Last-mile delivery services in retail

a consumer-centric approach

Olsson, John

2023

Document Version:
Publisher's PDF, also known as Version of record

Last-mile delivery services in retail

A consumer-centric approach

JOHN OLSSON
DEPARTMENT OF DESIGN SCIENCES | FACULTY OF ENGINEERING | LUND UNIVERSITY

Last-mile delivery services in retail

Last-mile delivery services in retail

A consumer-centric approach

John Olsson

LUND
UNIVERSITY

DOCTORAL DISSERATION

by due permission of the Faculty of Engineering (LTH), Lund University, Sweden.
To be defended at Stora Hörsalen, Ingvar Kamprad Design Centrum (IKDC),
29th September 2023 at 09:15am.

Faculty opponent
Chee Yew Wong
Professor of Supply Chain Management
Leeds University Business School
Leeds, United Kingdom

Organization LUND UNIVERSITY Faculty of Engineering (LTH) Department of Design Sciences Division of Packaging Logistics	**Document name** DOCTORAL DISSERTATION **Date of issue** 2023-09-29
Author John Olsson	Sponsoring organization Familjen Kamprads stiftelse (No: 20210262)

Title and subtitle

Last-mile delivery services in retail: A consumer-centric approach

Abstract

The retail industry faces a multitude of complex sustainability challenges, which calls for transformational change. While the retail industry is a major driver of production and consumption patterns, it also offers significant potential to reduce global greenhouse gas emissions. Notably, logistics services, such as warehousing, delivery, and returns, have gained vital importance in retail due to the continuous growth of e-commerce and the development toward omnichannel retail. Escalating parcel shipping volumes have sparked growing interest in last-mile delivery among scholars and practitioners. In fact, last-mile delivery has been described as the most expensive, least efficient, and most polluting part of the supply chain. Despite the recognition of the growing importance of the consumer, scholarly investigations on last-mile delivery from the consumer perspective remain fragmented and rather limited. Building on the notion that changing consumer demands and behavioral patterns represent the primary drivers of change in the retail industry, the purpose of this research is to explore the consumer perspective on last-mile delivery to provide a foundation for more sustainable retail business models.

This dissertation compiles the results of four papers from four separate, yet subsequent, studies. The first study, a systematic literature review, proposed a framework of last-mile logistics research that consists of five interrelated components. The review identified a lack of consumer research in last-mile logistics. The second study, a multiple case study, explores customer expectations of an unattended home delivery service in e-grocery retail. The study captured three types of services expectations—desired service, expected standard service, and predicted service—which are formed by three determinants; personal needs, technology literacy, and situational factors. The third study, an engaged scholarship field study, explored customer experience of an unattended home delivery service in e-grocery retail. The study found that the total customer experience in last-mile delivery is multidimensional, comprising consumers' cognitive, emotional, behavioral, sensorial, physical, and social responses to the service. The fourth study, a collaborative study, explored the drivers of circular business model innovation and how to accelerate this process in fashion retail. The study proposes that consumer centricity acts as a main driver of circular business model innovation, and that logistics acts as a catalyst that accelerates this process, which contributes to the transformation of fashion retail towards the circular economy.

This dissertation contributes to research in multiple ways. The results of this dissertation shed light on the last-mile delivery customer journey in retail by mapping forms and determinants of customer expectations and by providing a rich understanding of customer experience dimensions. The findings illustrate how customer experience has become more logistics and supply chain-related. Furthermore, this dissertation contributes to the literature by identifying patterns of circular business model innovation and illustrates how consumer centricity and logistics affect the transition of retail business models toward circular economy.

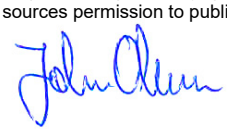
This dissertation also holds multiple implications for practice. This research indicates that consumer centricity holds significant potential to reduce the environmental impact of last-mile delivery. Retailers can leverage consumer centricity to encourage consumers to adopt more sustainable last-mile delivery services and accept longer lead times and time windows. Moreover, managers are encouraged to take advantage of consumer centricity as an innovation driver and logistics as a catalyst in circular business model innovation to unfold the full potential of the circular economy.

Key words

Unattended home delivery, customer experience, customer expectations, circular business model innovation

Classification system and/or index terms (if any)

Supplementary bibliographical information		**Language** English
ISSN and key title		**ISBN** 978-91-8039-743-8 (print) **ISBN** 978-91-8039-744-5 (pdf)
Recipient's notes	**Number of pages** 97	Price
	Security classification	

Signature  Date 2023-08-21

Last-mile delivery services in retail

A consumer-centric approach

John Olsson

LUND
UNIVERSITY

Coverphoto by Justus Weitekamp

LTH | Faculty of Engineering
Department of Design Sciences

ISBN 978-91-8039-743-8 (print)
ISBN 978-91-8039-744-5 (pdf)

Printed in Sweden by Media-Tryck, Lund University
Lund 2023

In loving memory of my grandmother Johanna.

Acknowledgments

This dissertation marks the end of my five-year long research education journey, and I would like to take this opportunity to express my deepest gratitude to the many people who have supported and guided me in various ways. This research would not have been possible without the funding provided by Sweden's innovation agency Vinnova and The Kamprad Family Foundation for Entrepreneurship, Research & Charity.

Words cannot express my deepest gratitude to my supervisor Rolf Daniel Hellström. Thank you for your humble attitude, your patient guidance, your intellectual curiosity, for your growth mindset, and for being a source of inspiration. Moreover, I am deeply grateful to my co-supervisor Henrik Pålsson, for his insightful and constructive feedback and structured comments, for fostering an intellectually stimulating environment, and for sharing insights into the various aspects and facets of being a researcher. Likewise, I am immensely grateful to my co-supervisor Yulia Vakulenko for her insightful and constructive comments, her expert knowledge, and her availability and willingness to support me, despite a busy schedule.

Special thanks to my fantastic colleagues at the division of packaging logistics for creating a place for me to learn and grow. Thanks to Klas, Stefan, Pernilla, Jenny, Annika, Fredrik, Mats, Giana, and Katrin, and to my fellow doctoral students at the department of design sciences with whom I share the ups and downs of the doctoral student life: Nathalie, Faiza, Camilla, Malin, Mikael, Diogo, Macy, Silvia, Satabdee, Ibrahim, Lena, and Rosa. Also, special thanks to the support staff at the department of design sciences: Cilla, Erik, Susanne, Jessika, Marie, Eileen, Hajnalka, and of course the service group Kristel, Claudia, Maria, Linda, and Simon. My sincere appreciation to Andreas Norrman, opponent at my final seminar, and Jens Hultman, opponent at my licentiate seminar. Thank you very much for your time and for offering constructive feedback, which has been valuable in improving my research.

Many thanks to Helena Forslund, of Linnaeus university, for sparking my curiosity in research. Thanks to my former colleagues at Adolf Würth GmbH & Co. KG for offering a wonderful place to work. Special thanks to my former mentor Jan Kobald and my former manager Siegfried Beichter. Many thanks to Manfred Wenzel at KOBOLD Messring GmbH for his support when I was an engineering student.

Wholeheartedly, I would like to thank my family for their endless support and unconditional love. First, I would like to thank my parents for encouraging my curiosity: my late mother Claudia and my father Göran. Sincere thanks to my sister Anna for sharing your creative ideas, spreading energy and enthusiasm, and challenging me to think outside the box. Thanks to my father's partner Saeedeh and her family for believing in me. Thanks to my late grandmother Johanna for her love, for spreading joy and happiness, and for putting life in perspective. Thanks to Karl-

Heinz and Annette for their unconditional support and motivation over the years. Thanks to Christina and Magnus, Elin, Hedda, and Vilma for their unlimited support and love. Thanks to Lars and Pia, Petter and Magdalena, Trolle, and Malte for your encouragement and support through all the ups and downs. You all have always been there for me!

Thanks to my friends for always being there for me and for supporting me on my journey. To Malmö Indiekör, thank you for the best Thursday of the week and for giving me a break from research.

To my partner Johanna, thank you for your love and support, for your encouraging curiosity, and for the dreams we share. I look forward to continuing to learn and grow together with you. Thanks to your family for welcoming me with open arms and for supporting me, especially to Bernadette and Andreas, Hermann and Annette and to your four siblings: Paula, Justus, Sophia, and Elena.

John Olsson

Lund, September 2023

Table of Contents

Acknowledgments ix
Abstract xv
Populärvetenskaplig sammanfattning xvii
List of appended papers xxi
List of figures xxiii
List of tables xxiii

1. Introduction 1

1.1. Background 1
1.1.1. The environmental impact of last-mile delivery services 2
1.1.2. Toward the circular economy in retail 2
1.2. Research problem 3
1.3. Purpose, research questions, and objectives 5
1.4. Key definitions and concepts 5
1.4.1. Omnichannel retail 5
1.4.2. Last-mile logistics 6
1.4.3. Last-mile delivery 6
1.4.4. Consumer centricity 6
1.4.5. Customer journey 7
1.4.6. Customer expectations 7
1.4.7. Customer experience 7
1.4.8. Circular business model 7
1.4.9. Circular business model innovation 7
1.5. Research focus and demarcations 8
1.6. Reading guidance 10

2. Frame of reference 11

2.1. Positioning the research 11
2.2. Omnichannel retail 13
2.2.1. E-grocery retail 15
2.2.2. Fashion e-retail 15
2.3. Last-mile delivery 16

2.3.1. Defining last-mile delivery 16
2.3.2. The role of last-mile delivery in e-retail 18
2.3.3. Defining 'unattended home delivery' 19
2.4. The customer journey in last-mile delivery 20
2.4.1. The evolution from product centricity to consumer centricity 20
2.4.2. Understanding the customer journey 21
2.4.3. The prepurchase stage: defining customer expectations 22
2.4.4. The postpurchase stage: defining customer experience 24
2.4.5. Consumer research in last-mile delivery 25
2.5. Circular business models 25
2.5.1. Circular economy principles 26
2.5.2. Defining circular business models 26
2.5.3. Circular business model innovation 27
3. Research methodology 29
3.1. Research approach and assumptions 29
3.1.1. Philosophy of science 29
3.1.2. Systems approach 30
3.1.3. Scientific reasoning 30
3.2. Research design 31
3.2.1. Study A: Systematic literature review 33
3.2.2. Study B: Multiple case study 33
3.2.3. Study C: Engaged scholarship field study 33
3.2.4. Study D: Collaborative research 34
3.3. Research process 34
3.4. Scholarly independence 35
3.5. Research quality 36
3.5.1. Credibility 36
3.5.1. Transferability 38
3.5.1. Dependability 39
3.5.2. Confirmability 39
4. Results 41
4.1. Paper I – Framework of last-mile logistics research 41
4.2. Paper II – Customer expectations 43
4.3. Paper III – Customer experience 44
4.4. Paper IV – Logistics services in circular business model innovation 46
4.5. Connecting the results from appended papers 48

5. Discussion 55
5.1. Toward a holistic understanding of the customer journey in last-mile delivery 55
5.2. Building competitive advantage through consumer-centric last-mile delivery 56
5.3. Toward sustainable last-mile delivery services 58
6. Key findings and implications, limitations, and future research 61
6.1. Key findings 61
6.2. Implications for research 62
6.3. Implications for practice 63
6.4. Limitations 65
6.5. Future research avenues 66
6.5.1. Integrating operations and marketing in last-mile delivery 66
6.5.2. Integrating sustainability into last-mile delivery 67
6.5.3. Understanding the role of consumer-centric last-mile delivery in the circular economy 67
6.5.4. Achieving competitive advantage through last-mile delivery 68
6.5.5. Circular business model experimentation 68
6.5.6. Understanding the journey of various consumer groups 69
References 71
Appendices 87
Appendix I: Interview guide study B 87
Appendix II: Respondents study C 89
Appendix II: Interview guide study C 91
Appendix III: Research quality study C 94
Appendix IV: Interview guide study D 95

Abstract

The retail industry faces a multitude of complex sustainability challenges, which calls for transformational change. While the retail industry is a major driver of production and consumption patterns, it also offers significant potential to reduce global greenhouse gas emissions. Notably, logistics services, such as warehousing, delivery, and returns, have gained vital importance in retail due to the continuous growth of e-commerce and the development toward omnichannel retail. Escalating parcel shipping volumes have sparked growing interest in last-mile delivery among scholars and practitioners. In fact, last-mile delivery has been described as the most expensive, least efficient, and most polluting part of the supply chain. Despite the recognition of the growing importance of the consumer, scholarly investigations on last-mile delivery from the consumer perspective remain fragmented and rather limited. Building on the notion that changing consumer demands and behavioral patterns represent the primary drivers of change in the retail industry, the purpose of this research is to explore the consumer perspective on last-mile delivery to provide a foundation for more sustainable retail business models.

This dissertation compiles the results of four papers from four separate, yet subsequent, studies. The first study, a systematic literature review, proposed a framework of last-mile logistics research that consists of five interrelated components. The review identified a lack of consumer research in last-mile logistics. The second study, a multiple case study, explores customer expectations of an unattended home delivery service in e-grocery retail. The study captured three types of services expectations—desired service, expected standard service, and predicted service—which are formed by three determinants; personal needs, technology literacy, and situational factors. The third study, an engaged scholarship field study, explored customer experience of an unattended home delivery service in e-grocery retail. The study found that the total customer experience in last-mile delivery is multidimensional, comprising consumers' cognitive, emotional, behavioral, sensorial, physical, and social responses to the service. The fourth study, a collaborative study, explored the drivers of circular business model innovation and how to accelerate this process in fashion retail. The study proposes that consumer centricity acts as a main driver of circular business model innovation, and that logistics acts as a catalyst that accelerates this process, which contributes to the transformation of fashion retail towards the circular economy.

This dissertation contributes to research in multiple ways. The results of this dissertation shed light on the last-mile delivery customer journey in retail by mapping forms and determinants of customer expectations and by providing a rich understanding of customer experience dimensions. The findings illustrate how customer experience has become more logistics and supply chain-related. Furthermore, this dissertation contributes to the literature by identifying patterns of

circular business model innovation and illustrates how consumer centricity and logistics affect the transition of retail business models toward circular economy.

This dissertation also holds multiple implications for practice. This research indicates that consumer centricity holds significant potential to reduce the environmental impact of last-mile delivery. Retailers can leverage consumer centricity to encourage consumers to adopt more sustainable last-mile delivery services and accept longer lead times and time windows. Moreover, managers are encouraged to take advantage of consumer centricity as an innovation driver and logistics as a catalyst in circular business model innovation to unfold the full potential of the circular economy.

Populärvetenskaplig sammanfattning

Klimatförändringar påverkar hela världen med allvarliga konsekvenser för naturen, men de utgör även ett hot mot samhället och näringslivet. För att förhindra de allvarligaste effekterna av klimatförändringarna behöver de globala utsläppen av växthusgaser minskas avsevärt.

Handeln utgör den kritiska länken mellan producenter och konsumenter och spelar därmed en betydande roll i att påverka produktions- och konsumtionsmönster. Den fungerar även som en viktig drivkraft för ekonomisk tillväxt, samtidigt som den har betydande potential att bidra till en kraftig minskning av de globala växthusgasutsläppen. Då konsumenter blir alltmer medvetna om klimatförändringarna sätter de också hållbarhetskrav på handlarna som i sin tur försöker hitta innovativa lösningar för att minska sin miljöpåverkan av sina verksamheter. Det krävs dock mer genomgående förändringar för att effektivt begränsa klimatförändringar och deras effekter, trots pågående hållbarhetsinitiativ i handeln.

Bortsett från de brådskande miljö- och hållbarhetsfrågorna genomgår handeln redan en radikal förändring vars hastighet och omfattning saknar motstycke: utvecklingen mot omnikanal. Digitalisering och teknologisk utveckling möjliggör en integration av handelns olika kanaler och kundkontaktpunkter för att skapa en sömlös kundupplevelse i samtliga kanaler. Till följd av denna utveckling har e-handelsomsättningen ökat enormt de senaste åren. Coronaviruspandemin har ytterligare accelererat e-handelstillväxten. Även om e-handelsomsättningen minskade något under 2022 ligger den fortfarande på en hög nivå jämfört med före pandemin. Samtidigt varierar e-handelstillväxten väldigt mycket bland de olika delbranscherna. Medan den digitala dagligvaruhandeln i Sverige ökade med 95% under 2020 minskade den med 17% under 2022. Ett annat exempel är kategorin kläder och skor som ökade med 16% under 2020 och med 2% under 2022.

Till följd av omnikanalutvecklingen och e-handelstillväxten blir logistiktjänster såsom lagerhållning, leverans och returer allt viktigare. Samtidigt står logistiktjänster för en betydande del av handelns totala miljöpåverkan. Exempelvis uppskattas att leveranstjänster inom sista milen fram till kunden står för cirka 25% av växthusgasutsläppen från transporter. Leveranstjänster är avgörande faktor för e-handelns koldioxidavtryck, även om lokal infrastruktur såsom lager också har en stor påverkan. Samtidigt påverkar konsumenters val och beteenden som exempelvis val av leveransplats och tidsfönster sista milens miljöpåverkan. Andra exempel på konsumentbeteenden som påverkar leveransens koldioxidavtryck är köpfrekvens, storlek på inköp samt sättet att resa för upphämtning.

Trots den tydliga kopplingen mellan konsumentbeteenden och miljöpåverkan visar den här avhandlingen genom en systematisk litteraturgenomgång att kunskapen om konsumentperspektivet på leveranstjänster i handeln är mycket begränsad. Den

befintliga litteraturen handlar främst om framväxande trender och teknologier, operativ optimering, försörjningskedjestrukturer, prestandamätning och policy. Enbart ett fåtal publikationer har tagit upp konsumentens perspektiv på logistiken inom sista milen genom att undersöka servicekvalitet och kundnöjdhet. Trots dessa bidrag är konsumentinsikterna i leveranstjänster fortsatt begränsade och fragmenterade.

Det finns flera olika alternativ för hur e-handelsbeställningar kan levereras till konsument. I Sverige har leverans till ombud länge varit det vanligaste leveransalternativet. De senaste åren har vi sett en markant ökning av innovativa leveranstjänster såsom leverans till paketautomat och mottagarfri hemleverans där paketet lämnas utanför dörren. Nackdelen med att lämna paket utanför dörren är att detta alternativ är mindre lämpligt för dyrbara produkter eller produkter med speciella krav som exempelvis livsmedel där kylkedjan behöver upprätthållas konstant. Då kan det vara relevant att leverera till ett leveransskåp.

Två empiriska studier i denna avhandling utforskar konsumentperspektivet på en mottagarfri hemleveranstjänst. Den är särskilt lämpad för livsmedel eftersom den är kopplad till ett leveransskåp med inbyggd kyl och frys. En intressant utgångspunkt för att studera konsumentperspektivet på mottagarfria hemleveranstjänster finns i begreppet kundresa. Den består vanligtvis av tre faser: före köpet, under köpet och efter köpet. Först studeras konsumenters förväntningar på mottagarfri hemleverans före köp genom en kvalitativ flerfallstudie med tio hushåll. Studien identifierar tre typer av kundförväntningar: önskad service, standard grundservice, och förutsedd service. Medan önskad service beskriver den tjänst som konsumenten strävar efter och betraktar som önskvärd beskriver standard grundservice den lägsta servicenivån som konsumenten är beredd att acceptera. Förutsedd service avser tjänsten som konsumenten tror att de kommer få. Studien visar att dessa tre typer av förväntningar tar sig olika former och att kombinationen av dessa sätter förväntningsnivån. Resultaten indikerar att dessa förväntningar påverkas av personliga behov, digitala färdigheter och situationsfaktorer.

Den andra studien fokuserar på konsumentupplevelsen av mottagarfri hemleverans i kundresans sista fas genom en fältstudie med nio hushåll. Studien visar att den totala kundupplevelsen av leveranstjänster är flerdimensionell och dynamisk. Studien identifierar sex dimensioner av konsumentupplevelse: kognitiv, emotionell, beteendemässig, sensorisk, fysisk och social upplevelse. Dessa sammanlänkade dimensioner poängterar att e-handlare och tredjepartslogistiker behöver ta hänsyn till samtliga dimensioner för att skapa en betydelsefull konsumentupplevelse. Dessutom tyder studiens resultat på att leveranstiden påverkar konsumenternas val av köpkanal och köpbeteende, vilket i sin tur påverkar upplevelsen. Exempelvis valde vissa studiedeltagare att handla i butik i stället för på nätet i brist på snabba leveransalternativ. De tillgängliga leveransledtiderna ledde till att vissa deltagare beställde relativt höga volymer med låg frekvens. Samtidigt föreslog deltagarna att kortare leveransledtider skulle skapa incitament att beställa lägre volymer med

högre frekvens. Resultaten tyder på att leveransledtid och konsumenternas köpbeteende i slutändan påverkade kundupplevelsen.

Konsumentperspektivet kan spela en viktig roll i handelns omställning mot en cirkulär ekonomi för bättre hållbarhet. I avhandlingen studeras cirkulär affärsmodellsinnovation genom en empirisk studie i modehandeln i samarbete med e-handlare, hjälporganisationer och användare. Studien visar att kundcentrering utgör en huvudsaklig innovationsdrivare. Forskningen visar även att affärsmodellen skapar en digital donationsupplevelse, alltså en kundupplevelse av att donera kläder digitalt. Dessutom visar resultaten att affärsmodellen skapar ytterligare konsumentkontaktpunkter som resulterar i en utökad och mer komplex kundresa. Vidare ökar affärsmodellen konsumentengagemanget genom att visa uppskattning för konsumenter som bidrar till återanvändning av kläder. Uppskattningen fungerar som ett sätt att skapa incitament för konsumenter att engagera sig i cirkulära affärsmodeller och bidra till en cirkulär ekonomi.

Avhandlingen belyser också logistikens roll som katalysator inom cirkulär affärsmodellsinnovation. Studien demonstrerar att logistikens roll går långt bortom godstransport till att påskynda cirkulär affärsmodellsinnovation. Forskningen illustrerar tydligt att logistik utgör en strategisk resurs i affärsmodellen eftersom den har en naturlig koppling till centrala delar av det ekonomiska systemet som behöver ställas om, som exempelvis produktion, distribution och omfördelning. Studien visar också att affärsmodellen ökar behovet av logistikaktiviteter eftersom modellen syftar till att öka antalet användare per produkt, vilket sätter press på logistiksystem. Det växande behovet av logistikaktiviteter, som hantering och transport av kläder, kan leda till betydande kostnader som kräver att cirkulära affärsmodeller omfamnar en ny syn på logistikkostnader. På samma sätt måste cirkulära affärsmodeller säkerställa att miljövinster överstiger miljöpåverkan från logistik.

Omställningen av modehandeln till en cirkulär ekonomi ger möjlighet till bättre hållbarhet i handeln som helhet. Cirkulära affärsmodeller förlänger livscykeln för kläder genom att underlätta förflyttningar och återanvändning av kläder. Vidare överbryggar cirkulära affärsmodeller klyftan mellan aktörerna i modesystemet genom att etablera sammanlänkade nätverk som ger tillgång till externa resurser och förmågor som krävs för att minska miljöpåverkan. För att lyckas med cirkulära affärsmodeller krävs engagerade konsumenter som håller kläder i omlopp så länge som möjligt. Konsumentengagemang är alltså avgörande i omställningen till cirkularitet. Denna forskning belyser därför behovet av att utöka producentansvaret för insamling och behandling av textilavfall så att konsumentansvaret också inkluderas.

