacement decision	Investigate the impact of the type of add-ons on the base product evaluation	Offering external add-ons affects a base product's evaluation. Alignable add-ons reduce base product value; non-alignable add-ons improve the value of the base product. When consumers' uncertainty about the product value is low, the impact is reduced.
Erat and Bhaskaran (2012)	Smartphone (karaoke game); Ski pass (queue-skipping voucher)	• Base product owned • Internal & external feature locus • No artificial feature limitation • Post-purchase configuration • No replacement decision	Investigate the effect of base product price and base product usage intensity on purchase likelihood for the add-on	When the price of the base product is high, or when the prior usage of the base product is low, the purchase likelihood for the add-on increases. The effects of price and of usage are stronger for coupled add-ons compared with decoupled add-ons.
Foerderer and Heinzl (2018)	Smartphone (software update)	• Base product owned • External feature locus • No artificial feature limitation • Post-purchase configuration • No replacement decision	Investigate the effects of software feature updates on product demand and ratings of new and existing customers.	Software feature updates attracted new customers, but alienated existing consumers. However, the authors investigated external third-party software features, not built-in features that were deliberately restricted in their functionality by design.
Gershoff et al. (2012)	Printer (printing speed chip); Smartphone (Bluetooth, 10 MB storage space); MP3 player (memory chip)	• Base product not owned • Internal feature locus • Artificial feature limitation • No post-purchase configuration • No replacement decision	Investigate the impact of feature-degraded products on the purchase intention for the brand	Products with artificially degraded features are perceived as unfair and decrease purchase intentions. Reducing the similarity between the degraded and the enhanced product model can attenuate the negative effect of degrading.
Gill (2008)	PDA (Yellow Pages & satellite radio); MP3 player (Yellow Pages & satellite radio)	• Base product not owned • Internal feature locus • No artificial feature limitation • No post-purchase configuration • No replacement decision	Investigates the incremental value that is added by congruent vs. incongruent functionalities to hedonic vs. utilitarian base products	Adding an incongruent, hedonic functionality (HF) to an utilitarian base product is valued more than adding a congruent, utilitarian functionality (UF). Adding an incongruent, UF to a hedonic base product is valued less than adding a congruent, HF.
Liu et al. (2018)	Digital camera (memory card)	• Base product owned • External feature locus • No artificial feature limitation • Post-purchase configuration • Replacement decision required	Investigate the impact of incompatibility of add-ons with base products and the role of past purchases on replacement purchases	Consumers are locked-in by their past purchase behavior and by the utility that compatible add-ons provide. The add-on inventory effect is enhanced when future prices of add-ons are higher; lock-in is attenuated when future incompatibility is expected.
Ma et al. (2015)	Car (autopilot technology, adaptive cruise control system) Smartphone (kinetic charging system)	• Base product not owned • Internal vs. external feature locus • No artificial feature limitation • No post-purchase configuration • No replacement decision	Investigate the impact of innovation locus and innovation newness on the adoption of the entire product (base product + added feature)	Offering innovative features as external (vs. internal) component increases product adoption intentions (base product + added feature). However, the effect of innovation locus only exists for very new innovations, not for incrementally new ones.

Okada (2001)	Time share beach house (superior beach house); Sports club membership (superior membership); Bicycle (superior bike)	• Base product owned • Internal feature locus • No artificial feature limitation • No post-purchase configuration • Replacement decision required	Investigates the negative effect of a write-off of a purchased product on a replacement purchase decision and demonstrates ways in which it can be attenuated	When facing a replacement purchase decision, consumers consider the mental book value of a purchased product. Pricing tools, such as trade-ins or high one-time usage fees for a comparable product, can mitigate the write-off of the mental book value.
Okada (2006)	Sports tickets (better seats); Concert seat tickets (better seats); Mobile phone (enhanced features)	• Base product owned • Internal feature locus • No artificial feature limitation • No post-purchase configuration • Replacement decision required	Investigates WTP for upgrades and how an enhanced product should be positioned to reduce the psychological costs that are associated with the existing product and facilitate replacement purchases	WTP for the enhanced alternative is higher if it is dissimilar to the existing alternative. This can be attributed to a reduction of sunk costs. Furthermore, non-alignable enhancements are more desirable than proportional alignable enhancements.
Schaefers et al. (2022)	Car (seat heater, intelligent voice assisstant)	• Base product owned • Internal feature locus • Artificial feature limitation • Post-purchase configuration • No replacement decision	Investigate the impact of feature tangibility and feature pricing for non-permanent internal product upgrades on feature purchase intentions	Consumers show lower purchase intentions for tangible vs. intangible features. Moreover, their purchase intentions are higher for flat-rate vs. pay-per-use pricing.
Thompson et al. (2005)	Digital video/audio player (low, medium, high number of features)	• Base product (not) owned • Internal feature locus • No artificial feature limitation • No post-purchase configuration • No replacement decision	Investigate the effects of increasing the number of product features on consumers' product evaluations	Increasing the number of product features positively affects perceived capability but negatively affects perceived usability.
Ülkü et al. (2012)	Desktop computer (hard drive, DVD drive, flat-screen monitor)	• Base product (not) owned • External feature locus • No artificial feature limitation • Post-purchase configuration • (No) replacement decision	Investigate how consumers respond to modular products depending on the upgrade interval, the pricing plan of the base product/the feature, and product quality and effort	Consumers are willing to pay a premium for modular products that decreases with the time to upgrade. Different pricing plans are profitable for firms depending on short vs. long upgrade intervals; immediate vs. distant upgrades affect the favorability of upgrade vs. replacement decisions.
Wiegand and Imschloss (2021)	Car (different features, e.g., extended range, improved acceleration)	• Base product not owned • External vs. internal feature locus • (No) artificial feature limitation • No post-purchase configuration • No replacement decision	Investigate (a) how consumers' base product evaluations differ for continuous OTA software updates and external hardware upgrades and (b) the role of feature pricing for consumer responses to OTA software updates vs. internal product upgrades	While continuously upgradeable products (vs. standard products) have a positive effect on consumers' base product evaluations, they are less favorable for products that allow for continuous OTA software updates (vs. continuous external hardware upgrades). Moreover, consumers' evaluate temporary (vs. permanent) OTA software updates less favorably. However, there is no difference for internal product upgrades.
Current research	**Smartphone (memory chip)** **Car (digital radio, rear-view camera, driving performance software, head-up display)**	• **Base product owned** • **Internal vs. external feature locus** • **Artificial feature limitation** • **Post-purchase configuration** • **No replacement decision**	Investigate the impact of permanent internal (vs. external) product upgrades on consumers' behavioral responses (in terms of the willingness to pay for the feature and their loyalty intentions towards the firm)	This research is the first to empirically show that consumers' behavioral intentions are less favorable in response to internal (vs. external) product upgrades. It reveals that perceived feature ownership and perceived betrayal drive the effects. Finally, it shows three factors (i.e., upgrading responsibility, feature tangibility, and product-identity-relevance) that help companies reduce the negative effects of internal product upgrades.

To help marketers understand how consumers respond to internal product upgrades, we conducted seven studies that examine three major questions: (1) Will internal (vs. external) product upgrades have negative effects on consumer responses? (2) Which underlying mechanisms help explain these effects? (3) How can firms mitigate negative effects of internal product upgrades? In addressing these questions, our results show that internal (vs. external) product upgrades elicit negative effects (e.g., in terms of consumers' behavioral intentions toward the firm). Examining the underlying process, we demonstrate that these negative effects result from higher levels of consumer-perceived "feature ownership", which in turn, triggers perceived betrayal among consumers (Studies 1A and 1B). Moreover, our studies show that shifting the upgrading responsibility to the company (i.e., having the company, rather than the consumer, upgrade the focal feature) helps reduce the negative effects of internal product upgrades (Study 2). Furthermore, offering the upgrade at a discount (vs. same price) helps reduce some of the negative effects (e.g., on purchase intentions) (Study 3). Additionally, our findings suggest that internal product upgrades are more detrimental for tangible (vs. intangible) features (Studies 4A and 4B). Finally, an exploratory study (in which we surveyed consumers of a car-leasing firm) suggests that managers should take the product's relevance for a consumer's identity into account when offering tangible (vs. intangible) product upgrades (Study 5).

Our research makes several contributions. First, we introduce internal (vs. external) product upgrades as a quickly emerging marketplace phenomenon to the marketing literature and demonstrate its systematic negative impact on consumers' behavioral responses in the post-purchase stage. Prior work was largely concerned with consumer responses to product modifications at a *pre*-purchase stage (e.g., Bertini et al. 2009; Gershoff et al. 2012; Ma et al. 2015; Wiegand and Imschloss 2021), and the few studies on post-purchase responses either focused on external

product upgrades (e.g., Liu et al. 2018), non-built-in software applications (e.g., Erat and Bhaskaran 2012; Yoo et al. 2012), or non-permanent internal product upgrades (Schaefers et al. 2022), yet without comparing them to established modifications. As such, our research expands the literature on product modifications in general (e.g., Bertini et al. 2009; Ma et al. 2015), and it responds to recent calls for more research on product reconfigurations in particular (Ng and Wakenshaw 2017).

Second, we explore the underlying process that helps explain why consumers respond unfavorably to this new after-sales revenue model: internal product upgrades increase a consumer's perceived feature ownership, which then elicits consumer-perceived betrayal, and ultimately drives negative downstream effects (e.g., consumer intentions toward the firm).

Third, we investigate both conceptually meaningful and managerially relevant boundary conditions for the negative effect of internal product upgrades by examining the role of four moderating factors (i.e., upgrading responsibility, upgrade pricing/discounts, feature tangibility, and the base product's relevance for consumer identity). Importantly, our findings on these moderating effects not only help managers identify consumer segments that respond relatively more favorably to internal product upgrades, but also point to actionable strategies that help companies alleviate the negative effects of internal product upgrades.[8]

3.2 Theoretical background

3.2.1 Literature review

Product modifications at a post-purchase stage are becoming increasingly relevant for firms, as they are a means for after-sales revenue (Ellison 2005; Guiltinan 1987). To date, separately sold add-on features that enhance the value of

[8] Moreover, we further enhance the scholarly and managerial relevance of our research by providing additional studies (Appendix 3.F and 3.G), which identify potentially relevant moderators that, however, we found not to be effective in mitigating the negative effects of internal product upgrades.

an existing base product (e.g., additional memory cards for cell phones, processor upgrade cards for laptops) have been the dominant approach toward post-purchase product modifications. Accordingly, prior marketing research on post-purchase product modifications has focused on *external* product upgrades (e.g., Bertini et al. 2009; Erat and Bhaskaran 2012; Liu et al. 2018). For example, some research has examined how the availability of external add-on features influences the evaluation of the base product in the pre-purchase stage (e.g., Bertini et al. 2009). Other work (e.g., Erat and Bhaskaran 2012; Liu et al. 2018) focused on the post-purchase stage itself and examined how base product or add-on pricing influence the decision to purchase the add-on feature or the future replacement of the base product. Besides research on external product upgrades, Ma et al. (2015) are the first to differentiate between feature loci and compare the effect of non-restricted *internal* versus *external* features on pre-purchase adoption intentions. Finally, first empirical research also investigates internal product upgrades (Schaefers et al. 2022; Wiegand and Imschloss 2021). For instance, Wiegand and Imschloss (2021) examined how consumers' attitude and purchase intentions for the base product in the pre-purchase phase differ for internal product upgrades that are sold permanently for a one-time fee versus temporarily for rent. Instead, Schaefers et al. (2022) focused on the post-purchase phase to investigate consumers' purchase intentions for non-permanent internal product upgrades depending on a feature's tangibility (tangible vs. intangible) and feature pricing (monthly subscription vs. pay-per-use). Hence, while prior work offers valuable insights into various aspects of different product modifications (as Table 3.2 shows), it does not explain how consumers respond to internal product upgrades in relation to existing product modifications *after* they have purchased (and own) the focal base product. To address this void in the literature, we draw on insights about consumers' normative

expectations (e.g., Aggarwal 2004; Maxwell 1999), and propose the conceptual framework in Figure 3.1.

Figure 3.1. Conceptual framework.

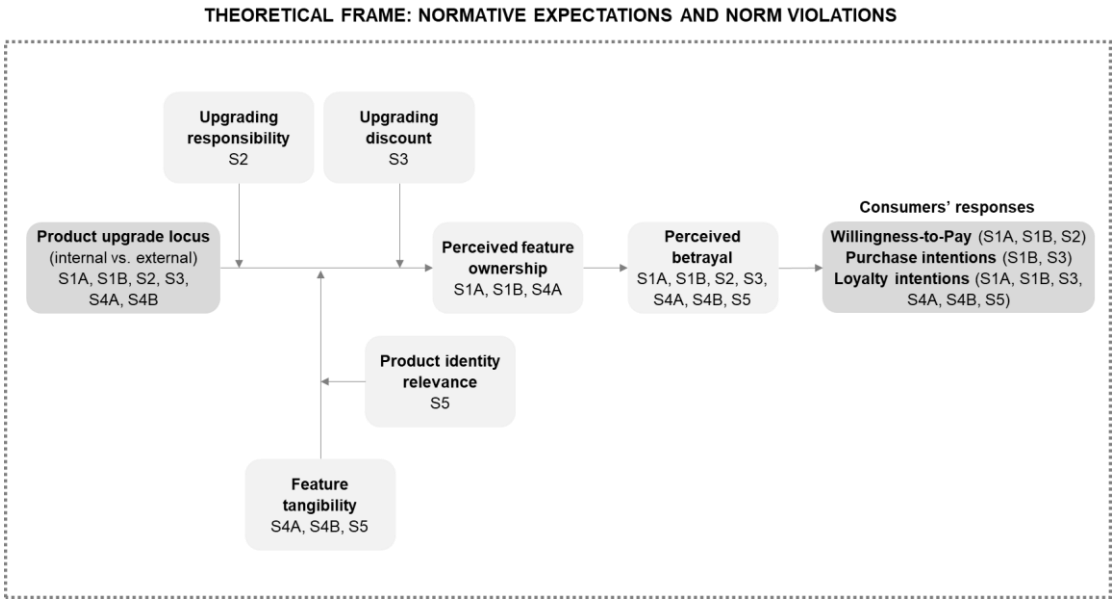


Figure 3.1. Consumer responses to product upgrade locus in light of boundary conditions from a normative expectations perspective. S1A, S1B, S2, S3, S4A, S4B and S5 stand for the studies that demonstrate the corresponding effects.

3.2.2 Hypotheses: Internal product upgrades and normative expectations

Exchange relationships between consumers and firms are governed by distinct norms (Aggarwal 2004). Norms are implicit, stable rules and guiding principles that function as a lens to evaluate the appropriateness of a firm's actions (Aggarwal and Zhang 2006; Maxwell 1999). Typically, the underlying norm within exchange relationships implies that both, consumers and firms, provide a comparable benefit in return for received benefits (i.e., quid pro quo; Aggarwal 2004; Clark and Mills 1993). Hence, exchange relationships focus on the balance of inputs relative to outcomes (Clark and Mills 1993).[9] As a reference point to evaluate

[9] Although we focus on exchange relationships, we note that communal norms can also influence commercial relationships. However, even in these relationships, the commercial elements dictate a certain level of quid pro quo, especially because relationships with firms almost always involve monetary payment (Aggarwal 2004). For instance, even though healthcare providers are often

whether a firm adheres to these relationship norms and whether it treats consumers fairly, consumers often consider their previous marketplace experiences that constitute the status quo (e.g., Kahneman et al. 1986; Xia et al. 2004).

Traditionally, when consumers purchased physical goods in exchange relationships, a full transfer of ownership occurred (Bardhi and Eckhardt 2012). With ownership, consumers are used to acquiring full property rights over the purchased object (e.g., the right to possess and be able to use all of its built-in components; Snare 1972). However, as internal product upgrades are making products more reconfigurable after the purchase, ownership boundaries become blurred. Even though a consumer may have no legal claim to use a focal feature without paying an extra fee, we expect that internal product upgrades nevertheless elicit psychological ownership for internal features as these features are built-into the base product, which customers have purchased and consider their property. This idea is in line with research suggesting that psychological ownership is inherent within an individual and that legal ownership is *not* a necessary condition for psychological ownership (e.g., Peck and Shu 2009; Reb and Connolly 2007).

Consequently, in the case of *internal* product upgrades, we expect that the fee-based activation of a focal feature, which is perceived to be part of one's property, can elicit perceptions of betrayal (i.e., a serious norm violation) because consumers expect to have free access to it and thus believe they have to pay extra to use their own property. Perceived betrayal is defined as "[…] a customer's belief that a firm has intentionally violated what is normative in the context of their relationship" (Grégoire and Fisher 2008, p. 250). In contrast, we theorize that *external* product upgrades should not elicit similar perceptions of betrayal as the external feature is a separate item that is not already part of the consumer's purchased product (Bertini et al. 2009; Erat and Bhaskaran 2012; Liu et al. 2018).

described through a communal lens, their services are linked to payment (and the vast majority of healthcare providers will not provide services without payment).

Research on exchange relationships suggests that these perceptions of betrayal, in turn, motivate consumers to restore fairness (e.g., by punishing or causing inconveniences to the firm; Grégoire and Fisher 2008; Grégoire et al. 2009; Ward and Ostrom 2006). Against this background, we expect that consumers respond less favorably to internal (vs. external) product upgrades in terms of their willingness-to-pay for the feature (WTP) and their loyalty intentions toward the firm, two managerially relevant outcome variables that are widely studied in marketing (e.g., Atasoy and Morewedge 2017; Chaudhuri and Holbrook 2001; Grégoire et al. 2009). We hypothesize:

H1: Consumers will respond less favorably (e.g., in terms of WTP or loyalty intentions) to internal (vs. external) product upgrades.

H2: There is a serial mediation such that internal (vs. external) product upgrades evoke higher perceived feature ownership, which triggers perceptions of betrayal, and ultimately drives consumers' downstream responses (per H1).

3.3 Overview of studies

We conducted seven studies across two contexts (consumer electronics and automotive) to examine our hypotheses (Table 3.3). Studies 1A and 1B provide initial evidence of consumers' negative reactions to internal (vs. external) product upgrades and the underlying psychological mechanisms (i.e., higher feature ownership → increased perceived betrayal) in a consumer-electronics context. Study 1B also rules out several alternative explanations (e.g., cost/effort perceptions, environmental friendliness). Studies 2-5 adopt a managerial focus to test how firms can mitigate the negative effects of internal product upgrades (these studies will also introduce corresponding moderator hypotheses, H3-H6). Study 2 examines whether shifting the upgrading responsibility from consumers to firms attenuates the negative effects of internal product upgrades (H3). In Study 3, we investigate whether a price discount attenuates the negative effects of internal

product upgrades (H4). Studies 4A and 4B examine the moderating role of feature tangibility (i.e., whether the negative effects of internal product upgrades can be buffered for features that are (perceived as) more *intangible*; H5). Finally, Study 5 offers managerially actionable segmentation criteria that allow firms to target consumers who are likely to respond more favorably to internal product upgrades related to the low (vs. high) identity-relevance of the product (H6); we demonstrate this moderating effect with customers of a global car-leasing company.

Table 3.3. Overview of studies, findings, and managerial implications.

Study	Dependent variables, *Base product (Feature)*	Hypothesis tested and main findings	Managerial implications
Study 1A: 2(internal, external) bw/ss	WTP for added feature Loyalty intentions *Phone (Memory chip)*	Participants showed less favorable behavioral intentions (WTP, loyalty intentions) in response to internal product upgrades. Serial mediation via perceived feature ownership and perceived betrayal. (H1, H2)	Managers should note that, although internal product upgrades may offer customization benefits to consumers, they might come with unintended consequences for firms, in terms of a lower WTP and less favorable loyalty intentions (Studies 1A & 1B).
Study 1B: 2(internal, external) bw/ss	WTP for added feature, Loyalty intentions *Phone (Memory chip)*	We replicate the results of S1A using a subtler manipulation. (H1, H2)	
Study 2: 2(internal, external) × 2(self-responsibility, firm-responsibility) bw/ss	WTP for added feature *Car (Digital radio receiver)*	Participants in the self-upgrading condition perceived internal (vs. external) product upgrades more negatively. This is buffered under company responsibility. (H1, H3)	Firms may want to establish the infrastructures to offer company-implemented upgrading instead of self-service based upgrading; at least, as long as internal product upgrades are not established as a new (normative) standard in the marketplace.
Study 3: 2(upgrade locus: internal, external) × 2(upgrade discount: no, yes) bw/ss	Purchase intentions, Loyalty intentions *Phone (Memory chip)*	A price discount can mitigate the negative effect of internal (vs. external) product upgrades on consumer's purchase intentions, but not on their loyalty intentions towards the firm. (H1, H4)	If a firm's goal is to increase purchases of internal product upgrades, offering it at a discounted price can help. However, the price discount (studied here) is not effective in increasing loyalty intentions.
Study 4A: 2(upgrade locus: internal, external) × 2(feature tangibility: tangible, intangible) bw/ss	Loyalty intentions *Car (Tangible: Rear view camera; Intangible: Driving assist software)*	Participants had less favorable behavioral intentions for internal (vs. external) upgrades of a tangible feature. This is attenuated when the upgraded feature is intangible. (H1, H5)	Firms should offer internal upgrades for intangible features (i.e., software, apps), but should anticipate negative consumer responses for tangible features (i.e., hardware). On a related note, firms should segment (1) customers based on their feature tangibility perceptions and especially target those who perceive the added feature as intangible, and (2) features for which they provide internal product upgrades and focus on features that are intangible in nature.
Study 4B: 2(internal, external) × measured (perceived feature tangibility) bw/ss	Loyalty intentions *Phone (Memory chip)*	Participants who perceived the feature as rather tangible, reported less favorable behavioral intentions for internal (vs. external) product upgrades. This is attenuated when features are perceived more intangible. (H1, H5)	
Study 5: Survey measured: feature tangibility perceptions and product identity relevance	Loyalty intentions toward the leasing company *Car (Head-up display)*	Participants with a high product identity relevance showed less favorable behavioral responses to tangible (vs. intangible) product upgrades; this effect is attenuated for consumers with a low product identity relevance. (H6)	If firms offer internal product upgrades for tangible features, managers should consider how relevant a focal base product is for a customer's identity. Managers should target (1) customers who have a low product identity relevance, and (2) base products for which they provide internal product upgrades and focus on product categories that are less relevant to a customer's identity.

3.4 Study 1: Effects of internal versus external product upgrades on consumers

3.4.1 Study 1A

Study 1A investigates the impact of upgrade locus (internal vs. external) on consumers' responses and the underlying process driving the effects. We expect consumers to respond less favorably to an internal (vs. external) upgrade (H1); and that these negative effects are driven by perceived betrayal, resulting from increased feature ownership perceptions (H2).

3.4.1.1 Design, participants, and procedure of Study 1A

The experiment employed a 2(upgrade locus: internal, external) between subjects design. In line with prior research (Sela and LeBoeuf 2017), we used a familiar low-complexity consumer-electronics context (base product: smartphone, added feature: memory chip) for external validity. See Appendix 3.A for the stimuli. We recruited 335 smartphone owners (M_{age} = 41.35, 50.4% female) of a consumer panel provider with a high-quality recruitment process and randomly assigned them to one of the two conditions. Participants were asked to imagine that they had recently bought a 64 GB smartphone (i.e., the base product) of a well-established brand, and were interested in upgrading their phone's memory by purchasing an additional 32 GB of memory (i.e., the focal added feature). In the *internal* product upgrade condition, the smartphone came with an additional 32 GB memory chip built-in, which was deactivated by the company. Consumers pay a fee to activate the built-in chip and obtain the memory upgrade. In the *external* product upgrade condition, consumers pay for the additional memory by purchasing an external 32 GB memory card, offered separately. Study 1A also aims to rule out the alternative explanation of reusability of the external feature. Specifically, we informed participants that the memory chip upgrade is only available for use in their current phone (i.e., the external chip is non-reusable).

Next, we measured consumers' willingness-to-pay (WTP) for the additional memory in an open-ended format with "Please indicate the maximum amount you would be willing to pay for the [added feature]" (e.g., Atasoy and Morewedge 2017). We also measured loyalty intentions toward the firm (Chaudhuri and Holbrook 2001; Grégoire and Fisher 2006). Participants next indicated their level of psychological ownership for the added feature (Peck and Shu 2009) and their perceptions of betrayal (Bardhi et al. 2005; Grégoire and Fisher 2008) (See Table 3.4 for all measures in this and subsequent studies). As a manipulation check, participants indicated if they perceived the added feature to be internal or external to the product by measuring participants' perception of spatial proximity of the added feature to the base product with a slider ranging from 0 (*not part of the smartphone*) to 100 (*part of the smartphone*).[10] Finally, participants indicated their demographics (i.e., gender and age).

[10] For this and all studies, manipulation checks performed as intended. Detailed reporting of manipulation checks is available in Appendix 3.B.

Table 3.4. Measurement items by study[11]

Construct & origin	Study & Cronbach's *α*	Measurement items
Willingness-to-Pay Atasoy and Morewedge (2017)	N/A	Please indicate the maximum amount you would be willing to pay for the [added feature]. (open-ended response format)
Purchase intentions Chandran and Morwitz (2005)	S1B (α = .96) S3 (α = .98)	• I am very interested in upgrading my [base product]'s [feature]. • I would upgrade my [base product]'s [feature]. • I would be very likely to upgrade my [base product]'s [feature]. • How likely would you be to upgrade your [base product]'s [feature]?
Loyalty intentions[12] Chaudhuri and Holbrook (2001), Grégoire and Fisher (2006)	S1A (α = .88) S1B (α = .81) S3 (α = .80) S4A (α = .77) S4B (α = .86) S5 (α = .80)	• I will buy from this company the next time I buy a [base product]. • I intend to keep purchasing from this [base product] company. • I will spread negative word-of-mouth about the [base product] company. (R) • If my friends were looking for a [base product], I would tell them not to buy a [base product] from this company. (R)
Perceived betrayal Bardhi et al. (2005), Grégoire and Fisher (2008),	S1A (α = .96) S1B (α = .98) S2 (α = .96) S3 (α = .97) S4A (α = .96) S4B (α = .96) S5 (α = .99)	In this situation when I wanted to upgrade the [feature] of the [base product], I felt... • cheated • lied to • taken advantage of • betrayed …by the company (S1A–4B). / by [Leasing Company name] (S5).
Perceived feature ownership Peck and Shu (2009)	S1A (α = .99) S1B (α = .99) S4A (α = .98)	• I feel like I own the [feature]. • I feel that the [feature] is mine. • I feel a very high degree of personal ownership of the [feature].
Feature tangibility perceptions[13] Developed based on Schmitt (2019), Shostack (1977)	S4B (α = .82) S5 (α = .81)	The [feature] of a [base product] is ... • a digital product. / a physical product. • untouchable. / touchable. • intangible. / tangible. • immaterial. / material.
Product identity relevance Coulter et al. (2003)	S5 (α = .88)	[Base products] … • are a part of my self-image. • tell others about me. • tell me about other people. • portray an image of me to others.

[11] Unless otherwise indicated, the measures are based on 7-point Likert scales (ranging from 1 = strongly disagree to 7 = strongly agree); (R) = reverse scored, randomized. [Base product] is either a phone or a car.

[12] In Study 5, the items were adapted to replace the word "buy" with "lease" for the leasing firm's customers.

[13] In Study 4A we manipulated feature tangibility; the manipulation check was "a digital product/a physical product". We measured feature tangibility in Study 4B using the 4-item index in the table.

3.4.1.2 Results of Study 1A

Willingness-to-Pay. We conducted an ANCOVA on WTP[14], as a function of upgrade locus, controlling for gender and age.[15] Results showed a significant upgrade locus main effect ($M_{internal}$ = 2.52 vs. $M_{external}$ = 2.84; $F(1, 331) = 8.17$, $p < .01$, $\eta^2 = .02$); consumers in the internal (vs. external) product upgrade condition reported a significantly lower WTP.

Loyalty intentions. An ANCOVA on loyalty intentions revealed consistent results. Loyalty intentions toward the firm were lower with an internal (vs. external) product upgrade ($M_{internal}$ = 4.36 vs. $M_{external}$ = 5.03; $F(1, 331) = 18.64$, $p < .001$, $\eta^2 = .05$).

Perceived feature ownership. An ANCOVA on perceived feature ownership showed that participants perceived significantly more ownership for the internal feature than for the external feature ($M_{internal}$ = 5.04 vs. $M_{external}$ = 2.82; $F(1, 331) = 110.51$, $p < .001$, $\eta^2 = .25$).

Perceived betrayal. An ANCOVA on perceived betrayal showed that participants in the internal (vs. external) product upgrade condition felt significantly more betrayed ($M_{internal}$ = 3.59 vs. $M_{external}$ = 2.76; $F(1, 331) = 18.52$, $p < .001$, $\eta^2 = .05$).

Mediation analyses. To test the underlying processes, we conducted serial mediation analyses on each outcome variable (PROCESS Model 6; 5,000 resamples; Hayes 2017), estimating the indirect effects of upgrade locus on (1) WTP and (2) loyalty intentions through perceived feature ownership and perceived betrayal. Results revealed the predicted serial mediation paths on WTP (internal

[14] In all instances where WTP is included, we log-transformed this variable. In line with prior literature (e.g., Zhou et al. 2018), we log-transformed the data after adding 1 to each score in order to include zero values.

[15] We control for gender and age consistently across all studies (e.g., Gilly and Zeithaml 1985, Lee and Coughlin 2015). These variables have been shown to affect the contexts we study. We note that our hypothesized effects are stable when control variables are included or excluded from the model (Appendix 3.C). Results of control variables are reported in Appendix 3.D.

product upgrade → higher feature ownership perceptions → increased perceived betrayal → reduced WTP); a × b = −.0957, 95% CI = [−.1639, −.0416]. There was also a significant serial mediation on loyalty intentions (internal product upgrade → higher feature ownership perceptions → increased perceived betrayal → reduced loyalty intentions); a × b = −.3066, 95% CI = [−.4507, −.1936].

3.4.1.3 Discussion of Study 1A

In support of H1 and H2, Study 1A reveals the negative effect of internal product upgrades on consumer responses and sheds light on the underlying mechanisms: internal (vs. external) product upgrades elicit higher perceptions of feature ownership, which trigger perceptions of betrayal, and ultimately result in less favorable consumer responses.

3.4.2 Study 1B

The goal of Study 1B was twofold. First, we intended to replicate the findings of Study 1A with a more subtle manipulation of upgrade locus, *by not explicitly telling consumers that the feature was actively deactivated by the company*. As such, we avoid inducing a potentially artificial negative effect of internal product upgrades. Second, Study 1B also aims to rule out alternative explanations, namely that our effect relies (1) on cost evaluations (i.e., perceived (a) production effort and (b) upgrading effort) or (2) the environmental friendliness of the upgrade.[16] For exploratory purposes, we also examine five other potential alternative explanations

[16] That is, one alternative explanation for the observed effects is that participants consider internal product upgrades as less effortful for companies. Following a cost-plus pricing approach (Kalapurakal et al. 1991), consumers might expect reduced prices due to lower costs/effort for companies. Another alternative is that consumers are concerned with *the* environmental impact of internal product upgrades. Integrating hardware features into products by default does not seem to be beneficial from a sustainability point of view (i.e., it seems wasteful) (e.g., Arkes 1996), which could explain a less favorable response to such upgrades. We thank the review team for pointing to these interesting alternative explanations.

(i.e., perceived convenience, performance risks, failure severity, value-in-use and perceived greed).[17]

3.4.2.1 Design, participants, and procedure of Study 1B

The experiment employed a 2(upgrade locus: internal, external) between subjects design. We recruited smartphone owners (N = 272, M_{age} = 47.06, 40.8% female) using the same context (i.e., base product: phone, added feature: memory chip), consumer panel, and procedure as in Study 1A, with one important difference: we did *not* explicitly state that the additional memory was deactivated by the company in the internal product upgrade condition. See Appendix 3.A for the stimuli.

We used the same measures for WTP, loyalty intentions, feature ownership, betrayal, and the manipulation check as in Study 1A. Finally, participants completed the manipulation check, and indicated demographics (i.e., gender and age). See Table 3.4 for items.

3.4.2.2 Results of Study 1B

Willingness-to-Pay. We conducted an ANCOVA on WTP as a function of upgrade locus. Results showed the predicted significant effect for upgrade locus on WTP ($M_{internal}$ = 2.13 vs. $M_{external}$ = 2.69; F(1, 268) = 12.47, $p < .001$, $\eta^2 = .04$); that is, consumers in the internal (vs. external) product upgrade condition reported a significantly lower WTP.[18]

Loyalty intentions. An ANCOVA on loyalty intentions revealed similar significant results. Loyalty intentions toward the firm were lower with an internal (vs.

[17] We thank the review team for pointing to these interesting alternative explanations. Please see Appendix 3.E for detailed results.

[18] In addition to WTP, we assessed consumers' purchase intentions of the product upgrade using a four-item measure (adapted from Chandran and Morwitz 2005). Consistent with the results for WTP, an ANCOVA on purchase intentions found that consumers were significantly less likely to purchase the internal (vs. external) upgrade ($M_{internal}$ = 3.48 vs. $M_{external}$ = 4.36; F(1, 268) = 12.47, $p < .001$, $\eta^2 = .04$).We find a significant serial mediation on purchase intentions (internal product upgrade → higher feature ownership perceptions → increased perceived betrayal → reduced purchase intentions); a × b = −.0336, 95% CI = [−.0816, −.0055].

external) product upgrade ($M_{internal}$ = 4.64 vs. $M_{external}$ = 5.45; F(1, 268) = 26.04 p < .001, η^2 = .09).

Perceived feature ownership. An ANCOVA on perceived feature ownership revealed that participants had significantly higher feature ownership perceptions for the internal versus the external feature ($M_{internal}$ = 4.86 vs. $M_{external}$ = 3.89; F(1, 268) = 14.87, p < .001, η^2 = .05).

Perceived betrayal. An ANCOVA on perceived betrayal showed that participants in the internal (vs. external) product upgrade condition felt significantly more betrayed ($M_{internal}$ = 3.57 vs. $M_{external}$ = 2.38; F(1, 268) = 29.60, p < .001, η^2 = .10).

Mediation analyses. We conducted serial mediation analyses on each outcome variable (PROCESS Model 6; 5,000 resamples; Hayes 2017), estimating the indirect effects of upgrade locus on WTP and loyalty intentions through perceived feature ownership and perceived betrayal, controlling for age and gender. As in Study 1A, results showed the predicted serial mediation paths on WTP (internal product upgrade → higher feature ownership perceptions → increased perceived betrayal → reduced WTP); a × b = −.0310, 95% CI = [−.0676, −.0077]. We also find a significant serial mediation on loyalty intentions (internal product upgrade → higher feature ownership perceptions → increased perceived betrayal → reduced loyalty intentions); a × b = −.0730, 95% CI = [−.1426, −.0223].

3.4.2.3 Discussion of Study 1B

Study 1B provides three main insights: First, replicating the findings of Study 1A, Study 1B shows that internal (vs. external) product upgrades elicit higher perceptions of feature ownership, which trigger perceived betrayal and ultimately undermine consumer responses. Second, we replicate our findings with an arguably more subtle manipulation, which suggests that our results are robust. Third, Study 1B shows that the negative effect of internal product upgrades cannot be attributed

to potential alternative explanations, such as cost perceptions or environmental friendliness; please see Appendix 3.E for details.

3.5 Study 2: The moderating role of upgrade responsibility

The extent to which consumers perceive a norm violation in an exchange relationship is contingent on the salience of the focal norm violation (e.g., Gershoff et al. 2012; Xia et al. 2004). Therefore, one viable strategy to mitigate the negative effects of internal product upgrades might be to shift the responsibility for the upgrade from the consumer to the firm. Internal product upgrades over the course of the product's lifecycle can be co-created by consumers because upgrading the product is a self-service, such that consumers themselves can perform the upgrade via their computer or smartphone (e.g., Tesla and Audi). This is in line with Ng and Wakenshaw's (2017) conceptualization of dynamic service platforms, which are designed to have customizable functionalities that can (or have to) be changed by consumers themselves; it is also consistent with the increasingly service dominated economy and the related servitization of goods (Vargo and Lusch 2017). However, we expect that——as consumers pay for and perform this self-service upgrade——it will become rather salient to them that the performance-boosting feature is already physically embedded in *their* product (i.e., the product they already paid for when they bought it) and is literally just a fingertip (and a credit card transaction) away from use. In contrast to this self-service solution, having the firm perform the product upgrade reduces this salience, as consumers might not fully comprehend which procedures companies complete to upgrade the product. Therefore, we expect that shifting the upgrading responsibility from the consumer to the firm attenuates the negative effects of internal product upgrades:

H3: When performing the upgrade is consumers' (self-service) responsibility, they will respond less favorably to internal (vs. external) product upgrades; this effect will be attenuated when the company is responsible for performing the upgrade.

3.5.1 Design, participants, and procedure of Study 2

Study 2 employed a 2(upgrade locus: internal, external) × 2(upgrading responsibility: consumer, company) between-subjects design. Car owners (N = 330, M_{age} = 34.56, 50.0% female) of a professional online consumer panel with a high-quality recruitment process were randomly assigned to one of the four conditions. Participants were asked to imagine that they recently bought a car (i.e., the base product) of a well-established brand with an excellent reputation (consistent with the marketplace reality that premium carmakers such as Daimler, Audi, and Tesla are using internal product upgrades). We asked participants to imagine being interested in upgrading their car's infotainment system by purchasing a digital radio (i.e., the focal tangible feature). We manipulated upgrade locus similar to our previous studies: in the *internal* product upgrade conditions, every car had a built-in digital radio receiver, which was deactivated. To activate the digital radio receiver, consumers have to pay a fee. In the *external* product upgrade conditions, consumers pay for an external digital radio receiver.

We manipulated upgrading responsibility by describing the upgrading task as being performed by either the consumer or the company (see Appendix 3.A for the stimuli). In the *consumer*-conditions, consumers could upgrade the functionality themselves either by purchasing and thereby activating the digital radio receiver via the company's online shop (internal product upgrade), or by purchasing and physically adding it to the car (external product upgrade). In the *company*-conditions, the digital radio receiver is purchased from and activated (vs. purchased and physically installed) by the car company's dealership.

After reading the scenario, participants indicated their WTP for the added feature and their perceptions of betrayal. Finally, they answered the same manipulation check as in previous studies, and provided demographics (i.e., gender and age). A manipulation check study (N = 82, M_{age} = 46.01, 45.1% female)

confirmed that the company responsibility manipulation performed as intended (company responsibility measure adapted from Botti and McGill 2006); see Appendix 3.B for manipulation check result details.

3.5.2 Results of Study 2

Willingness-to-Pay*.* An upgrade locus × upgrading responsibility ANCOVA on WTP revealed the predicted significant two-way interaction ($F(1, 324) = 4.60$, $p < .05$, $\eta^2 = .01$). It also revealed a significant upgrading responsibility main effect ($F(1, 324) = 6.00$, $p < .05$). The upgrade locus main effect is nonsignificant ($F(1, 324) = 1.96$, $p = .16$).

When the upgrade is the *consumer's responsibility*, WTP for internal product upgrades is significantly lower ($M_{internal,consumer} = 3.44$ vs. $M_{external,consumer} = 4.08$; $F(1, 324) = 5.93$, $p < .05$), replicating the findings thus far and supporting H1. However, when the upgrade is the *company's responsibility*, WTP for internal vs. external product upgrades did not differ ($M_{internal,company} = 4.28$ vs. $M_{external,company} = 4.14$; $F(1, 324) = .29$, $p = .59$). Furthermore, under the internal upgrade locus condition, WTP was significantly lower when it was the consumer's (vs. company's) responsibility ($M_{internal,consumer} = 3.44$ vs. $M_{internal,company} = 4.28$; $F(1, 324) = 10.20$, $p < .01$); however, under the external upgrade locus, WTP was unaffected ($M_{external,consumer} = 4.08$ vs. $M_{external,company} = 4.14$; $F(1, 324) = .05$, $p = .83$). See Figure 3.2.A.

Perceived betrayal. An ANCOVA on perceived betrayal as a function of upgrade locus, upgrading responsibility, and their interaction showed a significant interaction on perceived betrayal ($F(1, 324) = 4.01$, $p < .05$, $\eta^2 = .01$), as well as a significant main effect of upgrade locus ($F(1, 324) = 18.58$, $p < .001$, $\eta^2 = .05$). All other effects were nonsignificant (*p*s > .35).

When the upgrade is the *consumer's responsibility*, they felt significantly more betrayed by an internal (vs. external) product upgrade ($M_{internal,consumer} = 4.05$ vs. $M_{external,consumer} = 2.85$; $F(1, 324) = 18.82$, $p < .001$), replicating our previous

findings. When it is the *company's responsibility*, perceived betrayal for internal vs. external product upgrades was weaker ($M_{internal,company}$ = 3.66 vs. $M_{external,company}$ = 3.22; F(1, 324) = 2.84, $p < .10$) (see Figure 3.2.B).

Figure 3.2. Results of Study 2.

Panel A. Willingness-to-Pay: The effect of upgrade locus and upgrading responsibility on willingness-to-pay for the feature.

Panel B. Perceived betrayal: The effect of upgrade locus and upgrading responsibility on perceived betrayal.

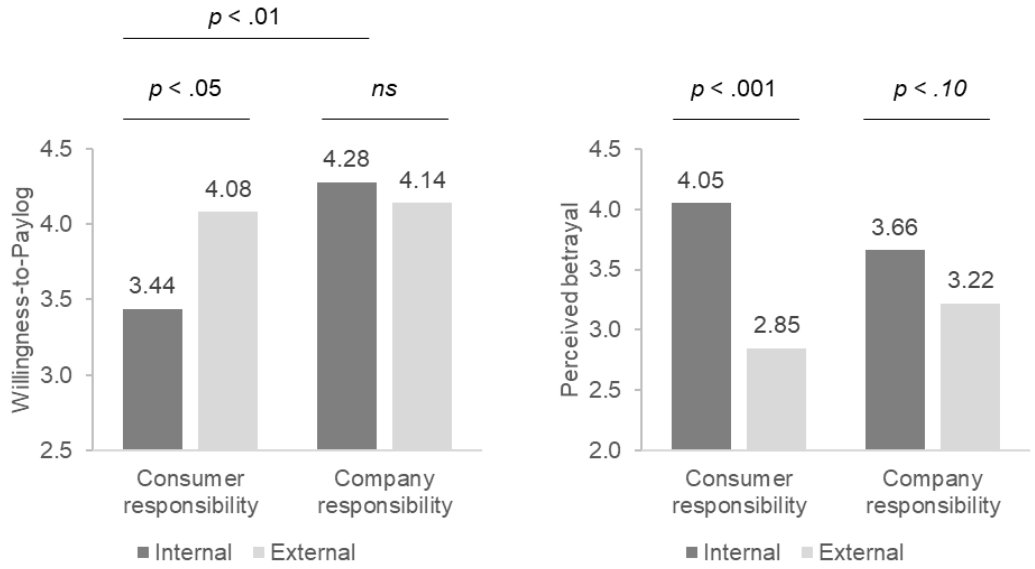


Figure 3.2. Study 2. Panel A: When the upgrade is the consumers' responsibility, they are willing to pay less for an internal (vs. external) product upgrade; when the upgrade is the firm's responsibility, WTP is relatively unaffected. Panel B: The effects on WTP are driven by the greater magnitude of perceived betrayal when the consumer is responsible for implementing the upgrade.

Moderated mediation analysis. We estimated the indirect effect of upgrade locus × upgrading responsibility on WTP through perceived betrayal with PROCESS Model 7 (5,000 resamples; Hayes 2017). Results showed that perceived betrayal mediates the effects of the two-way interaction on WTP (moderated mediation index = .1987, 95% CI = [.0068, .4573]). Perceived betrayal mediates for consumer self-upgrading (a × b = −.3135, 95% CI = [−.5724, −.1255]), but not for company upgrading (a × b = −.1148, 95% CI = [−.2812, .0149]).

3.5.3 Discussion of Study 2

In line with our previous findings, Study 2 shows that having consumers upgrade their products internally (vs. externally) by themselves triggers negative responses. Importantly, shifting the upgrading responsibility away from the consumer (toward the company) can attenuate the negative effects for consumers' behavioral intentions, in support of H3. As such, we identified one meaningful buffering approach that managers can employ to attenuate the negative effect of internal product upgrades. Moreover, by referring to the automotive context we increase the generalizability of our results, drawing on marketplace realities of car manufacturers already using these upgrades (e.g., Tesla, Audi, and Daimler).

3.6 Study 3: The moderating role of an upgrade price discount

While Study 2 investigated an important distribution-related strategy (i.e., self-service upgrade vs. firm-performed upgrade), Study 3 tests a pricing-related strategy, namely, whether offering the upgrade at a discounted price can reduce the negative effects of internal product upgrades. Price promotions, such as price discounts, are not only a well-established managerial tool, but are also an effective way to elicit positive consumer responses (e.g., Aydinli et al. 2014). Importantly, price promotions not only provide utilitarian benefits in terms of cost savings, but also hedonic benefits (Chandon et al. 2000). Hence, offering the upgrade at a discounted price might reduce consumers' negative responses to internal product upgrades, as price discounts can induce positive emotions (Schindler 1989). Inducing positive emotions might be especially relevant in situations in which consumers have already encountered negative emotions (Santini et al. 2016). Thus, we propose that offering internal product upgrades at a discount (vs. same price as compared to the product purchase) helps counteract consumers' negative emotions in terms of betrayal and downstream responses. On the other hand, we do not

expect a positive impact of a price discount on consumers' reactions to external product upgrades, as consumers have not experienced negative emotions. Accordingly, we hypothesize:

H4: The negative effect of internal (vs. external) product upgrades on consumers' responses will be mitigated when the upgrade is offered at a discounted price (vs. no discount).

3.6.1 Design, participants, and procedure of Study 3

Study 3 employed a 2(upgrade locus: internal, external) × 2(upgrade discount: no, yes) between-subjects design. Three hundred seven participants (M_{age} = 41.81, 54.1% female) were randomly assigned to one of the four conditions. Similar to Study 1A, participants were asked to imagine that they had purchased a 64 GB smartphone, and now they were interested in upgrading their smartphone's memory. Upgrade locus was manipulated as in our prior studies. We manipulated upgrade discount as follows: In the *no discount* condition participants were told that there was no difference in the price of an upgrade today ($29.99) and the price of an upgrade a year ago ($29.99). In the *discount* conditions participants were told that the memory upgrade today would cost 33% less ($19.99) as compared to the price of an upgrade a year ago ($29.99). See Appendix 3.A for the stimuli. We used the same measures for loyalty intentions and perceived betrayal as in previous studies. As we provided the price in this study, we measured purchase intentions toward the product upgrade (Chandran and Morwitz 2005). Participants also reported demographics (i.e., gender and age). As a manipulation check for upgrade locus, we used the same measures as in previous studies. We also included a check of the discount manipulation (adapted from Srivastava and Lurie 2004). The manipulation checks were successful; see Appendix 3.B for details.

3.6.2 Results of Study 3

Purchase intentions. An ANCOVA on purchase intentions as a function of upgrade locus, upgrade discount, and their interaction showed a significant two-way interaction ($F(1, 301) = 3.98$, $p < .05$, $\eta^2 = .01$), and upgrade locus main effect ($F(1, 301) = 8.01$, $p < .01$, $\eta^2 = .03$). The upgrade discount main effect was not significant ($F(1, 301) = 1.60$, $p = .21$).

In the *no discount* condition, purchase intentions are significantly lower for internal (vs. external) upgrades ($M_{internal,no} = 4.98$ vs. $M_{external,no} = 5.87$; $F(1, 301) = 11.73$, $p < .01$), replicating our findings thus far and supporting H1. However, in the *discount* condition, purchase intentions for internal and external upgrades did not differ ($M_{internal,yes} = 5.58$ vs. $M_{external,yes} = 5.73$; $F(1, 301) = .36$, $p = .55$). Looked at another way, in the internal upgrade condition, purchase intentions were significantly higher when a discount was offered (vs. not) ($M_{internal,no} = 4.98$ vs. $M_{internal,yes} = 5.58$; $F(1, 301) = 5.38$, $p < .05$); in the external upgrade condition ($M_{external,no} = 5.87$ vs. $M_{external,yes} = 5.73$; $F(1, 301) = .26$, $p = .61$), purchase intentions were unaffected by a price discount; see Figure 3.3.A.

Loyalty intentions. We conducted an ANCOVA on loyalty intentions as a function of upgrade locus, upgrade discount, and their interaction. There was a significant upgrade locus main effect ($M_{internal} = 4.96$ vs. $M_{external} = 5.43$; $F(1, 301) = 11.86$, $p < .01$, $\eta^2 = .04$). The price discount main effect and the interaction were nonsignificant ($Fs < 1$, $ps > .70$). See Figure 3.3.B.

Perceived betrayal. An ANCOVA revealed a significant main effect of upgrade locus on perceived betrayal ($M_{internal} = 2.78$ vs. $M_{external} = 2.25$, $F(1, 301) = 8.27$, $p < .01$; $\eta^2 = .03$). The main effect of upgrade discount ($F(1, 301) = 1.21$, $p = .27$) and the two-way interaction were nonsignificant ($F < 1$, $p = .92$). The results are illustrated in Figure 3.3.C.

Figure 3.3. Results of Study 3.

Panel A. Purchase intentions: The effect of upgrade locus and upgrade discount on purchase intentions for the product upgrade.

Panel B. Loyalty intentions: The effect of upgrade locus and upgrade discount on the loyalty intentions index.

Panel C. Perceived betrayal: The effect of upgrade locus and upgrade discount on perceived betrayal.

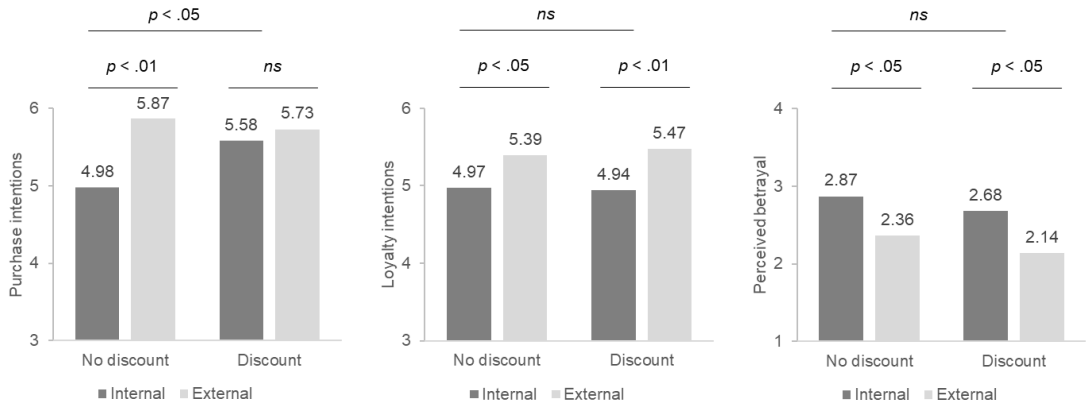


Figure 3.3. Study 3. When the upgrade is offered at no discount, consumers' purchase intentions are lower for internal vs. external product upgrades; when the upgrade is offered at a discount, purchase intentions are relatively unaffected. Consumers' loyalty intentions and perceptions of betrayal are unaffected by upgrade discount.

Mediation analysis. As we find the same patterns for perceived betrayal when using an upgrade discount (vs. not), we merged the data to test for replication of our previous indirect effects. We conducted a mediation analysis (PROCESS Model 4; 5,000 resamples; Hayes 2017), estimating the indirect effect of upgrade locus on purchase intentions and loyalty intentions through betrayal, controlling for gender, age, and upgrade discount. Results revealed a significant mediation on purchase intentions (internal product upgrade → increased perceptions of betrayal → reduced purchase intentions); a × b = −.2592, 95% CI = [−.4644, −.0743]. Results also showed a significant mediation on loyalty intentions (internal product upgrade → increased perceptions of betrayal → reduced loyalty intentions); a × b = −.2942, 95% CI = [−.5105, −.0959], replicating our previous results.

3.6.3 Discussion of Study 3

Study 3 shows that offering a discount in the context of internal upgrades mitigates some of its negative effects and significantly increases product-related outcomes, such as increasing *intentions to purchase* the internal upgrade. At the same time, offering the product upgrade at the focal discount (a) did *not* attenuate the negative effects of internal product upgrades on relationship-related outcomes like loyalty intentions and it (b) did *not* resolve the emotional problem of consumers feeling betrayed.

This points to an important nuance uncovered in Study 3: The focal upgrade discount overcomes the negative effects of internal product upgrades for *short-term* product-related outcomes (i.e., purchase intentions); however, the focal discount is not effective in mitigating *longer-term* relationship-related outcomes (i.e., loyalty intentions, perceived betrayal). Hence, H4 is partially supported. Notably, these findings are consistent with two meta-analyses by Santini et al. (2016) and DelVecchio et al. (2006), showing that sales promotions positively impact purchase intentions, but *not* company loyalty. Moreover, we also note that while offering internal product upgrades at a discount can increase consumers' likelihood of purchasing them, external product upgrades do not require such pricing tactics.

3.7 Study 4: The moderating role of feature tangibility

So far, our results demonstrate that consumers feel betrayed when they are confronted with internal (vs. external) upgrades for *tangible* features like memory chips or digital radio receivers and that this betrayal can be attributed to increased feature ownership perceptions. We now propose that this feature tangibility (i.e., the degree to which a feature is more dominated by tangible (e.g., hardware) rather than intangible (e.g., software) elements; Laroche et al. 2001) moderates how consumers respond to internal product upgrades. Existing research shows that ownership

perceptions are contingent on the tangibility of a given product. Specifically, products high in tangibility create greater ownership perceptions than products low in tangibility (Atasoy and Morewedge 2017). Building on this notion, we expect that consumers should feel less ownership for an intangible (vs. a tangible) feature in a purchased product. Consequently, consumers should perceive internal upgrades for intangible features as less norm violating and, thus, react less negatively to internal (vs. external) upgrades for intangible features (e.g., driving performance software) than for tangible features (e.g., rear-view camera). Hence, we hypothesize:

H5: In the context of an upgrade of a feature that is perceived to be highly *tangible*, consumers will respond less favorably to internal (vs. external) product upgrades; this effect will be attenuated for product upgrades of features that are perceived to be highly *intangible*.

3.7.1 Design, participants, and procedure of Study 4A

To test H5, we ran a 2(upgrade locus: internal, external) × 2(feature tangibility: tangible, intangible) between-subjects design. Car owners (N = 297, M_{age} = 34.26, 56.2% female) of a professional online consumer panel with a high-quality recruitment process were randomly assigned to one of the four conditions. Participants were asked to imagine that they recently bought a car (i.e., the base product) of a well-established brand with an excellent reputation. We manipulated feature tangibility by asking them to imagine being interested in upgrading their car's basic technology system by purchasing either a rear-view camera (i.e., *tangible* feature condition) or a driving performance software (i.e., *intangible* feature condition). We manipulated upgrade locus similar to our previous studies. In the *internal* upgrade conditions, every car came equipped with a built-in camera (tangible feature) or with the driving performance software already pre-installed (intangible feature); yet, both these features (the camera and the software) were deliberately deactivated. To obtain the respective feature, consumers pay a fee to

activate it. In the *external* product upgrade conditions, consumers pay for an external camera sensor (tangible feature) or install the software (intangible feature).

We used the same measures for loyalty intentions, feature ownership, and betrayal as in our previous studies. Moreover, participants provided demographics (i.e., gender and age) and rated the centrality of the respective feature for the base product on a one item semantic differential measure (Bertini et al. 2009).[19] Additionally, participants answered the upgrade locus manipulation check and a manipulation check for perceived feature tangibility (i.e., "The [feature] is a ... *(1) digital product, (7) physical product*", Schmitt 2019; Shostack 1977). The manipulation performed as intended (see Appendix 3.B for details).

3.7.2 Results of Study 4A

Loyalty intentions*.* A two-way ANCOVA on loyalty revealed a marginally significant upgrade locus × feature tangibility interaction ($F(1, 290) = 2.76$, $p < .10$, $\eta^2 = .01$). We also found a marginally significant main effects of upgrade locus ($F(1, 290) = 3.23$, $p < .10$, $\eta^2 = .01$) and feature tangibility ($F(1, 290) = 2.83$, $p < .10$, $\eta^2 = .01$).

In the *tangible* feature conditions, loyalty intentions for internal product upgrades were significantly lower ($M_{internal,tangible} = 4.42$ vs. $M_{external,tangible} = 4.90$; $F(1, 290) = 6.39$, $p < .05$), replicating the findings of previous studies and supporting H1. However, in the *intangible* feature conditions, loyalty intentions for internal vs. external upgrades did not differ ($M_{internal,intangible} = 4.89$ vs. $M_{external,intangible} = 4.91$; $F(1, 290) = .01$, $p = .92$). Looked at another way, in the internal upgrade conditions, loyalty intentions were significantly lower for a tangible (vs. intangible) feature upgrade ($M_{internal,tangible} = 4.42$ vs. $M_{internal,intangible} = 4.89$; $F(1, 290) = 5.34$, $p < .05$);

[19] We measured perceived centrality as we manipulated feature tangibility using two distinct features. To rule out that our effects are driven by the feature's respective centrality to the base product, we controlled for that.

however, in the external upgrade conditions ($M_{external,tangible}$ = 4.90 vs. $M_{external,intangible}$ = 4.91; F(1, 290) = .00, p = .98), loyalty was unaffected; see Figure 3.4.A.

Perceived feature ownership. An upgrade locus × feature tangibility ANCOVA on perceived feature ownership showed a significant interaction effect (F(1, 290) = 4.13, p < .05, η^2 = .01). Analysis also found a significant main effect of upgrade locus (F(1, 290) = 49.41, p < .001, η^2 = .15) and feature tangibility (F(1, 290) = 5.09, p < .05, η^2 = .02).

Planned contrasts revealed that in the *tangible feature* condition, consumers felt significantly more feature ownership for internal (vs. external) upgrades ($M_{internal,tangible}$ = 4.98 vs. $M_{external,tangible}$ = 2.98; F(1, 290) = 44.02, p < .001), replicating our previous findings. In the *intangible* feature conditions, perceived feature ownership for internal versus external upgrades was also significantly different ($M_{internal,intangible}$ = 4.03 vs. $M_{external,intangible}$ = 2.92; F(1, 290) = 11.88, p < .01). Looked at another way, for internal upgrades, perceived feature ownership was significantly greater for tangible versus intangible features ($M_{internal,tangible}$ = 4.98 vs. $M_{internal,intangible}$ = 4.03; F(1, 290) = 8.80, p < .01). However, for external upgrades, perceived feature ownership was relatively unaffected ($M_{external,tangible}$ = 2.98 vs. $M_{external,intangible}$ = 2.92; F(1, 290) = .03, p = .86); see Figure 3.4.B.

Perceived betrayal. An ANCOVA on perceived betrayal showed a significant main effect of upgrade locus (F(1, 290) = 12.85, p < .001, η^2 = .04). All other effects were nonsignificant (ps > .13). Regarding the upgrade of a *tangible* feature, consumers felt significantly more betrayed in the context of internal (vs. external) upgrades ($M_{internal,tangible}$ = 3.61 vs. $M_{external,tangible}$ = 2.74; F(1, 290) = 11.67, p < .01), replicating our previous findings. When upgrading an *intangible* feature, perceived betrayal was marginally significantly different for internal (vs. external) product upgrades ($M_{internal,intangible}$ = 3.21 vs. $M_{external,intangible}$ = 2.74; F(1, 290) = 2.98, p < .10); see Figure 3.4.C.

Figure 3.4. Results of Study 4A.

Panel A. Loyalty intentions: The effect of upgrade locus and feature tangibility on loyalty intentions towards the firm.

Panel B. Perceived feature ownership: The effect of upgrade locus and feature tangibility on perceived feature ownership.

Panel C. Perceived betrayal: The effect of upgrade locus and feature tangibility on perceived betrayal.