Sammantaget visar denna avhandling att konsumentcentrering är en viktig förutsättning för utvecklingen av leveranstjänster och för omställningen av handeln mot en cirkulär ekonomi. Förståelse av konsumenters förväntningar utgör en outnyttjad potential för att förbättra hållbarheten av leveranstjänster och handeln i

sin helhet. Vidare visar denna avhandling att konsumentcentrering är en huvudfaktor i cirkulär affärsmodellinnovation, som ytterligare kan accelereras med hjälp av logistik som agerar katalysator i denna process. Konsumentcentrerad logistik är av stor betydelse för att stödja utvecklingen av handeln och dess omvandling mot en cirkulär ekonomi.

List of appended papers

This doctoral dissertation is a compilation of four individual papers. The papers and the author's contributions are presented below. A summary of the results is provided in Section 4, and the full versions of the papers are appended at the end of the thesis.

Paper I

Olsson, J., Hellström, D., and Pålsson, H. (2019). "Framework of Last Mile Logistics Research: A Systematic Review of the Literature", *Sustainability*, 11, 7131. Published under the Creative Commons Attribution (CC BY 4.0) license.

The paper is a systematic literature review and includes a framing of the study, and the selection, review, analysis, and synthesis of the existing literature in last-mile logistics research.

As the lead author, John Olsson collected, analyzed, and synthesized the data. He also wrote the majority of the text. Daniel Hellström contributed guidance regarding the methodology and provided valuable and insightful support during data analysis and synthesis, and critical and constructive reviews of the text. Henrik Pålsson contributed guidance on the methodology and reviewed the manuscript critically at several stages of the research process. All authors contributed to the framing of the study. An initial draft of this paper was presented at the 31st NOFOMA conference in Oslo in 2019.

Paper II

Olsson, J., Osman, M.C., Hellström, D. and Vakulenko, Y. (2022), "Customer expectations of unattended grocery delivery services: mapping forms and determinants", *International Journal of Retail & Distribution Management*, Vol. 50 No. 13, pp. 1–16. Published under the Creative Commons Attribution (CC BY 4.0) license.

The paper is a multiple case study based on data from semi-structured interviews and direct observations.

John Olsson is the lead author and developed the overall research design, contributed significantly to data analysis and synthesis, and wrote the majority of the text. Mary Catherine Osman contributed to the data collection process by setting up the initial case study protocol and conducting semi-structured interviews and observations. She also conducted initial a priori coding based on theory and contributed to formulating the propositions and drafting the conceptual model. Daniel Hellström provided guidance on the research design, gave valuable inputs for the analysis, and critically reviewed the text at all stages during the research process. Yulia Vakulenko contributed to the theoretical framework of the study as well as the section pertaining to implications for theory and practice. She also critically reviewed the manuscript during the final stages of the research process.

Paper III

Olsson, J., Hellström, D. and Vakulenko, Y. (2023), "Customer experience dimensions in last-mile delivery: an empirical study on unattended home delivery", *International Journal of Physical Distribution & Logistics Management*, Vol. 53 No. 2, pp. 184–205. Published under the Creative Commons Attribution (CC BY 4.0) license.

The paper is a field study using an engaged scholarship approach to investigate customer experience dimensions in last-mile delivery. Empirical data were collected primarily from nine households that actively used an unattended delivery service for a period of six to nine months.

John Olsson is the lead author and developed the overall research design, collected the data, contributed substantially to data analysis and synthesis, wrote the original draft, and edited various iterations of the manuscript. Daniel Hellström provided guidance on the research design, offered valuable input during data analysis and synthesis, and critically reviewed the manuscript draft during all stages of the research process. Yulia Vakulenko substantially contributed to the theoretical background of the study, offered valuable input on data analysis and synthesis, and critically reviewed several iterations of the manuscript during multiple periods of the research process. The authors would like to thank Mary Catherine Osman for her support during data collection. An initial draft of this paper was presented at the 33rd NOFOMA conference in Rejkjavik, Iceland, in 2021.

Paper IV

Hellström, D. and Olsson J. (2023), “Let’s go thrift shopping: Exploring circular business model innovation in fashion retail”, *under review (2nd round) at Technological Forecasting & Social Change*, a previous version was presented at the 18th Academy of Innovation, Entrepreneurship, and Knowledge (ACIEK) Conference, Madrid, Spain.

This paper develops and validates a circular business model to advance knowledge on what drives such innovation and how this process can be accelerated. In a collaborative approach, data were primarily collected from semi-structured interviews, field visits and observations, focus groups, and workshops.

Daniel Hellström is the lead author of this paper and acquired the funding for the project, and developed the idea and the study design. As the second author, John Olsson contributed substantially to data analysis and synthesis, developed the theoretical background, and wrote the majority of the initial draft. In line with the overall research approach, the authors collaborated throughout the research process in the theoretical framing, description of the business model, synthesis, and implications for research and practice. Overall, the authors have contributed equally to the paper. The authors would like to thank Maria Hallgren and Alfhild Hedelin for their substantial support to data collection.

List of figures

Figure 1.1. Overview of last-mile delivery services in the last-mile logistics system. 8
Figure 2.1. Research context and intersection of the research disciplines in this thesis. 11
Figure 2.2. A consumer-centric typology of unattended and attended delivery services (Olsson et al. 2023). 17
Figure 2.3. The circular economy and the linear economy, adapted from Geissdoerfer et al. (2020). 26
Figure 3.1. Research process 35
Figure 4.1. Overall framework of last-mile logistics research (Olsson et al. 2019). 43
Figure 4.2. Conceptual model of the forms and determinants of unattended grocery delivery services (Olsson et al. 2022) 44
Figure 4.3. Conceptual model of dimensions and elements of unattended grocery delivery experience (Olsson et al. 2023) 45
Figure 4.4. Last-mile delivery experience feedback loop (Olsson et al. 2023). 46
Figure 4.5. Business model innovation towards circular economy transformation in retail (Hellström and Olsson 2023) 47
Figure 4.6. The logistics service-related customer journey: a basis for consumer centricity 50
Figure 4.7. Key patterns of circular business model innovation, adapted from Hellström and Olsson (2023) 52
Figure 4.8. Connecting the research results. 53

List of tables

Table 3.1. Overview of appended papers for justification of the research design. 32
Table 3.2. Connection between appended papers, research questions, and research objectives 32
Table 3.3. Summary of research quality in this research. 37
Table 4.1. Themes addressed in last-mile logistics research (Olsson et al. 2019). 42
Table A1. Descriptive information of the respondents 90
Table A2. Trustworthiness of the study and findings. 94

1.Introduction

This section presents the background, research problem, purpose, research question, objectives, and key definitions and concepts. It also provides suggestions for the order in which this doctoral thesis should be read.

1.1. Background

The retail landscape is changing at an unprecedented speed and scale, fueled by the omnichannel development and the aftermath of the COVID-19 pandemic (Gielens 2022). Digitalization and technological advancements have enabled retailers to move away from being either pure bricks-and-mortar or pure online retailers and instead integrate various channels to serve customers across these channels. For example, traditional brick-and-mortar retailers such as IKEA and Walmart have launched e-commerce channels. Likewise, online-first retailers like Amazon have opened physical stores in addition to their e-commerce channels. To integrate their channels, retailers have strongly focused on logistics services, such as warehousing, last-mile delivery, and return (Gielens 2023; Saghiri et al. 2018). For example, retailers have introduced "click-and-collect" and "ship-from-store" to better align their logistics services with omni channel customer journeys.

The transformation toward omnichannel retail and the continuous growth of online channels spark growing demand for last-mile delivery services. Globally, e-retail sales increased from 3,351 billion US dollars in 2019 to 5,211 billion US dollars in 2021, which corresponds to a growth of 55% in two years (Statista 2022b). The COVID-19 pandemic also increased e-retail sales as social distancing measures spurred consumers to shop online. Although e-retail sales dropped in some markets in 2022, e-retail sales were still high compared to pre-pandemic sales and further growth is predicted. For example, e-retail sales in Sweden dropped 7% in 2022 to a total of 136 billion SEK, which is well above the pre-pandemic sales of 87 billion SEK in 2019 (Postnord 2023; PostNord 2020). Growing e-retail sales prompt escalating parcel shipping volumes, which increased interest in last-mile delivery services among scholars and practitioners. In the five-year period from 2017 and 2021, global parcel shipping volumes grew 115%, reaching a total of 159 billion parcels (Statista 2022a).

1.1.1. The environmental impact of last-mile delivery services

The growth in parcel shipping volumes highlights the significant economic cost and environmental impact of last-mile delivery services. The large number of small, heterogeneous deliveries in a large number of small vehicles with high time sensitivity induces considerable cost (Xing et al. 2011). Some studies estimate that last-mile delivery services account for 13%–75% of total supply chain costs (Gevaers et al. 2009). From an environmental perspective, last-mile delivery services have a considerable impact, despite varying estimates. For example, last-mile logistics is estimated to accounts for around 25% of greenhouse gas emissions from transportation (European Commission 2011). Thus, last-mile delivery services are a key determinant of the total carbon footprint in retail, and local infrastructure—such as warehouses and stores—also has a great impact (Buldeo Rai et al. 2023).

Retailers are scrambling to innovate and find ways of decreasing the environmental impact of logistics services fueled by consumers' growing environmental awareness and sustainability demands. Such initiatives are coined by a strong focus on operational efficiency to decrease environmental impact and operational costs. Sustainability initiatives in retail include the use of electric vehicles and other zero-emission solutions in last-mile delivery operations. For example, INGKA group, the biggest IKEA franchisee, aims to transform its entire home delivery offering to zero emissions by 2025 (IKEA n.d.-b).

1.1.2. Toward the circular economy in retail

The retail industry has a widespread and substantial impact on the environment, highlighting the need for disruptive and transformational change. The circular economy decouples economic activity from the consumption of finite resources and offers promising system-wide change, given its potential to disrupt the prevailing linear economy to move toward zero emissions. Transforming every part of the retail ecosystem to create a thriving circular economy requires innovation and new ways of value creation decoupled from resource use and greenhouse gas emissions. Circular business models offer a substantial opportunity for new and more sustainable growth in retail in the form of resale, rental, repair, and remaking. In fashion retail, for example, circular business models are growing rapidly; still, the market share of such models remains limited at 3.5% of the total fashion market in 2019 (Ellen MacArthur Foundation 2021). Resale is taking a lead and represents the largest portion of circular fashion retail models by revenue (Thredup 2022).

Retailers recognize the enormous potential of the circular economy, with some leading the way and laying out ambitious circularity and sustainability goals. For example, IKEA aims to be circular and climate-positive by 2030 by designing circular products, using renewable and recycled materials, and developing circular services (IKEA n.d.-a). Another example is Zalando, which aims to apply the

circular economy principles by 2023 and has worked in a strategic partnership with the Ellen Macarthur Foundation since 2021 (Ellen MacArthur Foundation n.d.-a). Zalando focuses on the design of fashion, intensified use of clothing, the reuse of clothing, and recycling (Zalando n.d.). While the growth of circular business models in retail and consumers' growing demand of used products is promising, this is just the beginning of the transition toward a circular economy, as traditional linear models still dominate the retail sector.

Despite various initiatives and ambitious goals, there is a need for more disruptive and transformational change to effectively transform logistics services and the wider retail ecosystem toward zero emissions. Retailers and logistics service providers need to understand the drivers of change to effectively decrease the environmental impact of retail and decarbonize logistics services. The literature suggests that profitability, environmental policy, and stakeholder pressure are the main drivers of sustainable retailing (Naidoo and Gasparatos 2018). Consumers are key stakeholders in retail and have in recent years gained increasing power to set demands for sustainability. Therefore, there is growing recognition that changing consumer demands and behavioral patterns act as the primary drivers for change leading retailers to shift their focus to sustainability (Deloitte n.d.; Accenture 2022). Despite this recognition, little is known about consumer perception of last-mile delivery services.

1.2. Research problem

The logistics and marketing disciplines have diverged from their historically integrated connection, despite myriad social and technological changes (Esper et al. 2020). In the new rapidly changing retail environment, consumer perception, value, and behavior are directly impacted by logistics and supply chain performance (Vakulenko et al. 2019a; Vakulenko et al. 2018; Singh and Rosengren 2020). Consumers interact with the last stage of the supply chain and, in fact, become an integral part of it. Thus, consumer preferences and behavior can form the basis for managing supply chains, especially for firms closer to the consumer, but also firms further upstream in the supply chain (Castillo et al. 2018). At the same time, the omnichannel development leads to an extended and more complex customer journey (Verhoef et al. 2015; Lemon and Verhoef 2016). Retailers have significantly less control over customers' experiences as new touchpoints evolve. The exponential increase in the number of potential touchpoints, in combination with reduced control requires retailers to integrate logistics and marketing functions to create and deliver a positive customer experience. Still, managing the customer journey of each individual consumer is increasingly complex. Notably, the lack of consumer insights limits transformational change to enhance the sustainability of logistics services and the retail ecosystem.

In recognition of the growing importance of consumers, scholars call for more consumer-centric logistics research. Rooderkerk et al. (2023) encourage researchers to combine consumer preferences for fulfillment methods with operational efficiency to actively lure consumers into the most efficient options. Esper et al. (2020) call on scholars to adopt a consumer-centric approach to supply chain management. In this consumer-centric supply chain management, the entire supply chain should focus on customer experience and emphasize the pivotal role of last-mile delivery. Similarly, Hänninen et al. (2021) find that extant literature lacks generalization of the contemporary customer, as customer journeys become more complex. The study proposes that scholars recognize the changing customer characteristics in the 2020s.

Despite the need for consumer insights in last-mile delivery, scholarly investigations on the matter remain fragmented and rather limited. The existing literature provides insights into the role of last-mile delivery in the overall customer experience in retail, and provides evidence that last-mile delivery affects the overall customer e-retail experience (Vakulenko et al. 2019a; Liu et al. 2008; Jiang and Rosenbloom 2005). Moreover, extant studies identify factors such as timeliness, reliability, provision of delivery information, and order tracking as antecedents to customer satisfaction and loyalty in e-retailing (Page-Thomas et al. 2006; Rao et al. 2011; Sharma et al. 1995; Mentzer et al. 1989). However, despite these contributions, scholarly understanding of how last-mile delivery influence the customer journey in retail remains very limited.

The scarcity of consumer-centric logistics research poses a major challenge to the development of sustainable last-mile delivery services in retail. Consumer choices have an effect on the environmental impact and operational efficiency of last-mile delivery, which constitutes the critical link between the upstream supply chain and the consumer. Scholarly investigations indicate that greenhouse gas emissions and the cost of last-mile delivery depend on numerous factors, such as delivery options, delivery time windows, customer density, mode of transport, failed first-time deliveries, packaging, returns, and buildings (Wygonik and Goodchild 2018; Pålsson et al. 2017; van Loon et al. 2015; Edwards et al. 2010; Boyer et al. 2009). Therefore, consumer insights can provide an important foundation for increasing the environmental sustainability and operational efficiency of logistics services. Additionally, consumer buying behavior—including travel mode, choice of delivery option, and basket size—strongly affects the carbon footprint of last-mile delivery.

1.3. Purpose, research questions, and objectives

This research builds on the notion that changing consumer demands and behavioral patterns are important drivers of change in the retail industry. Despite this recognition and multiple calls to shed light on the consumer perspective on last-mile delivery services, consumer-centric last-mile delivery research is still in its infancy. However, the problem discussion above indicates a scholarly and practical need to adopt a consumer-centric approach to last-mile delivery services. The purpose of this research is to explore last-mile delivery services' influence on the customer journey in retail. This research was guided by the following research questions:

1. *What do consumers expect from last-mile delivery services?*
2. *How do consumers experience last-mile delivery services?*
3. *What is the role of consumer-centric logistics services in the circular economy?*

This dissertation lays out four research objectives to address the lack of consumer research in last-mile delivery services and support the evolution of retail toward the circular economy:

1. To consolidate the knowledge of last-mile logistics and provide an integrated view of the literature.
2. To map the forms and determinants of customer expectations of last-mile delivery services.
3. To identify and describe the customer experience dimensions of last-mile delivery services.
4. To provide foresight on the role of logistics services in the circular economy.

Based on the results of this research, this dissertation aims to discuss a consumer-centric approach to last-mile delivery services in relation to competitive advantage and environmental sustainability.

1.4. Key definitions and concepts

1.4.1. Omnichannel retail

Retailers have long relied on different channels, such as stores, catalogues, and online websites (von Briel 2018). With the advent of e-commerce, many retailers have diversified their channel mix to become multichannel retailers with no overlap

between the separate channels. In contrast to multichannel retail, omnichannel describes the synergetic management of various available channels and touchpoints to optimize customer experience across channels (Verhoef et al. 2015).

1.4.2. Last-mile logistics

Available definitions of last-mile logistics in the extant literature differ significantly in regard to the scope of the concept. In this dissertation, last-mile logistics is defined as *the process of planning, implementing, and controlling efficient and effective storage and movement of products in the last leg of a business-to-consumer supply chain from the order penetration point to the consumers' preferred destination point* (Lim et al. 2018; Halldórsson and Wehner 2020). Thus, 'last-mile logistics' is a broad term that spans back-end fulfillment (including warehousing, picking, sorting, and packing) to last-mile transport and delivery.

1.4.3. Last-mile delivery

The literature offers multiple definitions of last-mile delivery. In this dissertation, last-mile delivery is defined as *the activity of delivering an order to the recipient at the predefined delivery location* (Lim et al. 2018; Gevaers et al. 2011). Thus, last-mile delivery can also be seen as the front-end where the order meets the receiver. The role of the consumer depends on the selected delivery options; in some cases the consumer can take an active role in last-mile delivery by collecting orders from a pickup point or store (Halldórsson and Wehner 2020).

1.4.4. Consumer centricity

While both logistics and marketing scholars often use the terms 'customer' and 'consumer' synonymously, the key difference can be found in their relationship with the firm. In contrast to customers, consumers do not necessarily have a relationship with a specific organization (Hamilton 2016). 'Consumer centricity' is a marketing approach that assesses each customer individually to understand and satisfy their individual needs, wants, and resources (Sheth et al. 2000). Constitutive elements of customer centricity focus on interactive customer relationship management, customer integration, internal integration, and supply chain integration (Lamberti 2013). Consumer centricity requires firms to align their organizational structures and performance metrics in combination with leadership commitment and systems support (Shah et al. 2006).

1.4.5. Customer journey

The customer journey describes a series of touchpoints related to the delivery of a service from the consumer's perspective (Zomerdijk and Voss, 2010). This journey spans three overall phases: prepurchase, purchase, and postpurchase (Shavitt and Barnes, 2020; Lemon and Verhoef, 2016). Customer touchpoints—i.e. interactions with the customer—can be owned by the brand itself; its partners; the customer; or the social/external environment (Lemon and Verhoef 2016)

1.4.6. Customer expectations

The literature offers multiple definitions of customer expectations and their roles in the customer journey. In this dissertation, customer expectations are defined according to Parasuraman et al. (1988: 17) as the "desires or wants of consumers, i.e., what they feel a service provider should offer rather than would offer." The seminal contribution by Zeithaml et al. (1993) defines three levels of customer expectations: desired service, adequate service, and predicted service.

1.4.7. Customer experience

Customer experience is a multidimensional construct that attempts to integrate multiple marketing concepts. This dissertation defines customer experience following Lemon and Verhoef (2016: 71) as a "customer's cognitive, emotional, behavioral, sensorial, and social responses to a firm's offerings during the entire purchase journey." This definition highlights the importance of customer touchpoints as an integral part of the customer experience throughout the customer journey (Stein and Ramaseshan 2016).

1.4.8. Circular business model

Business models describe the logic of how firms create, deliver, and capture value (Teece 2018). The value creation logic of circular business models is designed to sustain a competitive advantage while improving resource efficiency through slowing, closing, and narrowing resource loops (Bocken et al. 2016; Nußholz 2017).

1.4.9. Circular business model innovation

Circular business model innovation is generally understood as both a process and as an outcome (Kahn 2018). In this dissertation, circular business model innovation refers to the process of conceptualizing and implementing circular business models (Geissdoerfer et al. 2020).

1.5. Research focus and demarcations

The research included in this compilation thesis was conducted in packaging logistics. While this research has not investigated packaging per se, it still contributes to packaging logistics research. In last-mile delivery, packaging is used to prepare ordered products for safe transport and delivery to the ultimate consumer. In taking a logistics-focused perspective on packaging logistics, this research is deeply rooted in the logistics and supply chain management literature. The focus of this dissertation is on last-mile delivery from a business logistics and management perspective. In this dissertation, last-mile delivery is defined as the activity of delivering an order to the recipient at the predefined delivery location (Lim et al. 2018; Gevaers et al. 2011). Research and practice have advanced multiple last-mile delivery services, such as delivery to a retail store (click-and-collect), delivery to a pickup point (such as a post office or parcel locker), unattended home delivery, attended home delivery, and delivery to roaming delivery location. Figure 1 provides an overview of common last-mile delivery services in the last-mile logistics system and highlights the role played by packaging in last-mile delivery. It should be noted that returns have not been included in Figure 1, as returns are outside the scope of this research.

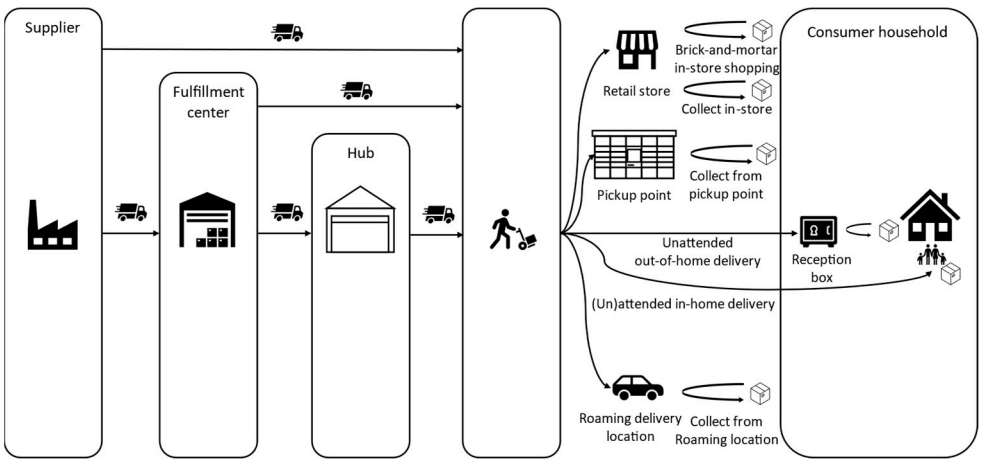


Figure 1.1. Overview of last-mile delivery services in the last-mile logistics system.

This research addresses the research questions and purpose by investigating a specific unattended home delivery service using a reception box and advance the knowledge of last-mile delivery services in retail (study B and C). The temperature-controlled reception boxes were installed outside of participating consumers' homes and seamlessly integrated with the delivery service. Reception boxes featured a built-in refrigerator and freezer, an internet connection, a digital lock to ensure that

only the intended recipient received each delivery, and remote-control access through a mobile application. The service is primarily intended for e-grocery delivery; however, it features an open access system that is not locked into a specific retailer, logistics service provider, or product type. Rather, consumers order from the retailer of their choice and select the reception box as their delivery location. The delivery courier uses the reception box barcode scanner to access the reception box and place the groceries or parcels inside the refrigerator or freezer depending on product requirements. Recipients are notified of the delivery through the mobile application, which is also used to unlock the reception box and collect deliveries. It should be noted that other components of the last-mile logistics system, such as fulfillment and transport, have not been studied in this research. Figure 2 shows the scope of this research. Likewise, returns remain outside the scope of this research.

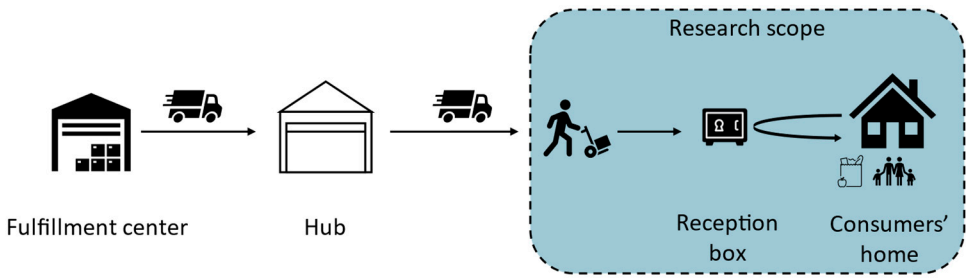


Figure 1.2. Scope of the research included in this dissertation.

The research in this dissertation was conducted in a retail context. While the retail industry can be considered the main driver of production and consumption patterns, it also presents a significant opportunity to reduce global greenhouse gas emissions. Additionally, logistics services have gained vital importance in the retail industry, driven by the continuous e-retail growth and omnichannel development. This research includes but was not limited to omnichannel retail, because logistics services are equally important for pure e-retailers. This research focused on two retail sectors in particular: e-grocery retail (studies B and C) and fashion retail (study D). E-grocery retail was an interesting and highly relevant context for studying logistics services, as the idiosyncrasies of groceries (such as sensitivity to temperature, shock sensitivity, shelf life, and relatively low item value) pose significant challenges to last-mile delivery. Fashion retail provides a highly relevant context for studying circular business model innovation, given that global clothing production doubled between 2000 and 2015 while clothing utilization declined by 36%. While fashion retailers recognize the enormous market potential of circular business models, traditional linear models still dominate the market, highlighting the need for business model innovation.

This research investigates last-mile delivery services from a consumer perspective. Well-established marketing constructs are employed in this research, such as customer expectations, customer experience, and the customer journey. Given the significant and important difference between customers and consumers, it is important to clarify how these two terms are used in this dissertation. The author recognizes that these two terms should not be employed as synonyms. Still, this dissertation follows and applies well-established terminology related to these marketing constructs to explore the expectations and experiences of consumers in their journey.

1.6. Reading guidance

This dissertation is composed of six chapters. The reader is recommended to read the first three chapters in the following order: chapter 1—introduction, chapter 2—frame of reference, and chapter 3—research methodology. Then, it is recommended that the reader go through the appended papers in order. Thereafter, the reader can continue to read the remaining chapters: chapter 4—results, chapter 5—discussion, and chapter 6—implications and future research. Despite the summary of key findings in chapter 4, it is necessary to read the appended papers to fully comprehend the results of this research.

2.Frame of reference

This chapter provides an overview of key concepts and theories relevant to the theoretical framing of this research. A graphical overview is presented to position the research and help the reader position the concepts of this research and how they relate to each other.

2.1. Positioning the research

This dissertation investigates last-mile delivery in a retail context and is deeply rooted in the logistics and supply chain management literature. The research draws on the marketing literature to address research questions and objectives. Figure 2.1 provides a highly simplified overview of the intersection of research disciplines and concepts used in this research.

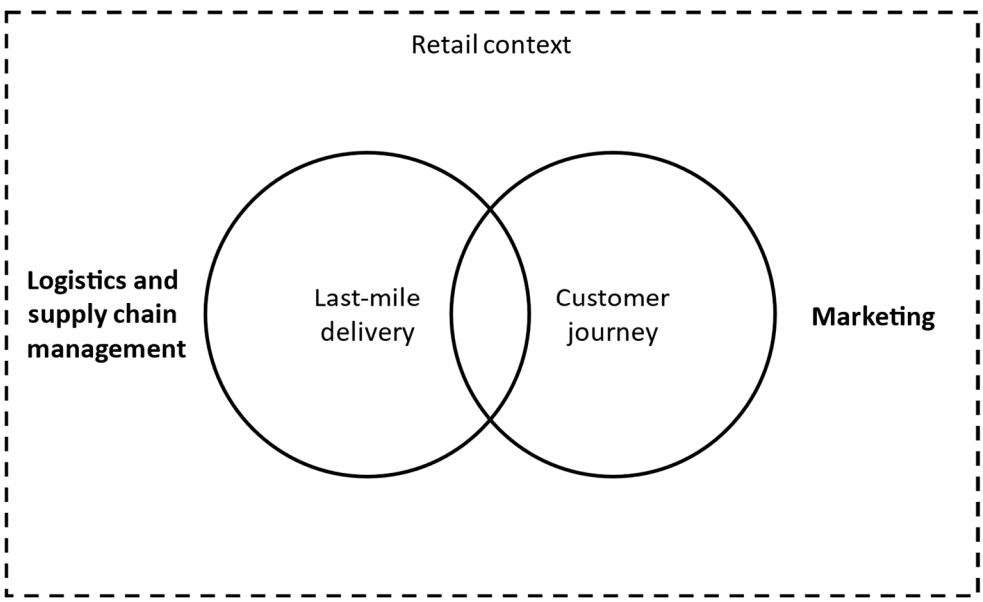


Figure 2.1. Research context and intersection of the research disciplines in this thesis.

This research is rooted in logistics and supply chain management with a focus on last-mile delivery. Logistics can be described as the science of the efficient flow of materials within and between companies in the supply chain. Inherent to the logistics discipline is a systems view, which conceptualizes a logistics system as a network of organizations, people, activities, information, and resources required for the physical flow of goods from supplier to customer (Fahimnia et al. 2011). The logistics system is an open system; that is, it involves an exchange with its surroundings. A logistics system may consist of three main subsystems: the supply system, the production system, and the distribution system; and the relationship between these subsystems generates synergy effects (Jonsson 2008). Because last-mile delivery is part of a broader supply network, it can be considered as a distinct subsystem of the logistics system (Lim et al. 2018). Building on Bowersox et al.'s (2020) view of a supply chain as a series of cycles, the last-mile delivery cycle overlaps with the consumer service cycle as the interface among manufacturers, wholesalers, and retailers with the end consumer. Thus, last-mile delivery is the critical link between the consumer and the upstream supply chain.

The development towards omnichannel retail uncovers the growing tensions between the market's goal of creating a seamless customer experience and operation's aim of enhancing efficiency. This marketing–operations interface refers to decisions required to coordinate multiple channels aimed at balancing seamless customer experiences and efficient product flow (Rooderkerk et al. 2023). These key decisions at the marketing–operations interface revolve around assortment and inventory, distribution and delivery, and returns (Bijmolt et al. 2021). Omnichannel consumer behavior and fulfillment requires an integrative approach that involves both the supply (operations) and demand side (marketing) in decision making. Such integration is reminiscent of the marketing–logistics interface that received academic attention in the 1980s and 1990s (Stank et al. 1999; Langley and Holcomb 1992)—yet with a new focus on the consumer.

Cross-functional decisions on last-mile delivery are important management decisions in omnichannel fulfillment (Bijmolt et al. 2021). Operational decisions, including routing and scheduling, have great impact on the efficiency of last-mile delivery operations (Boyer et al. 2009; Ostermeier et al. 2022). At the same time, last-mile delivery needs to fulfill customer requirements and create a seamless customer journey (Lim et al. 2018; Hübner et al. 2016c). Thus, a cross-functional approach that integrates logistics and marketing disciplines is required to successfully manage last-mile delivery in omnichannel retail.

Furthermore, this research draws an on the marketing literature to explore the consumer perspective on last-mile delivery services. Although the supply chain management and marketing disciplines have diverged in the second half of the last century, marketing theories remain frequently used in supply chain management research (Defee et al. 2010). Recent consumer-centric developments in retail urge the two disciplines to reconnect (Esper et al. 2020). The customer journey is a key concept

that was used in this research to shed light on customer expectations and customer experience in last-mile delivery. The 'customer journey' is referred to as a series of touchpoints related to the delivery of a service from the consumer perspective (Zomerdijk and Voss 2010). Conceptually, the customer journey can be described in three general stages throughout which the customer encounters a series of touchpoints: the prepurchase stage, the purchase stage, and the postpurchase stage.

This research was conducted in a retail context in Sweden, where e-retail shares are relatively high, despite considerable variations among the various retail sectors. 'Retail' is a relatively broad term that could be described as the sale of goods and services to consumers, often in relatively small quantities, for use or consumption. Retail provides an interesting context for this research, considering the substantial importance of logistics services, including last-mile delivery, for this industry. Moreover, retail constitutes the critical link between production and consumption, which indicates enormous potential for reducing the overall environmental impact. Given the growing importance of consumers in retail, it is particularly important to shed light on the consumer perspective in this context.

Finally, this research was conducted in packaging logistics, an emerging research area which focuses on the interface between packaging and logistics throughout the supply chain (Pålsson 2018). As a multidisciplinary research area, packaging logistics aims to contribute to sustainable development through integrating packaging with logistics, innovation, and other fields of technology, marketing, and sustainability. Historically, packaging logistics is viewed from two perspectives: a packaging-focused perspective, and a logistics-focused perspective (Hellström 2007). While the logistics-focused perspective argues that packaging logistics research deals with the interaction between packaging and logistics, the packaging-focused perspective argues that these interactions cannot fully capture all the aspects of facets of packaging logistics research. It can therefore be argued that this research adopts a logistics-focused perspective of packaging logistics by exploring last-mile delivery from the consumer perspective to advance knowledge of logistics services in retail.

2.2. Omnichannel retail

The world of retail is currently undergoing a dramatic transformation from traditional bricks-and-mortar practices to multifaceted omnichannel strategies (Grewal et al. 2021; Verhoef et al. 2015). The manifestation of the online channel has disrupted and permanently reshaped retailing (Rigby 2011). The tremendous growth of the online channel is largely driven by increasing internet penetration, relatively low entry barriers, access to new customer groups, and transaction convenience for consumers (Zentes et al. 2017). Contemporary retail makes extensive use of technology (Pantano and Priporas 2016), enabling retailers to offer

a synergetic customer experience across channels (Verhoef et al. 2015). Furthermore, changing consumer behavior further accelerates retail transformations (Wagner et al. 2020). Moreover, omnichannel transformation has far-reaching consequences for marketing and logistics; for example on in-store strategies, warehousing, last-mile delivery, and communication strategies (Grewal et al. 2021).

Combining alternative channels into a single integrated omnichannel strategy enables retailers to exploit the unique benefits of various retail formats and enhance their service offerings. In other words, the service offerings provided by physical stores, traditional catalogs, online channels, mobile channels, and social media are integrated into a single transaction process (Piotrowicz and Cuthbertson 2014). While retailers have used various retail channels in parallel as part of following a multichannel strategy, the novelty of the omnichannel strategy lies in the integration of these channels, which enables consumers to move seamlessly among available retail channels (Verhoef et al. 2015). An example of integrating customer experience across channels is showrooming, which is a way of integrating customer experience across physical and digital channels, where consumers examine a product in a brick-and-mortar store and then make the purchase in another channel, typically the digital channel (Flavián et al. 2020).

Technological developments pave the way for retailers to offer experiential online shopping and mass customization. Retailers use augmented reality and virtual reality (Bonetti et al. 2018), avatars (Holzwarth et al. 2006), chatbots (Pantano and Pizzi 2020), and other interactive measures to enhance the customer experience in various channels. The incorporation of social aspects into their online shops indicates that retailers are recognizing the growing importance of social communities. In community-based retailing, product ratings and discussions among community members become central aspects of the retail concept (Shih et al. 2013; Sridhar and Srinivasan 2012). Moreover, retailers increasingly offer individually tailored products or services, also known as mass customization. Typically, customers can combine various product elements, such as shape or color, to create their customized configuration. In turn, mass customization can increase customer satisfaction and enhance brand loyalty (Yoo and Park 2016).

The retail industry has a widespread and substantial impact on the environment. As the critical link between producers and consumers, the retail industry is a major driver of production and consumption patterns while simultaneously offering significant potential to reduce global greenhouse gas emissions. Influencing producers to produce and consumers to consume sustainably is pointed out as a key challenge of sustainable retailing (United Nations environment programme n.d.). Estimating greenhouse gas emissions from retail is difficult, given its complex interactions with various sectors including transport, industry, buildings, and waste. Yet, estimates by Boston Consulting Group suggest that the retail industry and its supply chains account for more than 25% of global emissions (Unnikrishnan et al. 2022).

2.2.1. E-grocery retail

Although the e-commerce share in the grocery sector remains relatively low, its growth has been tremendous in recent years. While the initial omnichannel transformation of grocery retail has been relatively slow compared to other retail segments, e-grocery markets have grown considerably in recent years. This growth of e-grocery retail was further fueled by social distancing measures mandated during the COVID-19 pandemic that spurred consumers to shop for groceries online. For example, e-grocery sales across Europe grew 54.0% in 2020 to reach a market volume of $95.82 billion (McKinsey & Company 2021). However, following the overall e-retail development, e-grocery markets shrank in the aftermath of the COVID-19 pandemic. For example, the e-grocery market in Sweden shrank 17% in 2022, reaching an e-commerce share of 4% compared to 6% the previous year (Postnord 2023). Key challenges in e-grocery retail revolve around high costs and the complexity of online order fulfillment (Aspray et al. 2013). Grocery retailers are continuously expanding their service offerings to address these challenges and enhance the last-mile delivery experience. Examples of these novel service offerings include curbside grocery pickup, drive-through grocery collection, attended home delivery, and unattended home delivery (Fabric 2020).

Parallel with the rapid growth of e-grocery retail, scholarly interest in in the matter has substantially increased. E-grocery research has primarily investigated omnichannel fulfillment (Hübner et al. 2016b; Wollenburg et al. 2018), consumer behavior (Singh and Rosengren 2020; Hood et al. 2020; Kühn et al. 2020), pricing (Breugelmans and Campo 2016), and autonomous technology (de Bellis and Johar 2020). Although omnichannel retail revolves around creating a seamless customer experience, scholarly research on customer experience remains relatively scarce. While grocery logistics play a key role in creating this seamless customer experience, the extant literature remains relatively fragmented (Lagorio and Pinto 2021).

2.2.2. Fashion e-retail

Fashion retail sales have grown significantly in recent decades, partly propelled by the advent of fast fashion, which offers consumers rapidly changing trend-led items at a low price. Fast fashion models have been successful in driving sales and taking market shares, as evidenced by escalating global clothing production, which doubled between 2000 and 2015 (Ellen MacArthur Foundation 2021). However, the fashion industry faces abundant criticism for disregarding pressing environmental and social issues. In fact, the environmental impact of the fashion industry is widespread and substantial, as it accounts for an estimated 8%–10% of global CO_2 emissions, a total of 4–5 billion tons annually (Quantis 2018; United Nations Climate Change 2018). Following fast fashion development, clothing utilization

declined by 36% paired with shrinking profit margins between 2000 and 2015 (Ellen MacArthur Foundation 2021).

The growth of fashion e-retail has been tremendous in recent decades and further growth is projected. The global fashion e-retail market is expected to show an annual growth rate of 9.45% by 2027 (Statista 2023). Logistics services are critical for the success of fashion e-commerce, as they provide agility and facilitate fast delivery and convenient returns to create a positive customer experience. The provision of free delivery and returns has encouraged sales growth in this industry. Fashion e-retail is coined by liberal return policies and relatively high return rates. In fact, return rates of 30% are not uncommon, with estimates ranging from 23% in the UK to 40% in the US (Cullinane et al. 2019). Fashion e-retailers faces harsh criticism for the environmental impact of consumer returns. While the literature lacks a comprehensive understanding of the environmental impact of consumer returns, numerous practices for managing such returns have been identified in the literature (Hjort et al. 2019).

2.3. Last-mile delivery

This subsection defines last-mile delivery and lays out its role in e-retail before offering an overview of unattended home delivery.

2.3.1. Defining last-mile delivery

Logistics services for delivering products to consumers are essential to omnichannel distribution (Hübner et al. 2016a). Last-mile delivery concerns activities conducted for physical delivery to the final destination and is often described as the most expensive, least efficient, and most polluting part of the supply chain (Gevaers et al. 2011). Retail transformation, urbanization, and changing consumer behavior have all led to growing parcel volumes, placing tremendous stress on last-mile delivery operations. Innovation and emerging initiatives have reshaped last-mile delivery in an attempt to address the changing market environment. Urban consolidation centers have been investigated as one way of addressing sustainability concerns while simultaneously handling larger volumes of parcels in urban areas (Björklund and Johansson 2018). Another example is crowd logistics, which relies on outsourcing logistics services to an undefined external crowd (Buldeo Rai et al. 2017). Moreover, the use of autonomous drones for last-mile delivery has been investigated in both research and practice (Aurambout et al. 2019). In combination with trucks, the relatively short operating ranges of drones could be addressed (Boysen et al. 2018).

In consumer-driven markets, firms leverage last-mile delivery to offer a seamless customer experience. Therefore, retailers and logistics service providers constantly explore novel last-mile delivery options to extend their service offerings. The literature offers multiple classifications of last-mile delivery methods. Gevaers et al. (2009) offer a widely-accepted classification of last-mile delivery options, delivery location, and type of delivery. Hübner et al. (2016b) add delivery time, delivery area, and returns in their classification. More recently, Halldórsson and Wehner (2020) develop a typology of last-mile delivery options according to the energy efficiency of these delivery options. Lim et al. (2018) distinguish three basic forms of last-mile distribution structures: (a) push-centric structures, where products are sent by someone other than the consumer; (b) pull-centric structures, where deliveries are fetched by the consumer; and (c) hybrid structures, in which deliveries are sent to an intermediary from which the delivery is fetched by the consumer. Figure 2.2 complements existing classifications by providing a consumer-centric typology of delivery services.

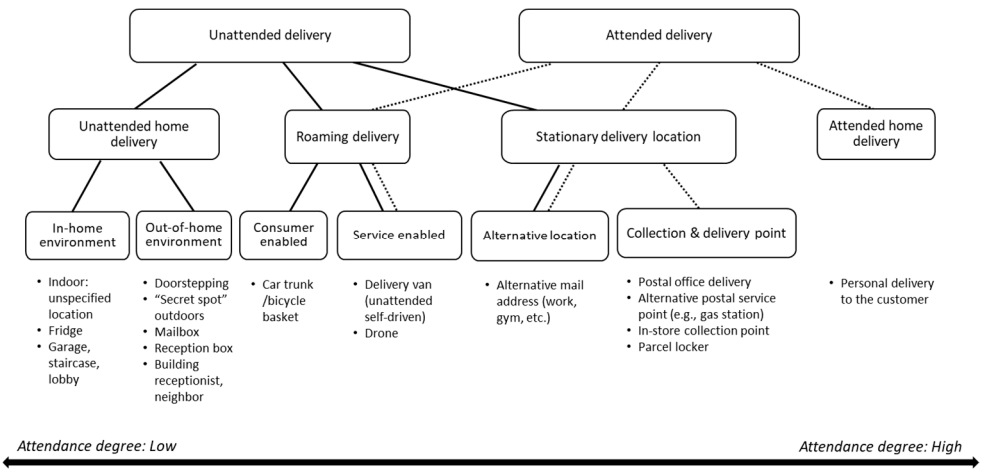


Figure 2.2. A consumer-centric typology of unattended and attended delivery services (Olsson et al. 2023).

Last-mile delivery is part of a broader supply network. Lim and Srai (2018) emphasize last-mile delivery as an integral part of a last-mile supply network comprising four configurational constructs: network structure, network flow, relationship governance, and service architecture. Capabilities inherent to last-mile supply networks can positively influence omnichannel performance when adequately utilized. Last-mile delivery depends on several actors, such as retailers, wholesalers, logistics service providers, and the consumer. Key processes in last-mile delivery—namely, fulfillment, transportation, and delivery—require seamless integration between these actors. Hübner et al. (2016b) distinguish backend and frontend logistics in their strategic planning framework for last-mile order

fulfillment and delivery. The framework highlights that last-mile delivery should be considered part of a broader network that interacts with other functions and actors of the supply network. In particular, the interaction between last-mile delivery and backend fulfillment is highlighted. Hence, warehouse operations such as picking and packing can have a significant effect on last-mile delivery.

2.3.2. The role of last-mile delivery in e-retail

The emergence of e-retail has spurred a race in the logistics market for business-to-consumer deliveries (Allen et al. 2018). Last-mile delivery is recognized as a source of market differentiation and competitive advantage in e-retail (Lim et al. 2017). In recent years, last-mile delivery has become an integral part of a firm's service offering. Order fulfillment variables—such as on-time delivery (Roy Dholakia and Zhao 2010), total delivery time, and price (Fisher et al. 2019) are considered to have an effect on customer satisfaction and loyalty in e-retail. Retail giants like Amazon and Alibaba lead the way in using logistics services to attract new customers and enhance customer loyalty. For example, the Amazon Prime program offers members free two-day shipping and free same-day delivery in certain regions (Amazon 2021). While the Amazon Prime program has recently been complemented with a number of additional services, such as video and music streaming, delivery remains the core of the program.

In the light of the growing importance of last-mile delivery, retailers and logistics service providers push for the development and implementation of innovative last-mile delivery methods (Vakulenko et al. 2019b). The growing bargaining power of consumers and the tremendous increase in competition has compelled e-retailers to rethink last-mile delivery. Technology-driven innovation enables e-retailers to gradually complement traditional delivery options with new and emerging delivery services, such as in-car delivery, self-service lockers, autonomous drones, and unattended delivery services to the consumer's home. These emerging services in e-retail provide benefits for all actors involved: consumers gain from the convenience (Tsai and Tiwasing 2021), retailers can expand their market presence (Zentes et al. 2017), and logistics service providers can potentially increase their revenues.