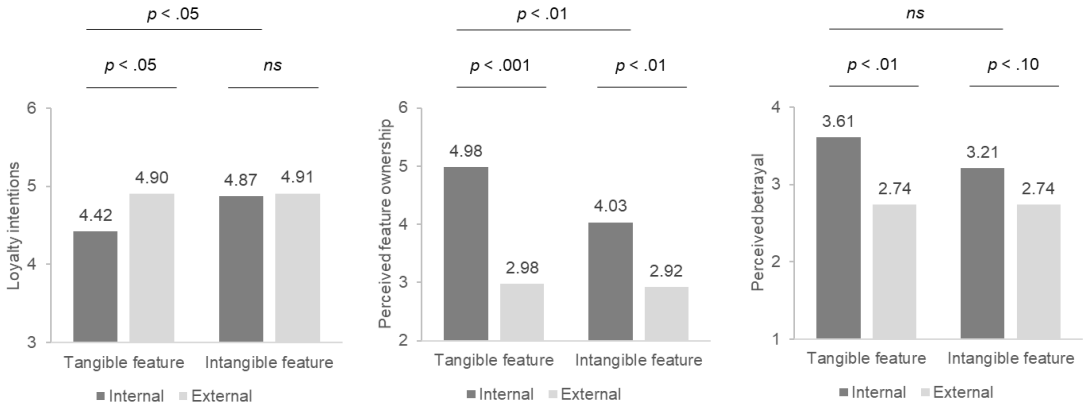


Figure 3.4. Study 4A. Panel A: Consumers show less favorable loyalty intentions for an internal (vs. external) product upgrade when the focal feature is tangible (vs. intangible). Panel B: Perceived feature ownership is higher for internal (vs. external) product upgrades of tangible (vs. intangible) features. Panel C: Consumers feel more betrayed when being confronted with an internal (vs. external) product upgrade; irrespective of whether it is a tangible or intangible feature.

Moderated mediation analysis. We estimated the indirect effect of upgrade locus × feature tangibility on loyalty intentions through perceived feature ownership and perceived betrayal, controlling for gender, age, and feature centrality with PROCESS Model 83 (5,000 resamples; Hayes 2017). Results revealed a significant serial mediation via perceived feature ownership and perceived betrayal of the two-way interaction on loyalty intentions (moderated mediation index = .0977, 95% CI = [.0010, .2077]). We found a significant serial mediation via perceived feature ownership and perceived betrayal in the context of upgrading a *tangible* feature (a × b = −.2190, 95% CI = [−.3403, −.1170]), replicating our findings from Studies 1A and 1B. The results also revealed a smaller indirect effect when consumers were able to upgrade an *intangible* feature (a × b = −.1213, 95% CI = [−.2271, −.0417]).

3.7.3 Discussion of Study 4A

In support of H5, we find that feature tangibility influences the impact of upgrade locus on consumers' responses. In line with H1, internal (vs. external) upgrades elicit less favorable behavioral responses for *tangible* features. Yet, the negative effect of internal product upgrades is mitigated for *intangible* features, as customers perceive less ownership of an intangible (vs. a tangible) feature and, in turn, feel less betrayed.

3.8 Study 4B

In the era of the IoT, hardware and software components within products become increasingly mingled (Schmitt 2019), which suggests that the evaluation of whether products or features are tangible or intangible might not be discrete anymore, but rather continuous and may depend on individual perceptions. Hence, consumers might differ in terms of the extent to which they perceive the objectively identical feature to be predominantly tangible or intangible in nature. Accordingly, we conducted Study 4B to test whether the findings of Study 4A are replicated with *perceived* feature tangibility.

3.8.1 Design, participants, and procedure of Study 4B

This study employed a 2(upgrade locus: internal, external) × continuous (perceived feature tangibility, measured) design. Upgrade locus was manipulated between subjects and feature tangibility perceptions were measured. Members of a professional online consumer panel provider were randomly assigned to one of the two conditions (N = 332, M_{age} = 41.74, 50.9% female). The context for this study was the same as in Study 1A (base product: phone, added feature: memory chip). See Appendix 3.A for the stimuli. After reading the scenario, participants indicated their loyalty intentions and perceived betrayal using the same items as in previous studies. Moreover, they assessed their tangibility perceptions of the added feature

on a four-item scale (adapted from Schmitt 2019; Shostack 1977), evaluated the perceived spatial proximity between the base product and the added feature (see Appendix 3.B for manipulation check results), and provided demographics (i.e., gender and age) (see Table 3.4 for the measurement items).

3.8.2 Results of Study 4B

Loyalty intentions. An ANCOVA on loyalty intentions showed a significant upgrade locus × perceived feature tangibility interaction ($F(1, 326) = 18.96$, $p < .001$, $\eta^2 = .06$). The upgrade locus main effect was significant ($M_{internal} = 4.48$ vs. $M_{external} = 5.18$; $F(1, 326) = 9.36$, $p < .01$, $\eta^2 = .03$); the feature tangibility main effect was not ($F(1, 326) = 1.75$, $p = .19$).

To explore the significant two-way interaction, we performed a floodlight analysis (Spiller et al. 2013). The analysis revealed that the effect of upgrade locus on loyalty intentions was significant among participants whose feature tangibility perception was greater than 4.85 ($b = -.331$, $t = -1.97$, $p = .05$) and lower than 2.59 ($b = .705$, $t = 1.97$, $p = .05$; see Figure 3.5.A). That is, participants who perceived the feature as relatively more tangible (above 4.85) had lower loyalty intentions with an internal (vs. external) upgrade. This reversed for participants who perceived the feature as relatively intangible (below 2.59); they had more favorable loyalty intentions with an internal (vs. external) upgrade.

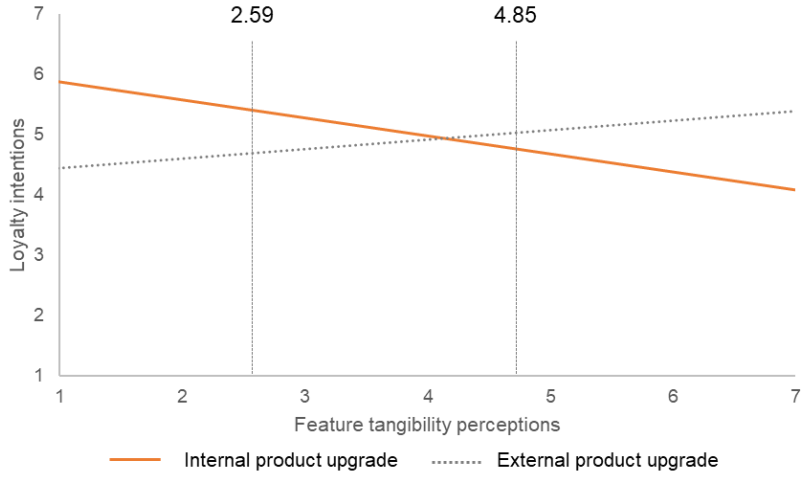
Perceived betrayal. A two-way ANCOVA on perceived betrayal revealed the predicted upgrade locus × feature tangibility perceptions interaction ($F(1, 326) = 6.43$, $p < .05$, $\eta^2 = .02$). The main effects of upgrade locus ($F(1, 326) = .80$, $p = .37$) and feature tangibility perceptions ($F(1, 326) = .54$, $p = .47$) were nonsignificant.

To explore the significant two-way interaction, we conducted a floodlight analysis. The analysis showed that the effect of upgrade locus on perceived betrayal was significant ($p < .05$) among participants whose feature tangibility perception was higher than 3.86 ($b = .613$, $t = 1.97$, $p = .05$; see Figure 3.5.B). Participants who

rated the tangibility of the feature as higher (above 3.86) showed greater perceptions of betrayal when facing internal (vs. external) product upgrades. Perceptions of betrayal for participants with lower feature tangibility perceptions (below 3.86) were unaffected by upgrade locus.

Figure 3.5. Results of Study 4B.

Panel A. Loyalty intentions: The effect of upgrade locus and feature tangibility perceptions (measured) on loyalty intentions.



Panel B. Perceived betrayal: The effect of upgrade locus and feature tangibility perceptions (measured) on perceived betrayal.

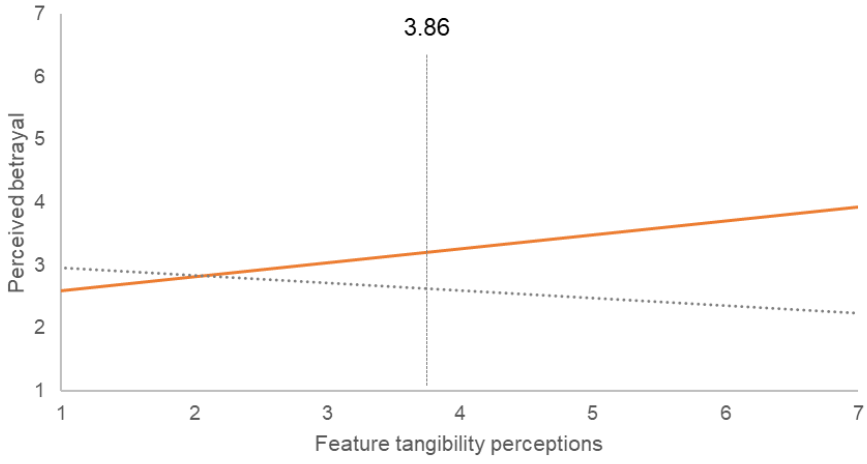


Figure 3.5. Study 4B. Panel A: For features perceived as rather tangible, internal (vs. external) product upgrades elicit less favorable loyalty intentions. The negative effect of internal product upgrades is mitigated for consumers who perceive the added feature as rather intangible. Panel B: The effects on loyalty intentions are driven by the greater magnitude of perceived betrayal when the internal (vs. external) feature is perceived as rather tangible.

Moderated mediation analysis. We estimated the indirect effect of upgrade locus × feature tangibility perception on loyalty intentions through perceived betrayal, controlling for gender and age with PROCESS Model 7 (5,000 resamples; Hayes 2017). Results revealed that perceived betrayal mediates the effects of the two-way interaction on loyalty intentions (moderated mediation index = −.1676, 95% CI = [−.3081, −.0472]). Perceived betrayal mediates for consumers with *higher* feature tangibility perceptions (+1 SD) (a × b = −.8258, 95% CI = [−1.1412, −.5387]) as well as for consumers with *lower* feature tangibility perceptions (−1 SD) (a × b = −.3633, 95% CI = [−.5871, −.1106]).

3.8.3 Discussion of Study 4B

In support of H5, and replicating the findings of Study 4A, Study 4B shows that feature tangibility perceptions influence the impact of upgrade locus on consumers' responses. Again supporting H1, we find that for features perceived as tangible, internal product upgrades (vs. external product upgrades) elicit less favorable responses. The negative effect of internal product upgrades is attenuated for consumers who perceive the added feature as more intangible. Taken together, Studies 4A and 4B suggest that upgrades of intangible features may be perceived as less norm violating.

3.9 Study 5: How the relevance of products for consumers' identity can influence the response to internal product upgrades

Across six experiments, we showed that internal (vs. external) product upgrades can result in negative consumer responses. Our final study, which focuses on internal upgrades only,[20] has three objectives: First, it draws on research that has

[20] We focus on internal upgrades because when we analyze the internal product upgrade condition in Study 4B, a linear regression analysis with feature tangibility perceptions as independent variable, controlling for gender and age, shows a significant negative effect of feature tangibility perceptions on loyalty intentions toward the car manufacturer (β = −.31, t = −4.24, p < .001). Running the same regression analysis for the external product upgrade condition, the overall model is nonsignificant

shown that products (e.g., cars) can be important for consumer identity (Belk 1988; Ferraro et al. 2011). Thus, Study 5 examines whether the relevance of a product (i.e., a car) for a consumer's identity is a boundary condition that affects how consumers respond to internal product upgrades. Second, this study is a highly conservative test of our theory as it investigates whether internal product upgrades can also backfire in *non-ownership contexts* (i.e., with consumers who are leasing their car rather than having purchased it), and whether it might even cause negative spillover effects for companies beyond the manufacturer of the base product (e.g., spillover to car leasing companies). As consumers come to intimately know the object (e.g., their car), control it, and invest themselves to a certain extent (Bagga et al. 2019; Bardhi and Eckhardt 2012; Fritze et al. 2020; Pierce et al. 2001), we expect that consumers' negative behavioral responses will remain even in a non-ownership context (i.e., a leased car). Third, we seek to increase external validity for the findings of Studies 4A and 4B by surveying actual customers of a global car leasing company who are periodically surveyed regarding new product and service ideas.

The product's relevance for consumers identity and feature tangibility perceptions

Whether or not consumers react negatively to internal product upgrades of tangible features may be contingent on how relevant the product is for consumers' self-identity (Atasoy and Morewedge 2017; Coulter et al. 2003). The more relevant a product is for consumers' identity, the more they should value this material possession, which increases their sense of psychological ownership. For instance, Belk (1988, 2013) argues that material possessions that are highly relevant to a person's self-identity become part of the extended self and losing them results in a loss of some aspect of the self (Belk 1988; Ferraro et al. 2011). In a similar vein,

(F(3, 160) = 1.82, p = .15). These finding suggest that it is of particular importance to focus on internal product upgrades.

Atasoy and Morewedge (2017) find that consumers who strongly relate to a product prefer a physical (i.e., tangible) over a digital (i.e., intangible) format of the same product, because they can integrate physical products more easily into their self-identity, establishing a higher perception of psychological ownership.

Building on these findings, we expect that the *higher a base product's relevance for a consumer's identity,* the more negative consumers respond to embedded tangible (vs. intangible) features, because these consumers perceive a company's norm violation through internal product upgrades as particular relevant given their close bond to the product and its features. In contrast, if consumers are required to pay a fee to upgrade a built-in feature in a base product that is *less relevant to their self-identity,* we do not expect them to show different responses for tangible (vs. intangible) features. These consumers are less attached to the product and its features and the norm violation becomes less relevant to them; formally:

H6: Consumers with a high product identity relevance will respond less favorably to tangible (vs. intangible) product upgrades; this effect will be attenuated for consumers with a low product identity relevance.

3.9.1 Design, participants, and procedure of Study 5

We collected survey data of real customers from a global car leasing company. Participating customers have an ongoing contract with the company (i.e., they are in possession of a leased car); we supplemented the survey data with secondary contract-based data (i.e., gender, age, and monthly net leasing price). We chose the automotive leasing context, as it is a prevalent financing model for cars, and independent leasing companies are also common within this industry, which allows us to investigate potential spillover effects (from the manufacturer to the leasing company). Cars are also relevant to the self-identity of many consumers

(Belk 1988), which makes it an ideal category for our study. The online survey was administered by the partner company, with a final sample size of 313 customers.[21]

We asked participants to *think about their own leased car*, before reading a promotional offer for our study. As the focal upgraded feature was a head-up display, participants first indicated whether they already have a head-up display in their leased car. Next, they read a short description of the offer for activating the head-up display in their own leased vehicle to increase the validity of our findings (see Appendix 3.A for the detailed description). After reading the offer, customers indicated their loyalty intentions and their perceptions of betrayal by the leasing company, using the same items as in previous studies but adapted to the car leasing context. Moreover, they responded to the same feature tangibility perceptions scale as in Study 4B. Finally, customers assessed the product's relevance for their identity on a four-item scale by Coulter et al. (2003) (see Table 3.4).

3.9.2 Results of Study 5

Loyalty intentions toward the leasing company. We analyzed customers' loyalty intentions toward the leasing company as a function of feature tangibility perceptions, product identity relevance, and their interaction, controlling for gender, age, head-up display possession, and monthly net leasing rate. The regression analysis showed the expected interaction ($b = -.096$, $t = -3.80$, $p < .001$), and main effects of feature tangibility perceptions ($b = .198$, $t = 2.17$, $p < .05$) and product identity relevance ($b = .242$, $t = 2.60$, $p < .01$).

We performed a floodlight analysis to explore the significant two-way interaction. The effect of perceived feature tangibility on loyalty intentions was significant among customers whose product identity relevance was higher than 2.94

[21] A total of 2,300 survey invitations were delivered to customers during the 24-day collection period. Of those invited, 399 responded (17.3%). Of the 399 responses, 86 (21.6%) were incomplete, resulting in 313 customers (M_{age} = 48.26, 20.4% female).

(b = −.084, t = −1.97, *p* = .05; see Figure 3.6.A). Customers high in product identity relevance (> 2.94) showed less favorable loyalty intentions toward the leasing company when perceiving the internally upgraded feature as relatively tangible (vs. intangible). Loyalty intentions for customers low in product identity relevance (< 2.94) were relatively unaffected by feature tangibility perceptions.[22]

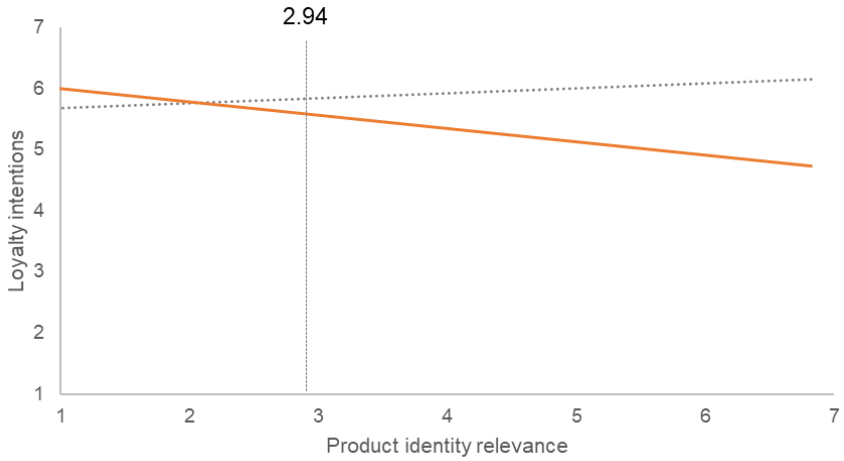
Perceived betrayal by the car leasing company. We analyzed perceived betrayal as a function of feature tangibility perceptions, product identity relevance, and their interaction, controlling for gender, age, head-up display possession, and monthly net leasing rate. Results revealed the predicted two-way interaction (b = .086, t = 2.63, *p* < .01). The main effects of feature tangibility perceptions (b = −.140, t = −1.19, *p* = .24) and product identity relevance (b = −.191, t = −1.59, *p* = .11) were not significant.

We conducted a floodlight analysis to explore the significant two-way interaction. The effect of feature tangibility perceptions on perceived betrayal was significant among participants whose product identity relevance was higher than 2.91 (b = .109, t = 1.97, *p* = .05; see Figure 3.6.B). Customers with a higher product identity relevance (> 2.91) showed greater perceptions of betrayal when perceiving the internally upgraded feature as relatively tangible (vs. intangible). Perceptions of betrayal for customers low in product identity relevance (< 2.91) were unaffected by feature tangibility perceptions.

[22] The correlations of the relationships of the model (ranging from .02 to .34) and the variance inflation factors (range 1.00–1.07) indicate that multicollinearity is not an issue (Mason and Perreault Jr 1991).

Figure 3.6. Results of Study 5.

Panel A. Loyalty intentions: The effect of feature tangibility perceptions (measured) and product identity relevance (measured) on loyalty intentions toward the leasing company.



Panel B. Perceived betrayal: The effect of feature tangibility perceptions (measured) and product identity relevance (measured) on perceived betrayal by the leasing company.

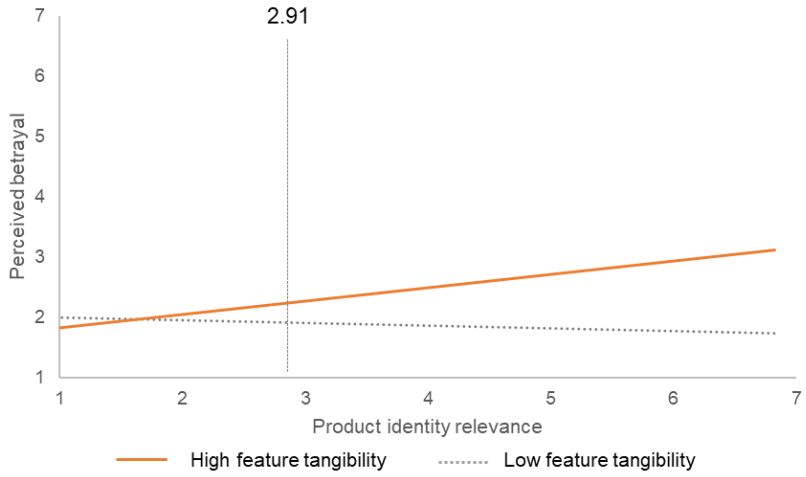


Figure 3.6. Study 5. Panel A: Consumers with a high product identity relevance show less favorable loyalty intentions toward the leasing company to tangible (vs. intangible) internal product upgrades; this effect is attenuated for consumers with a low product identity relevance. Panel B: The effects on loyalty intentions are driven by the greater magnitude of perceived betrayal when a rather tangible (vs. intangible) feature is added to a product with a high identity relevance.

Moderated mediation analysis. We estimated the indirect effect of the feature tangibility perception × product identity relevance interaction on loyalty intentions through perceived betrayal by the leasing firm, controlling for gender, age, head-up display possession, and monthly net leasing rate with PROCESS Model 7 (5,000 resamples; Hayes 2017). Results revealed that perceived betrayal mediates

the effects of the two-way interaction on loyalty intentions (index of moderated mediation = −.0200, 95% CI = [−.0456, −.0012]). Perceived betrayal mediates for customers *high* in product identity relevance (+1 SD) (a × b = −.0639, 95% CI = [−.1266, −.0193]), but not for customers *low* in product identity relevance (−1 SD) (a × b = −.0003, 95% CI = [−.0344, .0355]).

3.9.3 Discussion of Study 5

In line with previous studies, the findings of Study 5 suggest that offering fee-based access to built-in, tangible product features can elicit negative responses of customers that consider the base product relevant for their identity. Importantly, the negative effect of feature tangibility is attenuated for customers with a low product identity relevance, supporting H6. Moreover, we provide empirical evidence that consumers' negative responses to internal product upgrades even hold in a *non-ownership* leasing context, which is a conservative test for our theory. Additionally, we find that internal product upgrades are not only detrimental to the focal firm. Rather, internal product upgrades can have negative spillover effects for related business partners of the manufacturer (e.g., leasing companies akin to guilt-by-association). Finally, the results of this study also add to the external validity of our research as we (1) surveyed real-world customers of a leasing firm who are periodically surveyed regarding new product ideas (and thus understand that their answers are considered by the firm) and (2) asked them to think about their personal product, which they leased from the firm.

3.10 Single paper meta-analysis

We tested the overall validity of H1 (that consumers' responses are less positive for internal (vs. external) product upgrades) by performing a single paper meta-analysis (SPM; McShane and Böckenholt 2017) on studies 1A–4B. We standardized the dependent variables and we only included those conditions (internal vs. external product upgrades), in which the effect was not attenuated by the manipulated moderator condition (i.e., consumer upgrading conditions (Study 2), no discount conditions (Study 3), tangible feature conditions (Study 4A)). Study 4B contains a measured (not manipulated) moderator. Since Studies 1A, 1B, and 3 contained multiple outcome variables, i.e., WTP/purchase intentions and loyalty intentions, we opted to include the outcome variable with the weaker results (WTP for Studies 1A, 1B and loyalty intentions for Study 3), contributing to a more conservative test in the SPM. We note that this test is also conservative as it does not include any control variables. In support of our theory, the SPM showed that across our studies, consumers' behavioral intentions were significantly lower when they were facing internal (vs. external) product upgrades (Estimate = −0.3835, SE = 0.0523; z = −7.33, $p < .0001$).

3.11 General discussion

Although manufacturers increasingly transform (traditionally) static physical products into dynamic service platforms that allow consumers to reconfigure them *after* the purchase, research on this emerging marketplace phenomenon is scant. Therefore, we examine internal product upgrades to provide initial evidence on how consumers respond to this new after-sales revenue model. Seven studies, in two different contexts, show that consumers respond less favorably to internal (vs. external) product upgrades. Moreover, we shed light on the underlying process driving this unfavorable response (the serial mediation: internal product upgrades →

perceived feature ownership → perceived betrayal → unfavorable consumer intentions). In addition, we examine four (context- and consumer-related) boundary conditions that help companies in better managing internal product upgrades. Our findings offer new theoretical and managerial implications as well as avenues for future research.

3.11.1 Theoretical implications

Internal product upgrades elicit negative post-purchase reactions. By investigating internal product upgrades, we respond to Ng and Wakenshaw's (2017) call for more research on post-purchase product modifications. We introduce internal product upgrades as a promising product modification strategy from both a managerial and scholarly perspective, beyond existing modifications through software (e.g., Erat and Bhaskaran 2012; Yoo et al. 2012) or external product upgrades (e.g., Bertini et al. 2009; Liu et al. 2018; Ülkü et al. 2012). Yet, we find that this strategy can backfire, as internal (vs. external) product upgrades elicit less favorable consumer responses. Although add-ons are an important after-sales tool, marketing research has mainly focused on consumers' *pre*-purchase evaluations of both non-restricted features (e.g., Bertini et al. 2009; Ma et al. 2015; Wiegand and Imschloss 2022) and restricted features (e.g., Wiegand and Imschloss 2022). Moreover, we complement existing research in the post-purchase phase that investigated different strategies for non-permanent internal product upgrades (e.g., feature tangibility, feature pricing) without comparing them to established product reconfiguration approaches (Schaefers et al. 2022). By showing that a feature's locus (i.e., whether the feature is physically detached from or built-into the base product) has negative effects for consumers' willingness-to-pay for the feature and their relationship to the firm, and even related third-party business partners (e.g., car leasing companies), we offer new insights on product upgrades. These insights are important for scholars and managers, because——consistent with an increasingly

service dominated economy and the related servitization of goods (Vargo and Lusch 2017)——we expect that dynamic service platforms that are characterized by self-service co-creation will quickly become even more relevant.

Perceived norm violations explain the negative effects of internal product upgrades. Investigating the underlying reasons for the negative effects, our studies show that consumers feel betrayed by a firm that offers internal product upgrades. This betrayal arises because consumers believe they already own the built-in feature, even though they do not have any *legal* claim to this feature's functionality without paying an extra fee. That is, we find that consumer-perceived ownership (e.g., Peck and Shu 2009; Reb and Connolly 2007) plays an important role in the context of artificially restricted tangible features. In this respect, our findings contribute to research on product versioning (e.g., Deneckere and McAfee 1996; Gershoff et al. 2012) by demonstrating that a fee-based activation of restricted functionalities after the product purchase does *not* heal the negative effects of product versioning; rather, it further *undermines* consumers' behavioral responses after the product purchase. We add to prior work (e.g., Gershoff et al. 2012) by showing that consumers perceive being offered fee-based access to a tangible feature in a product they already own as a norm violation.

Perceived feature ownership drives consumers' betrayal perceptions. By highlighting the relevance of normative standards that consumers apply to purchased products, we enrich prior research on perceived betrayal and psychological ownership in consumer-firm relationships. Answering a call for more research on perceived betrayal, which is in its "infancy" (Reimann et al. 2018, p. 250), our betrayal-ownership framework is crucial for understanding why consumers respond negatively to internal product upgrades. As such, we also expand research on perceived betrayal that is often limited to investigations on charities (Joireman et al. 2020) and communication tactics (e.g., Jewell and Barone 2007).

Moreover, our work offers unique insights into perceived ownership, by taking a reversed endowment effect perspective (e.g., Kahneman et al. 1990; Peck and Shu 2009; Reb and Connolly 2007). While research on the endowment effect investigates how much money owners are willing to *accept* to give up their ownership for a base product (e.g., Kahneman et al. 1990), we examine how much money owners of a base product are willing to *pay* for a feature that is part of a purchased product, but is deliberately restricted. Hence, consumers are expected to pay a fee for accessing what they consider as being part of their property. We find that higher feature ownership perceptions elicit perceived betrayal and reduce favorable consumer responses (e.g., WTP/purchase intentions and loyalty intentions).

Upgrading responsibility matters. By shifting the upgrading responsibility *away from consumers and toward the firm*, managers can mitigate the negative effects of internal product upgrades, which underscores that firms need to carefully design the upgrading process. While Ng and Wakenshaw (2017) emphasize consumers' self-customization as a key characteristic of dynamic service platforms, our results suggest that shifting the upgrading responsibility to the firm (and thus making it less obvious that the increased performance is literally 'just a fingertip away' from use) buffers the negative consequences of internal product upgrades. Firms should therefore carefully consider the extent to which they exploit the full technical potential of IoT-related upgrades, which are likely to make the norm violation more salient.

Pricing matters (partially). Price discounts are a well-established managerial tool to elicit positive consumer responses (e.g., Aydinli et al. 2014). However, in line with prior research (DelVecchio et al. 2006; Santini et al. 2016), we find that the focal upgrade discount in our study only reduced the negative effects on product-related outcomes (i.e., purchase intentions) *but not on relationship-related*

outcomes (i.e., loyalty intentions, perceived betrayal). Thus, marketers need to carefully consider their short- versus their long-term goals.

Feature tangibility matters. Whereas digital and physical products were easy to distinguish in the past, their boundaries are increasingly blurred; indeed Schmitt (2019, p. 825) states: "the digital revolution is entering a new phase […] by incorporating digital information into physical, solid products." Just like smartphones, everyday physical objects such as cars, TVs, and refrigerators are increasingly (pre-)equipped with digital technology, sensors, or services (e.g., Kannan and Li 2017; Ng and Wakenshaw 2017; Yoo et al. 2012). Therefore, our finding that feature tangibility influences post-purchase product modifications is non-trivial, because consumers tend to perceive tangible and intangible products differently (e.g., Atasoy and Morewedge 2017; Belk 2013). Indeed, we show that feature tangibility affects the negative effects of internal product upgrades on perceived feature ownership and, in turn, perceived betrayal and loyalty intentions (i.e., the negative effect is attenuated when consumers upgrade an intangible vs. tangible feature). Moreover, although research often treats a product's physical (i.e., tangible) and digital (i.e., intangible) aspects as discrete elements, consumer perceptions of such products might be malleable: they may evaluate a product differently, as a function of whether they perceive it to be relatively more tangible or intangible in nature. Therefore, we also examined consumers' *perceived* feature tangibility, indicating the relevance of our findings for products that entail both tangible (i.e., physical) and intangible (i.e., digital) elements. Finally, further exploring the role of feature tangibility, Study 5 showed that the negative effect of tangible features is only prevalent for customers who perceive the base product (i.e., their car) as highly relevant for their identity, but there was no difference for customers with a low product identity relevance.