E-retail and last-mile delivery are considered to have significant impacts on the environment (Allen et al. 2018). The environmental impact of last-mile delivery depends on consumers' choice of delivery method. A review of the environmental impact of e-commerce reveals that in a comparison between home delivery and collection from a delivery standpoint, home delivery has higher environmental impacts (Mangiaracina et al. 2015). The main reasons are the high number of failed home deliveries (Buldeo Rai et al. 2021), and the number of light goods vehicles used for home delivery (Allen et al. 2018). While consumers generally prefer free next-day delivery to an address of their choice, they are prepared to make trade-offs

and collect orders themselves or accept longer lead times when free delivery and returns are offered (Buldeo Rai et al. 2019).

2.3.3. Defining 'unattended home delivery'

Unattended delivery is an emerging service that allows the delivery of orders without the receiver having to sign a delivery note to confirm receipt. Multiple unattended delivery practices have evolved in recent decades. The seminal contribution by McKinnon and Tallam (2003) provides a classification of unattended delivery methods. Two fundamental concepts can be distinguished in this regard: unsecured delivery and secured delivery. Unsecured delivery, also known as 'doorstepping', refers to leaving the consignment in proximity of the recipient's home—for example, on the doorstep or in another unsecured location around the property. However, these unsecured setups come with risks, such as theft, denial of receipt, or burglary. In contrast, secured delivery is an attempt to address these risks by securing the reception of goods in different ways. Home access systems provide the delivery company access to the consumer's home or surrounding facilities such as a garage or outbuilding. Such home access systems typically use digital door locks and may be complemented with security systems such as cameras and alarm systems. Home reception boxes include designated boxes for deliveries and both individual and communal reception boxes are available. Collection points can also offer unattended delivery, which are another form of communal reception boxes.

Unattended delivery services offer significant benefits for various actors. Currently, between 2% and 60% of home deliveries fail because no one is at home during regular workdays to receive deliveries in more than half of all households (Fernie and McKinnon 2009; Buldeo Rai et al. 2021). Unattended delivery has the potential to reduce failed deliveries significantly because recipients are not required to be at home to receive their delivery. Such delivery options can reduce the cost of delivery drastically, and some studies estimate cost reductions up to 60% compared to conventional home delivery (Punakivi et al. 2001). The main reason for the increased cost-efficiency of the unattended deliver method is that delivery companies do not have to follow time windows for delivery. The size of the time window is negatively correlated with delivery costs (Boyer et al. 2009). Since time windows can be neglected in unattended delivery, routes can be optimized, and the number of vehicles required can be reduced substantially. Moreover, unattended delivery provides benefits for consumers, as they are not required to be at home to receive their delivery. One of the drawbacks of unattended delivery services is the need to invest in reception facilities. For example, the installation of reception boxes requires dedicated space for such boxes (Punakivi et al. 2001).

2.4. The customer journey in last-mile delivery

The transformation of the retail landscape has resulted in extended and more complex journeys, which has accelerated scholarly interest in in the customer journey due to the variety of touchpoints through which consumers interact with firms via multiple channels (Grewal and Roggeveen 2020). This section outlines the evolution from product centricity to consumer centricity, introduces the customer journey concept, defines customer expectations and customer experience, and lays out the scarcity of consumer research in last-mile delivery. This section focuses on the prepurchase and postpurchase stages of the customer journey, as logistics services primarily touch upon these two stages.

2.4.1. The evolution from product centricity to consumer centricity

The concept of customer centricity has been discussed since the 1950s (Drucker 1954; Levitt 1960). Still, many firms have tended to be more product-centric and have faced challenges in adopting a customer centric approach. After World War II, firms gained access to mass production paired with mass distribution and communication, which led to the development of a mass consumption society. Marketing activities focused on promoting, pricing, and distributing products in product-centric organizations. Growing awareness of the customer perspective, including customer satisfaction (Oliver 1981; Bitner et al. 1990), customer expectations (Zeithaml et al. 1993), and customer loyalty (Dick and Basu 1994), prompted the development of market-orientation (Hurley and Hult 1998; Kohli and Jaworski 1990) and market-driven organization (Day 1994). Following this development, researchers discussed the shift in management paradigms from a product-based strategy to a customer-based strategy (Gale 1994), and the evolution from a goods-dominant logic to a service-dominant logic (Vargo and Lusch 2004).

Customer centricity is a marketing approach that assesses each customer individually to understand and satisfy their individual needs, wants, and resources, rather than those of mass markets (Sheth et al. 2000). Lamberti (2013) identifies four constituting elements of customer centricity that center on interactive customer relationship management, customer integration, internal integration, and supply chain integration. Customer centricity applies the principles of customer orientation and inter-functional coordination in a more customer-focused and personalized approach than marketing orientation (Lamberti 2013). Shah et al. (2006) provide a framework outlining how organizational structures and performance metrics must be aligned to achieve customer centricity. Furthermore, the framework highlights that leadership commitment and system support are important foundations of customer centricity. Adopting a customer centric-approach allows for an increased emphasis on firms' unique contribution to enhanced customer experience (Homburg et al. 2017).

Logistics and marketing scholars alike have struggled to distinguish between 'customers' and 'consumers'. Hamilton (2016) suggests that the relationship with a firm is the key differentiator between the two terms: customers have a relationship with a firm, while consumers do not necessarily have this relationship. From the perspective of a focal firms, customers are those consumers or organizations that engage in an exchange of products or services with a specific focal firm. Consumers have the potential to become customers when engaging in an exchange of products or services, but they are not necessarily associated with a specific firm. While consumers are typically the end users of a product or service, they might not necessarily have purchased it.

This conceptual discussion of the consumer contributes to the foundation of consumer centricity by clarifying the important role consumers play in the marketplace. Given that consumers have the potential to become customers of supply chain output—particularly in retail supply chains—understanding their wants and needs related to products, services, and order fulfillment provides important insights for decision-making and management along the supply chain. In the marketing literature, such an emphasis on the consumer led to the development of consumer-based strategies (Hamilton and Price 2019). Furthermore, scholars argue that the consumer experiences provide an important foundation for the development of strategies; even for strategies involving business-to-business interactions and relationships (Seybold 2001). Lemon and Verhoef (2016) argue that developing strategies with the customer experience in mind requires an internal firm perspective that places the consumer at the center of the decision-making process.

2.4.2. Understanding the customer journey

The customer journey has become a widely-adopted concept by both academics and practitioners and is defined as a series of touchpoints related to the delivery of a service from the consumer's perspective (Zomerdijk and Voss, 2010). During the buying process, customers go through several stages, moving from needs recognition to purchasing, and eventually evaluation of the purchase (Howard and Sheth 1969). In this buying process, behavioral elements such as goals, information processing, involvement, and attitudes play an important role (Puccinelli et al. 2009). Customers encounter a number of touchpoints when buying products, such as advertising, in-store communications, or word-of-mouth (Baxendale et al. 2015; Meyer and Schwager 2007). These buying process models provide a solid theoretical foundation to support the notion that customer experience is created along a series of touchpoints throughout the customer journey (Puccinelli et al. 2009).

The customer journey can be conceptualized in three overall stages: prepurchase, purchase, and postpurchase (Shavitt and Barnes, 2020; Lemon and Verhoef, 2016). The prepurchase stage encompasses the customer experience from need recognition

to purchase consideration (Hoyer 1984). The subsequent purchase stage refers to customer interactions with the firm and its environment during the actual purchase. This stage has received significant scholarly attention, particularly in relation to retail atmospherics (e.g., Naylor et al. 2008; Bitner 1990). The postpurchase stage involves customer interactions with the firm and its environment after the actual purchase. This stage can both include purchase behavior, such as product returns (Moore et al. 2020) or repurchase (Patterson and Spreng 1997), as well as nonpurchase behavior, like word of mouth (Trusov et al. 2009; Engel et al. 1969). Given the iterative nature of the customer journey, past experiences can influence customers' experiences at each stage of the customer journey. In this sense, past experiences constitute antecedents of customer experience (Verhoef et al. 2009).

There are different types of touchpoints throughout the customer journey. Lemon and Verhoef (2016) identify four types of customer touchpoints: brand-owned, partner-owned, customer-owned, and social/external. Brand-owned touchpoints refer to customer interactions that are managed by the firm and are under its control. Scholarly research has focused in particular on the impact of product and service attributes on customer satisfaction (Berry et al. 2002; Oliver 1993; Bitner 1990). 'Partner-owned' touchpoints refer to interactions that are jointly designed and managed by the firm and its partners. Although the service marketing literature suggests that partner-owned touchpoints play an important role, the experience effects of these touchpoints remain unclear. 'Customer-owned' touchpoints refer to customers actions during the experience that are not under the control of the firm, its partners, or others. These actions are prevalent during the postpurchase stage, where consumption and use of the product or service are in focus. Furthermore, consumers can co-create value independently from firms (Vargo and Lusch 2004). Finally, social/external touchpoints recognize the role of others in the creation of customer experience. In particular, human interactions play a critical role in the retail experience (Srivastava and Kaul 2014); a few examples of this could be the interactions with other customers, peer influence, or reviews from other customers.

2.4.3. The prepurchase stage: defining customer expectations

Multiple understandings of customer expectations and their role in customer experience can be found in the literature. Parasuraman et al. (1988) highlight that there are different understandings of the construct in both service quality literature and customer satisfaction literature. In customer satisfaction literature, customer expectations are understood as predictions regarding what is likely to happen during a service encounter. Following this perspective, Oliver (1981: 33) states "it is generally agreed that expectations are consumer-defined probabilities of the occurrence of positive and negative events if the consumer engages in some behavior." In contrast, the service quality literature views expectations as consumers' *desires*. Parasuraman et al. (1988: 17) define expectations as the

"desires or wants of consumers, i.e., what they feel a service provider should offer rather than would offer."

There is some disagreement on the role of expectations in the evaluation of the service. Robledo (2001) identifies two conflicting paradigms: the disconfirmation paradigm and the perception paradigm. The disconfirmation paradigm holds that customer satisfaction is a result of the comparison of perceived performance and customer expectations (Oliver 1981; Bitner 1990). One of the most influential models of this paradigm is the SERVQUAL model developed by Parasuraman et al. (1985). In contrast, the perception paradigm contends that expectations are not antecedents of service quality, and that customer perception is the only measure required. Influential models that build on this paradigm include the evaluated performance (EP) measurement model (Teas 1993) and the SERVPERF model (Cronin and Taylor 1994).

Different types of customer expectations have been described in the literature. In relation to services, there are three well-established types of customer expectations: expected standard, predictive expectations, and desired expectation. 'Expected standard' refers to a plausible level of performance (Miller 1977); 'predictive expectations' describe the anticipated performance level (Swan and Trawick 1980); and 'desired expectations' refer to the performance level that the customer wishes to receive (Swan and Trawick 1980). While the sources of expectations remain largely unexplored, studies indicate that these expectation types can be formed through various means. Examples include comparison of similar products, prior beliefs related to a product or service from advertisements or word of mouth, personal desires for the effect of the product or service in the consumer's life, and cultural aspects (Assouad and Overby 2016; Nicolae et al. 2013).

In their fundamental contribution, Zeithaml et al. (1993) provide a conceptual model of the nature and determinants of service expectations. They identify three levels of customer expectations: desired service, adequate service, and predicted service. The 'desired' and 'predicted' services in this model are in line with the desired and predictive expectations identified by Swan and Trawick (1980). 'Adequate service' describes the service level that customers are "willing to accept" (Zeithaml et al. 1993: 6). Moreover, the model shows that a number of key antecedents affect each expectation level: desired service is affected by personal needs and enduring service intensifiers; adequate service is affected by transitory service intensifiers, perceived service alternatives, self-perceived service role, and situational factors; and, lastly, predicted service is influenced by explicit service promises, implicit service promises, word of mouth, and past experience (Zeithaml et al. 1993).

2.4.4. The postpurchase stage: defining customer experience

Customer experience is a multidimensional construct that is deeply rooted in marketing. The concept of customer experience attempts to integrate multiple concepts from the marketing literature at the same time as it seeks to disregard a few archaic longstanding marketing concepts (Lemon and Verhoef 2016). The roots of customer experience can be traced back to the 1960s, when initial theories on marketing and consumer behavior emerged. With the evolution of the marketing field, multiple research areas have contributed to the formation of customer experience research. Schmitt (1999) identifies five types of experiences: sensory, affective, cognitive, physical, and social–identity experiences. Similarly, Verhoef et al. (2009) state that customer experience is a holistic construct that involves the customer's cognitive, affective, emotional, social, and physical responses to the retailer. Interactions between the customer and the firm, referred to as "touchpoints", are an integral part of the customer experience throughout the customer's journey (Stein and Ramaseshan 2016). Lemon and Verhoef (2016: 71) recognize the importance of touchpoints by defining customer experience as a "customer's cognitive, emotional, behavioral, sensorial, and social responses to a firm's offerings during the customer's entire purchase journey."

Customer experience is distinct from other constructs in marketing. Historically, scholarly research has focused on related, more focused constructs. It is helpful to understand how customer experience is related to other customer-focused constructs in marketing. While there are numerous constructs in marketing literature that have contributed to customer experience research, two important constructs are highlighted here: customer satisfaction and service quality. Customer satisfaction is a well-established construct that has become a standard practice for firms to measure customer reactions to their offerings. 'Customer satisfaction' can be described as the resulting disconfirmation from comparing delivered performance with customer expectations (Oliver 1980). Thus, customer satisfaction could be one of the components of customer experience that focuses on the cognitive evaluation of the experience (Lemon and Verhoef 2016). As such, customer satisfaction provides an important building block for the overall understanding and measurement of the customer experience construct. 'Service quality' provides insights into the context in which experiences arise (Parasuraman et al. 1988). Lemon and Verhoef (2016) argue that service quality is an initial attempt to map the customer journey. Thus, service quality can be considered an antecedent of customer experience (Mittal et al. 1999).

2.4.5. Consumer research in last-mile delivery

Despite the rich body of consumer research in retail, consumer-centric research in last-mile delivery remains scarce. The notion that the customer experience is created along a series of touchpoints highlights the importance of last-mile delivery in the overall retail experience. In the retail customer journey, last-mile delivery is situated in the post-purchase stage, but it can also affect the prepurchase and purchase stage of repurchases. Consumers tend to evaluate service encounters holistically, without differentiating among individual actors in the service delivery network (Tax et al. 2013). In e-retail, at-checkout satisfaction can vary from after-delivery satisfaction, which indicates that delivery has an impact on overall customer satisfaction (Jiang and Rosenbloom 2005). More recently, Vakulenko et al. (2019a) provide evidence that last-mile delivery mediates the relationship between online experience and customer satisfaction. Further, last-mile delivery can also affect repurchase intention. Jain et al. (2021) find that customer satisfaction mediates the relationship between electronic logistics service quality and repurchase intention. Numerous studies have identified factors such as timeliness, reliability, provision of delivery information, and order tracking as antecedents of customer satisfaction and customer loyalty in e-retailing (Page-Thomas et al. 2006; Rao et al. 2011; Sharma et al. 1995; Mentzer et al. 1989). Despite these contributions, insights into the consumer perspective on last-mile delivery remain both limited and fragmented.

Consumer research on unattended home delivery is very scarce. Two studies have conducted more focused investigations of customer perceptions of unattended delivery services. Xu et al. (2008) surveyed 125 consumers and 15 e-retailers to examine their perception of unattended delivery services. The findings reveal that delivery options offered by retailers were not aligned with consumer preferences. Goethals et al. (2012) conducted a survey of 245 French consumers to investigate their perception of unattended delivery services. The findings reveal that some consumer groups were interested in adopting the service, although they were reluctant to pay for the service. Despite these contributions, little is known about customer experience in unattended delivery services.

2.5. Circular business models

The notion that technology-based firms created value at an unprecedented speed and scale sparked great interest in the business model concept around the millennium shift (Amit and Zott 2001). More recently, the broader dissemination of the circular economy gave rise to circular business models as a way of maintaining competitive advantage while improving resource efficiency (Nußholz 2017). This section defines the business model concept and introduces circular business model innovation.

2.5.1. Circular economy principles

The circular economy concept describes patterns of production and consumption that involve sharing, leasing, reusing, repairing, refurbishing, and recycling to extend the lifecycle of products (European Parliament 2023). Figure 2.3. illustrates the difference between the circular economy and the linear economy. The circular economy is a systems solution framework intended to address pressing global challenges including climate change, biodiversity loss, escalating use of finite resources, and growing volumes of waste. Three design-based principles guide the circular economy: eliminate waste and pollution, circulating products and materials at their highest value, and regeneration of nature (Ellen MacArthur Foundation n.d.-b). Thereby, a circular economy decouples economic activity from finite resource use. Moving away from the predominant take–make–dispose system requires transformational change of every part of the economic system. The European Parliament (2023) argues that such transformational change could contribute to protecting the environment, reducing dependence on raw materials, and job creation.

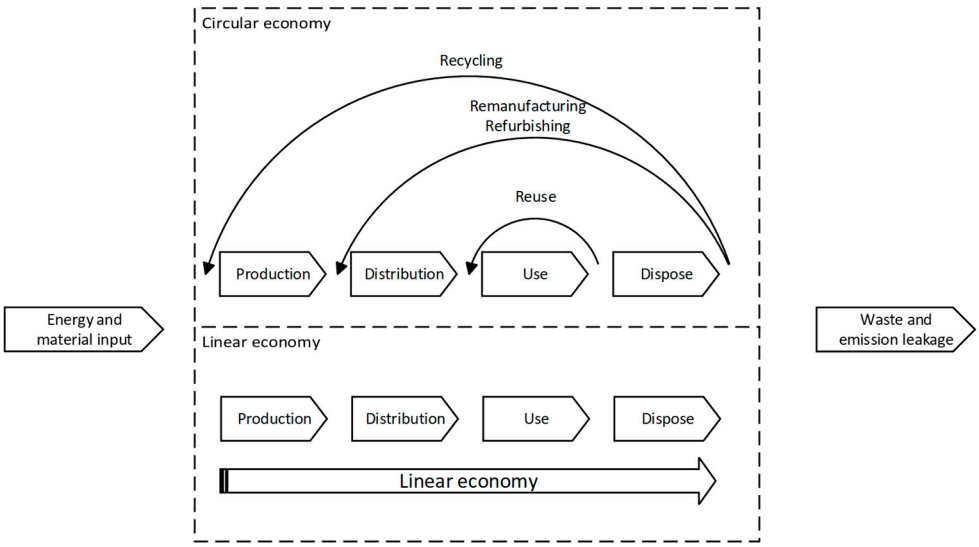


Figure 2.3. The circular economy and the linear economy, adapted from Geissdoerfer et al. (2020).

2.5.2. Defining circular business models

For decades the term "business model" has been frequently misunderstood, which lead to a lack of consensus as to its meaning (DaSilva and Trkman 2014). However, a common denominator among available definitions is that the business model outlines the logic of how firms create, deliver, and capture value (Teece 2018;

Osterwalder and Pigneur 2010). Customer value, which is central to business models, is defined as a customer's assessment of product attributes and performance and their consequences in relation to the customer's goals and purposes (Woodruff 1997). At its core, the business model delineates the configuration of interdependent structures, activities, and processes for value creation and competitive advantage (Sorescu et al. 2011). Rather than solely focusing on a revenue model, cost structure, or set of resources, the 'business model' describes how these individual pieces create and appropriate value together (Magretta 2002). Importantly, the multilayered interdependencies among the individual parts of the business model as a whole is not equal to the sum of these parts (Sorescu et al. 2011).

The circular business model concept emerged parallel to the broader dissemination of the circular economy. A multitude of understandings and definitions of circular business models have been identified in the literature. In essence, circular business models leverage circular economy principles of slowing, closing, and narrowing loops to create, capture, and deliver value (Bocken et al. 2016; Nußholz 2017; Geissdoerfer et al. 2020). Linder and Williander (2017) argue that circular business models require a return flow from users to producers, either directly or through intermediaries, which implies an overlap with closed-loop supply chains. Sustainability is often considered to be inherent to circular business models (Zucchella and Previtali 2019). Examples of circular business models include providing products as services, rental models, and extending the lifecycle of products (Tukker 2004).

2.5.3. Circular business model innovation

Circular business model innovation is an ambiguous term that can be understood as both a process and an outcome (Kahn 2018). Innovating the business model can either refer to designing an entirely new business model or reconfiguring an established business model (Zott et al. 2011; Massa and Tucci 2014). Business models can be reconfigured in response to opportunities and challenges in the business environment or as a mean of differentiation to achieve competitive advantage (Santa-Maria et al. 2021). The innovation process is iterative in nature and contains several stages, including initiation, ideation, integration, and implementation (Frankenberger et al. 2013).

The literature offers two complementary roles for the business model in promoting innovation. The first view suggests that innovative technology has no economic value on its own; rather, the business model is used to create economic value from such innovation (Chesbrough and Rosenbloom 2002). The second view suggests that the business model presents a novel source of innovation and competitive advantage in and of itself (Zott and Amit 2007; Casadesus-Masanell and Zhu 2013). In fact, innovative business models can change the predominant logic of value creation and disrupt an entire industry (Magretta 2002).

Circular business model innovation is complex and multifaceted, and driven by multiple factors. The extant literature clearly shows that technological innovation and digitalization has sparked a great deal of business model innovation, allowing firms to provide new ways of value creation on the market (Neligan et al. 2022). While environmental sustainability has traditionally been considered a cost driver, there is mounting evidence suggesting that sustainability represents an innovation driver (Metz et al. 2016). Further, market-driven business model innovation puts the customer at the center of value creation in order to achieve long-term customer satisfaction (Geissdoerfer et al. 2023). Moreover, economic interests, including sustained business growth, cost reduction, and tapping into new revenue streams act as innovation drivers (Tura et al. 2019). Finally, policy and regulation drive innovation by either putting pressure on or creating incentives for circular business model innovation (Huijben et al. 2016).

3.Research methodology

This section presents the research methodology of this doctoral thesis. It begins by presenting the research approach and assumptions, followed by a presentation of the research design, after which the research process is laid out. The section concludes with reflections on scholarly independence and research quality.

3.1. Research approach and assumptions

As is the case with any human, researchers have implicit or explicit assumptions about the world which will have an impact on how the researcher carries out research. Therefore, it is both relevant and important to discuss the assumptions made in this research. The following subsections lay out the assumptions concerning philosophy of science, the systems approach used in this research, and the scientific reasoning.

3.1.1. Philosophy of science

Laying out ontological and epistemological assumptions helps to comprehend the methodological choices made in this research. While ontology refers to the nature of 'reality', epistemology refers to the nature of 'knowledge'. The underlying assumptions regarding the nature of reality and the nature of knowledge tend to differ significantly between qualitative and quantitative research. While previous research suggests typical pairings of underlying assumptions and research approaches, these are not deterministic (Bryman and Bell 2015). I consider myself to be a critical realist, meaning that I assume the existence of an objective world which researchers can never fully grasp (Bhaskar 2010). Knowledge is assumed to be a subjective and constantly changing social construction. Thus, critical realism offers an alternative to the sterile standoff between the positivist and constructivist tradition (Mingers 2015). Bhaskar (2010) distinguishes three domains of reality: the real, the actual, and the empirical. Critical realists assume the existence of generative mechanisms that create certain events. The key task for critical realists is to link these generative mechanisms and the actual event through analysis.