3.11.2 Managerial implications

Because internal product upgrades are increasingly emerging in the marketplace, firms need to understand how consumers respond to this after-sales revenue model. Managers should be aware that internal product upgrades might come with unintended consequences. However, we identify actionable (contextual and consumer-related) moderators, which provide useful implications for managers, summarized in Table 3.3. First, although self-service upgrades seem convenient for consumers, having the firm perform the upgrade can mitigate the negative effect internal product upgrades can have on consumers' willingness-to-pay and perceived betrayal (Study 2). Consequently, firms may want to offer company-implemented upgrading instead of self-service upgrading, at least as long as internal product upgrades are not established as a new (normative) standard in the marketplace.

Second, if a firm is primarily focused on increased sales of internal product upgrades, offering the upgrade at a discounted price helps to stimulate demand (Study 3). Yet, firms should consider how much cost savings they can generate by leveraging economies of scale and offer corresponding discounts. If firms focus on consumers' loyalty intentions, the price discounts we studied were not effective (but larger discounts might be more effective).

Third, managers should segment their customers, features, and products, as our findings suggest that internal product upgrades elicit negative responses only for tangible (i.e., hardware) features (Studies 4A and 4B). In contrast, when an intangible (i.e., software) feature is upgraded, the negative effect of internal product upgrades is mitigated. On a related note, managers should consider how relevant a base product (e.g., a car) is for a customer's identity, as our findings show that the negative effects for features that are perceived as tangible are attenuated for customers with a *low* product identity relevance (Study 5). Therefore, companies should track customers' perceived feature tangibility and their product identity

relevance (e.g., as part of their market research) (Coulter et al. 2003; Leung et al. 2019). Managers can leverage these insights twofold: First, they can segment customers based on their feature tangibility perceptions as well as their product identity relevance and then target those customers who perceive the added feature as rather intangible or——in case of features that are perceived as rather tangible——have a *low* product identity relevance.[23] Second, managers can also segment features and base products for which they provide internal product upgrades and focus on features that are more intangible in nature or offer them only for product categories that tend to be less relevant to a customer's identity per se.

Fourth, demonstrating the robustness of our core effect (Study 5), we show that negative effects of internal product upgrades even emerge in a non-ownership context (i.e., car leasing). Importantly, this shows how internal product upgrades can cause spillover effects for third-party business partners, like leasing companies. Accordingly, companies that offer product leasing should cautiously balance the pros and cons of internal product upgrades.

Finally, we not only identify a set of managerially relevant moderators that help alleviate the risks of internal product upgrades; we also include studies that examined other strategies (i.e., [a] leveraging transparency at the pre-purchase stage, [b] emphasizing convenience benefits of the upgrade, and [c] using norm appeals). The results from these studies, which are reported in Appendix 3.F and 3.G, suggest that these promotional strategies are not effective in reducing the negative effects of internal product upgrades. Therefore, managers seem better served to consider the above distribution-related (i.e., offer company upgrading) and product-related strategies (i.e., offer internal product upgrades for intangible

[23] Proactively targeting these consumers (with a low product identity relevance) seems especially important, as long as internal product upgrades have not become standard practice. As our conceptual focus on marketplace norms suggests, consumers might get used to internal product upgrades over time; at that point, firms might be able to promote internal product upgrades to all their customers, regardless of product identity relevance.

features, or, in case of tangible features, target consumers with a low base product involvement) to mitigate the negative effects on consumers' loyalty intentions.

3.11.3 Limitations and future research

This research has limitations that provide promising directions for future research (see Table 3.5). First, we focus on the post-purchase phase, but product modifications can also affect consumers' pre-purchase evaluations of the base product (e.g., Bertini et al. 2009; Gershoff et al. 2012). Going beyond existing findings of Wiegand and Imschloss (2021), future research could examine how internal product upgrades influence pre-purchase decisions, for instance, the number of selected features when purchasing a product. Another question is whether the benefit of tailoring the product over its lifecycle outweighs the negative impact of restricted features in a pre-purchase situation, as proposed by Gershoff et al. (2012). Second, further research might identify additional strategies that help prevent negative consumer responses. For example, could anthropomorphizing the product or the added feature prevent a negative response (e.g., Guthrie 1993)? Third, future research might also investigate different add-on feature pricing schemes. We studied one-time purchases (as used by Tesla); some firms (e.g., Audi) plan to offer *short-term access* to features for a fee. Could temporary access to otherwise restricted access to built-in features mitigate the negative effects as compared to permanent access or might it even increase perceived betrayal over time? Finally, although we surveyed customers of an actual leasing company, we used a scenario-based approach because access to real-world data for fully implemented internal product upgrades is still limited. As this new after-sales revenue model becomes increasingly prevalent, researchers will likely gain access to real-world data that would, for example, allow tracking the effects of internal product upgrades over time.

Table 3.5. Exemplary future research questions.

Domain	Exemplary future research questions
Consumption mode & pricing	• **Base product-related:** What is the role of base product ownership on the negative effects of internal (vs. external) upgrades? For example, what processes underly how a customer responds to an (internal vs. external) upgrade on a rental car for a 2-week vacation vs. a purchased vehicle? Do short-term non-ownership consumption modes of the base product (access-based consumption, sharing) mitigate the negative effects of internal upgrades? • **Feature-related:** How do different pricing schemes for the feature (e.g., one time purchase, monthly subscription, pay per use) impact consumers' responses to internal product upgrades in the usage phase? Do free short-term trials backfire or alleviate the negative impact of internal product upgrades? Can larger upgrade price discounts attenuate the negative effects? Which consequences does permanently offering internal product upgrades at a lower price as compared to the pre-purchase situation have? • **Interrelationships:** Should the consumption mode of the base product match the consumption mode of the added feature or are unmatched combinations more effective?
Product design	• **Base product-related:** Is there a difference in consumer responses to internal product upgrades in hedonic vs. utilitarian base products? • **Feature-related**: What types of features are eligible for internal product upgrades? How does the centrality of the feature for the base product affect consumers' responses to internal product upgrades? Is there a difference between hedonic vs. utilitarian features, or between visible vs. invisible ones?
Communication	• **Pre-purchase:** How should firms advertise internal product upgrades before the purchase? Does transparent communication reduce the number of features selected by consumers in the purchase phase as features can be activated during the lifecycle? Does the benefit of tailoring the product during the lifecycle outweigh the negative impact of limited features on base product evaluations as investigated by Gershoff et al. (2012)? • **Post-purchase**: How should firms communicate corresponding offers of internal product upgrades in the product usage phase? Does anthropomorphizing the feature provide extra benefits that alleviate the negative impact of internal product upgrades? • **Cost-based brand positioning**: Are the negative effects of internal product upgrades reinforced as consumers are increasingly aware of company costs as firms more and more approach cost structure transparency as part of their brand positioning?
Selling value	• Do consumers demand a higher willingness-to-accept for products with built-in features even if the feature has not been activated in case of one time purchases?
Contextual boundary conditions	• **Competitive position:** Is there a difference in consumer responses to internal product upgrades offered by a cost vs. quality leader? • **Environmental consciousness:** What is the moderating role of environmental consciousness on consumers' response to internal (vs. external) product upgrades? How might this vary by product type (e.g., product category)?

Potential other process variables	• **The bright side of internal product upgrades**: Which advantages do internal product upgrades have for consumers (e.g., increased flexibility)? Can pricing schemes (e.g., monthly subscriptions, short-term rental fees) emphasize these benefits to outweigh consumers' betrayal? • **The dark side of internal product upgrades:** Are there mediators other than perceived ownership and perceived betrayal that explain why consumers react negatively to internal product upgrades (e.g., increased complexity)? Is there feature fatigue (Thompson et al. 2005) for internal product upgrades?
Valence of ownership effects	• Is there a difference in consumers' value perceptions of internal product upgrades before vs. after the purchase of a base product (e.g., would consumers value 'having the option' of an upgrade even if they decide not to use it)?

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3.13 Appendices

Appendix Table of Contents

Appendix 3.A. Study stimuli (manipulations in square brackets).

Study 1A: 2(upgrade locus: internal, external) bw/ss

A year ago, you obtained a new state-of-the-art smartphone. You decided to purchase the phone outright and pay for it in full. The brand you purchased is well-established with an excellent reputation. Your new smartphone was equipped with a variety of features, including a HD display and a 12-megapixel camera with wide-angle and telephoto lens. You also selected a memory space of 64 GB.

Now, you are considering upgrading your smartphone's memory by adding 32 GB. This will enable you to store more pictures, music, and videos. The memory chip that is required for the extra 32 GB [was already / was not] integrated in the phone when you got the phone [but deactivated by the smartphone company / .]. To obtain the extra memory, you have to pay for the [internal / external] memory chip and may [activate it to / physically] add it into your smartphone. After the purchase of this upgrade, the memory chip will be available permanently in this smartphone only. The appearance of your smartphone will not change and the functionality will be seamless.

Study 1B: 2(upgrade locus: internal, external) bw/ss

A year ago, you obtained a new state-of-the-art smartphone. You decided to purchase the phone outright and pay for it in full. The brand you purchased is well-established with an excellent reputation. Your new smartphone was equipped with a variety of features, including a HD display and a 12-megapixel camera with wide-angle and telephoto lens. You also selected a memory space of 64 GB.

Now, you are considering upgrading your smartphone's memory by adding 32 GB. This will enable you to store more pictures, music, and videos. The memory chip that is required for the extra 32 GB [was already / was not] physically built-into the phone when you purchased it. To obtain the extra memory, you have to pay a fee; the [internal / external] memory chip can then be [activated in / incorporated into] your phone. After the purchase of this upgrade, the extra memory will be available permanently in this smartphone for as long as you keep it. The appearance of your smartphone will not change, and the functionality will be seamless.

Study 2: 2(upgrade locus: internal, external) × 2(upgrading responsibility: consumer, company) bw/ss

A year ago, you purchased a new car from the premium price segment for 45.000 €. The brand you purchased is a well-established car brand with an excellent reputation. Your new car was equipped with a variety of features, including electric windows, seat heaters, and a hill-holder. You also selected the base model infotainment package – consisting of a car radio and a navigation system.

Now, you are considering upgrading your car's basic infotainment package by adding a digital radio. The digital radio significantly improves the number of radio stations and the sound quality. The receiver that is required for the digital radio [was already / was not] integrated in your car ex-factory [but deactivated by the car manufacturer /.].

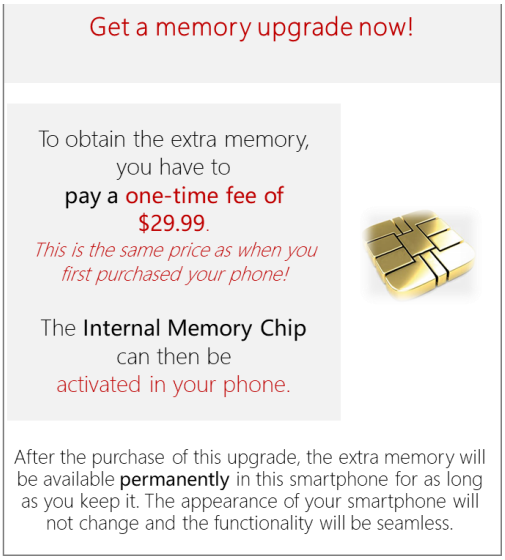
To obtain the digital radio, you have to pay for the receiver via the car manufacturer's [online shop / dealership] and [activate it to add it in / have it physically added to] your car by [yourself / the dealership]. After the purchase of this upgrade, the digital radio will be available permanently in the car. The appearance of your car will not change, and the functionality is equivalent to an originally [activated / integrated] digital radio.

Study 3: 2(upgrade locus: internal, external) × 2 (upgrade discount: no, yes) bw/ss

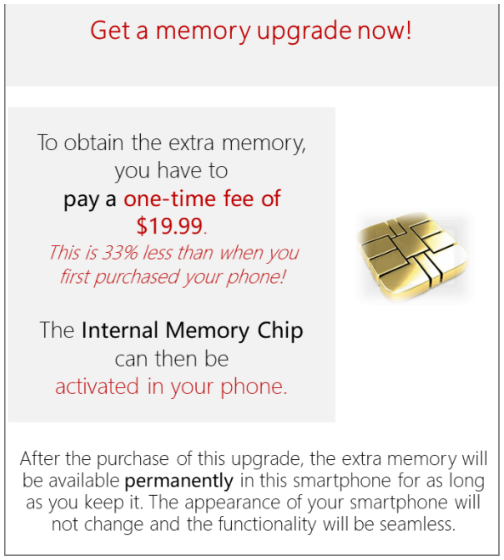
A year ago, you obtained a new state-of-the-art smartphone. You decided to purchase the phone outright and pay for it in full. The brand you purchased is well-established with an excellent reputation. Your new smartphone was equipped with a variety of features, including a HD display and a 12-megapixel camera with wide-angle and telephoto lens. You also selected a memory space of 64 GB.

Now, you are considering upgrading your smartphone's memory by adding 32 GB. Your phone came with the capability to [activate an internal / to add an external] memory chip. The memory chip that is required for the extra 32 GB [was already / was not] physically built-into the phone when you purchased it. To obtain the extra memory, you have to pay a one-time fee. The [internal/external] memory chip can then be [activated in /incorporated into] your phone. When you originally purchased the phone a year ago, the cost to access the extra memory in your phone would have cost you an additional $29.99. Today, the price is [the same / 33% less] to [access / embed] the extra memory. Today it costs [$29.99 / $19.99].

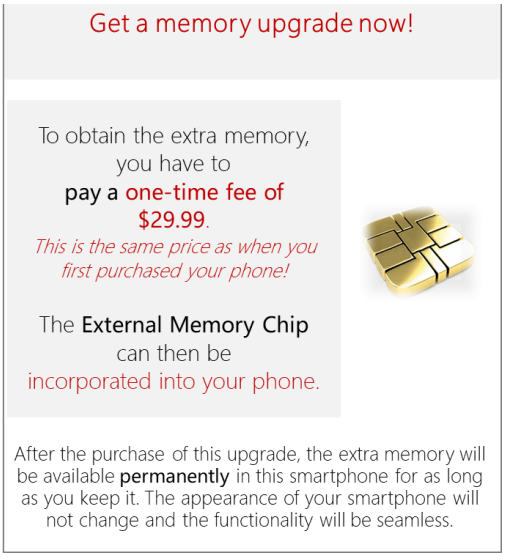
Internal product upgrade; no discount



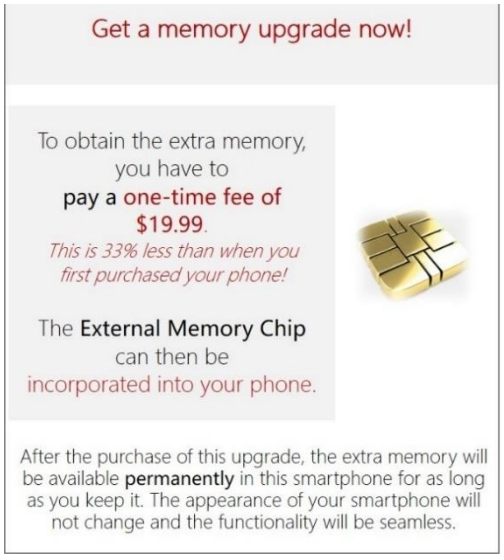
Internal product upgrade; discount



External product upgrade; no discount



External product upgrade; discount



Study 4A: 2(upgrade locus: internal, external) × 2(feature tangibility: tangible, intangible) bw/ss

A year ago, you purchased a new car from the premium price segment for 45.000 €. The brand you purchased is a well-established car brand with an excellent reputation. Your new car was equipped with a variety of features, including electric windows, seat heaters, and a hill-holder. You also selected the base model infotainment package – consisting of a frequency modulation car radio and a hands-free equipment.

Now, you are considering upgrading your car's basic infotainment package by adding a [rear view camera / driving performance program]. [The rearview camera allows you to maneuver and park more comfortably. It displays the vehicle's rear surroundings and displays lane lines to help with parking. / The driving performance program enables you to continuously improve your driving performance. It measures driving behavior, visualizes driving performance, and allows you to create individual driver profiles.] The [camera sensor / software] that is required for the [rear view camera / driving performance program] [was already / was not] integrated in your car ex-factory [but deactivated by the car manufacturer / .].

To obtain the [rear view camera / driving performance program], you have to pay for the [camera sensor / software] via the car manufacturer's online shop and [activate it in your car / incorporate it in a slot at your license plate of your car / activate it in your car / install it in your car using a standard USB stick]. [The live image of the rear vehicle environment is / Driving performance and driver profiles are] shown on the color display of the infotainment system. After the purchase of this upgrade, the [rear view camera / driving performance program] will be available permanently in this car. The appearance of your car will not change and the functionality will be seamless.

Study 4B: 2(upgrade locus: internal, external) × measured (perceived feature tangibility)

A year ago, you obtained a new state-of-the-art smartphone. You decided to purchase the phone outright and pay for it in full. The brand you purchased is well-established with an excellent reputation. Your new smartphone was equipped with a variety of features, including a HD display and a 12-megapixel camera with wide-angle and telephoto lens. You also selected a memory space of 64 GB.

Now, you are considering upgrading your smartphone's memory by adding 32 GB. This will enable you to store more pictures, music, and videos. The memory chip that is required for the extra 32 GB [was already / was not] integrated in the phone when you got the phone [but deactivated by the smartphone company / .]. To obtain the extra memory, you have to pay for the [internal / external] memory chip via the company's online shop. You may then [activate the memory chip in / physically add the memory chip into] your smartphone. After the purchase of this upgrade, the memory chip will be available permanently in this smartphone only. The appearance of your smartphone will not change, and the functionality will be seamless.

Study 5: measured (feature tangibility perception) and measured (product identity relevance)

Please think about your leased car and the following situation: [Company Name] informs you about the possibility to upgrade a head-up display. A head-up display shows all driver-relevant information (e.g., current speed, speed limits, alerts) within the driver's field of view.

The display that is required for the head-up display was already integrated in your car, but it was deactivated by the car manufacturer. Thus, you cannot use it. To obtain the head-up display, you have to pay for the display via the car manufacturer's online shop and thus activate the head-up display in your car. After the purchase of this upgrade, the head-up display will be available permanently for use in this car only. The functionality of the head-up display will be seamless.

Appendix 3.B. Manipulation checks for experimental studies (Studies 1A-4B).

Study	Upgrade locus main effect	Moderator main effect	Interaction	Manipulation check items (Cronbach's α is at least .77 for multi item scales)
1A	Proximity to the base product:			
	$M_{internal}$ = 77.14, $M_{external}$ = 16.66; F(1, 333) = 367.86, *p* < .001	N/A	N/A	At the time you originally obtained the [base product], the [feature] was… not part (0); part (100) of the [base product]
1B	Proximity to the base product:			
	$M_{internal}$ = 72.52, $M_{external}$ = 15.88; F(1, 270) = 227.30, *p* < .001	N/A	N/A	At the time you originally obtained the [base product], the [feature] was… not part (0); part (100) of the [base product]
2	Proximity to the base product:			
	$M_{internal}$ = 57.96, $M_{external}$ = 17.01; F(1, 326) = 141.87, *p* < .001	F(1, 326) = .63, *p* = .43	F(1, 326) = .59, *p* = .44	At the time you originally obtained the [base product], the [feature] was… not part (0); part (100) of the [base product]
	Firm responsibility (Manipulation check study)			
	F(1, 78) = 1.91, *p* = .17	**$M_{consumer}$ = 2.14, M_{firm} = 4.69; F(1, 78) = 47.39, *p* < .001**	F(1, 78) = 1.52, *p* = .22	The company's dealership is…. ….for upgrading the [feature]. • …responsible… • …accountable…
3	Proximity to the base product:			
	$M_{internal}$ = 65.59, $M_{external}$ = 16.29; F(1, 303) = 153.40, *p* < .001	F(1, 303) = 1.61, *p* = .21	F(1, 303) = .81, *p* = .37	At the time you originally obtained the [base product], the [feature] was… not part (0); part (100) of the [base product]
	Upgrade discount:			
	F(1, 303) = 1.16, *p* = .28	**M_{no} = 4.22, M_{yes} = 2.49; F(1, 303) = 117.71, *p* < .001**	F(1, 303) = .74, *p* = .39	Relative to the price of the [feature] upgrade at the time of the [base product] purchase, the price of the [feature] upgrade after the [base product] purchase is… • …lower. / …higher. • …cheaper. / …more expensive. • …more economical. / …more costly.
4A	Feature tangibility:			
	F(1, 293) = .50, *p* = .48	**$M_{tangible}$ = 4.16, $M_{intangible}$ = 2.00; F(1, 293) = 99.35, *p* < .001**	F(1, 293) = 1.23, *p* = .27	The [feature] of a [base product] is rather …a digital product. / …a physical product.
4B	Proximity to the base product:			
	$M_{internal}$ = 75.06, $M_{external}$ = 11.95; F(1, 330) = 430.33, *p* < .001	N/A	N/A	At the time you originally obtained the [base product], the [feature] was… not part (0); part (100) of the [base product]

Appendix 3.C. Basic effects when control variables are included and removed from the model.

	Model including control variables			**Model excluding control variables**		
	Internal	External	(Simple) Main Effect	Internal	External	(Simple) Main Effect
DV	Adj. M (SE)	Adj. M (SE)		Adj. M (SD)	Adj. M (SD)	
Study 1A: Upgrade locus (internal, external)						
WTP	2.52 (.08)	2.84 (.08)	$F(1, 331) = 8.17$, $p < .01$	2.52 (1.09)	2.85 (1.04)	$F(1, 333) = 8.03$, $p < .01$
Loyalty intentions	4.36 (.11)	5.03 (.11)	$F(1, 331) = 18.64$, $p < .001$	4.37 (1.59)	5.02 (1.30)	$F(1, 333) = 17.15$, $p < .001$
Perceived ownership	5.04 (.15)	2.82 (.15)	$F(1, 331) = 110.51$, $p < .001$	5.04 (1.93)	2.83 (1.95)	$F(1, 333) = 108.48$, $p < .001$
Perceived betrayal	3.59 (.14)	2.76 (.13)	$F(1, 331) = 18.52$, $p < .001$	3.59 (1.86)	2.76 (1.63)	$F(1, 333) = 18.58$, $p < .001$
Study 1B: Upgrade locus (internal, external)						
WTP	2.13 (.11)	2.69 (.11)	$F(1, 268) = 12.47$, $p < .001$	2.15 (1.39)	2.67 (1.26)	$F(1, 270) = 10.48$, $p < .01$
Purchase intentions	3.48 (.18)	4.36 (.17)	$F(1, 268) = 12.47$, $p < .001$	3.50 (1.99)	4.34 (2.08)	$F(1, 270) = 11.74$, $p < .01$
Loyalty intentions	4.64 (.11)	5.45 (.11)	$F(1, 268) = 26.04$, $p < .001$	4.67 (1.57)	5.43 (1.03)	$F(1, 270) = 22.42$, $p < .001$
Perceived ownership	4.86 (.18)	3.89 (.18)	$F(1, 268) = 14.87$, $p < .001$	4.84 (2.06)	3.92 (2.07)	$F(1, 270) = 13.74$, $p < .001$
Perceived betrayal	3.57 (.15)	2.38 (.15)	$F(1, 268) = 29.60$, $p < .001$	3.55 (2.01)	2.40 (1.56)	$F(1, 270) = 28.07$, $p < .001$
Study 2: Upgrade locus (internal, external) × upgrade responsibility (consumer, company)						
WTP						
Consumer	3.44 (.19)	4.08 (.19)	$F(1, 324) = 5.93$, $p < .05$	3.45 (1.76)	4.09 (1.62)	$F(1, 326) = 5.60$, $p < .05$
Company	4.28 (.18)	4.14 (.17)	$F(1, 324) = .29$, $p = .59$	4.27 (1.24)	4.13 (1.98)	$F(1, 326) = .31$, $p = .58$
2-way Interaction	$F(1, 324) = 4.60$, $p < .05$			$F(1, 326) = 4.43$, $p < .05$		
Perceived Betrayal						
Consumer	4.05 (.20)	2.85 (.19)	$F(1, 324) = 18.82$, $p < .001$	4.05 (1.79)	2.85 (1.70)	$F(1, 326) = 19.03$, $p < .001$
Company	3.66 (.19)	3.22 (.18)	$F(1, 324) = 2.84$, $p < .10$	3.66 (1.66)	3.21 (1.71)	$F(1, 326) = 3.01$, $p < .10$
2-way Interaction	$F(1, 324) = 4.01$, $p < .05$			$F(1, 326) = 3.94$, $p < .05$		
Study 3: Upgrade locus (internal, external) × upgrade discount (no, yes)						
Purchase intentions						
No	4.98 (.18)	5.87 (.18)	$F(1, 301) = 11.73$, $p < .01$	4.96 (1.91)	5.87 (1.15)	$F(1, 303) = 12.33$, $p < .01$
Yes	5.58 (.18)	5.73 (.19)	$F(1, 301) = .36$, $p = .55$	5.58 (1.63)	5.74 (1.62)	$F(1, 303) = .37$, $p = .54$
2-way Interaction	$F(1, 301) = 3.98$, $p < .05$			$F(1, 303) = 4.24$, $p < .05$		
Loyalty intentions						
No	4.97 (.14)	5.39 (.14)	$F(1, 301) = 4.73$, $p < .05$	4.95 (1.35)	5.40 (1.09)	$F(1, 303) = 5.32$, $p < .05$
Yes	4.94 (.14)	5.47 (.14)	$F(1, 301) = 7.32$, $p < .01$	4.95 (1.44)	5.48 (.88)	$F(1, 303) = 7.49$, $p < .01$
2-way Interaction	$F(1, 301) = .15$, $p = .70$			$F(1, 303) = .09$, $p = .77$		
Perceived betrayal						
No	2.87 (.18)	2.36 (.18)	$F(1, 301) = 3.88$, $p < .05$	2.90 (1.69)	2.35 (1.52)	$F(1, 303) = 4.36$, $p < .05$
Yes	2.68 (.18)	2.14 (.19)	$F(1, 301) = 4.43$, $p < .05$	2.69 (1.84)	2.11 (1.35)	$F(1, 303) = 5.00$, $p < .05$
2-way Interaction	$F(1, 301) = .01$, $p = .92$			$F(1, 303) = .01$, $p = .92$		
Study 4A: Upgrade locus (internal, external) × feature type (tangible, intangible)						
Loyalty intentions						
Tangible	4.42 (.14)	4.90 (.13)	$F(1, 290) = 6.39$, $p < .05$	4.43 (1.22)	4.89 (1.31)	$F(1, 293) = 6.12$, $p < .05$
Intangible	4.89 (.14)	4.91 (.14)	$F(1, 290) = .01$, $p = .92$	4.89 (1.13)	4.90 (.98)	$F(1, 293) = .00$, $p = .96$
2-way Interaction	$F(1, 290) = 2.76$, $p < .10$			$F(1, 293) = 2.72$, $p = .10$		
Perceived ownership						
Tangible	4.98 (.22)	2.98 (.21)	$F(1, 290) = 44.02$, $p < .001$	5.00 (1.84)	3.01 (1.86)	$F(1, 293) = 43.23$,$p < .001$
Intangible	4.03 (.23)	2.92 (.23)	$F(1, 290) = 11.88$, $p < .01$	4.00 (2.07)	2.89 (1.85)	$F(1, 293) = 11.74$, $p < .01$
2-way Interaction	$F(1, 290) = 4.13$, $p < .05$			$F(1, 293) = 3.93$, $p < .05$		
Perceived betrayal						
Tangible	3.61 (.19)	2.74 (.17)	$F(1, 290) = 11.67$, $p < .01$	3.60 (1.73)	2.77 (1.62)	$F(1, 293) = 10.71$, $p < .01$
Intangible	3.21 (.20)	2.74 (.19)	$F(1, 290) = 2.98$, $p < .10$	3.17 (1.62)	2.75 (1.45)	$F(1, 293) = 2.34$, $p = .13$
2-way Interaction	$F(1, 290) = 1.17$, $p = .28$			$F(1, 293) = 1.24$, $p = .27$		
Study 4B: Upgrade locus (internal, external) × feature tangibility (continuous)						
Loyalty intentions	4.48 (.10)	5.18 (.10)	N/A	4.57 (1.48)	5.22 (1.14)	N/A
2-way Interaction	$F(1, 326) = 18.96$, $p < .001$			$F(1, 328) = 17.02$, $p < .001$		
Perceived betrayal	3.63 (.13)	2.40 (.13)	N/A	3.57 (1.87)	2.35 (1.42)	N/A
2-way Interaction	$F(1, 326) = 6.43$, $p < .05$			$F(1, 328) = 6.19$, $p < .05$		
Study 5: Product identity relevance (continuous) × feature tangibility (continuous) *(internal product upgrades only)*						
Loyalty intentions						
2-way Interaction	$b = -.096$, $p < .001$			$b = -.096$, $p < .001$		
Perceived betrayal						
2-way Interaction	$b = .086$, $p < .01$			$b = .085$, $p < .05$		

Appendix 3.D. Table of test statistics for covariates for each study.

Study	Dependent variable	Gender		Age	
		F	*p*	F	*p*
1A	WTP	F(1, 331) = .47	.49	F(1, 331) = 21.26	< .001
	Loyalty intentions	F(1, 331) = 10.20	< .01	F(1, 331) = .06	.81
	Perceived feature ownership	F(1, 331) = 3.17	< .10	F(1, 331) = 2.49	.12
	Perceived betrayal	F(1, 331) = .19	.66	F(1, 331) = .37	.54
1B	WTP	F(1, 268) = 1.36	.25	F(1, 268) = 11.29	< .01
	Purchase intentions	F(1, 268) = .70	.40	F(1, 268) = 1.07	.30
	Loyalty intentions	F(1, 268) = 11.77	< .01	F(1, 268) = 2.99	< .10
	Perceived feature ownership	F(1, 268) = 1.54	.22	F(1, 268) = 1.00	.32
	Perceived betrayal	F(1, 268) = 3.62	< .10	F(1, 268) = 3.06	< .10
2	WTP	F(1, 324) = .40	.53	F(1, 324) = 10.76	< .01
	Perceived betrayal	F(1, 324) = .88	.35	F(1, 324) = .07	.80
3	Purchase intentions	F(1, 301) = 1.95	.16	F(1, 301) = 2.09	.15
	Loyalty intentions	F(1, 301) = 4.53	< .05	F(1, 301) = 6.52	< .05
	Perceived betrayal	F(1, 301) = .96	.33	F(1, 301) = 4.61	< .05
4A[24]	Loyalty intentions	F(1, 290) = .01	.94	F(1, 290) = .51	.48
	Perceived feature ownership	F(1, 290) = 1.01	.32	F(1, 290) = .12	.73
	Perceived betrayal	F(1, 290) = 2.14	.14	F(1, 290) = 2.28	.13
4B	Loyalty intentions	F(1, 326) = 11.34	< .01	F(1, 326) = 2.60	.11
	Perceived betrayal	F(1, 326) = 5.53	< .05	F(1, 326) = 5.96	< .05
5[25]	Loyalty intentions (Leasing)	b = -0.263	.10	b = 0.010	< .10
	Perceived betrayal (Leasing)	b = 0.422	< .05	b = -0.014	< .05

[24] In Study 4A, we additionally controlled for feature centrality as we manipulated feature type and used two distinct features (i.e., rear view camera (= tangible feature) and (driving performance software (= intangible feature)). Feature centrality had a significant impact on perceived feature ownership (F(1, 290) = 7.07, $p < .01$), but not on loyalty intentions F(1, 290) = .00, p = .95 or perceived betrayal (F(1, 290) = .00, $p = .97$).