3.1.2. Systems approach

This research is based on a systems approach that considers logistics system to be a set of interrelated components (Arbnor and Bjerke 1997). The systems approach is inherent to the logistics discipline (Lambert et al. 1998), which makes its use in this dissertation neither surprising nor controversial. It is important to distinguish between closed and open systems. In contrast to a closed system, an open system interacts with and has a relationship with its surrounding environment. The last-mile logistics system is considered an open system that interacts with its environment. Studying last-mile delivery in the last-mile logistics system (see Figure 1.1) requires the surrounding environment to be considered, since it is constantly present and influences the last-mile logistics system. Another important distinction concerns the 'hard' and 'soft' traditions of the systems approach. Hard systems thinking assumes that the world contains systems which can be engineered, as opposed to soft systems thinking assuming that the world is problematic and can be explored through a systems approach (Checkland 1985). This research adopts soft systems thinking, where the assumed reality is described subjectively in an attempt by the researcher to distinguish the whole system.

Critical realism has been described as intrinsically systemic and transdisciplinary (Mingers 2015). It also offers a middle ground between positivism and constructivism to overcome typical disciplinary silos. Combining critical realism and a systems approach allows this research to tackle complex real-world problems while avoiding the issues other paradigms face when dealing with such problems. In line with soft systems thinking, critical realism assumes the existence of a real world while it recognizes that researchers' access to that world is inevitably limited. Thus, the combination of critical realism and a systems approach is considered suitable to address the research questions and purpose of this dissertation.

3.1.3. Scientific reasoning

Last-mile delivery has garnered increased scholarly attention in recent years fueled by the ubiquitous transformation of retail. Technological development and digitalization have given rise to innovative delivery services. Continuously-changing industrial and social environments require these emerging services to adjust rapidly to changing market conditions. Despite contributions from multiple academic disciplines, the research area of last-mile delivery was relatively incoherent and fragmented when this research was initiated in September 2018. Accordingly, this research began with a systematic review of literature, which revealed the scarcity and fragmentation of consumer insights in last-mile delivery. In response, this research was designed as an exploratory investigation, drawing upon established theories from other fields to provide a robust theoretical foundation.

An inductive qualitative exploration was conducted in this research. The literature review conducted at the beginning of the doctoral research showed a need for more consumer-centric research in last-mile delivery. In line with the exploratory nature of the research question, inductive reasoning was adopted to explore the consumer perspective on unattended grocery delivery services. Qualitative research is suitable to explore emerging phenomena in their natural settings (Miles et al. 2018). The strength of this research strategy is that it is rich and holistic, which builds the basis for formulating propositions. Following the qualitative research strategy, this research is based on qualitative data, qualitative data analysis methods, and qualitative presentation of the results. Qualitative research is highly contextual. Describing the contextual intersecting relationships between the research and participants, referred to as 'reflexivity', can increase the credibility of the findings (Berger 2015).

3.2. Research design

The study's purpose and research questions called for a multimethod design. Multimethod research tends to generate rich data and provide a broad understanding of the phenomenon under investigation (McKendrick 1999). Combining multiple qualitative methods can help reduce bias to enhance the trustworthiness of the research. The prevalence of single-method quantitative investigations in logistics and supply chain management called for a reinforcement of qualitative research (Golicic and Davis 2012; Spens and Kovács 2006; Näslund 2002). Multimethod research was particularly suitable, given the exploratory character of this research, provided nuanced insights, and allowed for the formulation of research propositions. Combining multiple methods allowed for the examination of last-mile delivery services from multiple angles, which provided a rich understanding. The research builds on four qualitative studies: a systematic literature review in study 1, a qualitative case study in study 2, an engaged scholarship field study in study 3, and collaborative research inspired by design-sciences in study 4. Table 3.1 provides an overview of the appended papers and their characteristics.

The four papers contribute in different ways to addressing the research objectives (Table 3.2). Paper I conducted a systematic review of the extant literature to consolidate the knowledge in last-mile logistics and provide an integrated view of the literature. Paper II explored the forms and determinants of customer expectations in last-mile delivery through an empirical investigation of unattended home delivery. Paper III explored customer experience dimensions in last-mile delivery through an engaged scholarship field study of unattended home delivery. Paper IV explored the drivers of circular business model innovation and how this process can be accelerated to provide foresight on the role of consumer-centric last-mile delivery services in the circular economy.

Table 3.1. Overview of appended papers for justification of the research design.

	Paper I	**Paper II**	**Paper III**	**Paper IV**
Purpose	Consolidate knowledge in the research area of last-mile logistics to provide an integrated view of the literature published on different aspects and facets of last-mile logistics.	Contribute to the body of knowledge for unattended grocery delivery services by empirically identifying and describing the forms and determinants of customer expectations.	Provide empirically-based understanding of customer experience dimensions in unattended home delivery.	Explore the drivers of circular business model innovation and how to accelerate this process in fashion retail.
Phenomenon	n/a	Last-mile delivery services	Last-mile delivery services	Logistics services
Context	Business logistics	e-Grocery retail	e-grocery retail	Fashion retail
Unit of analysis	Last-mile logistics research	Customer expectations of unattended home delivery services	Customer experience of unattended home delivery services	Logistics services in circular business model innovation.
Research design	Systematic literature review	Multiple case study	Engaged scholarship field study	Collaborative research
Data sources	Literature	Semi-structured interviews, direct observations	Semi-structured interviews	Semi-structured interviews, field visits and observations, workshops
Data analysis	Qualitative content analysis	Open coding and axial coding	Open coding and axial coding	Open coding and axial coding

Table 3.2. Connection between appended papers, research questions, and research objectives.

Research question	**Paper 1**	**Paper 2**	**Paper 3**	**Paper 4**
RQ1. What do consumers expect from last-mile delivery services?		✓		
RQ2. How do consumers experience last-mile delivery services?			✓	
RQ3. What is the role of consumer-centric logistics services in the circular economy?				✓
Research objective				
To consolidate the knowledge in last-mile logistics and provide an integrated view of the literature.	✓			
To map the forms and determinants of customer expectations of last-mile delivery services.		✓		
To identify and describe the customer experience dimensions of last-mile delivery services.			✓	
To provide foresight on the role of logistics services in the circular economy.				✓

3.2.1. Study A: Systematic literature review

This systematic literature review of last-mile logistics research was conducted in 2019, following the six-step guidelines proposed by Durach et al. (2017). Before starting the systematic literature review, a scoping study was conducted to narrow down the research questions, find suitable keywords, and define appropriate inclusion and exclusion criteria. Three databases—namely Scopus, EBSCOhost, and the Web of Science—were searched, which resulted in a final synthesis sample of 155 scientific journal publications that met the inclusion criteria. A descriptive analysis was conducted to provide an overview of the literature landscape, followed by a qualitative content analysis to identify themes in the literature. The synthesis resulted in a framework of last-mile logistics research.

3.2.2. Study B: Multiple case study

This multiple case study explores customer expectations of potential early adopters in unattended delivery services. The case study methodology was selected because it is suitable for exploring a contemporary phenomenon in its real-life context (Yin 2018). A purposive sampling strategy was used to select 10 cases of potential early adopters based on socioeconomic household characteristics. Empirical data were collected from semi-structured interviews and direct observations. In total, 10 semi-structured interviews were conducted with 1–2 participants per case. Additionally, direct observations were conducted to gain a more holistic understanding of the individual cases and their immediate household environment. Case study protocols guided the research and a case study database was created (Yin 2018). To analyze the data, one investigator used a priori coding, and another investigator used a two-stage coding procedure of open coding and axial coding inspired by grounded theory (Corbin and Strauss 2008). The identified themes and codes from both coding strategies were merged and synthesized. Propositions were formulated based on patterns found during data analysis.

3.2.3. Study C: Engaged scholarship field study

This field study uses an engaged scholarship approach to shed light on customer experience in last-mile delivery. In a collaborative setting with logistics service providers, retailers, users, and sponsors, researchers were engaged in the innovation process of an unattended home delivery service. This delivery service was actively used by nine carefully-selected households for a period of six to nine months. These households were selected based on the socioeconomic characteristics of early adopters. Empirical data were collected through in-depth interviews, which are suitable for examining otherwise-inaccessible complex phenomena (Tracy 2013). The collected data were analyzed using a priori coding (Miles et al. 2018), as well

as open coding and axial coding (Corbin and Strauss 2014). Three investigators compared and matched the outcomes from the two coding procedures as a team to ensure trustworthiness. A series of six propositions on customer experience dimensions was then put forward, grounded in previous research and the empirical findings.

3.2.4. Study D: Collaborative research

Inspired by design-science and supported by existing business model literature, researchers engaged with key stakeholders in the innovation process of developing and validating a circular business model. The model draws on a digital platform and focuses specifically on clothing reuse. Empirical data were collected from multiple sources, including in-depth interviews, site visits and observations, focus groups, and workshops. Data analysis was conducted using a two-step coding procedure of open coding and axial coding (Corbin and Strauss, 2008). Key patterns of circular business model innovation emerged from participating in the process of developing and validating the model. Thirteen business model-oriented propositions were then put forward, grounded in previous research and the empirical findings, and provided glimpses into future trends and foresight into how fashion retail can prepare for continuous and dynamic change.

3.3. Research process

The multifaceted and complex challenges in the retail industry, paired with the gaps identified in the literature, shaped the research questions and research objectives. A qualitative inductive approach was employed in line with the exploratory purpose of the research. Four studies, resulting in four papers, were conducted over a period of five years during which I worked 80% of my full-time work on the doctoral thesis and 20% of my full-time work on departmental duties, primarily teaching. The research design emerged through an iterative process in which data collection and analysis methods evolved over time. While conducting these studies, knowledge was continuously created, and the research objectives were gradually addressed. An overview of the research process is presented in Figure 3.1, showing the timeline of these four studies and the four papers they resulted.

At the beginning of this doctoral research in 2018, the literature in last-mile logistics was relatively incoherent. Thus, study A conducted a systematic review of last-mile logistics literature and revealed a lack of consumer insights in the research area. To shed light on the consumer perspective, study B investigated customer expectations of unattended home delivery services. Subsequently, the researchers engaged with key stakeholders in the innovation process of developing, prototyping, testing, and

implementing an unattended home delivery solution using a reception box. By spring 2021, nine carefully-selected households had actively used this service for a period of six to nine months, which provided an opportunity to study their experiences. Finally, my co-author and I had the chance to engage in the innovation process of developing and validating a circular business model. Participating in this process provided an important opportunity to study the role of logistics services in the circular economy, which led to study D.

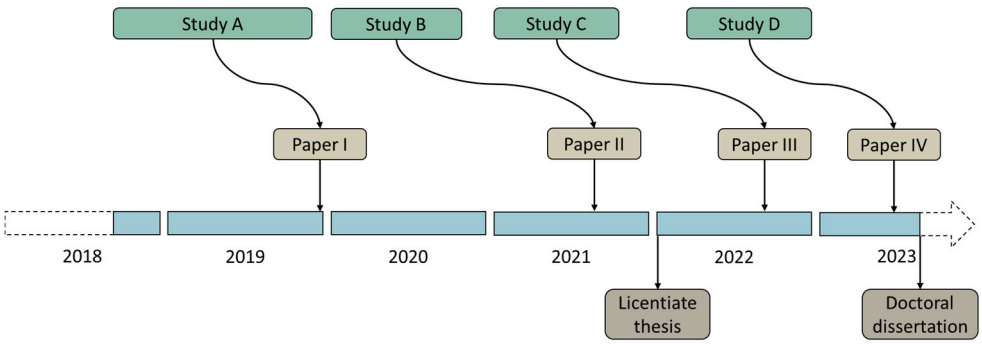


Figure 3.1. Research process

3.4. Scholarly independence

Scholarly independence refers to the autonomy of scholars to identify the need for further knowledge, formulate advanced research issues, solve problems, plan, carry out and evaluate research projects within a set time frame using appropriate methods. While this compilation thesis builds on the research I have performed together with my co-authors, I have independently compiled and synthesized this work to contribute to the formation of knowledge. The four studies included in this dissertation were conducted in close collaboration with other researchers. As the main author of Papers I–III and the second author of Paper IV, I have made a significant intellectual contribution to each of these four appended papers. A detailed contribution statement for each paper can be found in the list of appended papers in the beginning of this dissertation. Through this research I have demonstrated the ability to work independently; to formulate research issues with scholarly precision; and to plan, carry out, and evaluate research projects within a given time frame. Scholarly independence can be demonstrated in many ways and is not limited to publishing single-authored research articles. Rather, I have demonstrated scholarly independence within the research projects that I conducted together with my co-authors, as described in the contribution statements. Gardner (2008) argues that working in collaborative projects with peers contributes to

preparing doctoral students for independent work. While I argue that I have demonstrated scholarly independence, I also acknowledge that I could not have done this research and I could not have gained the knowledge I did had I tried to do it all alone. Senior scholars and fellow doctoral students have supported my process in becoming an independent researcher.

3.5. Research quality

Research quality was constantly considered and critically evaluated at various stages of the research process. In line with the critical realist tradition, this dissertation discusses four overlapping actions to achieve trustworthiness: credibility, transferability, dependability, and confirmability (Lincoln and Guba 1985). These four actions have parallels and some overlap with the traditional, more positivistic research quality criteria—i.e., validity and reliability (Yin 2018). In this dissertation, these two sets of research quality criteria are considered complementary rather than in inherent conflict, and they have been combined successfully to assess the research quality of qualitative studies (e.g., Mollenkopf et al. 2011). In Papers II–IV, the research quality was assessed using the latter more positivistic criteria, given that these studies aimed to explore a phenomenon in its real-life context, similar to a case study. The actions to achieve trustworthiness in this dissertation complement positivistic research quality criteria and should not be considered conflicting. Table 3.3 provides an overview of and summarizes the multiple actions taken to ensure validity, reliability and trustworthiness. As in any research, the studies included in this doctoral dissertation have limitations, despite the steps taken to ensure research quality and rigor.

3.5.1. Credibility

Credibility refers to the degree of match between constructed realities of respondents to those represented by the researcher (Halldórsson and Aastrup 2003) and overlaps with internal validity (Yin 2018). Several well-established measures have been employed in the empirical studies (B, C, and D) to increase the credibility of the research. Context-rich descriptions were generated based on the collected data, and multiple investigators independently analyzed the data and critically reviewed the coding results. Furthermore, the observed empirical patterns were compared to predicted patterns and relevant theory. In study B, systemic combinations of theory and empirical data were used to develop a logic model, while study C and D clearly linked empirical data to prior and emerging theory. The empirical studies carefully developed propositions and actively considered rival explanations. Furthermore, all respondents were offered the chance to approve of the researcher's representation of their interviews. Assessing the trustworthiness of

this research also reveals some weaknesses, despite the measures taken to ensure credibility. Study B relies heavily on interview data, although it was designed as a multiple case study which typically rely on multiple data sources. Tapping into additional data sources such as documentation, archival records, participant observation, or physical artifacts would have strengthened the credibility of the findings.

Table 3.3. Summary of research quality in this research.

Quality criteria	Research design	Data collection	Data analysis
Credibility Degree of match between constructed realities of respondents to those represented by the researcher	Detailed documentation of the research process.	Generated context-rich descriptions; triangulation of multiple sources of evidence; interview transcripts were checked against recordings.	Multiple investigators independently analyzed the data and critically examined the coding results; compared predicted patterns with observed empirical patterns; systemic combining of theory and empirical data; carefully developed propositions; actively examined rival explanations; held collaborative workshops and joint experience exchange seminars to collect feedback from practitioners.
Transferability Extent to which the study of one context is able to make general claims to other contexts	Research design is based on literal and theoretical replication.	Clearly documented the selection of collaborating organizations; clearly defined criteria for selecting participants; rich empirical data facilitates analytical generalization.	Rooted findings in relevant theory and literature; cross-case analysis of multiple cases.
Dependability Extent to which the findings are stable over time	Detailed documentation of the research process.	Clearly defined inclusion- and exclusion criteria to retrieve literature sample; a case study database was created and systematically organized; standardized interview protocols were used for the in-depth interviews; recorded interviews and transcribed them verbatim.	Used well-defined analytical constructs grounded in extant literature; conducted intercoder agreement checks.
Confirmability Extent to which the findings represent the results of the inquiry and not the researcher's biases	Explicit and detailed descriptions of the methods and procedures.	Conducted interviews using a semi-structured interview guide; interviews were transcribed verbatim and checked against recordings.	Clarification of the data analysis procedure; held collaborative workshops and joint experience exchange seminars to collect feedback from practitioners.

Table 3.3. (Continued)

Quality criteria	Research design	Data collection	Data analysis
Construct validity Accuracy with which the study measures the intended constructs		Triangulation of multiple sources of evidence: interviews and observations; interview transcripts were checked against recordings.	Clarification of the data analysis procedure; checked transcripts against recordings; held collaborative workshops and joint experience exchange seminars to collect feedback from practitioners
Internal validity Extent to which the study establishes a trustworthy causal relationship			Multiple investigators independently analyzed the data and critically examined the coding results; compared predicted patterns with observed empirical patterns; systemic combining of theory and empirical data; carefully developed propositions; actively examined rival explanations.
External validity Extent to which the study findings can be applied to the populations of interest and a domain can be established in which findings can be analytically generalized.	Research design is based on literal and theoretical replication.	Clearly documented the selection of collaborating organizations; clearly defined criteria for selecting participants; rich empirical data facilitates analytical generalization.	Rooted findings in relevant theory and literature; cross-case analysis of multiple cases.
Reliability Consistency and repeatability of study findings.		Clearly defined inclusion and exclusion criteria to retrieve literature sample; a case study database was created and systematically organized; standardized interview protocols were used for the in-depth interviews; recorded interviews and transcribed them verbatim; detailed documentation of the research process.	Used well-defined analytical constructs grounded in extant literature; conducted intercoder agreement checks.

3.5.1. Transferability

'Transferability' refers to the extent to which the study of one context is able to make general claims to other contexts and overlaps with external validity (Halldórsson and Aastrup 2003). Overall, the research design of the studies is based on analytical generalization, which, in contrast to statistical generalization, does not attempt to infer from the data to a wider population. Rather, analytical generalization compares findings from empirical data to a theory. The empirical studies (B, C, D) carefully documented the selection of collaborating organizations and used well-

defined criteria based on the literature to select participants. Moreover, the richness of the empirical data, including descriptions of contextual factors, facilitated analytical generalization. The empirical findings were rooted in relevant theory and literature. Study B conducted a cross-case analysis of multiple cases to enhance external validity. Studies B and C have investigated early adopters of unattended home delivery services. While early adopters constitute an interesting and relevant group, a more diverse theoretical sampling could have strengthened the transferability of this research.

3.5.1. Dependability

Dependability refers to the extent to which the findings are stable over time and overlaps with reliability (Halldórsson and Aastrup 2003). Study A followed a well-established systematic literature review methodology, which was carefully documented, thereby enabling it to be repeated at any time. Clearly defined inclusion criteria were used to retrieve the literature sample. The research process of the empirical studies (B, C, D) was carefully documented, and for study B a case study database was created and systematically organized. Standardized interview protocols were used for the in-depth interviews conducted in studies B, C, and D. Various interviews were recorded and transcribed verbatim. Well-define analytical constructs grounded extant literature were employed for the analysis of the empirical studies (B, C, D). Moreover, inter-coder agreement checks were conducted in all four studies.

3.5.2. Confirmability

'Confirmability' refers to the extent to which the findings represent the results of the inquiry and not the researcher's biases, and has parallels with objectivity (Halldórsson and Aastrup 2003). While critical realism assumes that the research process can never be fully separated from the researcher, the aim of confirmability is to minimize researcher biases. The methods and procedures used in this research were described explicitly and in detail to provide a complete picture of how the results were derived. Semi-structured interviews were conducted using an interview guide, and interviews were recorded and transcribed verbatim. Transcripts were checked against the recordings and respondents were offered the chance to approve of the transcripts. Collaborative workshops and joint experience exchange seminars were held to collect feedback from participants.

4.Results

The results of this dissertation stem from the four appended papers. This chapter starts with a synthesis of the four papers, followed by a summary of each of the appended papers individually. Collectively, the four paper contribute to the overall purpose of this thesis.

4.1. Paper I – Framework of last-mile logistics research

Academic interest in last-mile logistics has increased significantly in recent years. Multiple disciplines contribute to the growing body of literature in last-mile logistics, which has resulted in a relatively incoherent literature landscape. Therefore, the purpose of this study was to consolidate the knowledge in the research area and provide an integrated view of the various aspects and facets of last-mile logistics research. A systematic review was conducted to describe the literature landscape and provide a framework of last-mile logistics research.

The systematic review found that the literature landscape encompasses a wide range of themes, which emphasizes the complexity of the research area. The literature was classified according to the themes addressed in the studies to provide a structured overview of the thematic landscape. The following themes were identified: (1) emerging trends and technologies, (2) operational optimization, (3) supply chain structures, (4) performance measurement, and (5) policy (see Table 4.1). The diversity of themes indicates that last-mile logistics research goes beyond the scope of a single discipline.

The systematic review shows that last-mile logistics literature is both fragmented and diversified. The number of publications increased almost exponentially, with three out of four contributions published within the past five years (i.e., between 2015–2019). In total, 84 unique scientific journals published the selected 155 articles, with none of the journals leading the research area with respect to the number of publications. The review finds a diversity of methodological approaches in last-mile logistics research. While this methodological diversity indicates a broad examination of the research area, the imbalance between methodologies suggests a limited perspective on the phenomenon under investigation. In line with a general

lack of theory in logistics and supply chain management research, this review found that most publications in last-mile logistics lack a theoretical lens. At the same time, a diversity of theories was found among articles that employed a theoretical lens.

Table 4.1. Themes addressed in last-mile logistics research (Olsson et al. 2019).

Themes	Count
Emerging trends and technologies	**51**
Goods reception solutions	22
Innovative vehicle solutions	15
Emerging business models	7
New perspectives on collaboration	7
Operational optimization	**45**
Routing	23
Transport planning	12
Scheduling	6
Facility location	4
Supply chain structures	**35**
Logistics and supply chain design	15
Urban freight terminals	9
Urban planning	5
Urban freight structures	3
Networks design	3
Performance measurement	**22**
Environmental performance	9
Customer focused performance	9
Economic performance	4
Policy	**2**
Total	**155**

A framework was proposed to address the various aspects and facets of last-mile logistics identified in the literature. The framework was developed using a systems approach, through which the diversity and complexity of the literature was captured. The core of the framework comprises three sequenced components: last-mile fulfillment, last-mile transport, and last-mile delivery. These three central components are operational within a short-term planning horizon and coalesce under last-mile distribution; which is tactical, with a mid-term planning horizon. Finally, last-mile logistics is strategic in character with a long-term planning horizon. The proposed framework consists of back-end and front-end systems. The back-end of the framework faces the sender, while the front-end faces the receiver. The framework is presented in Figure 4.2.