[25] Study 5 surveyed actual customers of a global car-leasing firm. As participants were asked to think about their own car when being presented with the option to upgrade a head-up display, we additionally controlled for their monthly car net leasing rate and head-up display possession in their own car. Net leasing rate had no significant impact on loyalty intentions (b = .001, $p = .30$) or perceived betrayal (b = .000, $p = .90$). While the effect of head-up display possession on loyalty intentions towards the leasing firm is not significant (b = .164, $p = .31$), it had a marginally significant effect on perceived betrayal (b = -.405, $p < .10$).

Appendix 3.E. Examination of potential alternative explanations.

One important goal of Study 1B was to also explore potential alternative explanations to our effect (i.e., internal (vs. external) upgrades lead to decreased behavioral intentions; this is serially mediated via perceived feature ownership and perceived betrayal). Specifically, we examine the following potential process variables: (1) cost evaluations (i.e., (a) perceived production effort and (b) perceived upgrading effort), (2) the environmental friendliness of the upgrade, (3) perceived convenience, (4) performance risks, (5) failure severity, (6) value-in-use and (7) perceived greed.[26] We tested each of these constructs using existing measures from the literature. The table below presents details on the scale origin, an exemplary item of each construct, the number of items we used, the scale type as well as Cronbach's alpha.

Construct and measurement item source	Exemplary items	Index details
Perceived production effort Franke and Schreier (2010), Randall et al. (2007)	Producing the described upgrade option (e.g., components required for the upgrade) requires a lot of effort from the company.	3 items; Likert scale (α = .95)
Perceived upgrading effort Franke and Schreier (2010), Randall et al. (2007)	Delivering the described upgrade option to customers (e.g., the infrastructure to obtain the upgrade) requires a lot of effort from the company.	3 items; Likert scale (α = .94)
Environmental friendliness Joshi and Kronrod (2020), Reich and Soule (2016)	The upgrade option is environmentally friendly.	3 items Likert scale; 1 item semantic differential (α = .84)
Perceived convenience Wagner et al. (2009)	For me as a consumer, upgrading the additional memory is convenient.	5 items; Likert scale (α = .94)
Performance risks Ma et al. (2015)	I worry about whether the additional memory will really perform as well as it is supposed to.	4 items; Likert scale (α = .94)
Failure severity Maxham and Netemeyer (2002)	The upgrading procedure is a …minor problem. / …major problem.	3 items; Semantic differential (α = .95)
Value-in-use Gill (2008)	Overall, how would you consider using the smartphone with the additional memory than without the additional memory? much less valuable / much more valuable	4 items; Semantic differential (α = .95)
Perceived greed[27] Lee et al. (2017)	The company is greedy.	8 items; Likert scale (α = .82)
Perceived greed Grégoire et al. (2010)	The company has good/bad intentions.	4 items; Semantic differential (α = .88)

[26] We thank the review team for pointing to these interesting alternative explanations.
[27] Perceived greed was measured using two alternative measures (Likert scale and semantic differential scale).

To test whether our results (serial mediation via feature ownership perceptions and perceived betrayal), are stable even if we consider those potential alternative explanations, we conducted several analyses: (1) We controlled for these variables in the serial mediation model, (2) we included these variables as parallel mediators relative to perceived betrayal in the serial mediation model, (3) we further analyzed the relationship between perceived betrayal and two different measures of greed, and (4) we further analyzed value-in-use.

(1) Serial mediation model holds when accounting for alternative variables. First, we included those potential alternative explanations both simultaneously and individually[28] as control variables in the serial mediation models of upgrade locus on WTP and loyalty intentions via perceived feature ownership and perceived betrayal (PROCESS Model 6). In the table below, we report the results of the simultaneous analysis, though the individual analyses hold, as well. Results showed the predicted serial mediation path on WTP (internal product upgrade → higher feature ownership perceptions → increased perceived betrayal → reduced WTP); a × b = −.0111, 95% CI = [−.0299, −.0004] even if we control for all potential alternative explanations outlined above in addition to age and gender. Results revealed the predicted serial mediation path on loyalty intentions (internal product upgrade → higher feature ownership perceptions → increased perceived betrayal → lower loyalty intentions); a × b = −.0215, 95% CI = [−.0505, −.0028]. These results suggests that our proposed serial mediation is stable even if we control for all these potential alternative explanations.

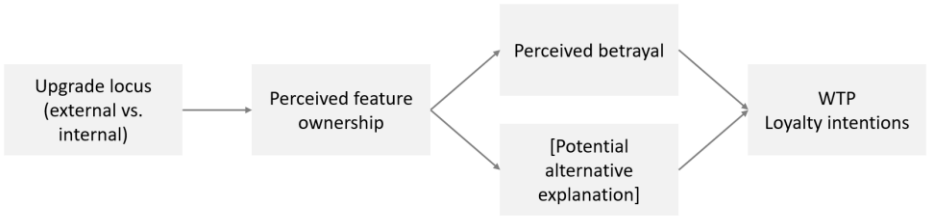
As noted by the table below, this model remains significant when controlling for all the variables below, either simultaneously in the model, as reported below, or when included individually.

Construct	Indirect effect for dependent variable WTP	Indirect effect for dependent variable loyalty intentions
Serial Mediation Model	a × b = −.0111, 95% CI [−.0299, −.0004]	a × b = −.0215, 95% CI [−.0505, −.0028]
Control Variables:		
Perceived production effort	95% CI [-.2188, .1501]	95% CI [-.0545, .2468]
Perceived upgrading effort	95% CI [-.0667, .3097]	95% CI [-.1877, .1183]
Environmental friendliness	95% CI [-.1084, .1603]	95% CI [-.1466, .0729]
Perceived convenience	95% CI [.0329, .2779]	95% CI [-.0651, .1350]
Performance risks	95% CI [-.0712, .1465]	95% CI [-.1304, .0474]
Failure severity	95% CI [-.2293, .0189]	95% CI [-.2488, -.0461]
Value-in-use	95% CI [-.0660, .1750]	95% CI [.0436, .2405]
Perc. Greed (Lee et al.)	95% CI [-.2338, .1485]	95% CI [-.4048, -.0926]
Perc. Greed (Grégoire et al.)	95% CI [.0016, .2919]	95% CI [-.0959, .1412]

[28] Please note that the effects of upgrade locus on WTP and loyalty intentions via perceived feature ownership and perceived betrayal are also significant if we control for each potential alternative explanation separately.

(2) Alternative variables as potential parellel mediators (Serial, parallel mediation model 81). Second, for completeness, we also included the alternative explanation variables as parallel mediators to perceived betrayal in the serial mediation model that includes perceived feature ownership (PROCESS Model 81). The table below summarizes the indirect effects for all included variables. The results suggest that for both WTP and loyalty intentions, only the serial mediation paths via perceived feature ownership → perceived betrayal are significant at a 95% CI. The serial mediation paths via perceived feature ownership and all potential alternative explanations are nonsignificant.

Model 81 (separate for each potential alternative explanation)



Indirect effect 1: Upgrade locus→ Perceived Feature Ownership → Perceived Betrayal → DV
Indirect effect 2: Upgrade locus→ Perceived Feature Ownership → Potential alternative explanation → DV

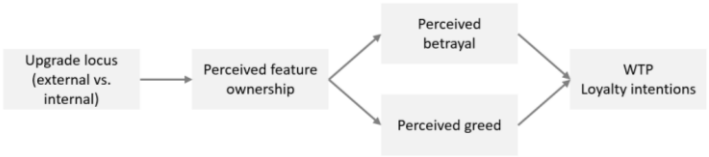
	Dependent variable: WTP	**Dependent variable: Loyalty intentions**
IND 1: Perceived betrayal	**a × b = -.0301, 95% CI [-.0684; -.0076]**	**a × b = -.0718, 95% CI [-.1375; -.0223]**
IND 2: Perceived production effort	a × b = .0001, 95% CI [-.0097; .0088]	a × b = .0002, 95% CI [-.0099; .0115]
IND 1: Perceived betrayal	**a × b = -.0292, 95% CI [-.0644; -.0074]**	**a × b = -.0716, 95% CI [-.1398; -.0227]**
IND 2: Perceived upgrading effort	a × b = -.0038, 95% CI [-.0177; .0060]	a × b = -.0028, 95% CI [-.0133; .0047]
IND 1: Perceived betrayal	**a × b = -.0261, 95% CI [-.0601; -.0052]**	**a × b = -.0678, 95% CI [-.1320; -.0221]**
IND 2: Environmental friendliness	a × b = .0047, 95% CI [-.0048; .0170]	a × b = .0049, 95% CI [-.0038; .0198]
IND 1: Perceived betrayal	**a × b = -.0223, 95% CI [-.0528; -.0039]**	**a × b = -.0663, 95% CI [-.1302; -.0209]**
IND 2: Perceived convenience	a × b = .0128, 95% CI [-.0098; .0416]	a × b = .0099, 95% CI [-.0065; .0366]
IND 1: Perceived betrayal	**a × b = -.0314, 95% CI [-.0680; -.0084]**	**a × b = -.0711, 95% CI [-.1405; -.0216]**
IND 2: Performance risks	a × b = .0006, 95% CI [-.0072; .0095]	a × b = -.0031, 95% CI [-.0150; .0041]
IND 1: Perceived betrayal	**a × b = -.0202, 95% CI [-.0499; -.0024]**	**a × b = -.0570, 95% CI [-.1129; -.0184]**
IND 2: Failure severity	a × b = -.0100, 95% CI [-.0329; .0037]	a × b = -.0147, 95% CI [-.0440; .0057]
IND 1: Perceived betrayal	**a × b = -.0250, 95% CI [-.0572; -.0051]**	**a × b = -.0643, 95% CI [-.1268; -.0202]**
IND 2: Value-in-use	a × b = .0135, 95% CI [-.0010; .0382]	a × b = .0194, 95% CI [-.0015; .0531]

IND 1: Perceived betrayal	**a × b = -.0269, 95% CI [-.0623; -.0054]**	**a × b = -.0417, 95% CI [-.0817; -.0133]**
IND 2: Perc. Greed (Lee et al.)	a × b = -.0017, 95% CI [-.0127; .0058]	a × b = -.0046, 95% CI [-.0208; .0102]
IND 1: Perceived betrayal	**a × b = -.0346, 95% CI [-.0736; -.0094]**	**a × b = -.0623, 95% CI [-.1242; -.0198]**
IND 2: Perc. Greed (Grégoire et al.)	a × b = .0048, 95% CI [-.0099; .0233]	a × b = -.0144, 95% CI [-.0385; .0001]

(3) Perceived betrayal and perceived greed. We also more extensively examined the role of perceived greed, because perceived betrayal and perceived greed are related, yet conceptually distinct constructs. According to Grégoire et al. (2010), the notion of greed is used for "any type of customer, regardless of the prior relationship" (p. 742), while betrayal is used in contexts where a prior relationship exists. Our research generally focuses on situations in which consumers are being offered to upgrade a previously purchased physical product; accordingly, we study situations in which consumers already have relationships with the firm.

To rule out perceived greed as an alternative explanation within our proposed framework, we conducted separate analyses to estimate the serial parallel mediation of upgrade locus on WTP and loyalty intentions through perceived feature ownership and perceived betrayal / perceived greed (PROCESS Model 81, Hayes, 2017). The results of the mediation analyses reveal that the indirect effects via perceived greed are not significant at a 95% CI (regardless of which measure for perceived greed we use). Instead, we find a significant mediation effect via perceived betrayal, which replicates our previous effects and supports our proposed theorizing. Below, please find an overview of the estimated indirect effects:

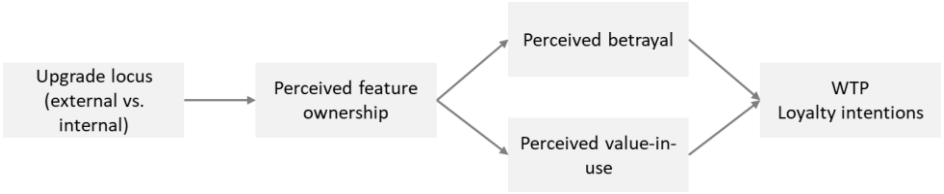
Model



Indirect effect	**Dependent variable: WTP**	**Dependent variable: Loyalty intentions**
Greed Variable A: 8-item perceived greed Likert measure by Lee et al. (2017)		
Indirect effect 1 (Upgrade locus→ Perceived Feature Ownership → Perceived Betrayal → DV)	a × b = -.0269, 95% CI [-.0623; -.0054]	a × b = -.0417, 95% CI [-.0817; -.0133]
Indirect effect 2 (Upgrade locus→ Perceived Feature Ownership → Perceived Greed → DV)	a × b = -.0017, 95% CI [-.0127; .0058]	a × b = -.0046, 95% CI [-.0208; .0102]
Greed Variable B: 4-item perceived greed semantic differential measure by Grégoire et al. (2010)		
Indirect effect 1 (Upgrade locus→ Perceived Feature Ownership → Perceived Betrayal → DV)	a × b = -.0346, 95% CI [-.0736; -.0094]	a × b = -.0623, 95% CI [-.1242; -.0198]
Indirect effect 2 (Upgrade locus→ Perceived Feature Ownership → Perceived Greed → DV)	a × b = .0048, 95% CI [-.0099; .0233]	a × b = -.0144, 95% CI [-.0385; .0001]

(4) Value-in-use. We further estimated a serial parallel mediation of upgrade locus on WTP and loyalty intentions through perceived feature ownership and perceived betrayal / perceived value-in-use using PROCESS Model 81 (Hayes, 2017). The results of the mediation analyses reveal that the indirect effects via perceived value-in-use are not significant at a 95% CI. However, we find a significant mediation effect via perceived betrayal, which replicates our previous effects and supports our theorizing. Below please find an overview of the estimated indirect effects:

Model



Indirect effect	**Dependent variable: WTP**	**Dependent variable: Loyalty intentions**
Indirect effect 1 (Upgrade locus→ Perceived Feature Ownership → Perceived Betrayal → DV)	a × b = -.0250, 95% CI [-.0572; -.0051]	a × b = -.0643, 95% CI [-.1268; -.0202]
Indirect effect 2 (Upgrade locus→ Perceived Feature Ownership → Perceived Value-in-Use → DV)	a × b = .0135, 95% CI [-.0010; .0382]	a × b = .0194, 95% CI [-.0015; .0531]

Taken together, these findings provide empirical support that our results are stable if we consider the potential alternative explanations mentioned above.

(5) Future research. As outlined above, our proposed mechanism via perceived feature ownership → perceived betrayal holds if we (1) control for these potential alternative explanations and (2) consider these potential alternative explanations as mediators. Even though we ruled out the potential alternative explanations mentioned above, we still think that they contain interesting aspects for future research, which is why we added some related research questions to Table 3.4 (e.g., related to the environmental friendliness of the upgrade: What is the moderating role of environmental consciousness on consumers' response to internal (vs. external) product upgrades? How might this vary by product type (e.g., product category))?

Appendix 3.F. Appendix studies overview: Results for the following experimental studies: (1) pre-purchase transparency, (2) convenience communication appeal, and (3) norm communication appeal.

WA Study	Design	Dependent variable	Upgrade Locus Main Effect (basic effect replication)	Two-Way Interaction	Moderator Main Effect
WA1 **Pre-Purchase Transparency**	2 (internal, external) × 2 (no pre-purchase transparency, pre-purchase transparency) between subjects	WTP	$M_{internal}$ = 2.30 vs. $M_{external}$ = 2.70, F(1, 338) = 9.24, p < .01	F(1, 338) = 1.09, p = .30	F(1, 338) = 7.27, p < .01
		Loyalty intentions	$M_{internal}$ = 4.67 vs. $M_{external}$ = 5.37, F(1, 338) = 23.01, p < .001	F(1, 338) = 3.22, p < .10	F(1, 338) = .82, p = .37
		Perceived feature ownership	$M_{internal}$ = 4.60 vs. $M_{external}$ = 3.09, F(1, 338) = 44.39, p < .001	F(1, 338) = 6.61, p < .05	F(1, 338) = 3.29, p < .10
		Perceived betrayal	$M_{internal}$ = 3.26 vs. $M_{external}$ = 2.44, F(1, 338) = 19.78, p < .001	F(1, 338) = .03, p = .87	F(1, 338) = 1.08, p = .30
WA2 **Convenience Appeal**	2 (internal, external) × 2 (no convenience appeal, convenience appeal) between subjects	WTP	$M_{internal}$ = 2.23 vs. $M_{external}$ = 2.46 F(1, 357) = 3.09, p < .10	F(1, 357) = .06, p = .81	F(1, 357) = 2.04, p =. 15
		Loyalty intentions	$M_{internal}$ = 4.73 vs. $M_{external}$ = 5.33 F(1, 357) = 14.19, p < .001	F(1, 357) = .76, p = .38	F(1, 357) = .13, p = .72
		Perceived feature ownership	$M_{internal}$ = 4.75 vs. $M_{external}$ = 2.52 F(1, 357) = 114.71, p < .001	F(1, 357) = .00, p = .97	F(1, 357) = 3.27, p < .10
		Perceived betrayal	$M_{internal}$ = 3.24 vs. $M_{external}$ = 2.16 F(1, 357) = 34.58, p < .001	F(1, 357) = .07, p = .80	F(1, 357) = .41, p = .52
WA3 **Norm Appeal**	2 (internal, external) × 2 (norm non-revealed, norm revealed) between subjects	WTP	$M_{internal}$ = 2.27 vs. $M_{external}$ = 2.61 F(1, 313) = 5.88, p < .05	F(1, 313) = 3.64, p < .10	F (1, 313) = .16, p = .69
		Loyalty intentions	$M_{internal}$ = 4.73 vs. $M_{external}$ = 5.31 F(1, 313) = 13.80, p < .001	F (1, 313) = .08, p = .78	F (1, 313) = .80, p = .37
		Perceived feature ownership	$M_{internal}$ = 5.01 vs. $M_{external}$ = 2.50 F(1, 313) = 162.38, p < .001	F (1, 313) = 1.70, p = .19	F (1, 313) = .03, p = .86
		Perceived betrayal	$M_{internal}$ = 3.29 vs. $M_{external}$ = 2.30 F(1, 313) = 26.92, p < .001	F (1, 313) = .34, p = .56	F (1, 313) = .46, p = .50

Note: All Appendix studies use phone (memory chip) as the product type. Samples were as follows: WA Study 1 (N = 344; M_{age} = 46.22, 42.4% female); WA Study 2 (N = 363; M_{age} = 46.66, 28.4% female); WA Study 3 (N = 319; M_{age} = 40.35, 48.6% female). In three cases, we see (marginally) significant interactions. However, the effects are amplified relative to the control condition.

Appendix 3.G. Detailed results for studies WA1, WA2, WA3 (summarized in Appendix 3.F).

Study WA1: Robustness under pre-purchase transparency

The purpose of this study is to test the robustness of our findings by exploring the influence of pre-purchase disclosure by the company. It is important to rule out that consumers' betrayal is not simply a consequence of withheld information at the time of purchase. Marketers often use covert marketing tactics to persuade consumers to show favorable behaviors. According to Milne et al. (2008, p. 58) covert marketing can be defined as "an intentional omission and distortion of facts by marketers pertaining to the collection and/or dissemination of information by marketers." As "covert marketing violates the full-disclosure […] norm for legitimate selling practices" (Xie et al. 2015, p. 227), one could argue that consumers' perceptions of betrayal in case the of internal product upgrades can be ascribed to a lack of transparency at the time of the base product purchase. When the company informs consumers about the mode of product upgrades at the time of the base product purchase, consumers may not have feelings of ownership, and consequently may not feel betrayed. Thus, transparency about product upgrades at the time of the base product purchase could mitigate the negative effects of internal product upgrades.

Design, participants, and procedure

The study employed a 2 (upgrade locus: internal, external) × 2 (pre-purchase transparency: no, yes) between-subjects design. Smartphone owners (N = 344, M_{age} = 46.22, 42.4% female) of a professional, selective online consumer panel were randomly assigned to one of the four conditions. We employed a two-staged process. First, participants were asked to imagine that they encountered a decision to purchase a 64 GB smartphone. Participants saw a technical specifications summary of a smartphone they purchased a year ago. In the pre-purchase transparency condition, it also indicated that participants could upgrade their phone's memory by 32 GB after the purchase with an internal (vs. external) chip. In the *no* pre-purchase transparency (i.e., control) condition, participants did not see any future upgrade information. Second, in the post-purchase situation, participants were confronted with the decision to purchase the memory upgrade. We manipulated upgrade locus in a manner similar to our previous studies. (In the *internal* product upgrade conditions, the smartphone had a built-in memory chip, and a fee was required to obtain the extra memory. In the *external* upgrade conditions, consumers pay for an external memory chip.)

We used the same measurements as previous studies for WTP, loyalty intentions, perceived feature ownership, perceived betrayal, and the upgrade locus manipulation check. Participants also answered a six-item manipulation check for perceived pre-purchase transparency (e.g., "When I originally purchased this phone, the company told me in advance that I would have the option to upgrade"; adapted from Dapko 2012[29]), and provided demographics (i.e., gender and age).

[29] Manipulation Check: A two-way ANOVA revealed a significant effect of upgrade locus on proximity to the base product ($M_{internal}$ = 73.70 vs. $M_{external}$ = 17.50; F(1, 340) = 299.85, p < .001). The other effects were NS (ps > .38). The means also significantly differed from the scale midpoint (i.e., 50; ps < .01). Thus, the manipulation of upgrade locus performed as intended. A two-way ANOVA on perceived pre-purchase transparency revealed a significant main effect of pre-purchase transparency (M_{no} = 3.57 vs. M_{yes} = 5.53; F(1, 340) = 116.62, p < .001); the other effects were NS (ps > .76). Thus, the pre-purchase transparency manipulation performed as intended.

Results

Specific results on the outcome variables are summarized in Appendix 3.F (a table summarizing results across the three Appendix studies). For completeness, here we also provide the mediation analysis results.

Mediation analysis. To test if our findings can be replicated under no pre-purchase transparency and are robust under pre-purchase transparency, we conducted two separate serial mediation analyses on each outcome variable (PROCESS Model 6; 5,000 resamples; Hayes 2017), estimating the indirect effects of upgrade locus on (1) WTP and (2) loyalty intentions through perceived feature ownership and perceived betrayal, controlling for age, gender and pre-purchase transparency. Results revealed the predicted serial mediation paths for WTP (internal product upgrade → higher feature ownership perceptions → increased perceptions of betrayal → reduced WTP); a × b = −.0318, 95% CI = [−.0690, −.0071]. Results also revealed a serial mediation path for loyalty intentions (internal product upgrade → higher feature ownership perceptions → increased perceptions of betrayal → reduced loyalty intentions); a × b = −.1231, 95% CI = [−.2171, −.0540], replicating previous studies.

Discussion

This study shows that consumers' betrayal is not a consequence of withheld information at the time of purchase. Results also show replication of our previous findings under high pre-purchase transparency. These findings suggest that consumers' negative reactions to internal product upgrades are robust and cannot be eliminated by informing consumers about upgrades at the time of the purchase.

Study WA2: Convenience communication appeal

As indicated in the introduction, manufacturers see the key benefit of internal product upgrades for customers in its convenience. As the car manufacturer Audi claims on its website: "With functions on demand Audi customers can book additional features for their car post-purchase, easily and conveniently online via myAudi". This notion is supported by the literature on service convenience which suggests that service convenience is considered to be a driver of satisfaction and service quality (e.g., Berry et al. 2002). This study examines whether emphasizing convenience benefits within the company's communication can attenuate the negative effects of internal product upgrades.

Design, participants, and procedure

To test whether emphasizing an upgrade's convenience will affect the negative response to internal product upgrades, this study employed a 2 (upgrade locus: internal, external) × 2 (convenience appeal: no, yes) between-subjects design. Smartphone owners (N = 363, M_{age} = 46.66, 28.4% female) were randomly assigned to one of the four conditions. Similar to our previous studies, participants were first asked to imagine that they recently purchased a 64 GB smartphone and that they were interested in upgrading their smartphone's memory. Upgrade locus was manipulated as in our previous studies. Next, participants saw a message by the company informing consumers about the option to upgrade their smartphone. In the *no convenience* appeal condition, participants read a text that described how consumers can get the internal/external upgrade. In the *convenience* appeal condition, we emphasized the ease of getting the internal/external upgrade. We used the same measurements for WTP, loyalty intentions, perceived feature ownership, and perceived betrayal as in our previous studies. Additionally, participants provided their gender and age. In an independent pretest (N = 80; M_{age}

= 44.41, 38.8% female) that was conducted before the main experiment, participants saw the stimuli and answered a four bipolar item manipulation check for perceived convenience (e.g., "Upgrading the extra memory is inconvenient / convenient"; "Upgrading the extra memory is effortful / effortless", adapted from Wagner et al. 2009).

Results[30]

Specific results on the outcome variables are summarized in Appendix 3.F. For completeness, here we also provide the mediation analysis results.

Mediation analysis. As we find the same patterns when using a convenience appeal (vs. not), we merged the data. To test whether our findings can be replicated, we conducted serial mediation analyses (PROCESS Model 6; 5,000 resamples; Hayes 2017), estimating the indirect effects of upgrade locus on (1) WTP and (2) loyalty intentions through perceived feature ownership and perceived betrayal controlling for gender, age and convenience appeal. Results revealed the predicted serial mediation paths of the effect of upgrade locus on WTP (internal product upgrade → higher feature ownership perceptions → increased perceptions of betrayal → reduced WTP); a × b = −.1463, 95% CI = [−.2459, −.0635]. Results also showed a significant serial mediation for the loyalty intentions index (internal product upgrade → higher feature ownership perceptions → increased perceptions of betrayal → reduced loyalty intentions); a × b = −.4197, 95% CI = [−.5878, −.2769], replicating our previous studies.

Discussion

Our findings from Study WA2 suggest that consumers' negative reactions to internal product upgrades are robust and cannot be mitigated by emphasizing the convenience benefits consumers would face when purchasing internal product upgrades.

Study WA3: Norm communication appeal

To assess whether a firm adheres to relationship norms, consumers might consider their previous marketplace experiences as a reference point, and also consider the behavior of other consumers (e.g., Xia et al. 2004) or the commonness in the marketplace per se (e.g., Gershoff et al. 2012). Previous research on product versioning suggests that revealing the commonness of an innovative production method in an industry mitigated consumers' negative responses to that production method (e.g., Gershoff et al. 2012). Hence, the purpose of this study was to test whether emphasizing an upgrade's commonness (i.e., revealing a normative standard) will reduce the negative consequences that come with internal product upgrades.

Design, participants, and procedure

The study employed a 2 (upgrade locus: internal, external) × 2 (norm appeal: not revealed, revealed) between-subjects design. Smartphone owners (N = 319, M_{age} = 40.35, 48.6% female) of a professional online consumer panel were randomly assigned to one of the four conditions. We employed the same process as in

[30] Manipulation Check: Two-way ANOVA revealed a significant upgrade locus main effect on proximity to the base product ($M_{internal}$ = 86.43 vs. $M_{external}$ = 2.28; F(1, 76) = 262.61, p < .001); the other effects were NS (ps > .63). The means also significantly differed from the scale midpoint (i.e., 50; ps < .01). Thus, the upgrade locus manipulation was successful. Two-way ANOVA on perceived convenience returned a significant convenience appeal main effect (M_{no} = 5.33 vs. M_{yes} = 6.16; F(1, 76) = 6.37, p < .05); the other effects were NS (ps > .46), indicating a successful manipulation.

previous studies (part 1: purchase of smartphone a year ago, part 2: receiving an upgrade offer by the firm). Upgrade locus was manipulated in the same way as in our previous studies. In the *norms revealed* condition, participants saw an advertisement that indicated the respective upgrade approach is a widely adopted standard in the consumer electronics industry and that over 250,000 customers of the focal firm got the respective upgrade. In the *not revealed* condition, participants were informed about the availability of the respective upgrade approach and option, without information about other consumers. We used the same measurements for loyalty intentions, perceived feature ownership, perceived betrayal and the upgrade locus manipulation check as in our previous studies[31]. Moreover, participants provided their gender and age. Prior to the main experiment, we ran a pretest (N=81; M_{age} = 42.96, 45.7% female) to test the norm communication manipulation. Participants answered a six-item manipulation check (e.g., "This upgrading approach is widely used by customers of this company.", adapted from Campbell and Goodstein 2001; Cox and Cox 2002).

Results

Specific results on the outcome variables are summarized in Appendix 3.F. For completeness, here we also provide the mediation analysis results.

Mediation analysis. As we find the same patterns when using a norm appeal (vs. not), we merged the data. We conducted a serial mediation analysis (PROCESS Model 6; 5,000 resamples; Hayes 2017), estimating the indirect effect of upgrade locus on loyalty intentions through perceived feature ownership and perceived betrayal, controlling for gender, age and norm appeal. Results showed a significant serial mediation of the effect of upgrade locus on the loyalty intentions index (internal product upgrade → higher feature ownership perceptions → increased perceptions of betrayal → reduced loyalty intentions); a × b = −.4112, 95% CI = [−.6111, −.2493], replicating the effects of our previous studies.

Discussion

The findings of Study WA3 show that we are able to replicate our previous findings and that the negative effects of internal product upgrades cannot be attenuated by using a norm communication appeal.

[31] Manipulation checks. Two-way ANOVA revealed a significant effect of upgrade locus on proximity to the base product ($M_{internal}$ = 90.39 vs. $M_{external}$ = 13.97; F(1, 77) = 180.26, p < .001). The other effects were NS (ps > .12). The means also significantly differed from the scale midpoint (i.e., 50; ps < .01). Thus, the manipulation of upgrade locus performed as intended. Moreover, two-way ANOVA on perceived typicality of the upgrade approach showed a significant main effect of norm appeal ($M_{nonrevealed}$ = 4.24 vs. $M_{revealed}$ = 5.17; F(1, 77) = 7.58, p < .01); the other effects were NS (ps > .35). Thus, the manipulation of norm appeal performed as intended.

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4 Essay 3: Privacy-related decision-making in Business Network Data Exchange settings: The role of consumers' immediate affective reactions

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Under Review (First Round) at the Journal of Retailing (VHB-Ranking A)

For a long time, consumer data disclosures in retailing contexts mainly occurred within dyadic relationships (i.e., between one consumer and one retailer). However, as consumer data constitute a crucial competitive advantage, retailers (e.g., ASOS, Walmart) increasingly share consumer data with other firms within networks. This research defines and conceptualizes such settings as Business Network Data Exchange (BNDE). While existing research on privacy-related decision-making within and beyond the retailing literature has mainly investigated data disclosure as a cognitive process in dyadic consumer-firm settings, the authors propose that cognitive processing reaches its limits in BNDE settings due to BNDE-evoked uncertainty. Instead, immediate affective reactions are crucial in explaining consumers' privacy-related decision-making in BNDE settings. Four experiments show that consumers react unfavorably to BNDE (vs. dyadic) data disclosure requests and that immediate affective reactions drive this effect. Moreover, the results show that while cognitive features like transparency and control are ineffective, other consumers' positive word-of-mouth referrals mitigate unfavorable BNDE-effects, thus providing retailers with meaningful guidance on how to manage such new data exchange practices.

Keywords: Business network data exchange, Immediate affective reactions, Information privacy, Privacy-related decision-making, Dual-processing

4.1 Introduction

For a long time, consumer data disclosures in retailing contexts mainly occurred within dyadic relationships (i.e., between one consumer and one retailer). However, in search of new opportunities to leverage consumer data for competitive advantage, many retailers like Walmart, ASOS, Zalando, and Amazon increasingly share consumer data within a commercial network of at least two firms (see Table 4.1 for examples of retailers engaging in such networks). For instance, ASOS builds advertising networks with advertising partners and marketing agencies and shares personal consumer information like clothing size, contact, purchase history and linked social media accounts within this network. This and similar data exchanges follow a similar process: the data-gathering retailer (e.g., ASOS) asks the consumer to disclose personal data and to consent to the exchange of these data across the whole network of partnering firms for this and all subsequent data exchanges, thus eliminating the need to obtain consumers' consent for every single follow-up exchange. Based on a consumer's data, the focal retailer builds consumer profiles and shares them with its partners, who then use the data, for example, to contact consumers with personalized products and services or to improve their offers. We denote such situations where data is gathered by one retailer and then exchanged within a commercial network of firms as *Business Network Data Exchange* (BNDE). Figure 4.1 illustrates the structure of BNDE and compares it against traditional dyadic data disclosure settings, where a consumer interacts with only a single data-gathering retailer.

Figure 4.1. Data exchanges in traditional dyadic settings vs. BNDE settings.

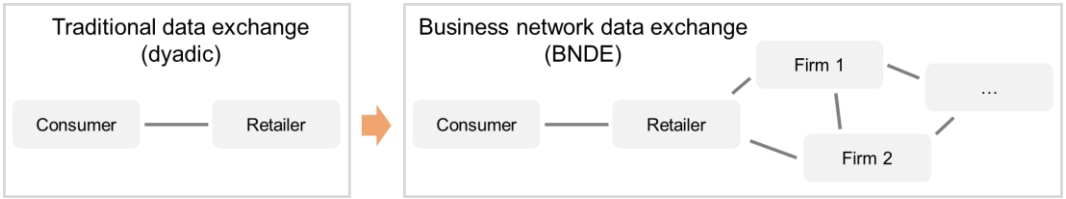


Table 4.1. Marketplace examples of retailers using consumer data as part of BNDE.

Focal Retailer	**Partner Firms**[32]	**Shared Data**	**Source** (Catling 2020)
Apparel			
ASOS	Marketing agencies, advertising partners, website hosts, affiliates	Size, price range, contact, linked social media accounts, order history	Daily Mail Privacy Policy
Nike	Service providers	Contact, size, order history, fitness activity data and preferences	Daily Mail Privacy Policy
Zalando	Advertising partners (e.g., Google, Facebook, Adobe, Bing, Econda)	Contact, brands, linked social media accounts, cookies	Daily Mail Privacy Policy
Zara	Advertising partners, marketing-related partners, service providers	Contact, payment, preferences, browsing data	Daily Mail Privacy Policy
Boohoo	Third parties (not further specified)	Contact, location, linked social media accounts, website usage behavior	Daily Mail Privacy Policy
Missguided	Third parties (not further specified)	Contact, website usage behavior, payment, cookies	Daily Mail Privacy Policy
Shein	Third parties (not further specified)	Contact, size, browser type, payment	Daily Mail
Food/General Merchandise			
Walmart	Other brands	Personal information (not specified)	Foodinstitute Adage
Kroger	Affiliates, subsidiaries, service providers, marketing partners	Contact, demographic information, finance, payment, cookies	RISnews Kroger
Costco	Banks, co-branded companies or joint marketing partners, service providers, affiliates, advertising providers	Contact information	neilpatel Privacy Policy
Drugstores/Pharmacy			
Walgreens	Service providers	Personal health information	Consumergoods Digitalcommerce Statnews
Other			
Ebay	Third parties (not further specified)	Activity data, messages	Rightly Privacy Policy
Amazon	Business partners and service providers	Name, age, voice recording, credit history, purchased products, downloads, cookies	Joindeleteme Rightly Privacy Policy
HP	Business partners (B2B), advertisers, service providers	Contact, location, payment	CRN Privacy Policy

[32] With regard to the denotations of the partner firms, we have followed the denotations in the sources. If available, we have specified the type of partner firm in greater detail. In all other cases, we refer to "third parties (not specified)."

Sharing consumer data in a network provides potential benefits to both firms and consumers. While additional consumer data enable firms to develop better products and services, the data also generate value for consumers as they generally have a great desire for personalization efforts as recent marketing research demonstrates (Adlucent 2016). As such, consumers might benefit from a wide variety of personalized offers, such as personalized digital content, products, services, or advertisements.

Despite these potential benefits of BNDE for firms and consumers, anecdotal evidence shows negative consumer reactions to such data gathering practices. For instance, users of the music streaming service Spotify are upset that their data are shared in a business network of advertisers, concert providers, and other third-party companies (Baterna 2021; Harding 2019). Similarly, when the telecommunication provider Telefónica tried to establish BNDE practices, users' negative reactions halted the venture for four years (Telefónica 2016).

Given these potential negative reactions to BNDE in spite of its potential benefits, we need a better understanding of whether consumers are actually willing to disclose their data in such settings. However, despite the growing proliferation of BNDE in the marketplace and the need for understanding consumers' data disclosure behavior in retail settings (e.g., Martin et al. 2020; Martin and Palmatier 2020), research on privacy-related decision-making in network settings within and beyond the retail context is scarce. So far, privacy-related decision-making literature predominantly focuses on *dyadic* consumer-firm settings through the lens of a *cognitive* risk-benefit trade-off analysis (Dinev and Hart 2006; Martin et al. 2020; Smith et al. 2011; Xu et al. 2009). Only a few notable exceptions have investigated network-like data sharing constellations such as in BNDE. For example, Angst and Agarwal (2009) study consumers' opt-in intentions for digital health records that can be shared with and accessed by various medical parties. In a more commercial

setting, Gerlach et al. (2015) investigate consumers' reactions to privacy policies that allow providers, among other things, to monetize user data by sharing these data with third parties. While these studies offer initial valuable insights into consumers' reactions to network data exchanges, these papers do not investigate potential differences in consumers' reactions to BNDE versus traditional (i.e., dyadic) data exchanges. However, understanding these differences in consumers' decision-making is essential for a successful diffusion of BNDE in the marketplace.

To address this gap, we build on the emerging research stream advocating for the importance of affective processing in privacy-related decision-making (Adjerid et al. 2018; Alashoor et al. 2018; Dinev et al. 2015; Gerlach et al. 2019; Kehr et al. 2015; Li et al. 2017; Li et al. 2011; Wakefield 2013; Yu et al. 2015). We argue that in order to understand consumers' decision-making in BNDE settings, it is indispensable to acknowledge their immediate affective reactions to the data disclosure situation instead of solely focusing on their cognitive evaluations (as is the predominant perspective of established privacy literature). BNDE disclosure settings are—compared to data disclosures to a single firm (i.e., dyadic data exchanges)—characterized by a high degree of uncertainty about which benefits and risks are to be expected from not only the focal firm but also from the other firms within the network. Thus, consumers might be overwhelmed by the network situation which triggers negative affective reactions to it.

To help retailers understand how consumers respond to BNDE, we conducted four studies that examine three major research questions: (1) Will BNDE (vs. dyadic) data disclosure settings reduce consumers' data disclosure? (2) How can the interplay of immediate affective reactions and cognitive evaluations explain this effect? (3) Which strategies help retailers to mitigate consumers' negative immediate affective reactions in BNDE settings?

In addressing these questions, we show that consumers are less likely to disclose personal data in a BNDE (vs. dyadic) setting, and uncover the underlying mechanisms. In particular, we find that BNDE (vs. dyadic) settings elicit more negative immediate affective reactions, which in turn lower disclosure intentions (a) directly and (b) indirectly by influencing consumers' risk-benefit assessments (Study 1). Testing different network sizes, Study 2 shows that BNDE effects are robust regardless of the actual size of the BNDE network (vs. dyadic setting). Finally, Study 3A and Study 3B investigate mitigating approaches for unfavorable BNDE effects: Study 3A demonstrates that the frequently used approach of providing transparency and control features to increase disclosure intentions (e.g., Brandimarte et al. 2013; Martin et al. 2017; Tsai et al. 2011) is not effective for mitigating BNDE-induced uncertainty. Rather, alternative approaches, which help consumers to cope with BNDE-inherent uncertainty, such as positive Word-of-Mouth (WOM) by peers, reduce negative immediate affective reactions (Study 3B). Finally, a single-paper meta-analysis demonstrates the robustness of BNDE's main effects on negative immediate affective reactions and disclosure intentions. With our research, we make three substantial and theoretical contributions to privacy-related decision-making literature.

Introducing BNDE as a distinct data disclosure setting. First, we contribute to privacy-related decision-making literature within and beyond the retailing context by introducing BNDE settings as data disclosure situations in which privacy-related decision-making is different to dyadic disclosure situations. In this way, we extend privacy-related decision-making research that has predominantly focused on dyadic data disclosure situations (e.g., Smith et al. 2011). Compared to dyadic data disclosure settings, BNDE settings are—relatively independent of their actual size—fundamentally different, as they evoke higher uncertainty, fostering more negative immediate affective reactions, which ultimately lead to lower

disclosure intentions. The peculiarity of BNDE is further highlighted by our findings that data transparency and control features, are ineffective to increase consumers' data disclosure intentions in BNDE settings.

The (dual) role of immediate affective reactions in privacy-related decision-making. Our second contribution unfolds by advancing the emerging research stream in privacy-related decision-making that advocates for the importance of affective processing (e.g., Alashoor et al. 2018; Dinev et al. 2015) threefold. First, using a dual-processing approach (Darke et al. 2006; Epstein 1994; Evans and Stanovich 2013), we reveal that immediate affective reactions are especially important in highly uncertain disclosure settings—such as BNDE—as they explain differences in consumers' privacy-related decisions compared to less uncertain, dyadic settings. Second, by investigating *immediate* affective reactions that are induced by the *data request per se*, we extend existing studies that either investigate situation-unrelated affect, or affective reactions that are induced by contextual factors of the disclosure situation. Third, we extend prior research by showing that immediate affective reactions lower consumers' disclosure intentions both (a) *directly* and (b) *indirectly by influencing consumers' cognitive assessments of the disclosure situation*.

Strategies to mitigate the negative effect of BNDE-induced uncertainty. Third, we investigate conceptually meaningful and managerially relevant strategies that mitigate the negative effect of BNDE. We introduce WOM as an important moderator in uncertain disclosure situations such as BNDE. Moreover, we demonstrate that particular, well-established dimensions of transparency and control, that is, transparency and control about who has access to consumer data, cannot reduce consumers' immediate affective negative reactions and hence, are not well suited under BNDE-induced uncertainty.

This paper is organized as follows. In the next section, we review the theoretical background and introduce BNDE as a distinct data disclosure context. We next develop a dual-processing model for privacy-related decision-making in BNDE settings. Subsequent sections describe our data collection procedures, serial mediation and moderation analyses, and discussions of each of the experimental studies. Finally, we include a within-paper meta-analysis to test the focal effects on our central variables (i.e., immediate affective reactions and disclosure intentions) in aggregate. We conclude with a general discussion of the findings, limitations, and avenues for further research.

4.2 Theoretical background, conceptual model, and hypotheses

4.2.1 Business network data exchanges

We define practices, where personal consumer data is gathered by one retailer (i.e., the focal retailer from the consumer's perspective) and then exchanged within a commercial network of at least two commercial parties as Business Network Data Exchange (BNDE). The focal retailer gathers consumer data, takes control of the disclosed data, and exchanges (some of) them with BNDE partner firms. These partner firms can further exchange consumer data among each other. Thus, even within one particular BNDE setting, retailers can be the data-gathering party in one case and the data-receiving party in another case.

Even though related, BNDE is different to concepts such as *unauthorized secondary data use* or *online social networks*. In contrast to unauthorized secondary data use, which describes the use of consumer data for purposes other than what consumers provided it for and without their consent (Culnan 1993), in BNDE settings consumers are *explicitly asked to give consent* to current *and* further exchanges of the data within the BNDE network. Furthermore, we distinguish BNDE from consumers' use of online social networks, where consumers also willingly disclose

data (i.e., postings) to a set of other users who could re-share this data in their network. In contrast to BNDE, however, recipients in online social networks have no commercial interest in further exchanging the disclosed data (this is important as objective risks and benefits differ between commercial and non-commercial settings).

Given their structure, BNDE settings are in sharp contrast to dyadic settings, which have dominated the marketplace and have been at the focus of marketing research for a long time. In contrast to BNDE, consumers in dyadic settings share their data only with *one* single retailer, which uses the data only for their own purposes and does not share them with other firms. We posit that this difference between BNDE and dyadic data exchanges has important consequences for consumers' privacy-related decision-making in such situations. Hence, in the following, we develop our conceptual framework and explain how BNDE (compared to dyadic settings) will influence consumers' reactions and their intentions to disclose data.

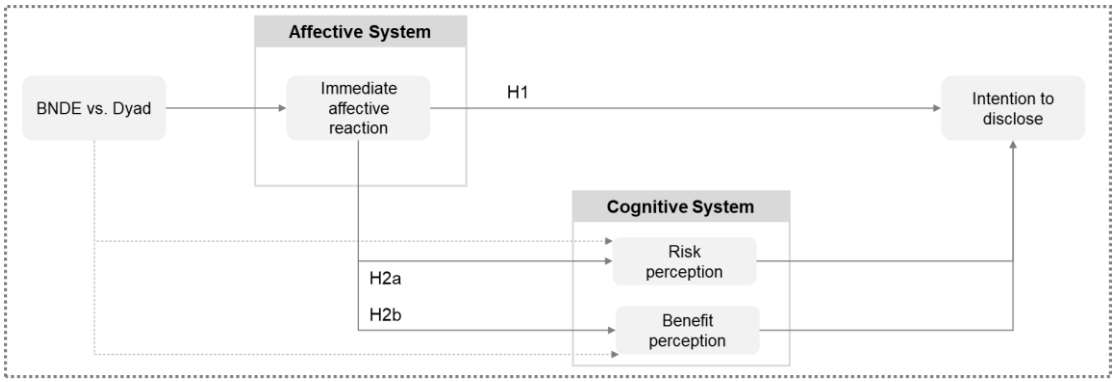
4.2.2 Data disclosure decisions in BNDE settings following a dual-processing approach

An established approach to research data disclosure settings is the "Privacy Calculus" framework (Smith et al. 2011), in which consumers weigh potential positive and negative consequences of data disclosures (such as personalization benefits, monetary aspects, ad-intrusiveness, loss of control, or risk of data misuse) (e.g., Beke et al. 2022; Kokolakis 2017; Smith et al. 2011). According to this framework, consumers are willing to disclose their data if the benefits of data disclosure surpass its accompanying risks (Dinev and Hart 2006).

We argue that in order to explain potential differences in data disclosure decisions between BNDE and dyadic settings, this purely cognitive Privacy Calculus approach is not ideal. Instead, we build on an emerging research stream that

acknowledges that consumers' privacy-related decision-making is not a strictly cognitive elaboration (Alashoor et al. 2018; Dinev et al. 2015; Gerlach et al. 2019), but also entails affective considerations (Dinev et al. 2015). In line with this emerging research stream, we build on general decision-making literature (e.g., Darke et al. 2006; Epstein, 1994; Evans and Stanovich, 2013) to explain consumers' disclosure intentions in BNDE (vs. dyadic settings). Specifically, we draw on the well-established dual-processing model which allows for both affective and cognitive processing (Darke et al. 2006; Epstein, 1994; Evans and Stanovich 2013) as shown in Figure 4.2. We propose that BNDE disclosure settings trigger immediate affective reactions that in turn influence consumers' data disclosures (a) directly and (b) indirectly through consumers' cognitive evaluations of the disclosure situation (i.e., Privacy Calculus), as we elaborate in detail in the following.

Figure 4.2. Conceptual model.



H1: BNDE vs. dyadic data disclosure → Immediate affective reaction → Intention to disclose
H2a: BNDE vs. dyadic data disclosure → Immediate affective reaction → Perceived risks → Intention to disclose
H2b: BNDE vs. dyadic data disclosure → Immediate affective reaction → Perceived benefits → Intention to disclose

Direct effects of consumers' immediate affective reactions on data disclosure intentions. As research outside the field of privacy shows, consumers unconsciously and automatically refer to an "affective pool" of positive and negative associations in response to a stimulus (Finucane et al. 2000; Zajonc 1980). In general, consumers' immediate affective reactions to data disclosures are likely to

be negative because consumers seek to protect their personal data from intrusion (Culnan 1993). However, we argue that compared to dyadic data disclosure settings, these immediate affective reactions are more negative in BNDE settings. While in dyadic settings consumers can usually assess the risks and benefits of data disclosure in a cognitive manner, this assessment might be more difficult in BNDE settings. The plethora of possible data exchanges between the focal retailer and its network partners as well as among the partnering firms is likely to overwhelm consumers (Walker 2016) and makes it hard for them to anticipate what consequences to expect from (often unknown) firms, for instance in terms of relevance and frequency of personalized communication. Hence, consumers are likely to experience "states of uncertainty" where they are uncertain about *who* has access to the data and *how* they are used, which should trigger immediate negative affective reactions, such as discomfort (Faraji-Rad and Pham 2017; Gino et al. 2012). In line with existing literature (Wakefield 2013), we expect that immediate affective reactions in turn directly influence consumers' data disclosure intentions, such that the more negative consumers' affective reactions, the lower their intentions to disclose their data. Hence, BNDE should ultimately lead to lower disclosure intentions compared to dyadic data disclosure settings explained by higher levels of negative immediate affect. Thus, we hypothesize:

H1: BNDE elicits more negative immediate affective reactions than a dyadic data disclosure setting which in turn directly lower consumers' disclosure intentions.

Indirect effects of consumers' immediate affective reactions on data disclosure intentions. Additionally, we suggest that BNDE should reduce consumers' disclosure intentions not only because consumers' affective reactions directly influence disclosure intentions but also have an indirect impact through their effect on consumers' cognitive perceptions. Prior research has shown that affective reactions influence cognitive risk and benefit assessments (Finucane et al. 2000;

Hüttel et al. 2018; Kehr et al. 2015; Li et al. 2011; Yu et al. 2015)—two main factors of consumers' cognitive evaluation. Specifically, in the privacy domain, Kehr et al. (2015) found that consumers' risk perceptions of disclosure decreased when positive affect was elicited by the design of the disclosure request. Transferring this line of reasoning, we propose that the negative immediate affective reaction elicited by BNDE will influence the cognitive processing route (i.e., the cognitive Privacy Calculus risk-benefit assessment). Specifically, we hypothesize that negative immediate affective reactions increase consumers' risk perceptions and decrease their benefit perceptions, which in turn lower consumers' disclosure intentions. Accordingly, we hypothesize:

H2: BNDE elicits more negative immediate affective reactions than a dyadic data disclosure setting, which in turn indirectly lower consumers' disclosure intentions by (a) increasing their risk perceptions and (b) reducing their benefit perceptions.

Within the next sections, we examine hypotheses H1, H2a and H2b on the psychological mechanism underlying consumers' disclosure intentions in BNDE vs. dyadic data disclosure settings (Study 1 and Study 2). Thereafter, we discuss and investigate managerial strategies to mitigate the negative effects of BNDE (Study 3A and 3B). Table 4.2 provides on overview over our studies.

Table 4.2. Overview of studies, findings, and managerial implications.

Study	Dependent variables & *mediators* tested	Hypotheses tested and main findings	Implications for retail managers
Study 1: 2 (BNDE vs. dyad) between-subjects design	Intention to disclose; *immediate affective reactions*, *perceived risks*, *& perceived benefits*	We show that BNDE settings trigger more negative immediate affective reactions than dyadic settings, which *directly* lower consumers' data disclosure intentions (H1). Moreover, immediate affective reactions reduce disclosure intentions *indirectly* by influencing consumers' benefit assessments (H2b). The indirect effect via perceived risks (H2a) becomes insignificant in the dual-processing model due to the strong influence of immediate affective reactions.	Retail firms considering engaging in BNDE should be aware that consumers' data disclosure intentions are lower for BNDE (vs. dyadic) data disclosure settings.
Study 2: 4 (5-BNDE vs. 30-BNDE vs. 100-BNDE vs. dyad) between-subjects design	Intention to disclose; *immediate affective reactions*	We replicate the results of Study 1 across different network sizes.	This negative effect is independent of network sizes.
Study 3A: 2 (low vs. high transparency about data access of other firms) × 2 (low vs. high control over data access of other firms) between-subjects design	Intention to disclose; *immediate affective reactions*	Transparency about and control over data access of other firms are not effective in reducing negative affective reactions and increasing consumers' intention to disclose their data in BNDE settings (H3).	Employing transparency and control features over data access of other firms, two frequently used marketplace approaches that are designed to stimulate consumers' cognitive evaluation of a privacy situation, are not effective in reducing negative consumer reactions to BNDE.
Study 3B: 2 (BNDE vs. dyad) × 2 (no WOM vs. WOM) between-subjects design	Intention to disclose; *immediate affective reactions*	WOM is an effective strategy for reducing consumers' negative immediate affective reactions in BNDE, which in turn positively influence their intentions to disclose (H4).	Retail managers should encourage WOM behavior among their customers (e.g., by incentivizing WOM) to reduce consumers' negative affective reactions to BNDE.

4.3 Study 1: The dual-processing model of privacy-related decision-making in BNDE (vs. dyadic) data disclosure settings

The purpose of Study 1 is to test the impact of a BNDE (vs. dyadic) data disclosure setting on consumers' intention to disclose data and to examine the proposed underlying dual-processing model. We expect consumers to show more negative immediate affective reactions when being confronted with BNDE (vs. dyadic) data disclosure situations, which in turn should have a negative direct impact on intention to disclose (H1) and a negative indirect effect through consumers' risk-benefit assessments (H2a & H2b).

4.3.1 Design, participants, and procedure of Study 1

The experiment employed a 2 (data disclosure setting: BNDE vs. dyad) between-subjects design. We recruited 325 participants (M_{Age} = 31.99 years, SD_{Age} = 8.13, 50% women) who are representative of adult Internet users from a professional online panel provider. Within the experiment, we told participants that an online fashion retailer required their data (e.g., interests, income, marital status) for personalization purposes. We assigned participants randomly to either a dyadic data disclosure condition, in which they read that their data would be used by the focal firm for internal purposes only, or a BNDE condition, in which they were informed that the data would be shared with 30 partner firms in the focal firm's network. See Appendix 4.A for the stimuli.

After being exposed to the manipulation, participants answered questions on all constructs specified in our theoretical framework. We adopted measures from prior research and contextualized them to an online shopping setting. First, we measured consumers' intentions to disclose their data (α = .97) by using a three-item measure by Malhotra et al. (2004). Participants then reported their immediate affective reactions and perceptions of benefits and risks of the data disclosure. We measured immediate affective reactions using the picture-based 5-point scale of

Shampanier et al. (2007), ranging from ☹ (1 = negative) to ☺ (5 = positive), which is well-suited to capture immediate affect (Gable and Harmon-Jones 2008; Lang et al. 1993). Moreover, we assessed perceived benefits of the data disclosure using the utilitarian benefit scale (α = .89) of Voss et al. (2003). Perceived risks were measured using four items (α = .91) by Dinev et al. (2013). Additionally, participants were asked to assess the perceived uncertainty of the data disclosure situation (self-developed; α = .77), as well as their perceptions of control (Dinev et al. 2013; α = .96) and perceived ad-intrusiveness (Li et al. 2002; α = .92).[33] Finally, participants indicated their age, gender, and the perceived sensitivity of the requested data (Xie et al. 2006). Appendix 4.B provides an overview of our measures and their reliabilities.

4.3.2 Results of Study 1

Consistency check.[34] An ANOVA on perceived uncertainty reveals a significant effect of the data disclosure setting (BNDE vs. dyad), indicating that our underlying assumption about higher uncertainty perceptions in BNDE settings compared to dyadic settings is correct (M_{BNDE} = 4.56 vs. M_{Dyad} = 4.18; F(1, 323) = 6.30, p = .01).

Intention to disclose. Testing for our base effect, an ANCOVA on disclosure intentions[35] reveals significantly lower disclosure intentions in the BNDE setting compared to the dyadic disclosure setting (M_{BNDE} = 2.58 vs. M_{Dyad} = 3.98,

[33] We measured perceived control and ad-intrusiveness because prior privacy literature suggests that those two constructs might be crucial in understanding the cognitive impact of BNDE on disclosure intentions (i.e., as customers lose control over data sharing within the BNDE network and perceptions of ad-intrusivenss from potential contacts from unknown BNDE partners might increase).

[34] Further supporting our underlying assumptions, ANOVAs on perceived control and ad-intrusiveness reveal unfavorable effects of BNDE. An ANOVA on perceived control shows that consumers feel significantly less in control when being confronted with a BNDE vs. dyadic data disclosure setting (M_{BNDE} = 2.48 vs, M_{Dyad} = 3.18; F(1, 323) = 15.21, p < .001). Moreover, an ANOVA on perceived ad intrusiveness reveals that consumers have significantly higher perceptions of ad intrusiveness when being confronted with a BNDE vs. dyadic data disclosure setting (M_{BNDE} = 4.57 vs. M_{Dyad} = 4.03; F(1, 323) = 8.43, p < .01).

[35] We control for gender, age, and perceived data sensitivity consistently across all studies (e.g., Gilly and Zeithaml 1985; Lee and Coughlin 2015; Xie et al. 2006). Results of control variables are discussed only when they are significant.

F(1, 320) = 47.21, $p < .001$). Perceived data sensitivity is a significant covariate (F(1, 320) = 55.86, $p < .001$).

Immediate affective reactions. Moreover, an ANCOVA on immediate affective reactions shows that consumers react more negatively when being confronted with BNDE (vs. dyadic) data disclosure settings (M_{BNDE} = 2.14 vs. M_{Dyad} = 2.94, F(1, 320) = 58.87, $p < .001$). The effect of perceived data sensitivity is significant as well (F(1, 320) = 37.58, $p < .001$).

Perceived risks of the data disclosure. An ANCOVA on perceived risks shows that consumers perceive significantly more risks in BNDE vs. dyadic settings (M_{BNDE} = 5.46 vs. M_{Dyad} = 5.03, F(1, 320) = 9.31, $p < .01$). Perceived data sensitivity is a significant covariate (F(1, 320) = 54.08, $p < .001$).

Perceived benefits of the data disclosure. Finally, an ANCOVA on perceived benefits shows that consumers in the BNDE condition perceive less benefits than those in the dyadic condition (M_{BNDE} = 2.77 vs. M_{Dyad} = 3.58, F(1, 320) = 25.18, $p < .001$). Both age (F(1, 320) = 6.81, $p < .01$) and perceived sensitivity (F(1, 320) = 14.77, $p < .001$) are significant covariates.

Dual-processing model. To test the underlying processes, we conduct a serial, parallel mediation analysis (using PROCESS Model 81; Hayes 2017; 5,000 bootstrapping samples), estimating the indirect effect of data disclosure setting (BNDE vs. dyad) on intentions to disclose through immediate affective reactions and perceived risks/perceived benefits of data disclosure.[36]

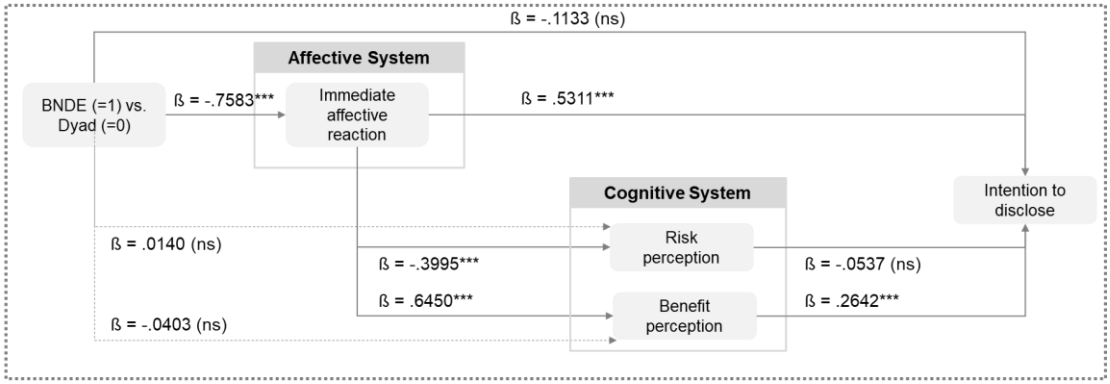
The dual-processing model explains substantial variance in consumers' data disclosure intentions (adjusted R^2 = .691, F(7, 317) = 104.66, $p < .001$). Compared to the dyad, BNDE induces more negative immediate affective reactions (β = -.7583, t(320) = -7.67, $p < .001$). Immediate affective reactions, in turn, have a significant positive effect on consumers' disclosure intentions, such that the more negative

[36] We use standardized coefficients in the mediation analyses.