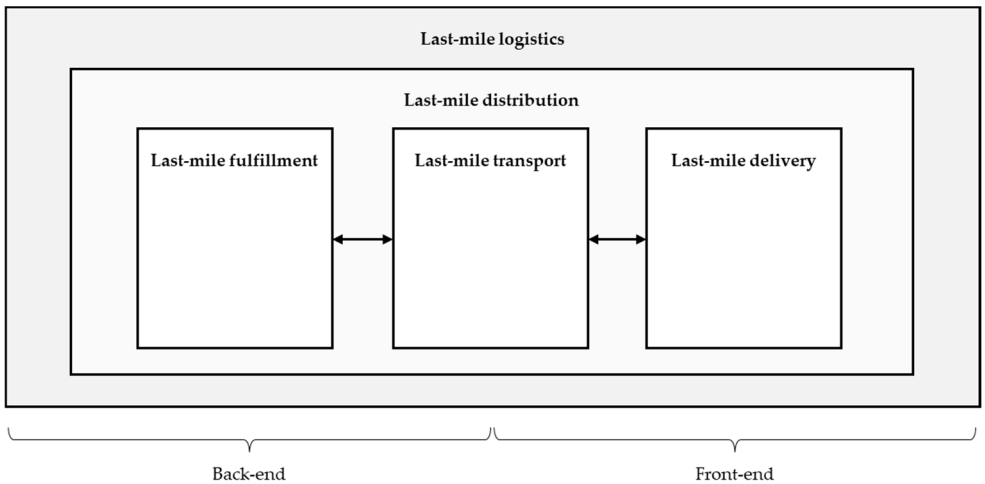


Figure 4.1. Overall framework of last-mile logistics research (Olsson et al. 2019).

4.2. Paper II – Customer expectations

The purpose of this paper is to map the forms and determinants of customer expectations of unattended grocery delivery services. The systematic literature review (Paper I) reveals a lack of consumer insights in last-mile delivery research. To address this gap, a multiple case study of early adopters was conducted to explore their expectations of unattended grocery delivery services. The study provides a conceptual model (Figure 4.3) that contributes understanding as to what consumers expect from unattended grocery delivery services and how these service expectations are formed. Three types of services expectations were identified: desired service, expected standard service, and predicted service. The results suggest that desired service centers on open access features from retailers and services providers, integrated product returns services, and nondescript hardware designs. Expected standard service revolves around saving time, gaining flexibility, and benefiting from services' ease of use. Predicted service deals with sufficient security of unattended delivery services. Furthermore, the case study evidence suggests that these service expectations are formed by three determinants: personal needs, technology literacy, and situational factors. The results indicate that personal needs revolve around stress reduction, limiting social interactions, and increasing spare time. Technology literacy refers to how fluently consumers use technology in relation to unattended home delivery, and situational factors center on an unexpected change to personal plans. A set of propositions was formulated based on the empirical evidence (for detailed argumentation, see appended Paper II).

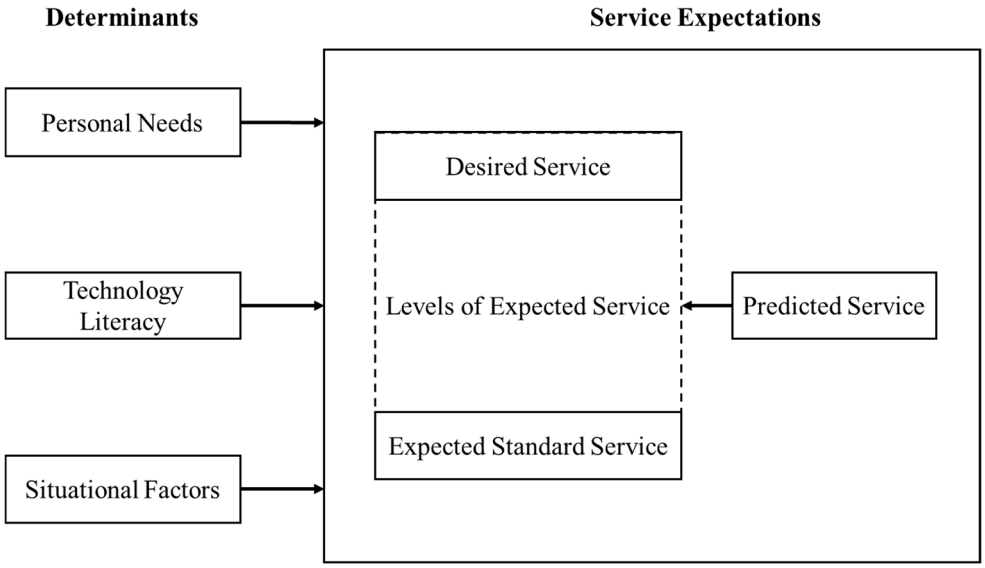


Figure 4.2. Conceptual model of the forms and determinants of unattended grocery delivery services (Olsson et al. 2022).

4.3. Paper III – Customer experience

In the pursuit of a creating a superior customer experience in retail, and fueled by the rapid retail transformation, last-mile delivery has become a critical touchpoint in the customer journey. Despite the growing body of literature in last-mile delivery, customer experience had not been investigated as a distinct construct. This study investigates customer experience in unattended home delivery with the purpose of providing an empirically-based understanding of customer experience dimensions. The results demonstrate that the total customer experience is multidimensional, comprising the consumers' cognitive, emotional, behavioral, sensorial, physical, and social responses to the service (Figure 4.4). Cognitive experience describes a mental evaluation of the functional aspects of unattended home delivery and centers on ease of use, time, security, and food safety. Emotional experience refers to the generation of moods, feelings, and emotions and revolves around a sense of freedom, contentment, and futurism. Behavioral experience refers to the consumers' behavioral response to unattended home delivery and include word of mouth and willingness to pay. The sensorial dimensions refer to experiences that corresponds to the consumers' senses and center on the reception box's visual design and size. Physical experience describes the consumers' physical response to unattended home delivery, and revolves around order collection and the mobile application. The social dimension describes the response to human interactions in unattended home

delivery. The role of these dimensions in the total delivery experience vary in frequency, weight, and magnitude (positive/negative). The analysis further suggested that the identified customer experience dimensions are interrelated. Rooted in previous research and empirical findings, a set of research propositions on the six customer experience dimensions was formulated (underlying reasoning and detailed argumentation are found in the appended paper).

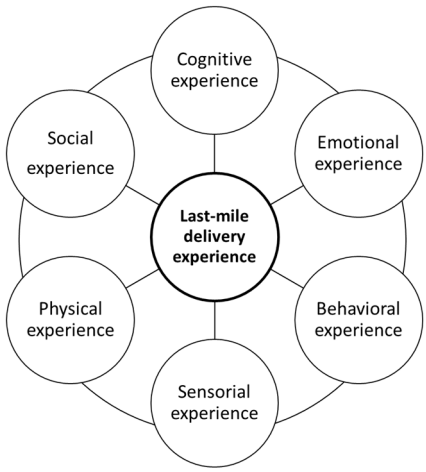


Figure 4.3. Conceptual model of dimensions and elements of unattended grocery delivery experience (Olsson et al. 2023).

The continuous development and growth of e-grocery retail puts pressure on delivery lead times. This research suggests delivery lead time affects consumers' retail channel choices and buying behavior, which in turn has an impact on the unattended delivery experience (see Figure 4.5). In the context of this study, available delivery lead times for groceries range between two to four days. The lack of fast delivery options induces a risk of channel switching and affects consumers' buying behavior. Available lead times prompted participants to place relatively large orders on a weekly or biweekly basis. At the same time, participants argue that shorter lead times would allow them to place smaller and more frequent orders. Furthermore, the empirical data indicate that participants could not take full advantage of the unattended delivery services because of the relatively long lead times. The results suggests that delivery lead time and consumer buying behavior ultimately affect customer experience.

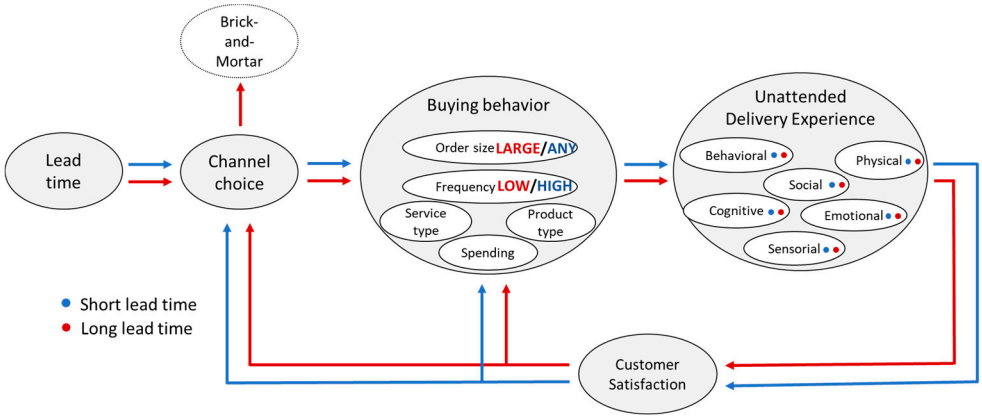


Figure 4.4. Last-mile delivery experience feedback loop (Olsson et al. 2023).

4.4. Paper IV – Logistics services in circular business model innovation

The circular economy offers a promising opportunity for new and better growth in fashion retail decoupled from resource use. However, research on business models for shifting fashion retail towards the circular economy is still in its infancy. The purpose of this paper is to explore the drivers of circular business model innovation and how to accelerate this process in fashion retail. The findings reveal key patterns of circular business model innovation that revolve around consumer centricity as an innovation driver, logistics services as an innovation catalyst, and how these affect business model transitions towards the circular economy (Figure 4.6). A set of research propositions that provide glimpses into future trends and foresights into the transition of retail toward circular economy was formulated that is grounded in previous research and the empirical findings (the underlying reasoning and detailed argumentation are found in the appended paper).

The results illustrate that consumer centricity drives circular business model innovation. The validated circular business model suggests that using the model enhances customer experience by creating a consumer donation experience from giving away clothing to charity. Furthermore, the research suggests that the circular business model creates additional consumer touchpoints, leading to an extended and more complex customer journey. Moreover, the circular business model elevates consumer engagement by providing international rewards that motivate consumers to contribute to the reuse of clothing. Finally, the research suggests that the circular business model strengthens the relationship between key actors; i.e., consumers, e-retailers, and charity NGOs.

This research suggests that logistics act as a catalyst for change that accelerates business models' shift towards the circular economy. This finding extends previous research that described logistics as an enabler for the slowing of resource flows to enhance circularity. Furthermore, the research illustrates that logistics represents a strategic resource in circular business models. Realizing the movement of clothes from user-to-user requires well-developed logistics capabilities of coordinating material and information flows. Additionally, the findings demonstrate that circular business models induce a need for increased logistics activities, which puts pressure on logistics systems. Specifically, first-mile pickup and last-mile delivery are critical to the success of the circular business model. The findings indicate that circular businesses models offer a substantial chance to integrate first-mile pickup and last-mile delivery. The research indicates that the increased need for logistics activities drives logistics cost. Thus, circular business models need to embrace a new way of thinking about logistics costs. Leveraging peer-to-peer models could be an important way to externalize such costs. Moreover, circular business models need to ensure that environmental gains from the reuse of clothing exceed the environmental impact from logistics.

Circular business model innovation contributes in several ways to the transformation of fashion retail towards circular economy. The research demonstrates that the business model facilitates the movement of clothing so that items can be used more, which expands the lifecycle of clothing. Moreover, the research shows that the circular business model establishes connected networks which bridge the circularity gap between actors in the fashion system. Finally, the results illustrate that the circular business model requires consumer engagement to successfully keep textiles in circulation.

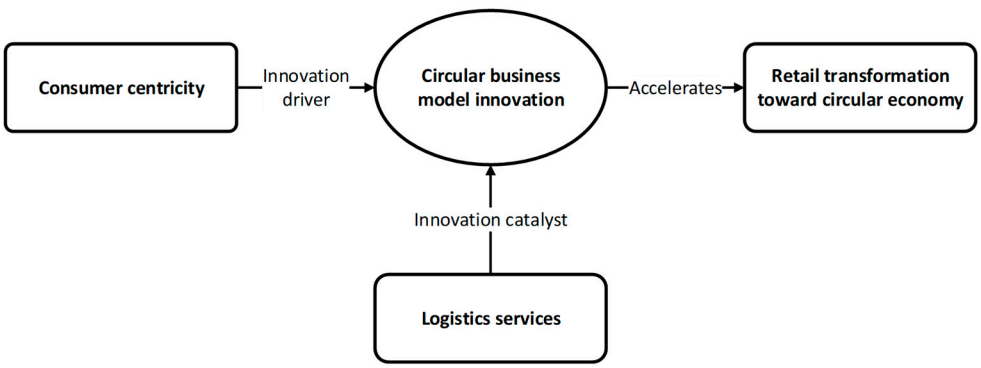


Figure 4.5. Business model innovation towards circular economy transformation in retail (Hellström and Olsson 2023).

4.5. Connecting the results from appended papers

Retailers struggle to address the multifaceted and complex challenges associated with last-mile delivery, including mitigating its negative environmental impacts. Reimagining last-mile delivery requires retailers to adopt a consumer-centric approach recognizing that consumers must be central to how delivery services are managed. Consumer centricity is not a call for abandonment of the traditional efficiency focus inherent to logistics, instead, it is an encouragement to not lose track of the consumer. Consumer centricity requires agility to be able to respond swiftly to the continuous and dynamic changes in consumer behavior, expectations, and experience. In response to those challenges, retailers are trying to innovate within the boundaries of existing infrastructure, re-organizing their supply chains, boosting omnichannel capabilities, and improving logistics challenges. Successfully moving toward consumer-centric last-mile delivery unfolds a significant opportunity to improve sustainability in retail.

Despite the growing recognition that consumer centricity is important, this research demonstrated through a systematic literature review (Paper I) that consumer research last-mile delivery is very scarce. The study finds that the extant literature covers a wide range of themes that revolve around emerging trends and technologies, operational optimization, supply chain structures, performance measurement, and policy. However, few publications have studied the consumer perspective on last-mile delivery, primarily investigating performance in terms of service quality and customer satisfaction. Despite these contributions, consumer insights into last-mile delivery remained limited and fragmented. The analysis further reveals that a diversity of theories from multiple fields has been used; however, most publications fail to employ an explicit theoretical lens. Thus, the use of marketing theories offers untapped potential for a comprehensive examination of the consumer perspective in last-mile delivery.

An interesting departure point for studying the consumer perspective in last-mile delivery can be found in the customer journey. Last-mile delivery has evolved into a critical touchpoint in the customer journey, creating interactions between the retailer and the consumer. These interactions have a significant effect on the relationship between the online shopping experience and the total customer satisfaction (Vakulenko et al. 2019a). The empirical studies in this dissertation contribute to an enhanced understanding of various stages of the customer journey in last-mile delivery. Paper II focuses on the pre-purchase stage and sheds light on customer expectations in last-mile delivery, while paper III focuses on the post-purchase stage, providing in-depth insights into customer experience dimensions.

Consumers' expectations in last-mile delivery serve as a standard against which the perceived performance is compared. Through a multiple case study of unattended home delivery (Paper II), this research identified three types of customer

expectations: desired service, expected standard service, and predicted service. While desired service describes the service the consumer aspires to and considers 'nice to have', expected standard service describes the minimum service that the consumer will accept. Predicted service refers to the service the consumer thinks they are likely to get. The study shows that these three types of service expectations assume various forms, and that the combination of these forms sets the expectations level. Moreover, the findings suggest that these service expectations are determined by personal needs, technology literacy, and situational factors. The identified personal needs center on stress reduction, limiting social interaction, and increasing spare time. Technology literacy refers to how fluently users adopt to new technology, while situational factors revolve around unexpected changes to personal plans.

The total customer experience in last-mile delivery is multidimensional and dynamic. An engaged scholarship field study (Paper III) of unattended home delivery identified six dimensions of customer experience: cognitive, emotional, behavioral, sensorial, physical, and social responses to the service. The role of these interrelated dimensions in the total delivery experience varies in frequency, weight, and magnitude (positive/negative). The study findings suggest that delivery lead time affects consumers' retail channel choices and buying behavior, which in turn has an impact on the unattended delivery experience. The lack of fast delivery options in the context of this study induced a risk of channel switching and affects consumers' buying behavior. The available lead times induced participants to order relatively high volumes with low frequency. At the same time, participants suggested that shorter lead times would encourage them to order lower volumes with higher frequency. The results suggest that delivery lead time and consumer buying behavior ultimately affected customer experience.

Customer expectations and customer experience are interrelated and affect each other in complex ways. The expectancy–disconfirmation theory suggests that customer satisfaction is influenced by the comparison of customer expectations to customer experience (Oliver 1981; Oliver 1980). According to this theory, satisfaction is determined by the degree to which expectations are exceeded, met, or not met. While this research has not investigated the concept of customer satisfaction, it corroborated earlier findings suggesting that customer expectations and customer experience affect each other. Study C indicated that participants reflected on their initial expectations when evaluating their actual experience of using the unattended delivery service. Considering that participants lacked previous experience of unattended home delivery at that time, their expectations were an important reference point against which the actual experience was compared. Likewise, the study suggested that actual customer experience affected participants' expectations concerning future use and purchase behavior. For example, participants experienced relatively long lead times, upon which they based their expectations regarding their future use of the unattended delivery service.

An in-depth understanding of the customer journey provides an important basis for consumer centricity, which requires firms to assess each consumer individually. The results from Papers II and III vividly illustrate how customer expectations and customer experience are directly affected by last-mile delivery. The results also shed light on the forms and determinants of customer expectations, as well as on customer experience dimensions in last-mile delivery. These initial insights into how last-mile delivery affects the customer journey provide a basis for consumer centricity. The results of this dissertation also indicate that logistics services and consumer centricity are interrelated. Figure 4.1 provides an overview of the relationship between logistics services, the customer journey, and consumer centricity.

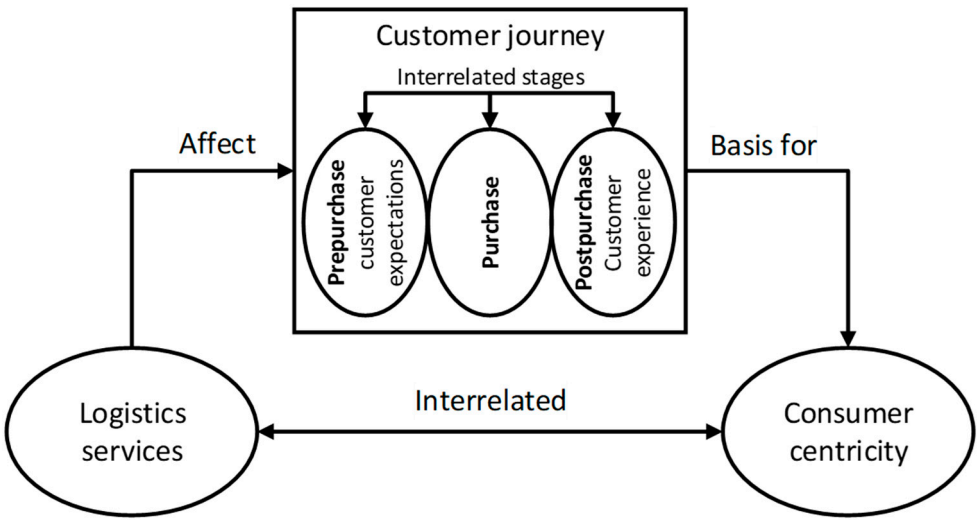


Figure 4.6. The logistics service-related customer journey: a basis for consumer centricity

Understanding the consumer perspective plays an important role in supporting the transformation of retail toward the circular economy and in enhancing sustainability in retail. This research demonstrated through a collaborative study of circular business model innovation in fashion retail (Paper IV) that consumer centricity represents a main innovation driver. The research further illustrates that the circular business model enhanced customer experience. For example, the business model at hand created a consumer donation experience, which is uniquely and phenomenologically determined by the individual consumer. Moreover, the results reveal that circular business models created additional consumer touchpoints, which resulted in an extended and more complex customer journey. Furthermore, the circular business model elevates consumer engagement by offering rewards for consumers who contribute to the reuse of clothing. Intentional rewards serve as a way of encouraging consumers to engage in circular business models and contribute to a circular economy.

The collaborative study (Paper IV) also sheds light on the role of logistics as an innovation catalyst in circular business model innovation. While previous research showed that logistics enhances circularity by enabling the slowing of resource flows (Gatenholm et al. 2021), this research demonstrates that logistics goes far beyond the movement of goods to accelerate circular business model innovation. The research vividly illustrates that logistics constitutes a strategic resource in circular business models, as it has an inherent connection to central parts of the economic system that need to be transformed; such as production, distribution, and redistribution. The study further demonstrates that the circular business model increases the need for logistics activities, as the model aims to increase the number of users per product, which puts pressure on logistics systems. The growing need for logistics activities, such as handling and transporting clothing, may induce considerable costs, requiring circular business models to embrace a new way of thinking about logistics cost. Likewise, circular business models need to ensure that environmental gains exceed the environmental impact of logistics.

Circular business models offer untapped potential to integrate first-mile collection and last-mile delivery. Traditionally, first-mile collection has been considered a part of reverse logistics, viewing the two as totally separate operations. This research suggests that circular business models offer an opportunity to integrate first-mile collection and last-mile delivery to decrease environmental impacts and operational costs, while elevating the service level for consumers, and reducing complexity for logistics service providers. While research on the matter remains scarce, the extant literature shows that integrating the two operations can significantly enhance route efficiency (Bergmann et al. 2020).

Transforming fashion retail towards the circular economy offers an important pathway for enhancing overall sustainability in retail. The circular business models expand the life cycle of clothing by facilitating the movement and reuse of clothing. Furthermore, the circular business model bridges the circularity gap between actors in the fashion system by establishing connected networks that provide access to external resources and capabilities necessary to achieve environmental value. Successfully operating circular business models requires consumer engagement to keep clothing in circulation for as long as possible. Despite the importance of the extended producer responsibility for the end-of-life collection and treatment of textiles, this research highlights a need to extend this responsibility to include the consumer. Consumer engagement is crucial for adopting circularity and extending the life cycle of clothing. Figure 4.2 illustrates the key patterns of circular business model innovation identified in Paper IV.