(positive) their reactions the lower (higher) their disclosure intentions (β = .5311, t(317) = 11.26, $p < .001$).[37] Accordingly, we find the predicted negative indirect effect of BNDE (vs. dyadic) data disclosure settings on data disclosure intentions via immediate affective reactions (β = -.4027, 95% CI [-.5435, -.2760]), supporting H1. Moreover, we find that immediate affective reactions interact with the cognitive system: in line with our assumptions, results confirm that more negative (positive) immediate affective reactions lead to higher (lower) risk perceptions (β = -.3995, t(319) = -7.34, $p < .001$) and lower (higher) benefit perceptions (β = .6450, t(319) = 13.54, $p < .001$). Supporting H2b, the results further show the predicted indirect effect of BNDE (vs. dyadic) data disclosure settings on data disclosure intentions via immediate affective reactions and perceived benefits (β = -.1292, 95% CI [-.1981; -.0756]). Interestingly, the indirect effect via immediate affective reactions and perceived risks is nonsignificant (β = -.0163, 95% CI [-.0431; .0064]). Hence, we have to reject H2a. Importantly, there is no remaining direct effect of BNDE (vs. dyadic) data disclosure setting on consumers' intention to disclose (β = -.1133, t(317) = -1.65, 95% CI [-.2488, .0222]). Moreover, the direct effect of BNDE (vs. dyadic) data disclosure setting on both perceived risks (β = .0140, t(319) = .13, 95% CI [-.1921, .2200]) and perceived benefits (β = -.0403, t(319) = -.44, 95% CI [-.2205, .1400]) is nonsignificant. Taken together, this suggests a full mediation of the BNDE effect on disclosure intentions through our dual-processing model. Figure 4.3 summarizes the results of the dual-processing model (see Appendix 4.C for a detailed results table).

[37] Immediate affective reactions are coded as follows: ☹ (1 = negative) to 😊 (5 = positive).

Figure 4.3. Results of the dual-processing model in Study 1.



$p < .05$, ** $p < .01$, *** $p < .001$	Total effect	ß = -.6729, 95% CI [-.8656; -.4802]
	Direct effect	ß = -.1133, 95% CI [-.2488; .0222]
	Indirect effect 1: DDS → AFF → ITD	ß = -.4027, 95% CI [-.5435; -.2760]
	Indirect effect 2: DDS → AFF → PRIS → ITD	ß = -.0163, 95% CI [-.0431; .0064]
	Indirect effect 3: DDS → AFF → PBEN → ITD	ß = -.1292, 95% CI [-.1981; -.0756]

Note: DDS = Data disclosure setting (BNDE vs. dyad); ITD = Intention to disclose; AFF = Immediate affective reactions; PRIS = Perceived risks; PBEN = Perceived benefits

Additional analysis—Comparing the dual-processing model to the cognitive Privacy Calculus model. To test whether our proposition that immediate affective reactions play a crucial role in in explaining consumers' reactions to BNDE is correct, we also tested a purely cognitive model without immediate affective reactions (i.e., the established Privacy Calculus model that only considers consumers' risk and benefit perceptions). To test the cognitive Privacy Calculus model, we conducted a parallel mediation analysis (using PROCESS Model 4; Hayes 2017; 5,000 resamples), estimating the indirect effect of data disclosure setting (BNDE vs. dyad) on intentions to disclose through perceived risks and perceived benefits of the data disclosure.

Results reveal that the cognitive Privacy Calculus model also explains substantial variance in consumers' data disclosure intentions (adjusted $R^2 = .569$, $F(6, 318) = 72.33$, $p < .001$). However, the variance explained by the dual-processing model is significantly higher ($\Delta R^2 = .121$, $p < .001$).

The following mediation analysis yields two interesting insights about consumers' decision-making in BNDE (compared to the dyad). First, it shows significant indirect effects of BNDE (vs. dyadic) data disclosure on intentions to

disclose through both perceived risks (β = -.0571, 95% CI [-.1132; -.0139]) and perceived benefits (β = -.2833, 95% CI [-.4162; -.1599]), which were insignificant in our dual-processing model. Second, there is still a strong remaining direct effect of BNDE (vs. dyadic) data disclosure on intentions to disclose (β = -.3325, 95% CI [-.4860; -.1790]), which cannot be explained through the purely cognitive Privacy Calculus (see Appendix 4.C for a results overview). As supported by our dual-processing model and outlined above, this direct effect disappears if we account for consumers' immediate affective reactions, hence advocating for the importance of extending the cognitive Privacy Calculus by affective processing.

4.3.3 Discussion of Study 1

In line with our reasoning, findings from Study 1 suggest that BNDE settings trigger more negative immediate affective reactions than dyadic settings, which in turn reduce their data disclosure intentions (a) *directly* (BNDE → immediate affective reactions → intentions to disclose; H1) and (b) *indirectly* by influencing consumers' benefit assessments (BNDE → immediate affective reactions → perceived benefits → intentions to disclose; H2b). Surprisingly, the indirect effect via perceived risks (which is significant in the cognitive Privacy Calculus model), becomes insignificant in the dual-processing model (BNDE → immediate affective reactions → perceived risks → intentions to disclose, H2a). One reason could be that consumers' risk perceptions are not fully independent of their emotional assessment of the disclosure situation, such that consumers' immediate affective reactions capture an important part of this risk assessment (Finucane et al. 2000). Comparing the dual-processing model to the purely cognitive Privacy Calculus model, the results clearly demonstrate that it is consumers' immediate affective reactions that ultimately explain differences in consumers' disclosure intentions in BNDE compared to the dyad. In contrast, the Privacy Calculus would fall short in fully explaining consumers' disclosure behavior.

4.4 Study 2: Robustness over different network sizes

While in Study 1, we find initial support for our proposed effect that BNDE reduces consumers' willingness to disclose data by eliciting more negative immediate affective reactions, the results might be ascribed to the specific size of the BNDE network, that is, consumers might be more uncertain and more overwhelmed when confronted with a large BNDE network compared to a small network and thus have more negative immediate affective reactions. Hence, the purpose of Study 2 is to test whether our negative effects are contingent on network size, thereby also underpinning the crucial role of immediate affective reactions.

4.4.1 Design, participants, and procedure of Study 2

The experimental design and procedure are similar to those for Study 1 with one exception: we manipulated the network size with sizes of 5, 30, or 100 collaborating network partners (three BNDE conditions) and compared it to a dyadic disclosure setting (dyadic condition), hence employing a single-factor between-subjects design with four conditions (data disclosure setting: 5-BNDE vs. 30-BNDE vs. 100-BNDE vs. dyad). The final sample consists of data from 322 respondents (M_{Age} = 31.78 years, SD_{Age} = 7.66, 50% women) of a professional online consumer panel provider. Again, after respondents saw the manipulation, they reported their disclosure intentions and immediate affective reactions as in Study 1.

4.4.2 Results of Study 2

Consistency check. We find that the data disclosure setting has a significant effect on consumers' uncertainty perceptions ($F(3, 318) = 3.77$, $p < .05$). In line with our expectations, planned contrasts reveal that uncertainty perceptions are significantly higher in all three BNDE conditions (i.e., 5-BNDE, 30-BNDE, 100-BNDE) as compared to the dyadic data disclosure setting ($M_{5\text{-BNDE}} = 4.86$, $M_{30\text{-BNDE}} = 5.02$, $M_{100\text{-BNDE}} = 4.82$ vs. $M_{Dyad} = 4.30$, $ps < .05$), while there is no significant difference between the different BNDE network sizes ($ps > .37$).

Intention to disclose. An ANCOVA on intention to disclose reveals a significant main effect of the data disclosure setting ($F(3, 315) = 8.55$, $p < .001$). Gender ($F(1, 315) = 6.19$, $p < .05$) and perceived data sensitivity ($F(1, 315) = 36.47$, $p < .001$) are significant covariates. Planned contrasts show that consumers in all three BNDE network size conditions have a significantly lower intention to disclose than in the dyadic data disclosure situation ($M_{5\text{-BNDE}} = 2.54$, $M_{30\text{-BNDE}} = 2.75$, $M_{100\text{-BNDE}} = 2.76$ vs. $M_{Dyad} = 3.88$, ps $< .001$). Moreover, there are no significant differences between the different BNDE network sizes (ps $> .43$), suggesting that our effects are not driven by varying network sizes (see Figure 4.4.A).

Immediate affective reaction. An ANCOVA on immediate affective reaction shows similar effects. The data disclosure setting has a significant effect ($F(3, 315) = 10.72$, $p < .001$). The effects of perceived data sensitivity ($F(1, 315) = 37.61$, $p < .001$), gender ($F(1, 315) = 3.80$, $p < .10$) and age ($F(1, 315) = 3.25$, $p < .10$) are (marginally) significant as well. In line with our expectations, planned contrasts reveal that consumers show more negative immediate affective reactions when being confronted with any of the three BNDE network conditions as compared to the dyadic data disclosure setting ($M_{5\text{-BNDE}} = 2.26$, $M_{30\text{-BNDE}} = 2.20$, $M_{100\text{-BNDE}} = 2.17$ vs. $M_{Dyad} = 2.90$, ps $< .001$). Importantly, there are no differences between the varying network sizes (ps $> .51$) (see Figure 4.4.B).

Figure 4.4. Results of Study 2.

Panel A. Intention to disclose: The effect of data disclosure setting on consumers' intention to disclose

Panel B. Immediate affective reactions: The effect of data disclosure setting on consumers' immediate affective reactions

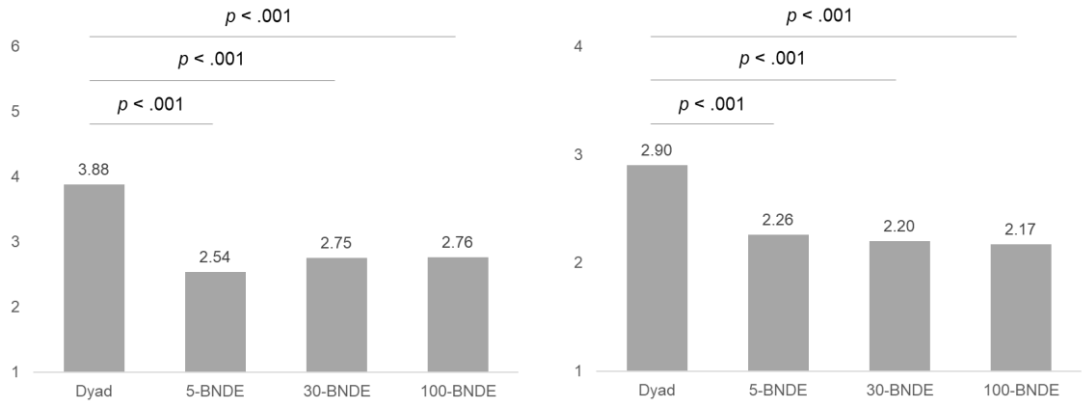


Figure 4. Study 2. Panel A: Consumers' intention to disclose is significantly lower in the BNDE (vs.) dyadic data disclosure settings–irrespective of network size. Panel B: Similarly, consumers' immediate affective reactions are significantly more negative in the BNDE (vs.) dyadic data disclosure settings–also irrespective of network size.

4.4.3 Discussion of Study 2

Study 2 validates the results of Study 1 by showing that consumers' more negative immediate affective reactions to BNDE as well as their lower disclosure intentions in this setting (compared to dyadic disclosure settings) are actually independent of the network size. Thus, our results reveal that BNDE is a distinct data disclosure setting that *generally* triggers negative immediate affective reactions. Consumers react negatively to the *network structure per se*, and not the size of the network and the number of data exchanges in it.

Given the consistent negative effects of BNDE compared to dyadic data exchanges, in the following studies, we now aim to test potential strategies to mitigate these negative effects of BNDE.

4.5 Mitigating negative immediate affective reactions to BNDE

One strategy often proposed by extant privacy research to increase consumers' data disclosure intentions, which is also extensively used by managerial practice, is the implementation of transparency and control features (e.g., Brandimarte et al. 2013; Martin et al. 2017; Tsai et al. 2011). Transparency features aim to inform consumers about firms' data collection processes (e.g., number of collected data, how they are used, by whom they are used, etc.), while control features allow consumers to actively manage and adjust their personal data settings (e.g., type of data shared, recipient of data; Brandimarte et al. 2013; Martin et al. 2017). As such, both features intend to give consumers a better understanding of the situation and to allow them to make better-informed decisions by assessing the potential risks and benefits of data disclosure more thoroughly. In turn, consumers should be more likely to disclose their data, as is also shown in privacy literature (e.g., Martin et al. 2017; Metzger 2007; Tsai et al. 2011). Thus, one would assume that transparency features (i.e., providing information about which firms are part of the network and thus have access to consumer data) and control features (i.e., giving consumers the chance to restrict data sharing) should also be suitable to mitigate unfavorable BNDE effects. However, we posit that transparency and control features will be less effective in the specific case of BNDE settings, where consumers are overwhelmed by a vast amount of information due to the network structure of BNDE, as compared to dyadic settings. In BNDE situations, transparency and control about with whom a focal retailer shares which data would lead to additional information consumers are not able to manage, fostering uncertainty and unclarity instead of reducing them (Walker 2016). For instance, control features would allow consumers to influence the data flow between network partners but also necessitate them to make several interrelated decisions, which is likely to additionally overwhelm them. Thus, we assume that even in the presence of

transparency and control features, consumers will demonstrate similar levels of negative immediate affective reactions as in the case in which these features are not present. Consequently, we hypothesize:

H3: Transparency and control features do not mitigate consumers' negative immediate affective reactions in BNDE settings.

Instead, we propose that unfavorable BNDE effects can be best mitigated using approaches that help consumers cope with the uncertainty of BNDE settings. Research on WOM and advice-seeking has demonstrated that in decision-making situations characterized by high uncertainty—as is the case in BNDE—consumers lack confidence in their own decision-making (Gino et al. 2012). Therefore, consumers are actively seeking out third-party advice, especially in the form of WOM, and are more willing to finally incorporate this advice into their decision-making. As such, WOM has been demonstrated to be a highly influential factor in uncertain decision-making situations (Arndt 1967; Lutz and Reilly 1974) compared to situations with lower levels of uncertainty and less feelings of negative affective reactions (Bansal and Voyer 2000; Gino et al. 2012; Lutz and Reilly 1974). Against this background, we argue that WOM should mitigate consumers' negative affective reactions to BNDE because it reduces negative feelings associated with the uncertainty of BNDE settings. In contrast, WOM should have a minor impact on consumers' affective reactions in dyadic situations because in such situations, consumers sense only minor levels of uncertainty. We hypothesize:

H4: WOM mitigates consumers' negative immediate affective reactions in BNDE settings.

4.6 Study 3A: Investigating data accessibility transparency and control features to mitigate negative immediate affective reactions to BNDE

4.6.1 Design, participants, and procedure of Study 3A

We employed a 2 (transparency about data access of other firms: low vs. high) × 2 (control over data access of other firms: low vs. high) experimental design. Two hundred and twenty-eight members of a professional online consumer panel provider with a selective, high quality recruitment process participated in the study and were randomly assigned to one of the four conditions (M_{Age} = 36.80 years, SD_{Age} = 15.08, 44.3% women). The general data disclosure situation was similar to our previous studies. We manipulated transparency and control about the data access in a BNDE setting by employing approaches that are in line with regulations that aim to strengthen consumers' understanding and control of data exchanges (e.g., California's Consumer Privacy Act (CCPA), Europe's General Data Protection Regulation (GDPR)). Transparency about data access was manipulated by providing vs. not providing information about the firms that are part of the BNDE network. In the *low* transparency conditions, we did not list firms of the BNDE network, only referring to the network as a whole. In the *high* transparency conditions, we listed all ten firms[38] that are part of the BNDE network. Control over data access was manipulated by displaying the opportunity to prohibit data sharing with the firms of the BNDE network via a slider bar. In the *low* control conditions, participants did not have the opportunity to prohibit data sharing in the network. In line with the implementation in the marketplace, in the *high* control condition, we showed slider bars to participants and they should imagine that they could prohibit data sharing either with the network as a whole (low transparency condition) or with

[38] As Study 2 demonstrated that our proposed effects are independent of network size, we decided to use ten network partners to avoid unnecessary scrolling of participants on the screen in the high transparency and high control conditions. In this way, the study would also offer a conservative test of H3: if transparency and control features do not mitigate the negative effect of BNDE for 10 network partners, it is unlikely that will be effective for more network partners.

each of the partner firms (high transparency condition). The low transparency, low control condition corresponds to our BNDE manipulation used in previous studies. See Appendix 4.A for the detailed stimuli.

After reading the scenario, participants indicated their disclosure intentions and immediate affective reaction. Moreover, to check whether our manipulations performed as intended, we measured participants' perceived transparency of data access by using two items adapted from Karwatzki et al. (2017) (i.e., "Jantho allows me to understand… /- … how my personal information is used. / - … by whom my personal information is used.") as well as control over data access using the following item: "I think I have control over who uses data I disclosed." (Dinev et al. 2013).

4.6.2 Results of Study 3A

Manipulation checks. A transparency × control ANOVA on perceived transparency reveals a significant main effect of transparency ($M_{low\ trans}$ = 3.09 vs. $M_{high\ trans}$ = 3.56, F(1, 224) = 5.47, p < .05). Both the effect of control and the interaction effect are nonsignificant (ps > .12). A transparency × control ANOVA on perceived control reveals a marginally significant main effect of control ($M_{low\ control}$ = 2.35 vs. $M_{high\ control}$ = 2.77, F(1, 224) = 3.68, p = .06). Both the main effect of transparency and the interaction effect are nonsignificant (Fs < 1, ps > .80), indicating successful manipulations.

Immediate affective reactions. We conducted an ANCOVA on immediate affective reactions as a function of transparency, control, and their interaction. As in the previous studies, we controlled for age, gender, and perceived sensitivity. The results reveal that neither the main effect of transparency (F(1, 221) = .28, p = .60) nor the main effect of control (F(1, 221) = .03, p = .87) are significant. Moreover, the interaction effect is also nonsignificant (F(1, 221) = .33, p = .57). Age (F(1, 221) = 9.97, p < .01) and perceived sensitivity of the requested data (F(1, 221) = 9.81, p <

.01) are significant covariates. These results support H3. Table 4.3 summarizes the focal results on immediate affective reactions.

Table 4.3. Results of Study 3A.

Design	**Method**	**Findings**		
2 (low vs. high transparency about data access of other firms) × 2 (low vs. high control over data access of other firms) between-subjects design	Lab experiment	Transparency about data access of other firms and control over data access of other firms are not effective to reduce negative consumer reactions to BNDE settings.		
ANCOVA			**Interaction effect**	
		Means	**F**	***p***
AFF		$M_{lowtrans,\ lowcont}$ = 2.32 $M_{lowtrans,\ highcont}$ = 2.42 $M_{hightrans,\ lowcont}$ = 2.32 $M_{hightrans,\ highcont}$ = 2.27	.33	.57

Note: AFF = Immediate affective reactions

Intention to disclose. We also checked whether transparency and control features had a moderating effect on intentions to disclose (i.e., to rule out that these features have no impact on immediate affective reactions but directly on consumers' intention to disclose). For this, we ran an ANCOVA on intention to disclose as a function of transparency, control, and their interaction, controlling for age, gender, and perceived sensitivity. Both the main effect of transparency ($F(1, 221) = 1.80$, $p = .18$) and the main effect of control ($F(1, 221) = .32$, $p = .57$) are not significant. The transparency × control interaction is nonsignificant as well ($F(1, 221) = .13$, $p = .72$). Age ($F(1, 221) = 10.66$, $p < .01$), gender ($F(1, 221) = 7.62$, $p < .01$), and perceived sensitivity ($F(1, 221) = 37.58$, $p < .001$) are significant covariates.

4.6.3 Discussion of Study 3A

Supporting H3, the results of Study 3A provide empirical evidence that two frequently used approaches in both academia and practice, designed to stimulate consumers' cognitive evaluation of a privacy situation (i.e., transparency and control over data access of other firms), are not effective in reducing negative consumer

reactions to BNDE. Even if consumers have full transparency and control about whether and with whom to share their data, they still show the same level of immediate negative affective reactions to BNDE networks as compared to a low transparency and low control situation. In turn, their disclosure intentions also do not change in the light of transparency and control features. As such, these results corroborate research revealing that transparency and control features are not always beneficial (e.g., Brandimarte et al. 2013; John et al. 2011; Karwatzki et al. 2017).

Next, we test WOM referrals as an alternative strategy to reduce BNDE-induced uncertainty and consumers' negative reactions to it. As hypothesized in H4, WOM referrals should help consumers to cope with BNDE-inherent uncertainty, thus successfully reducing negative immediate affective reactions, ultimately increasing disclosure intentions.

4.7 Study 3B: Mitigating negative immediate affective reactions to BNDE using positive WOM to counteract BNDE-inherent uncertainty

4.7.1 Design, participants, and procedure of Study 3B

We employed a 2 (data disclosure setting: BNDE vs. dyad) $\times$ 2 (WOM referral: no WOM vs. positive WOM) experimental design. We manipulated the existence of positive WOM by adding a note to the scenario telling participants that they visited the online shop after close friends reported on their positive experience and encouraged participants to try it out for themselves. We chose this type of WOM from a close friend—instead of, for example, testimonials—because research demonstrated that consumers especially rely on WOM from close peers, whereas WOM from unknown third parties has been shown to have less influence (Bansal and Voyer 2000). The no-WOM group did not receive any information related to close friends' referrals but was directly confronted with the online shops' data

disclosure request. The sample reflects data from 301 participants (M_{Age} = 36.05 years, SD_{Age} = 13.68, 48.8% women) of a professional online consumer panel provider. After reading the manipulation, participants indicated their disclosure intentions and immediate affective reaction as in Study 1.

4.7.2 Results of Study 3B

Immediate affective reactions. We conducted an ANCOVA on immediate affective reactions as a function of BNDE, positive WOM, and their interaction. As in the previous studies, we controlled for age, gender, and perceived sensitivity. We find significant main effects of BNDE (F(1, 294) = 27.14, $p < .001$) and WOM (F(1, 294) = 15.12, $p < .001$) on consumers' immediate affective reactions. Moreover, results show a marginally significant interaction effect of BNDE and WOM on immediate affective reactions (F(1, 294) = 2.87, $p = .09$). Additionally, all three covariates prove to be significant—age: (F(1, 294) = 18.71, $p < .001$); gender: (F(1, 294) = 5.56, $p < .05$); perceived sensitivity: (F(1, 294) = 22.15, $p < .001$).

Next, we explored the two-way interaction in greater detail. When there was *no WOM* by peers, consumers show significantly more negative immediate affective reactions in BNDE (vs. dyadic) data disclosure settings (M_{BNDE} = 2.00 vs. M_{Dyad} = 2.73, F(1, 294) = 22.16, $p < .001$), thus replicating our previous findings. When consumers received a *positive WOM* referral by their peers, the difference in negative affective reactions to BNDE (vs. dyadic) data disclosure settings is weaker (M_{BNDE} = 2.59 vs. M_{Dyad} = 2.95, F(1, 294) = 6.71, $p < .05$). Looked at another way, we find that WOM has a stronger positive effect on immediate affective reactions in BNDE situations (M_{noWOM} = 2.00, M_{WOM} = 2.59, F(1, 294) = 13.49, $p < .001$) than in dyadic situations (M_{noWOM} = 2.73, M_{WOM} = 2.95, F(1, 294) = 2.85, $p < .10$).

Moderated mediation analysis. As we found a significant interaction effect on consumers' immediate affective reactions, we next conducted a moderated mediation analysis (Model 7; 5,000 bootstrapping samples; 95% CI; age, gender,

and perceived sensitivity of the requested data were covariates) (Hayes 2017) to investigate the indirect effect of BNDE (vs. dyad) × WOM (vs. no WOM) on consumers' intentions to disclose through immediate affective reactions. Again, we find a marginally significant interaction effect of BNDE and WOM (β = .3567, t(294) = 1.69, *p* = .09) on immediate affective reactions. Conditional indirect effects show that this mitigating effect results in a less negative indirect effect of BNDE on disclosure intention in WOM-situations (β = -.1650, 90% CI [-.2885, -.0549]) compared to situations without WOM (β = -.3238, 90% CI [-.4583, -.1962]). These results support H4. Table 4.4 summarizes the study results.

Table 4.4. Results of Study 3B.

Design	**Method**	**Findings**		
2 (BNDE vs. dyad) × 2 (no WOM vs. WOM) between-subjects design	Lab experiment	Positive WOM by close peers is an actionable strategy to mitigate negative BNDE effects on consumers' immediate affective reactions and their disclosure intentions.		
ANCOVA			**Interaction effect**	
		Means	**F**	***p***
AFF		$M_{BNDE,\ no\ WOM}$ = 2.00 $M_{Dyad,\ no\ WOM}$ = 2.73 $M_{BNDE,\ WOM}$ = 2.59 $M_{Dyad,\ WOM}$ = 2.95	2.87	.09
Moderated mediation analysis, Process Model 7 (90%)				
			LLCI	**ULCI**
Index of moderated mediation		.1587	.0002	.3137
Conditional indirect effects				
No WOM	DDS → AFF → ITD	-.3238	-.4583	-.1962
WOM	DDS → AFF → ITD	-.1650	-.2885	-.0549

Note: DDS = Data disclosure setting (BNDE vs. dyad); ITD = Intention to disclose; AFF = Immediate affective reaction

4.7.3 Discussion of Study 3B

We provide empirical evidence for the mitigating effect of positive WOM on the unfavorable impact of BNDE on immediate affective reactions and consequently on disclosure behavior. Supporting H4, our results show that positive WOM is a mechanism that helps consumers to cope with uncertainty and effectively reduces negative immediate affective reactions. Specifically, we show that WOM has a

stronger, favorable effect in BNDE settings compared to dyadic settings. This stronger effect can be explained by the fact that consumers perceive dyadic settings to be less uncertain and therefore exhibit lower negative affective reactions in the first place. Hence, WOM, as an uncertainty-mitigating strategy, is more effective in reducing negative affective reactions in BNDE settings compared to dyadic settings.

4.8 Single-paper meta-analysis

To test the overall validity of the negative effect of BNDE (vs. dyad) on immediate affective reactions and on disclosure intentions we performed a single-paper meta-analysis (McShane and Böckenholt 2017) on studies 1, 2 and 3B. For Study 2, we used the BNDE condition with a network size of 30 firms[39] (in line with Study 1) and for Study 3B, we only included the condition, in which the effect was not attenuated by positive WOM by peers. The single-paper meta-analysis reveals that across the three studies, BNDE elicited more negative immediate affective reactions (Estimate = -.7682, SE = .0765; z = -10.04, $p < .001$) and resulted in lower disclosure intentions (Estimate = -.6742, SE = .0767; z = -8.79, $p < .001$) than a dyadic disclosure setting. The results are in support of our hypotheses, providing evidence for a robust unfavorable effect of BNDE on consumers' privacy-related decision-making.

4.9 General discussion

Although retailers like Walmart, ASOS, Zalando, and Amazon increasingly share consumer data within a network of other firms (which we denote as BNDE) to leverage consumer data for competitive advantage, research on how those network settings affect consumers' data disclosure is scant. In this research, we therefore examine BNDE and compare it to the traditional dyadic data exchange setting,

[39] Results of the single-paper meta-analysis are similar if we compare the dyadic data disclosure situation to the BNDE conditions with 5 and 100 network firms for Study 2.

where consumers share their data with a focal firm only. Across four experimental studies (see Table 4.2), we show that (a) consumers' data disclosure is lower in BNDE (vs. dyadic) data disclosure settings (Studies 1, 2 and 3B) and that this negative effect is stable even under varying network sizes (Study 2). Moreover, we (b) investigate potential mitigating strategies. We demonstrate that data access transparency and control cannot mitigate the negative immediate affective reactions to BNDE and increase data disclosure (Study 3A). Instead, firms should use WOM referrals by peers to help consumers cope with BNDE-induced uncertainty and attenuate the negative effect of BNDE (vs. dyadic) data disclosure situations (Study 3B).

4.9.1 Theoretical contributions

Despite the practical relevance of business models based on exchanges of consumer data within BNDE, privacy research has paid little attention to peculiarities of such settings and their implications for consumers' decision-making processes. Thus, this research contributes to the privacy-related decision-making literature in three ways.

Introduction of BNDE as distinct data disclosure settings. First, we contribute to privacy-related decision-making literature within and beyond the retailing context by introducing BNDE settings as data disclosure situations in which privacy-related decision-making is different to dyadic disclosure situations. In this way, we extend privacy-related decision-making research that has predominantly focused on dyadic data disclosure situations (e.g., Smith et al. 2011) as well as the few notable exceptions that have investigated settings similar to BNDE (e.g., Angst and Agarwal 2009; Gerlach et al. 2015). We show that BNDE settings evoke stronger perceptions of uncertainty in consumers (compared to dyadic settings) as they are confronted with a network of (mostly unknown) firms, which is not the case

in dyadic settings. This BNDE-inherent uncertainty regarding the future consequences of disclosing personal data in turn triggers negative affective reactions, which lower data disclosure decisions (a) directly as well as (b) indirectly by influencing consumers' cognitive benefit evaluations. Specifically, we find that consumers realize very quickly and intuitively that they face a network and not one single firm and react to the network *per se*—regardless of the actual network size, as we demonstrate in Study 2. That is, negative reactions to BNDE settings are not a result of objectively higher risks (i.e., data disclosure to one firm vs. many firms) but are rather a result of an immediate affective reaction to a network situation. The particularity of the BNDE settings due to its inherent uncertainty is further highlighted by our results from Study 3A. There, we find that contrary to the widespread assumption on the favorable effects of transparency and control features (e.g., Martin et al. 2017; Tsai et al. 2011), they are not effective in uncertain BNDE settings. Consumers still react affectively to the BNDE setting as the increase in transparency and control additionally overwhelms consumers in a situation that is already characterized by an abundance of complex information.