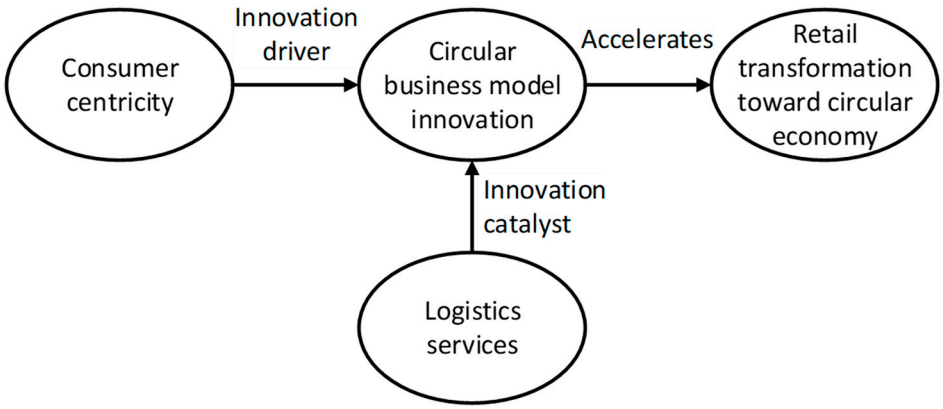


Figure 4.7. Key patterns of circular business model innovation, adapted from Hellström and Olsson (2023)

This dissertation proposes a conceptual model that integrates the findings of the four appended papers (Figure 4.3). In essence, the model suggests that last-mile delivery, as a central logistics service in retail, has a direct impact on the customer journey. An in-depth understanding of customer expectations and customer experience in the customer journey provides a foundation for adopting a consumer-centric approach to last-mile delivery. The research suggests that consumer centricity, in turn, acts as a main driver of circular business model innovation. Furthermore, the findings indicate that logistics services act as a catalyst that accelerates the process of circular business model innovation. As an outcome of this process, circular business model innovation supports the transformation of retail toward the circular economy. Finally, the conceptual model proposes that this retail transformation will have an impact on logistics services. This model integrates and synthesizes the results from the four appended papers. It should be noted that this model does not imply that retail transformation toward circular economy is merely driven by consumer-centric logistics services. Thus, the model cannot offer a complete picture of this transformation. Rather, the model highlights that consumer-centric last-mile delivery services have a role to play in retail transformation toward the circular economy.

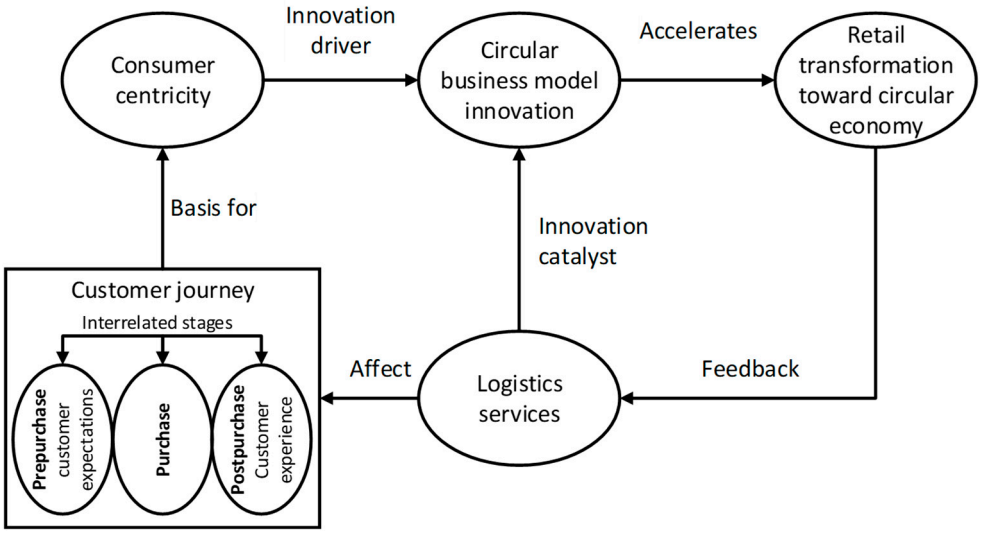


Figure 4.8. Connecting the research results.

5.Discussion

The following section discusses the results of this dissertation, enlarging the individual discussions from the four appended papers to provide a comprehensive overview of the answers to the research question.

5.1. Toward a holistic understanding of the customer journey in last-mile delivery

In the rapidly-changing retail landscape, consumers interact with firms through myriad touchpoints, resulting in an extended and more complex customer journey (Lemon and Verhoef 2016). Propelled by this escalating complexity, retailers scramble to manage the journey of each individual consumer. Considering that last-mile delivery has evolved into a critical touchpoint for both retailers and consumers, a holistic understanding of the customer journey in last-mile delivery is of vital importance. While this research cannot claim to offer a full picture, it provides an initial step and foundation on the path toward a holistic understanding of the customer journey in last-mile delivery.

This research suggests that last-mile delivery not only represents a critical touchpoint in the customer journey; it can also be leveraged to create and shape additional touchpoints. Although these touchpoints are only partly under the retailer's control, last-mile delivery has the potential to shape interactions between the consumer and the upstream supply chain (Larke et al. 2018). The retailer's delivery offerings effectively define the time, location, and condition of such interactions, which offers the opportunity to add new touchpoints. An illustrative example is the mobile application that was integrated into the unattended home delivery service investigated in Paper II and Paper III. The application provided an additional brand-owned touchpoint, which contributed to the creation of a physical delivery experience. Other possible examples include the interactions with delivery facilities, such as reception boxes or parcel lockers, as well as last-mile delivery tracking. The unattended delivery service illustrates that last-mile delivery shapes touchpoints; e.g., by limiting social interactions. Paper II found that consumers expected unattended home delivery to limit social interactions, which Paper III confirmed by demonstrating that the service had reduced human interactions.

Customer expectations and customer experiences are interrelated and affect each other in complex ways. The expectancy–disconfirmation theory suggests that consumers compare the actual experience to their initial expectations. While this research has not investigated the effect of this comparison, it sheds light on the prepurchase and postpurchase stages of the customer journey. Paper II revealed that consumers form expectations of their interaction with the service during the prepurchase stage and mapped the forms and determinants of these expectations in unattended home delivery. Paper III explored the customer experience during the post-purchase stage after interacting with the unattended home delivery service. While Papers II and III have not investigated the relationship between the two constructs, the research suggests that the consumer compared their actual experience to their initial expectations when evaluation their interaction with the service, indicating that expectations affected customer experience.

The experience and journey of each customer is dynamic in nature (Verhoef et al. 2009). While the importance of these dynamics is widely recognized, knowledge on the matter remains scarce. This research highlights that the expectations and experiences in last-mile delivery are not static, but evolve over time and are impacted by multiple factors. For example, this research suggests that previous last-mile delivery experience, as well as retail experience in other channels influenced customer experience. Moreover, the findings suggest that continuously-evolving lifestyles and overall life situation impacted customer experience. In addition, the continuously-evolving retail landscape affected what consumers expect from retail and how they experience their retail interactions.

5.2. Building competitive advantage through consumer-centric last-mile delivery

The competitive landscape in retail is undergoing drastic changes arising from volatility in customer expectations and emerging buying and behavioral trends, which has created a need for retailers to explore new ways of achieving competitive advantages. Last-mile delivery is critical for creating a seamless customer journey and provides a source of market differentiation (Lim and Winkenbach 2019). Retailers attempt to keep pace with consumer dynamics to win the race in last-mile delivery and to survive and thrive in the competitive retail landscape. Retail giant Amazon is an illustrative example of how retailers leverage consumer-centric last-mile delivery to gain competitive edge: building customer loyalty through their Amazon Prime membership program, offering free and fast delivery, seizing control over last-mile delivery by establishing their own delivery service provider, establishing their own parcel locker network, and offering same-day delivery in major cities. Furthermore, Amazon invests significant time and resources into last-

mile delivery innovations to be able to adjust to rapidly-changing markets. However, research on the role of last-mile delivery in achieving competitive advantage is very scarce.

Retailers can leverage last-mile delivery to differentiate and position themselves in the market. Porter (1996) argued that focusing on operational effectiveness is important in achieving superior performance, but is insufficient to achieve a competitive advantage. Instead, strategic positioning requires firms to create a unique value proposition by either performing different activities from rivals or performing similar activities in different ways. Despite the importance of creating a unique value proposition, Paper I showed that a substantial share of last-mile logistics research had focused on operational optimization. Papers II and III provided in-depth insights into customer expectations and customer experience in last-mile delivery. These results can form the basis for making deliberate choices to create a unique customer value proposition through delivery services.

The ongoing discussion around the consumer contributes to the foundation of consumer-centric last-mile delivery by highlighting the important role of consumers in the retail industry. In retail, consumer insights into preferences and behavior serve as basis for managing relationships and making supply-chain–related decisions (Esper et al. 2020). Consumer-centric last-mile delivery holds great potential to support firms in developing a consumer-based strategy. In contrast to the traditional strategic focus on customers, consumer-based strategy recognizes the need to understand the customer journey through consumer insights (Hamilton and Price 2019). This research provides consumer insights into customer expectations and customer experience in last-mile delivery. These initial consumer insights can build a starting point for developing organizational strategies rooted in consumer-centric last-mile delivery.

Market actors—such as retailers, public actors, and consumers—engage in activities that eventually shape the market. Market-shaping is far from a new phenomenon, as there are countless examples of deliberate efforts to influence markets and design new strategies for value creation and growth (Nenonen and Storbacka 2021). Retailers attempt to leverage consumer-centric last-mile delivery as a means of shaping markets. Amazon provides yet another glowing example: investing heavily to offer free next-day delivery for Prime members has effectively shaped retail markets. In response, other retailers followed this path by offering free delivery (often limited to orders over a minimum basket size), offering fast delivery options, and establishing loyalty programs. Market shaping requires strong and sustained focus on improving the value creation in a market (Nenonen et al. 2019). The empirical insights from Papers II and III provide an initial starting point for market-shaping through last-mile delivery.

Sector-specific considerations are important to successfully building a competitive advantage through consumer-centric last-mile delivery (EY 2021). Depending on

the sector, consumer preferences and buying behaviors may vary extensively, requiring firms to adjust their last-mile delivery offerings. For example, Paper III focused on grocery retail, revealing that delivery lead times impacted consumers' retail channel choices and buying behavior and affected their delivery experience. Specifically, the results revealed that long delivery lead times can induce channel switching and consumer migration. In grocery retail, shorter delivery lead times have the potential to enhance flexibility for consumers by facilitating smaller and more frequent deliveries. In contrast to these findings, consumers may well embrace longer delivery lead times in other sectors. For example, the Swedish furniture firm "Norrgavel" offers customized furniture, with lead times typically between 6–12 weeks. These relatively long lead times are aligned with the firm's strategic focus on sustainable furniture.

5.3. Toward sustainable last-mile delivery services

Despite varying estimates, it is widely acknowledged that last-mile delivery accounts for a considerable share of the total environmental impact in retail, which has resulted in a great deal of attention from scholars and practitioners. The environmental impact of last-mile delivery is complex and depends, among other factors, on consumers' choice of delivery options (Buldeo Rai et al. 2023); delivery time windows in routing and scheduling (Wygonik and Goodchild 2011); the mode of transportation, including type of vehicle and power source (Ranieri et al. 2018); and lead times (Muñoz-Villamizar et al. 2021). These determinants highlight that consumer preferences and choices substantially affect the environmental impact and sustainability of last-mile delivery, and thus retail's overall carbon footprint. Consequently, retailers need to assume a holistic approach and understand the consumer perspective on last-mile delivery.

While consumer centricity does not per se lead to sustainable solution, it offers an important opportunity to influence consumer choices and behavior to facilitate sustainable last-mile delivery. It should be noted that the four studies included in this dissertation have not measured or assessed the environmental impact of last-mile delivery. The findings of this dissertation suggest that living up to customer expectations and providing a tailor-made customer experience is important for consumer acceptance and paves the way for the success of last-mile delivery. As retailers struggle with rapidly-changing customer expectations and emerging behavioral trends, the significance of the consumer perspective yields substantial prospects to enhance the sustainability of delivery services. Particularly, a strong and sustained consumer-centric approach can foster more sustainable consumer behavior and choices. Effectively inducing more sustainable consumer behavior can positively affect the sustainability of last-mile delivery. Nudging could potentially be useful to induce changes to consumer behavior (Lehner et al. 2016). For example,

retailers could leverage nudging mechanisms such as changes to default options or framing information to induce consumers to adopt more sustainable delivery options, and to accept longer lead times for non-time–critical items, and longer time windows. Viet et al. (2023) found that consumers' preference and choice for longer delivery times increased significantly when sustainability impact information was disclosed.

Creating a tailored customer experience requires differentiated last-mile delivery offerings, allowing consumers to select a location and lead time that suits their individual needs (Accenture 2022). Retailers are seeking innovative solutions to differentiate their offerings while maintaining profitability and decreasing their environmental impact. The findings of this research illustrate that no single delivery service fits the diverse needs and preferences of all consumers, which substantiates the unique and phenomenological nature of customer experience. Rather, consumer centricity calls for a differentiated and diversified last-mile delivery offering, which helps to provide consumers a tailor-made delivery experience that is accustomed to their individual needs and preferences. Combining a differentiated last-mile delivery offering with appropriate environmental impact information empowers consumers to make conscious and sustainable choices.

Consumers' choice of delivery location has a considerable impact on the environmental sustainability. Consumer-centric delivery services need to ensure that the delivery meets the needs of the consumer rather than vice-versa. Established delivery locations including home delivery, 'click and collect', and parcel lockers are insufficient to meet consumers and deliver to where they are. The findings from Paper III indicate that that no single delivery location fits the needs of all consumers and that the experience of using the unattended home delivery service under investigation varied among participants. These findings further strengthen the argument for a need for a differentiated last-mile delivery offerings to enhance customer experience. Retailers need to focus on delivery location to catch consumers in their everyday life.

Short delivery lead times are still thought of as the key to successful last-mile delivery (Gielens 2023). However, there are growing signs that delivering within a promised time frame is more important for consumers than rapid delivery. There are indications that delivering earlier than promised may have a negative impact on consumer perception (PWC 2023). Paper III suggested that delivery lead time affects consumers channel choice, buying behavior, and delivery experience, highlighting the importance of delivery lead time for consumers. However, depending on the retail sector and the individual consumer, short lead times do not necessarily improve delivery experience. Promising time frames holds great potential to decrease the speed of last-mile delivery while sustaining a superior customer experience.

Creating consumer engagement offers an important opportunity to enhance the sustainability of last-mile delivery. The service-dominant logic argues that the consumer acts a co-creator of value in all services (Vargo and Lusch 2004; Vargo and Lusch 2008). Paper III illustrates how value is co-created among the various actors within the last-mile delivery ecosystem. Deliberately engaging consumers in the value creation of last-mile delivery services offers an important pathway for enhancing sustainability. Paper IV extends these findings by proposing that circular business models elevate consumer engagement. At the same time, the findings suggest that circular business models build on consumer engagement to successfully circulate textiles.

A secondary effect of promoting environmental awareness and more conscious consumer choices lies in the possibility to considerably decrease the significant economic cost inherent in last-mile delivery. Since the advent of e-commerce, retailers and logistics service providers alike have grappled with the low profitability of last-mile delivery. Similar to environmental impact, the cost of last-mile delivery is also to some degree affected by consumer choices. In fact, the literature suggests that cost efficiency and environmental impact of last-mile delivery are interrelated (Wygonik and Goodchild 2011), which indicates that decreasing the environmental impact also reduces financial cost.

6.Key findings and implications, limitations, and future research

This section outlines the key findings, implications for research and practice, limitations of the work, and suggestions for further research and future research avenues for studies beyond the scope of the immediate research questions.

6.1. Key findings

This research sheds light on the consumer perspective in last-mile delivery and offers insights into circular business model innovation in retail. While the systematic review of the literature shows a tremendous growth in academic publications in recent years, it also reveals a scarcity of consumer research in last-mile delivery. To address this lack of consumer research, this research investigated the customer journey in last-mile delivery. In the prepurchase stage, consumers form three types of last-mile delivery expectations: desired service, expected standard service, and predicted service. These three types of service expectations take various forms, and the combination of these forms set the expectations level. The findings indicate that last-mile delivery expectations are determined by personal needs, technology literacy, and situational factors. In the postpurchase stage, the total customer experience in last-mile delivery is multidimensional and dynamic. Six dimensions of last-mile delivery experience were identified: cognitive, emotional, behavioral, sensorial, physical, and social experience. The results suggest that the role of these interrelated dimensions in the total delivery experience vary in frequency, weight, and magnitude (positive/negative). Overall, this research suggests that consumer centricity offers an important opportunity to enhance the sustainability of last-mile delivery, given that consumer choices have a significant impact on the environmental impact of delivery services. Finally, this research reveals patterns of circular business model innovation that revolve around consumer centricity as an innovation driver, logistics as an innovation catalyst, and their effect on business model transition toward a circular economy.

6.2. Implications for research

This thesis addresses pressing calls for more consumer-centric research in last-mile delivery (Esper et al. 2020; Rooderkerk et al. 2023), and contributes to the limited body of knowledge in this area. The results shed light on the last-mile delivery customer journey in retail through an empirical exploration of customer expectations and customer experience as distinct constructs. While this research has not investigated the concept of customer satisfaction, this thesis corroborates earlier research suggesting that customer expectations and customer experience are interrelated and affect each other (Oliver 1981; Oliver 1980). Enhanced understanding of the customer journey offers an interesting starting point for configuring last-mile logistics networks (Lim and Srai 2018), and for managing relationships in the supply chain.

Building on the notion that logistics and supply chain management have an effect on customer experience in retail (Grewal et al. 2009), this research vividly illustrates how customer experience has become more supply-chain–related. The findings of this research suggest that last-mile delivery lead time affects consumers' choice of retail channel, buying behavior, and customer experience. Study C found that the lack of fast delivery options in Swedish grocery retail occasionally spurred consumers to shop in brick-and-mortar stores rather than buying groceries online. This suggests that the lack of fast delivery options introduced a risk of channel switching and consumer migration. In contrast, there are indications that delivering within a promised timeframe may be more important than fast delivery as delivering earlier than specified can have a negative impact on consumer perception (PWC 2023). In essence, the contribution of this research lies in demonstrating the relationship between lead time, buying behavior, and customer experience, although desired lead time varies among various retail sectors and individual consumers.

The findings of this research indicate that consumer centricity facilitates sustainable last-mile delivery. Despite the recognition that consumer behavior and preferences have an impact on the environmental impact of last-mile delivery, the role of consumer centricity in facilitating more sustainable last-mile delivery has been largely overlooked. Thus, this dissertation makes a minor, yet important, contribution to the literature of putting consumer centricity on the map of sustainable logistics research. This research suggests that focusing on delivery location, diversifying the last-mile delivery offering, and creating consumer engagement are promising paths toward sustainable last-mile delivery.

This dissertation contributes to the literature by identifying patterns of circular business model innovation. Building on previous research that identified technology and digitalization as the main drivers of business model innovation (Neligan et al. 2022), this research revealed that technology enabled a circular business model. The findings of this research advance the knowledge of circular business model

innovation by revealing patterns in this innovation process. Consumer centricity was identified as an important driver of circular business model innovation in retail. Logistics was identified as a catalyst that accelerates the process of circular business model innovation. Previous research found that logistics enabled circularity by slowing resource flows (Gatenholm et al. 2021). This research demonstrated that the role of logistics goes beyond the movement of goods to speed up the process of business model innovation. Finally, this research illustrated how consumer centricity and logistics affect the transition of retail business models toward the circular economy. These results demonstrate the vital importance of consumer centricity and logistics in enhancing the total sustainability of retail business models.

This dissertation also contributes to packaging logistics, and highlights how packaging plays an important role for last-mile delivery services at the delivery location. This research reveals that the reception box used in the unattended home delivery service fulfills multiple packaging-related functions, including protection, containment, communication, and convenience. This suggests that packaging in last-mile delivery is not limited to the primary product and e-commerce packaging. Rather, packaging and its functions are of vital importance for the consumer at the delivery location. In addition, packaging plays an important role in the circular business model: when ordering new clothes online, consumers reuse the e-commerce packaging to send their clothing donations to a participating charity of their choice. Thus, it can be argued that the business model not only contribute to extending the lifecycle of textiles, but also to extending the lifecycle of e-commerce packaging. Hitherto, scholarly research comparing disposable and reusable e-commerce packaging remains very scarce, despite growing recognition of the major environmental impact of disposable packaging, (Pålsson and Olsson 2023).

6.3. Implications for practice

This research has several practical implications for managers. This research suggests that consumer centricity provides untapped potential to reduce the environmental impact of last-mile delivery. The literature reveals that consumer choices and behaviors affect the environmental impact of last-mile delivery. The results of this research indicate that taking a consumer-centric approach to last-mile delivery can foster more sustainable consumer behavior and choices. Logistics managers in retail can use consumer centricity to encourage consumers to adopt more sustainable last-mile delivery options, including longer lead times and time windows. Managers can leverage consumers' growing environmental awareness and guide consumers by outlining the environmental impact of various last-mile delivery options.

The results also demonstrate how customer experience has become more logistics-related, and how delivery services contribute to a more meaningful and seamless customer experience in omnichannel retail. Logistics and supply chain managers need to recognize the growing importance of customer experience and adopt a holistic and consumer-centric approach to managing delivery services. Additionally, the results of this research illustrate how retail managers can leverage last-mile delivery to add and shape touchpoints and create a more personalized customer journey. The results of this research offer an interesting starting point by providing in-depth insights into customer expectations and customer experience in last-mile delivery. Retail managers can build on the results of this dissertation in the design and development of last-mile delivery services. Notably, this research also indicates that no single delivery service fits all consumers, meaning that a 'one-size-fits-all' approach is not suitable. Consequently, retail managers need to diversify their service offerings to allow each consumer to choose the alternative that best suits their needs.

This research illustrates that delivery location and lead time have a significant effect on the customer journey in retail as well as the cost and environmental impact of last-mile delivery. As retailers scramble to innovate last-mile delivery services in response to emerging expectations and behavioral trends, managers could use the results of this research and focus on delivery location and lead time. The results suggests that these two areas offer great potential for a diversified delivery offering, which could contribute to a seamless customer experience. For example, delivery locations determine how seamlessly consumers can pick up deliveries in everyday situations. For logistics service providers, delivery locations have a great effect on routing and scheduling, which in turn affects environmental impact and cost of delivery operations.

This research also revealed patterns of circular business model innovation in retail which revolve around consumer centricity as an innovation driver and logistics as an innovation catalyst that accelerates retail transformation toward the circular economy. Previous research identified technological innovation and digitalization as the main drivers of business model innovation (Neligan et al. 2022). This research complements these findings by demonstrating that a strong and sustained focus on the consumer also acts as an innovation driver. Additionally, previous research suggested that logistics acts as an enabler of circularity principles (Gatenholm et al. 2021), while this research illustrates that logistics is of strategic importance in accelerating circular business model innovation. These results contribute to understanding future possibilities and foresights about social change that support the evolution of retail given that, to quote David Bowie, "tomorrow belongs to those who can hear it coming." Managers are encouraged to take advantage of consumer centricity as an innovation driver and logistics as a catalyst for circular business models and tap into the full potential of the circular economy.

This research indicates that circular business models require a new way of thinking about logistics cost. The results demonstrate that circular business models induce a growing need for logistics-related activities to facilitate the movement of goods and allow them to be used more. This suggests that circular business models put pressure on logistics systems, which drives operational costs (e.g., warehousing and transportation). Consequently, logistics managers need to take on a new way of thinking about logistics-related costs and explore ways of externalizing such costs. Promising ways of tackling such growing logistics costs include peer-to-peer models and asking consumers to pay for shipments.