The (dual) role of immediate affective reactions in privacy-related decision-making. Second, our results explicate privacy literature's understanding of the key role of affective reactions in privacy decisions. We build on research advocating for the importance of investigating not only cognitive processing but also the need to account for affective reactions in privacy-related decision-making (Alashoor et al. 2018; Gerlach et al. 2019; Kehr et al. 2015; Li et al. 2011; Wakefield 2013). This perspective is especially valuable when investigating uncertain disclosure settings, such as BNDE, where consumers cannot assess the potential consequences of data disclosure and sense particularly higher negative immediate affective reactions. We extend research in privacy-related decision-making in three important ways. First, using a dual-processing approach that accounts for both

cognitive and affective processing (Darke et al. 2006; Epstein 1994; Evans and Stanovich 2013), we reveal that acknowledging immediate affective reactions to disclosure situations is especially important in explaining differences between consumers' privacy-related decisions in highly uncertain settings—such as BNDE—versus less uncertain, dyadic settings. Our findings show that purely cognitive approaches fall short in explaining such differences. Second, we investigate consumers' *immediate* affective reactions that are induced by the data request per se. As such, we extend existing studies that either investigate situation-unrelated affect, like mood (e.g., Dinev et al. 2015) and stable affective evaluations (Yu et al. 2015), or affective reactions that are induced by contextual factors, like aesthetic design of the data disclosure situation (e.g., Kehr et al. 2015). Third, we show that immediate affective reactions lower consumers' disclosure intentions both (a) *directly* and (b) *indirectly by influencing consumers' cognitive assessments of the disclosure situation*. In this way, we extend prior privacy research, which either investigated the direct impact of immediate affect on consumers' disclosure behaviors (e.g., Wakefield 2013) or looked solely at its indirect effect through reduced risk perceptions by inducing positive affect using design features (e.g., Kehr et al. 2015).

Strategies to mitigate the negative effect of BNDE-induced uncertainty. Third, we contribute to research on moderating factors in consumers' privacy-related decision-making (e.g., Angst and Agarwal 2009; Hui et al. 2007) by identifying positive WOM as a valuable approach to attenuate consumers' negative immediate affective reactions in uncertain BNDE settings. While WOM has been demonstrated to be a very influential factor in uncertain decision-making situations in general (Arndt 1967; Lutz and Reilly 1974), this moderator has remained untested in a privacy context, presumably because previous research focused on more certain data exchange settings like dyadic settings. Our results demonstrate that in

uncertain disclosure situations, such as BNDE settings, positive WOM is specifically suitable for reducing negative immediate affective reactions because it helps consumers cope with the uncertainty of the data disclosure situation. However, positive WOM is less effective in more certain—that is, dyadic—settings and thus might not be a universal mitigating strategy in all disclosure settings.

Moreover, our results provide a more nuanced understanding of strategies such as transparency and control features. Providing consumers with transparency and control (Martin et al. 2017) about who has access to consumer data is not well suited under BNDE-induced uncertainty. Even if retailers operating in BNDE provide more information of and control over the data flow in such uncertain disclosure situations, they cannot reduce consumers' immediate affective negative reactions.

4.9.2 Managerial implications

Our results also have important managerial implications for retailers. First, retail managers aiming to implement BNDE need to expect major declines in consumers' willingness to disclose their data compared to a dyadic exchange. Thus, retail managers need to evaluate beforehand whether the increase in revenues by having more sophisticated data within BNDE networks on the one hand offsets the loss of some customer data on the other hand. If retailers nonetheless decide that they want to establish BNDE practices, they should be aware of consumers' negative reactions as shown in this research and further supported by anecdotal evidence of Spotify and Telefónica. The introduction of such a business model should therefore be accompanied with intensive and professional marketing agencies. Second, when establishing BNDE networks or considering joining such a network, retail managers cannot hope to circumvent negative BNDE effects by setting up or joining only small BNDE networks because the negative effects of BNDE do not vary with network size. That is, consumers are likely to react equally negatively regardless of the actual network size. Third, when trying to reduce the

negative effects of BNDE, retail managers cannot rely on the effectiveness of established transparency and control features such as being transparent about who has access to one's data or controlling with which partners one shares his or her data, as is often done in practice. These features do not help in mitigating consumers' negative affective reactions towards BNDE and cannot increase data disclosure. Instead, our results show that in order to effectively reduce consumers' negative affective reactions to BNDE, retail managers should encourage positive WOM behavior among their customers. For instance, retailers could encourage or even incentivize customers to recommend their friends to disclose data in the network. Thereby, it is especially important to target peer referral, as in uncertain decision situations, consumers are susceptible to advice from peers to cope with situational uncertainty.

4.9.3 Limitations and further research

The limitations of our study offer opportunities for further research. First, in all of our experimental studies, we employed a setting requesting moderately sensitive data (personal interests, monthly income, marital status) for personalization purposes. Consumers frequently encounter similar situations in real life, but data disclosure also depends strongly on situational aspects (Dinev and Hart 2006; Li et al. 2010; Xu et al. 2009). Therefore, future research could examine whether our findings are robust for BNDE constellations that require consumers to disclose more sensitive (e.g., health care) or less sensitive information (e.g., favorite color), to generate additional insights on the negative impacts of BNDE on data disclosures.

Second, future research could investigate how different compositions of the network influence consumers' negative immediate affective reactions to BNDE and their intentions to disclose data. For instance, is BNDE more successful if consumers are familiar with the focal retailer and the network partners? How does the partnering firms' reputation influence consumers' reactions to BNDE?

Third, we only investigated WOM as a means to help consumers cope with uncertain data disclosure decisions. Further research might investigate other intervention strategies suitable to reduce uncertainty in an effort to mitigate negative affective reactions, for instance, privacy seals (Hui et al. 2007). Furthermore, future research could reinvestigate the role of transparency and control for BNDE. With transparency and control of data access as a potential mitigating strategy for consumers' negative immediate reactions, we focused on only one dimension of transparency and control. Future research could test whether other dimensions of transparency, for example, related to (a) how consumer data is used by the focal firm and network or (b) what concrete benefits consumers can expect if they disclose their personal data to the network, are more effective in eliciting favorable reactions and behavior. Additionally, future research might investigate whether other dimensions of consumer control, for instance, control about which data are collected and shared are effective in BNDE contexts.

Considering these aspects, this paper lays a fruitful ground for future research into BNDE data disclosure settings. We introduced BNDE as a data disclosure situation distinct from traditional dyadic exchanges, developed and empirically tested a dual-processing model to investigate the role of consumers' negative immediate affective reactions in BNDE decision-making, and developed advice for successfully implementing BNDE business models.

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4.11 Appendices

Appendix 4.A. Scenario descriptions

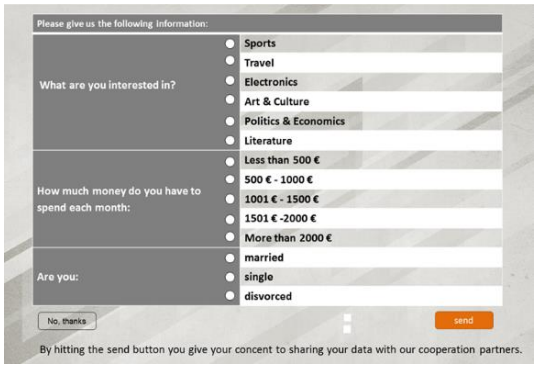
Base scenario for all studies

Please imagine that you are a customer of the online fashion retailer Jantho. Your past experiences with the retailer were largely positive: there have never been any technical issues and your orders were always delivered correctly. In order to make it easier for you to imagine, you can see an exemplary screenshot of the online shop below:

On your latest visit to the online shop, you get the following message:

> "In order to provide a better service and personalized products we would like to know some more about you. By answering the following questions, you help us provide you with a customized shopping experience and personalized discounts.
>
> All data will be used for **internal purposes only** (Dyadic condition) / in **cooperation with our 30 network partners of the marketing network Xumidu** (BNDE condition). This means that we link the collected data to your customer profile / (and make it available to all network partners). As a thank-you gift you will receive a free T-shirt with your next order."

This is the form Jantho asks you to fill out:



Scenario for Study 3A
Base scenario with 10 partnering firms followed by the following transparency and control data access manipulation:

<table>
<tr><th></th><th>Low Transparency</th><th>High Transparency</th></tr>
<tr><td>Low Control</td><td></td><td>These are our network partners with whom we share your data:
Analyst
Basto
Cereas
CoCu
Fashion More
Isan
Johco
Magian
Thomag
Yellow Motion</td></tr>
<tr><td>High Control</td><td>You can use the slider to determine whether or not we share your data with our network partners.

Network Xumidu  </td><td>These are our network partners with whom we share your data.
You can use the slider to determine whether or not we share your data with our network partners.

Analyst 
Basto 
Cereas 
CoCu 
Fashion More 
Isan 
Johco 
Magian 
Thomag 
Yellow Motion  </td></tr>
</table>

“Profit from personalized discounts with us and all 10 network partners in the future!
As a **thank-you gift** you will receive a **free T-shirt** with your next order.”

Appendix 4.B. Measurement items and reliability assessments, Studies 1–3B.

Construct	Statistics[40]	Measurement Items[41]
Immediate Affective Reaction Shampanier et al. (2007)	-	How did you feel when confronted with the data disclosure situation right now? 
Perceived Risks of Data Disclosure Dinev et al. (2013)	α_1 = .91	1. It would be risky to disclose personal data. 2. There would be high potential for privacy loss associated with disclosing personal data. 3. Personal data I disclosed could be inappropriately used. 4. Disclosing my personal data would involve many unexpected problems.
Perceived Benefits of Data Disclosure Voss et al. (2003)	α_1 = .89	Benefits resulting from my data disclosure will be… 1. …functional. 2. …practical. 3. …necessary. 4. …helpful.
Intention to Disclose Data Malhotra et al. (2004)	α_1 = .97 α_2 = .97 α_{3A} = .96 α_{3B} = .97	Specify the extent to which you would disclose the requested data. 1. Unlikely/Likely 2. Impossible/Possible 3. Unwilling/Willing
Perceived Sensitivity of Requested Data Xie et al. (2006)	-	How sensitive do you perceive the requested data to be? Not sensitive at all/Very sensitive
Perceived Uncertainty Self-developed	α_1 = .77 α_2 = .80	How do you perceive the data disclosure situation? 1. Easy to comprehend/Difficult to comprehend 2. Straightforward/Unclear 3. Not complex/Complex

[40] The values in this column refer to all studies in which the measure appears; subscripts indicate which study.

[41] For all items except the immediate affective reactions (smiley) scale, participants indicated their responses on seven-point Likert or semantic differential scales (1 = “strongly disagree” and 7 = “strongly agree”).

Appendix 4.C. Overview of the results of Study 1

Table Appendix C1. Results of the dual-processing model.

Design	Method	Findings
2 (BNDE vs. dyad) between-subjects design	Lab experiment	BNDE settings trigger more negative immediate affective reactions than dyadic settings and in turn reduce consumers' disclosure intentions directly (H1) as well as indirectly by influencing consumers' cognitive benefit assessments (H2b).

Dual-Processing Model

Adjusted R^2 = .691, $F(7, 317) = 104.66$, $p < .001$

	Direct Effects	β	t	*p*
	DDS → ITD	-.1133	-1.65	.10
	DDS → AFF	-.7583	-7.67	< .001
	DDS → PRIS	.0140	.13	.89
	DDS → PBEN	-.0403	-.44	.66
	AFF → ITD	.5311	11.26	< .001
	AFF → PRIS	-.3995	-7.34	< .001
	AFF → PBEN	.6450	13.54	< .001
	Indirect effects (95%)	**β**	**LLCI**	**ULCI**
H1	DDS → AFF → ITD	-.4027	-.5435	-.2760
H2a	DDS → AFF → PRIS → ITD	-.0163	-.0431	.0064
H2b	DDS → AFF → PBEN → ITD	-.1292	-.1981	-.0756

Note: DDS = Data disclosure setting (BNDE vs. dyad); ITD = Intention to disclose; PRIS = Perceived risks; PBEN = Perceived benefits; AFF = Immediate affective reaction

Table Appendix C2. Results of the purely cognitive (Privacy Calculus) model.

Design	Method	Findings
2 (BNDE vs. dyad) between-subjects	Lab experiment	We confirm negative indirect effects of BNDE (vs. dyad) on disclosure intentions through risk and benefit perceptions. The mediation analysis also reveals a significant remaining direct effect of BNDE on intentions to disclose, despite the expected full mediations by risks and benefits in the cognitive base model.

Cognitive Model

Adjusted R^2 = .569, $F(6, 318) = 72.33$, $p < .001$

Direct Effects	β	t	*p*
DDS → ITD	-.3325	-4.26	< .001
DDS → PRIS	.3170	3.05	< .01
DDS → PBEN	-.5294	-5.02	< .001
Indirect effects (95%)	**β**	**LLCI**	**ULCI**
DDS → PRIS → ITD	-.0571	-.1132	-.0139
DDS → PBEN → ITD	-.2833	-.4162	-.1599

Note: DDS = Data disclosure setting (BNDE vs. dyad); ITD = Intention to disclose; PRIS = Perceived risks; PBEN = Perceived benefits

5 General discussion

Over the last decades, technological advancements (e.g., the Internet and mobile technologies), have revolutionized every aspect of life, including consumer-firm interactions. Building long-term relationships is considered of key importance for marketing and can be facilitated by technology (Huang and Rust 2013, 2017; Rust 2020; Rust et al. 2010). One source of long-term relationships is tailoring offers through (1) consumer-initiated customization and (2) firm-initiated personalization. More radical recent technological developments (e.g., the Internet-of-Things) enable firms to expand tailored marketing. Consequently, firms increasingly augment their core businesses with innovative business models that help to leverage customization and personalization in the era of the digital economy (e.g., Kannan and Li 2017; Ng and Wakenshaw 2017; Rust 2020; Sorescu and Schreier 2021). Within this dissertation I sought to answer the overarching research question of how innovative technology-driven business models in the domains of customization and personalization influence consumer behavior compared to the status quo and hence, uncover related challenges and opportunities of these business models. To answer this question, I investigated two innovative business models across three independent essays.

Specifically, in Essay 1 and Essay 2, I investigate an innovative business model located in the realm of customization, that is, internal product upgrades (i.e., offering fee-based access to originally built-in, but deliberately restricted, optional features). Using a conceptual approach, Essay 1 provides a framework for understanding how internal product upgrades will likely influence consumers' responses. As such, it outlines evolving challenges and opportunities of internal product upgrades and derives questions for future research. In Essay 2, I use an empirical approach to examine pitfalls of internal product upgrades in the product usage phase. Drawing on research on normative expectations and perceived

ownership, this essay reveals that consumers respond less favorably to internal (vs. external) product upgrades and investigates managerially relevant boundary conditions.

Finally, Essay 3 creates novel insights into a business model in the domain of personalization. Together with my co-authors, I examine how the increasingly prevalent data disclosure practice of firms engaging in a network with other firms to exchange consumer data, which we denote as Business Network Data Exchange (BNDE), influences consumers' privacy-related decision-making. In particular, this essay shows that consumers are less likely to disclose personal data in BNDE (vs. traditional dyadic) data exchange settings and that immediate affective reactions are crucial in explaining consumers' privacy-related decision-making.

In the following, I will discuss the theoretical contributions and managerial implications that can be derived from the three essays of this dissertation and that go beyond the individual contributions and implications of each essay. The section concludes with a brief outlook.

5.1 Theoretical contributions

5.1.1 Unintended consequences of innovative technology-driven business models in the realm of customization and personalization

First, this dissertation addresses calls for research on innovative technology-driven business models and their impact on consumer responses (Marketing Science Institute 2020; Sorescu and Schreier 2021). By comparing innovative business models to the status quo in the respective domain, I reveal that transforming traditional business models (e.g., selling cars with permanent features; personalizing offers in dyadic consumer-firm relationships) into innovative ones (e.g., selling cars that allow for configuration after the purchase; engaging in BNDE networks to enable personalized offers by multiple partners) evokes consumer

responses that have the potential to reinforce, but especially threaten long-term customer-firm relationships.

On the bright side, consumers might, for instance, be willing to pay more for an increase in convenience and flexibility through customization after the purchase or might be more satisfied when receiving more relevant advertisements or coupons. However, as my dissertation clearly demonstrates, innovative customization and personalization business models can cause unintended consequences for marketers. As such, both Essay 1 and 2 illustrate that offering internal product upgrades in comparison to the status quo (e.g., related product feature modification approaches like external product upgrades) can result in negative consumer responses, for instance in terms of their willingness-to-pay for the upgrade and their loyalty intentions towards the firm. Additionally, Essay 3 reveals that engaging in business networks to exchange consumer data with other firms (BNDE) reduces rather than increases consumers' willingness to disclose their data as compared to the status quo of dyadic consumer data exchanges between a consumer and a single firm. With these findings, I extend research on internal product upgrades (Schaefers et al. 2022; Wiegand and Imschloss 2021) and data sharing in networks (e.g., Angst and Agarwal 2009; Arora et al. 2008; Chen et al. 2001; Gerlach et al. 2015). While existing studies provide valuable insights into how marketers can increase favorable consumer responses to the corresponding innovative business model, they investigated them in isolation instead of comparing them to the respective status quo. However, the comparison to the status quo is an important perspective to uncover consumers' reactions to digital transformations.

5.1.2 The shift from traditional to innovative business models challenges existing theoretical perspectives

By demonstrating the underlying psychological mechanisms that drive consumers' negative responses to the respective innovative business model (vs. the established, traditional business model), I enrich existing research on product customization (Franke et al. 2010; Schreier 2006) and privacy-related decision making (e.g., Dinev et al. 2013; Martin et al. 2020; Smith et al. 2011; Xu et al. 2009) with new theoretical perspectives. For instance, I introduce a novel betrayal-ownership framework to answer how consumers react to internal (vs. external) product upgrades in Essay 2, and illustrate that perceived ownership can backfire in a product customization context in the post-purchase phase, as it elicits perceptions of betrayal in case of internal product upgrades. This finding contrasts existing product customization research in a pre-purchase phase, which ascribes a positive effect on consumer responses through psychological ownership (i.e., pride of authorship; Franke et al. 2010; Schreier 2006).

Similarly, Essay 3 illustrates that explaining differences in consumers' privacy-related decision-making in BNDE vs. dyadic data disclosures through the lens of a cognitive risk-benefit trade-off analysis falls short (Dinev et al. 2013; Martin et al. 2020; Smith et al. 2011; Xu et al. 2009). Instead, one needs to account for consumers' affective reactions. Together with my co-authors, I reveal that immediate affective reactions are crucial in explaining differences in consumers' privacy-related decision-making in BNDE (vs. dyadic) settings. Specifically, the results show that immediate affective reactions lower disclosure intentions (a) directly and (b) indirectly by influencing consumers' risk-benefit assessments. Comparing the dual-processing model to the purely cognitive model, the results clearly demonstrate that it is consumers' immediate affective reactions that ultimately explain differences in consumers' disclosure intentions in BNDE compared to the dyad.

5.1.3 The moderating role of marketing mix actions in the transition from now to next

Third, this dissertation contributes to an understanding of the importance and effectiveness of strategic actions and boundary conditions in accompanying the transition from the status quo to the dissemination of innovative customization and personalization business models. As such, I emphasize the need to (1) develop strategies that are aligned to the peculiarities of the respective innovative business model and (2) evaluate the effectiveness of established strategic actions and boundary conditions in the domains of product customization/product modification and personalization (e.g., Bertini et al. 2009; Gershoff et al. 2012; Gill et al. 2008; Ma et al. 2015; Martin and Murphy 2017; Tucker 2014) in light of these peculiarities.

Specifically, Essays 2 and 3 illustrate the importance of adjusting strategies to the underlying peculiarity of the respective innovative business model. Extant research focusing on the status quo of customization and personalization has investigated a broad range of strategies to enhance favorable consumer responses. For instance, research on product customization has extensively examined the scope and design of the customization toolkit (e.g., Dellaert and Stremersch 2005; Huffman and Kahn 1998; Valenzuela et al. 2009), while research in the domain of personalization and privacy-related decision making proposed that transparency and control are two effective strategies to reduce unfavorable responses (e.g., Gerlach et al. 2015; Martin and Murphy 2017, Martin et al. 2017; Song et al. 2016; Tucker 2014). While these strategies might be successful in traditional business models, this dissertation shows that introducing innovative business models requires strategies that are aligned to their peculiarities in relation to the status quo and the reasons for underlying psychological barriers. Specifically, the peculiarity of internal product upgrades is that consumers are expected to pay an additional fee to gain access to a feature that is already built into a purchased product, while BNDE is

characterized through higher uncertainty about which benefits and risks are to be expected not only from the focal firm but also from the other firms within the network. Accordingly, Essay 2 demonstrates that strategies and boundary conditions addressing consumers' norm violations resulting from ownership perceptions (e.g., shifting the upgrading responsibility from consumers to firms or offering internal product upgrades for features that are (perceived) as rather intangible) are effective in reducing consumers' unfavorable responses. In contrast, strategies unrelated to ownership perceptions (e.g., emphasizing the convenience benefits of internal product upgrades, being transparent about internal product upgrades before the purchase) do not mitigate consumers' negative responses. Similarly, Essay 3 shows that unfavorable BNDE-effects are best mitigated by approaches that help consumers cope with the uncertainty of BNDE settings. It demonstrates that positive WOM can effectively reduce consumers' negative responses, while transparency and control features are not well suited under BNDE-induced uncertainty.

Moreover, Essay 1 gives an overview of actionable strategies from extant research within and beyond the domain of product feature modifications that influence consumers' responses and highlights the need for reassessing their effectiveness for offering internal product upgrades.

5.1.4 The need for an ecosystem perspective in the digital economy

Finally, this dissertation expands research on (product) customization and personalization by zooming out of the traditional customer-firm dyad (e.g., Dellaert and Stremersch 2005; Dinev et al. 2013; Franke and Schreier 2010; Franke et al., 2009; Martin et al. 2020; Smith et al. 2011; Xu et al. 2009). As outlined by various research (Ng and Wakenshaw 2017; Rust 2020; Sorescu and Schreier 2021), people, businesses, products, machines and data become increasingly interconnected in the digital economy. Hence, personalization and customization in

the digital economy might require an ecosystem perspective, as a firm's actions in an increasingly interconnected environment can have unintended consequences not only for the firm itself, but also for related partner firms in the ecosystem and vice versa.

Specifically, the findings of Essay 3 suggest that personalization based on data sharing practices that incorporate other firms (i.e., BNDE) as compared to traditional dyadic data exchanges reduce consumers' willingness to disclose data. Importantly, consumers' reduced data disclosure behavior is not only detrimental to the focal firm, but also implies less consumer data for related firms in the BNDE network. Moreover, as shown in Essay 2, consumer reactions to customization approaches that allow for offering fee-based access to features that are already built-in by the manufacturer can also have negative spillover effects for business partners that operate in a firm's ecosystem (i.e., leasing firms).

5.2 Managerial implications

Besides these theoretical contributions, this dissertation also offers actionable implications for managers that are implementing innovative technology-driven business models in the realm of customization and personalization.

5.2.1 Customization 2.0 and Personalization 2.0: What consumers want ≠ what firms think consumers want

First, I advise managers to be careful about blindly introducing innovative forms of customization and personalization. Despite the predicted tremendous advantages for both firms *and* consumers, the findings of this dissertation suggest that innovative technology-driven business models in the realm of customization (i.e., internal product upgrades) and personalization (i.e., BNDE) can pose a threat to the ultimate objective of building sustainable consumer relationships. Firms expect internal product upgrades to be beneficial for consumers, as they allow to

tailor a product based on changing wants and needs in a convenient way after the product purchase, while receiving personalized offerings from BNDE firms enables consumers to profit from tailored promotional messages or price discounts by multiple firms. However, Essays 2 and 3 show that consumers do not evaluate these business models as beneficial as firms do. Hence, firms need to evaluate carefully whether the benefits they expect for their business when introducing these innovative business models (e.g., realization of economies of scale in the manufacturing phase and additional sales in the post-purchase phase; increase in revenues through more sophisticated data) outweigh their potential negative drawbacks (e.g., in terms of reduced willingness to pay, loyalty intentions or data disclosure intentions)—at least as long as these business models are not more established and widely accepted in the marketplace.

5.2.2 The effectiveness of different marketing mix strategies

Second, this dissertation provides managerial guidance on strategies, firms can use to support the introduction of innovative business models in the domains of customization and personalization. Specifically, I provide actionable managerial guidelines along the elements of the marketing mix on how managers can reduce consumers' negative reactions and hence, enable a successful implementation of both internal product upgrades and BNDE. For business models that allow for post-purchase customization, I find that managers can leverage distribution, product, and price strategies to attenuate negative consumer responses. In contrast, promotion strategies seem to be less helpful in mitigating unfavorable effects (Essay 2). To buffer negative consumer responses to personalization in the context of business networks, I advise managers not to rely on well-established strategies of transparency and control. Instead, the findings suggest that managers should rather encourage positive WOM behavior among their customers (e.g., by incentivizing customers to recommend the network data disclosure to a friend) (Essay 3).

Importantly, the results also show that there is no universally effective strategy that can be used to mitigate negative effects of innovative business models. Instead, managers must understand the reasons for underlying psychological barriers and match their marketing mix activities accordingly. On a meta level, the findings of this dissertation suggest that transforming and augmenting established core businesses with innovative technology-driven business models requires an intensive preparation, in which consumers must be educated and guided step by step.

5.2.3 The importance of consumer-related factors

While providing managerial guidance through actionable strategies from the marketing mix is of considerable importance, managers should not neglect consumer-inherent factors and predispositions when trying to establish innovative customization and personalization business models. This dissertation advises managers to tailor innovative business models to sociodemographic (e.g., age, gender, culture) and psychographic (e.g., perceived feature tangibility, product identity relevance) characteristics. As such, firms need to collect corresponding data as part of their market research and segment their customers, features, and products accordingly. For instance, as Essay 2 shows, managers can segment customers based on their feature tangibility perceptions as well as their product identity relevance and then target those customers who perceive the added feature as rather intangible or—in case of features that are perceived as rather tangible—have a low product identity relevance. Moreover, managers can also segment features and base products for which they provide internal product upgrades and focus on features that are more intangible in nature or offer them only for product categories that tend to be less relevant to a customer’s identity per se.

5.3 Outlook on customization and personalization business models in the digital economy

The findings of this dissertation generate valuable insights on how consumers respond to innovative technology-driven business models in the domain of (1) customization (i.e., internal product upgrades) and (2) personalization (i.e., business network data exchange) in relation to the status quo. Yet, this dissertation is subject to limitations that open up fruitful avenues for further research.

Increasing methodological diversity using evidence from the field. Throughout this dissertation, I applied both conceptual as well as empirical methodological approaches. Using a conceptual approach, in Essay 1 I developed a conceptual framework for future research on internal product upgrades. Essay 2 and Essay 3 were both grounded on quantitative empirical data. While Essay 3 is exclusively based on online scenario experiments, in Essay 2, I conducted both online scenario experiments as well as a survey with actual customers of a car leasing company. While the latter allowed us to increase the external validity of our findings, we still used a hypothetical approach. To further increase external validity (Morales et al. 2017), effect size, as well as short- and long-term implications (Gneezy 2017), future research could enhance the external validity using evidence from the field.

Investigating the interplay of customization and personalization. Future research could investigate whether the combination of customization and personalization can help to alleviate consumers' negative reactions. In Essay 2, this dissertation already provides initial empirical evidence on (1) who is likely to respond more favorably to internal product upgrades (i.e., consumers with a low product identity relevance) and (2) which features are suited for internal product upgrades (i.e., features with a low tangibility). As outlined in Essay 1, future research could also test personalized offers for internal product upgrades based on consumers'

usage and location data, as already investigated in research on mobile advertising (Fong et al. 2015; Xu et al. 2009). Additionally, business models building on personalization could further examine whether customizing different aspects of personalized messages, such as the content (Chung et al. 2016), could mitigate consumers' negative reactions to data disclosures in network settings.

Examining internal product downgrades. In this dissertation, I investigated the consequences of offering internal product upgrades for consumers' responses. However, investigating consumer responses to internal product *downgrades* might also represent a fruitful avenue for future research. While existing research has already started to examine service membership downgrade decisions (Marinova and Singh 2014), it is unknown which factors influence the decision to downgrade built-in features in a purchased product or how voluntary (e.g., when a consumer actively decides that a feature is not needed anymore) and involuntary (e.g., when firms remove features in response to poor payment behavior) downgrades influence consumer responses.

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6 Conclusion

The era of the digital economy, in which people, businesses, products, machines, and data are increasingly interconnected, urges firms to transform their core business with new technology-driven business models that help to create and build long-term customer relationships. Tailoring offerings through (1) consumer-initiated customization and (2) firm-initiated personalization is considered a key driver of long-term consumer relationships. The overarching objective of this dissertation is to investigate how consumers react to two innovative technology-driven business models in the domains of customization (i.e., internal product upgrades) and personalization (i.e., business network data exchange) in light of the status quo.

Despite the tremendous potential of these innovative technology-driven business models to build and deepen customer relationships and to generate an important competitive advantage, existing marketing research on how consumers respond to these business models in comparison to established approaches (i.e., the status quo) is scarce. Across three independent essays, I demonstrate that—despite their promising advantages—introducing innovative technology-driven business models to leverage customization and personalization can backfire on firms and hence, pose a threat to long-term relationships. Additionally, the findings show that broadened theoretical perspectives are needed in explaining consumers' reactions. By investigating different strategies revolving around the elements of the marketing mix, this dissertation generates insights on how managers can attenuate consumers' negative reactions. Finally, as firms are increasingly interconnected in the digital economy, negative reactions also have consequences for business partners operating in the firm's ecosystem.

Within this dissertation, I make substantial contributions at a more general level to literature on customization and personalization by comparing innovative

business models to established ones. At the individual essay level, I extend existing research in the domains of product feature modifications, norm violations, and privacy-related decision making. Moreover, this dissertation provides actionable implications for managers who are facing the decision to transform an established business model in the domains of customization and personalization into innovative technology-driven business models. Finally, I also offer fruitful avenues for future research on innovative business models leveraging customization/personalization and technology.