The results of this research suggest that circular business models offer a previously unrealized potential to integrate first-mile collection and last-mile delivery. In practice, last-mile delivery and first-mile pickups are often considered to be two separate operations. Circular business model innovation offers a significant opportunity to integrate last-mile delivery and first-mile pickup. The results indicate that integrating these flows could decrease the environmental impact and operational cost of such operations. For example, the literature suggests that integrating the two operations could significantly improve route efficiency (Bergmann et al. 2020). At the same time, such integration could also elevate the service levels for consumers and decrease the complexity for logistics service providers.

Finally, this research suggests that retailers can leverage consumer-centric last-mile delivery to build and sustain competitive advantage. Notably, e-retailers can use last-mile delivery to position themselves in the market. There are indications that firms can leverage a consumer-centric approach to last-mile delivery services as a means of shaping markets. Moreover, sector-specific considerations are important to successfully use consumer-centric last-mile delivery services to achieve competitive advantage. However, there are indications that e-retailers need to adjust to dynamic changes and to the continuously-changing external environment to sustain this competitive advantage (e.g., to the dynamics of customer expectations and customer experience). Managers can also utilize the results of this research to develop and realize consumer-based strategies through last-mile delivery.

6.4. Limitations

It should be noted that, as in any research, the research included in this dissertation has limitations despite the multitude of measures implemented to enhance the trustworthiness of the research and its findings (see Chapter 3.4—Research quality). First, qualitative research is highly context-dependent, which means that some findings may only be applicable to the study context (e.g., e-grocery retail in Sweden). An example could be the desire for shorter lead times to enable consumers

to place smaller and more frequent orders identified in study C. Another example could be the need to limit social interactions in grocery shopping identified in study B. Studies in other geographical settings, such as China, Mexico, or Botswana, could help strengthen the transferability of the findings. Second, the biggest weakness in study B is its limited empirical sources of evidence. Case study research typically relies on multiple sources of evidence for data triangulation. However, study B mainly relies on semi-structured interviews and direct observations. Additional data would have strengthened the findings of this case study. Third, while the circular business model developed in study D has been validated empirically, it has not been verified as part of this research. Implementing and testing this business model could strengthen the trustworthiness of the findings. Fourth, this qualitative research was highly exploratory, providing several conceptual models and a multitude of research propositions. Future research could empirically verify these propositions to validate the findings of the studies included in this dissertation. Quantitative research is suitable for verifying the research propositions provided in this research. This requires developing testable and measurable hypotheses from the provided research propositions. These hypotheses could then be tested through a survey of consumers using different last-mile delivery options to receive their orders.

6.5. Future research avenues

This subsection presents directions for future research on consumer-centric last-mile delivery and circular business model innovation within and beyond the scope of the research question.

6.5.1. Integrating operations and marketing in last-mile delivery

This research contributes to the consumer-centric logistics and supply chain management literature (Esper et al. 2020; Rooderkerk et al. 2023). However, despite this contribution, consumer insights into last-mile delivery remain nascent, which provides avenues for future research. The results of this research demonstrate that there is no single delivery service that fits all consumers. Building on these results, future research could explore how last-mile delivery operations can be managed to fulfill varying requirements of individual consumers. Additionally, while this research sheds light on the forms and determinants of customer expectations in last-mile delivery, little is known about the mechanisms through which last-mile delivery experience is created. Further research could explore these mechanisms to provide a more holistic understanding of delivery experience.

6.5.2. Integrating sustainability into last-mile delivery

Despite a growing body of literature, research on the social and environmental impact of last-mile delivery remains rather limited, yet its importance will increase in the light of growing consumer awareness and increasing policy and regulation. Research on the matter has started with, for example, the work of Buldeo Rai et al. (2019) on e-consumers' willingness to adopt sustainable last-mile delivery options. Another example can be found in the work of Ignat and Chankov (2020), on the impact of providing e-consumers additional information on the environmental and social sustainability of last-mile delivery options. Future research could study the environmental impact of various last-mile delivery options, which could support retailers in developing a more sustainable offering and consumers in making more sustainable choices.

From an environmental perspective, this research suggests that consumer centricity offers a significant opportunity to decrease the environmental impact of last-mile delivery services. However, additional research is required to understand the role of consumer-centricity in promoting more sustainable consumer choices and enhancing the sustainability of last-mile delivery. Specifically, the question arises: "How does customer engagement in last-mile delivery contribute to reducing the negative environmental impact of delivery services?" Moreover, further research could investigate how outlining the environmental impact of available last-mile delivery options affects consumer choices.

Research on social sustainability in last-mile delivery remains largely absent. Despite a growing number of reports of (either intentionally or unintentionally) harsh working conditions for couriers, including low pay, long working hours, and significant stress levels, academic research has largely overlooked these issues. On top of the negative consequences for employees, firms risk negative word-of-mouth with potentially brand-damaging consequences. Further research could investigate how to ensure safe and fair working conditions for delivery employees. Specifically, future research could study the role of consumer centricity in enhanced social sustainability by asking "How does consumer centricity facilitate social sustainability in last-mile delivery?"

6.5.3. Understanding the role of consumer-centric last-mile delivery in the circular economy

The findings of this research strongly suggest that circular business model innovation induces an increased need for logistics activities. Moving products from one user to another to facilitate reuse requires efficient handling and transport. Therefore, last-mile delivery, first-mile collection, and product packaging will play a key role in circular retail business models. Further research could investigate the logistics capabilities necessary to successfully implement circular strategies.

Additionally, consumer-centric last-mile delivery could be of vital importance to a wider adoption of the circular economy, as it can foster more circular and sustainable consumer behavior. An interesting and relevant question is: “How do circular business models based on reuse affect last-mile delivery services” and “How do logistics service providers have to adapt their last-mile delivery capabilities to support the transformation of retail toward the circular economy?”

This research suggested that circular business model innovation provides untapped potential to integrate last-mile delivery with first-mile pickup. Despite growing recognition of the potential of such integration, scholarly research on the matter remains scarce (Agnusdei et al. 2022). Integrating last-mile delivery and first-mile pickup could improve route efficiency by 30%, illustrating the enormous potential of decreasing environmental impact and cost (Bergmann et al. 2020). Future research could contribute to understanding the effect of such integration and how it affects consumer service levels, customer experience and satisfaction. An interesting and relevant question to ask is “How do consumers perceive integrated last-mile delivery and first-mile pickup?”

6.5.4. Achieving competitive advantage through last-mile delivery

This research indicates that last-mile delivery plays a role in building and sustaining competitive advantage. Previous research showed that logistics can contribute to enhanced profitability and sustained growth in retail (Marino et al. 2018; Sandberg 2013). However, research on the role of last-mile delivery for overarching business strategy in retail is scarce. Future research could investigate last-mile delivery from a strategic perspective through the lens of dynamic capability theory to shed light on the logistics capabilities required to respond to rapidly-changing consumer preferences and behavioral trends. An interesting and relevant question to study is “How do logistics service providers adapt their last-mile delivery capabilities to respond to rapidly changing consumer preferences?” Likewise, the interrelationship between functional last-mile delivery strategy and overarching business strategy remains unclear. Future research could investigate the interrelationship between overarching business strategies and functional logistics strategies.

6.5.5. Circular business model experimentation

Business model experimentation has been identified as a key driver of the transition toward the circular economy (Bocken et al. 2021). The aim of business model experimentation is to test assumptions about the future business and stimulate innovation for a circular economy across networks of organizations (Bocken et al. 2019). This research has validated a circular business model for the reuse of clothing to shed light on the process of business model innovation. The rise of the circular economy provides numerous opportunities for future research to explore circular

business model experimentation. For example, future research could explore the use of design thinking in business model experimentation to develop and test new business models and support the transformation toward the circular economy (Santa-Maria et al. 2022). For example, interesting and relevant questions are "How does design thinking support circular business model innovation in retail?" and "How does design thinking transform retail business models toward circular economy?"

6.5.6. Understanding the journey of various consumer groups

This research focused on early adopters of unattended grocery delivery services. Early adopters were selected because they are an interesting group to investigate in relation to emerging technology-enabled services. Further research could investigate other consumer groups to gain additional insights and a more holistic understanding of the customer journey of other consumer groups. Different consumer groups have different socioeconomic characteristics, such as the number of people living in the same household, number and age of children living in the same household, spending on groceries, income, and lifestyle (e.g., special diet, sports). Elderly people are a particularly interesting consumer group to investigate, due to reduced mobility and a higher level of caution. Young professionals are another consumer group that is highly relevant to investigate, given that this group typically lives in single households, has an above-average income, no children, and is highly familiar with online shopping.

The results of this research suggest that the individual consumers' living situation has an impact on their personal customer journey. Examples from this research include personal needs, such as reducing stress, limiting social interaction, and increasing spare time, and situational factors, such as unexpected changes to personal plans, which affected service expectations. Hitherto, knowledge on the effect of other personal variables remains very limited. Additional research could investigate the effect of consumer characteristics on their perception of last-mile delivery services. Particularly, the role of housing could be explored further given that it potentially has an effect on consumers' preferred last-mile delivery options. For example, housing determines the distance to available parcel lockers, the possibility of using a 'secret spot' or of setting up a reception box for unattended home delivery. Further consumer-centric last-mile delivery research could consider the issue of housing to shed light on this matter.

References

Accenture (2022) *Keeping up the pace: The new face of last mile delivery*. Available at: https://www.accenture.com/ch-en/insightsnew/retail/last-mile-delivery (accessed 24 Feb 2023).

Agnusdei GP, Gnoni MG, Sgarbossa F, et al. (2022) Challenges and perspectives of the Industry 4.0 technologies within the last-mile and first-mile reverse logistics: A systematic literature review. *Research in Transportation Business & Management*. DOI: https://doi.org/10.1016/j.rtbm.2022.100896. 100896.

Allen J, Piecyk M, Piotrowska M, et al. (2018) Understanding the impact of e-commerce on last-mile light goods vehicle activity in urban areas: The case of London. *Transportation Research Part D: Transport and Environment* 61: 325-338.

Amazon (2021) *Amazon Prime*. Available at: https://www.amazon.com/gp/help/customer/display.html?nodeId=G6LDPN7YJHYKH2J6 (accessed 31 May 2021).

Amit R and Zott C (2001) Value creation in E-business. *Strategic Management Journal* 22(6-7): 493-520.

Arbnor I and Bjerke B (1997) *Methodology for creating business knowledge.* London: Sage.

Aspray W, Royer G and Ocepek MG (2013) Anatomy of a Dot-Com Failure: The Case of Online Grocer Webvan. *Food in the Internet Age*. Cham: Springer International Publishing, pp.25-35.

Assouad A and Overby J (2016) The Impact of Culture on Customer Expectations. *Journal of Management Policy and Practice* 17(2): 19-32.

Aurambout J-P, Gkoumas K and Ciuffo B (2019) Last mile delivery by drones: an estimation of viable market potential and access to citizens across European cities. *European Transport Research Review* 11(1): 30.

Baxendale S, Macdonald EK and Wilson HN (2015) The Impact of Different Touchpoints on Brand Consideration. *Journal of Retailing* 91(2): 235-253.

Berger R (2015) Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative Research* 15(2): 219-234.

Bergmann FM, Wagner SM and Winkenbach M (2020) Integrating first-mile pickup and last-mile delivery on shared vehicle routes for efficient urban e-commerce distribution. *Transportation Research Part B: Methodological* 131: 26-62.

Berry LL, Seiders K and Grewal D (2002) Understanding Service Convenience. *Journal of Marketing* 66(3): 1-17.

Bhaskar R (2010) *Reclaiming reality: A critical introduction to contemporary philosophy.* London: Routledge.

Bijmolt THA, Broekhuis M, de Leeuw S, et al. (2021) Challenges at the marketing–operations interface in omni-channel retail environments. *Journal of Business Research* 122: 864-874.

Bitner MJ (1990) Evaluating Service Encounters: The Effects of Physical Surroundings and Employee Responses. *Journal of Marketing* 54(2): 69-82.

Bitner MJ, Booms BH and Tetreault MS (1990) The Service Encounter: Diagnosing Favorable and Unfavorable Incidents. *Journal of Marketing* 54(1): 71-84.

Björklund M and Johansson H (2018) Urban consolidation centre – a literature review, categorisation, and a future research agenda. *International Journal of Physical Distribution & Logistics Management* 48(8): 745-764.

Bocken N, Boons F and Baldassarre B (2019) Sustainable business model experimentation by understanding ecologies of business models. *Journal of Cleaner Production* 208: 1498-1512.

Bocken NMP, de Pauw I, Bakker C, et al. (2016) Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering* 33(5): 308-320.

Bocken NMP, Weissbrod I and Antikainen M (2021) Business Model Experimentation for the Circular Economy: Definition and Approaches. *Circular Economy and Sustainability* 1(1): 49-81.

Bonetti F, Warnaby G and Quinn L (2018) Augmented Reality and Virtual Reality in Physical and Online Retailing: A Review, Synthesis and Research Agenda. In: Jung T and tom Dieck MC (eds) *Augmented Reality and Virtual Reality: Empowering Human, Place and Business*. Cham: Springer International Publishing, pp.119-132.

Bowersox D, Closs D and Cooper MB (2020) *Supply Chain Logistics Management.* New York: McGraw-Hill Education.

Boyer KK, Prud'homme AM and Chung W (2009) The Last Mile Challenge: Evaluating the Effects of Customer Density and Delivery Window Patterns. *Journal of Business Logistics* 30(1): 185-201.

Boysen N, Briskorn D, Fedtke S, et al. (2018) Drone delivery from trucks: Drone scheduling for given truck routes. *Networks* 72(4): 506-527.

Breugelmans E and Campo K (2016) Cross-Channel Effects of Price Promotions: An Empirical Analysis of the Multi-Channel Grocery Retail Sector. *Journal of Retailing* 92(3): 333-351.

Bryman A and Bell E (2015) *Business Research Methods.* Oxford: Oxford University Press.

Buldeo Rai H, Touami S and Dablanc L (2023) Not All E-commerce Emits Equally: Systematic Quantitative Review of Online and Store Purchases' Carbon Footprint. *Environmental Science & Technology* 57(1): 708-718.

Buldeo Rai H, Verlinde S and Macharis C (2019) The "next day, free delivery" myth unravelled: Possibilities for sustainable last mile transport in an omnichannel

environment. *International Journal of Retail & Distribution Management* 47(1): 39-54.

Buldeo Rai H, Verlinde S and Macharis C (2021) Unlocking the failed delivery problem? Opportunities and challenges for smart locks from a consumer perspective. *Research in Transportation Economics* 87: 100753.

Buldeo Rai H, Verlinde S, Merckx J, et al. (2017) Crowd logistics: an opportunity for more sustainable urban freight transport? *European Transport Research Review* 9(3): 39.

Casadesus-Masanell R and Zhu F (2013) Business model innovation and competitive imitation: The case of sponsor-based business models. *Strategic Management Journal* 34(4): 464-482.

Castillo VE, Mollenkopf DA, Bell JE, et al. (2018) Supply Chain Integrity: A Key to Sustainable Supply Chain Management. *Journal of Business Logistics* 39(1): 38-56.

Checkland P (1985) From Optimizing to Learning: A Development of Systems Thinking for the 1990s. *Journal of the Operational Research Society* 36(9): 757-767.

Chesbrough H and Rosenbloom RS (2002) The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change* 11(3): 529-555.

Corbin J and Strauss A (2008) Basics of Qualitative Research:Techniques and Procedures for Developing Grounded Theory. 3rd ed. Thousand Oaks, California: SAGE Publications.

Corbin J and Strauss A (2014) *Basics of qualitative research: Techniques and procedures for developing grounded theory.* Sage publications.

Cronin JJ and Taylor SA (1994) Servperf versus Servqual: Reconciling Performance-Based and Perceptions-Minus-Expectations Measurement of Service Quality. *Journal of Marketing* 58(1): 125-131.

Cullinane S, Browne M, Karlsson E, et al. (2019) Retail Clothing Returns: A Review of Key Issues. In: Wells P (ed) *Contemporary Operations and Logistics: Achieving Excellence in Turbulent Times*. Cham: Springer International Publishing, pp.301-322.

DaSilva CM and Trkman P (2014) Business Model: What It Is and What It Is Not. *Long Range Planning* 47(6): 379-389.

Day GS (1994) The Capabilities of Market-Driven Organizations. *Journal of Marketing* 58(4): 37-52.

de Bellis E and Johar GV (2020) Autonomous Shopping Systems: Identifying and Overcoming Barriers to Consumer Adoption. *Journal of Retailing* 96(1): 74-87.

Defee CC, Williams B, Randall WS, et al. (2010) An inventory of theory in logistics and SCM research. *The International Journal of Logistics Management* 21(3): 404-489.

Deloitte (n.d.) *Sustainability in retail*. Available at: https://www.deloitte.com/global/en/Industries/consumer/perspectives/sustainability-in-retail.html (accessed 26 March 2023).

Dick AS and Basu K (1994) Customer loyalty: Toward an integrated conceptual framework. *Journal of the Academy of Marketing Science* 22(2): 99-113.

Drucker P (1954) *The Practice of Management.* New York: HarperCollins.

Durach CF, Kembro J and Wieland A (2017) A New Paradigm for Systematic Literature Reviews in Supply Chain Management. *Journal of Supply Chain Management* 53(4): 67-85.

Edwards JB, McKinnon AC and Cullinane SL (2010) Comparative analysis of the carbon footprints of conventional and online retailing: A "last mile" perspective. *International Journal of Physical Distribution & Logistics Management* 40(1/2): 103-123.

Ellen MacArthur Foundation (2021) *Circular Business Models: Redefining growth for a thriving fashion industry*. Available at: https://emf.thirdlight.com/link/circular-business-models-report/@/preview/1?o (accessed 04 November 2022).

Ellen MacArthur Foundation (n.d.-a) *Company profile: Zalando*. Available at: https://ellenmacarthurfoundation.org/zalando (accessed 28 June 2023).

Ellen MacArthur Foundation (n.d.-b) *What is a circular economy?* Available at: https://ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview (accessed 30 March 2023).

Engel JF, Kegerreis RJ and Blackwell RD (1969) Word-of-mouth Communication by the Innovator. *Journal of Marketing* 33(3): 15-19.

Esper TL, Castillo VE, Ren K, et al. (2020) Everything Old is New Again: The Age of Consumer-Centric Supply Chain Management. *Journal of Business Logistics* 41(4): 286-293.

European Commission (2011) *White paper: Roadmap to a Single European Transport Area*. Available at: https://ec.europa.eu/transport/sites/transport/files/themes/strategies/doc/2011_white_paper/white-paper-illustrated-brochure_en.pdf (accessed 04 November 2021).

European Parliament (2023) *Circular economy: definition, importance and benefits*. Available at: https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits (accessed 30 March 2023).

EY (2021) *How last-mile strategy could be your biggest competitive advantage*. Available at: https://www.ey.com/en_us/strategy-transactions/supply-chain-last-mile-strategy (accessed 24 Feb 2023).

Fabric (2020) *The impact of Covid-19 on online grocery*. Available at: https://getfabric.com/the-impact-of-covid-19-on-online-grocery/ (accessed 25 June 2020).

Fahimnia B, Molaei R and Ebrahimi MH (2011) Integration in Logistics Planning and Optimization. In: Farahani RZ, Rezapour S and Kardar L (eds) *Logistics Operations and Management: Concepts and Models*. Amsterdam: Elsevier, pp.371-391.

Fernie J and McKinnon AC (2009) The development of e-tail logistics. In: Fernie J (ed) *Logistics and Retail Management: Emerging Issues and New Challenges in the Retail Supply Chain*. London: Kogan Page, pp.207-232.

Fisher ML, Gallino S and Xu JJ (2019) The Value of Rapid Delivery in Omnichannel Retailing. *Journal of Marketing Research* 56(5): 732-748.

Flavián C, Gurrea R and Orús C (2020) Combining channels to make smart purchases: The role of webrooming and showrooming. *Journal of Retailing and Consumer Services* 52: 101923.

Frankenberger K, Weiblen T, Csik M, et al. (2013) The 4I-framework of business model innovation: A structured view on process phases and challenges. *International Journal of Product Development* 18(3-4): 249-273.

Gale B (1994) *Managing customer value.* New York: Free Press.

Gardner SK (2008) "What's too much and what's too little?": The Process of Becoming an Independent Researcher in Doctoral Education. *The Journal of Higher Education* 79(3): 326-350.

Gatenholm G, Halldórsson Á and Bäckstrand J (2021) Enhanced circularity in aftermarkets: logistics tradeoffs. *International Journal of Physical Distribution & Logistics Management* 51(9): 999-1021.

Geissdoerfer M, Pieroni MPP, Pigosso DCA, et al. (2020) Circular business models: A review. *Journal of Cleaner Production* 277: 123741.

Geissdoerfer M, Santa-Maria T, Kirchherr J, et al. (2023) Drivers and barriers for circular business model innovation. *Business Strategy and the Environment* n/a(n/a).

Gevaers R, Van de Voorde E and Vanelslander T (2009) Characteristics of innovations in last mile logistics-using best practices, case studies and making the link with green and sustainable logistics. *Association for European Transport and contributors*.

Gevaers R, Van de Voorde E and Vanelslander T (2011) Characteristics and typology of last-mile logistics from an innovation perspective in an urban context. *City Distribution and Urban Freight Transport: Multiple Perspectives, Edward Elgar Publishing*. 56-71.

Gielens K (2022) From one disruption to the next: How to navigate chaos? *Journal of Retailing* 98(3): 373-377.

Gielens K (2023) Fulfillment, The New Retailer Battlefield. *Journal of Retailing* 99(1): 1-4.

Goethals F, Leclercq-Vandelannoitte A and Tütüncü Y (2012) French consumers' perceptions of the unattended delivery model for e-grocery retailing. *Journal of Retailing and Consumer Services* 19(1): 133-139.

Golicic S, L. and Davis D, F. (2012) Implementing mixed methods research in supply chain management. *International Journal of Physical Distribution & Logistics Management* 42(8/9): 726-741.

Grewal D, Gauri DK, Roggeveen AL, et al. (2021) Strategizing Retailing in the New Technology Era. *Journal of Retailing* 97(1): 6-12.

Grewal D, Levy M and Kumar V (2009) Customer Experience Management in Retailing: An Organizing Framework. *Journal of Retailing* 85(1): 1-14.

Grewal D and Roggeveen AL (2020) Understanding Retail Experiences and Customer Journey Management. *Journal of Retailing* 96(1): 3-8.

Halldórsson Á and Aastrup J (2003) Quality criteria for qualitative inquiries in logistics. *European Journal of Operational Research* 144(2): 321-332.

Halldórsson Á and Wehner J (2020) Last-mile logistics fulfilment: A framework for energy efficiency. *Research in Transportation Business & Management*. DOI: https://doi.org/10.1016/j.rtbm.2020.100481. 100481.

Hamilton R (2016) Consumer-based strategy: using multiple methods to generate consumer insights that inform strategy. *Journal of the Academy of Marketing Science* 44(3): 281-285.

Hamilton R and Price LL (2019) Consumer journeys: developing consumer-based strategy. *Journal of the Academy of Marketing Science* 47(2): 187-191.

Hellström D (2007) *On interactions between Packaging and Logistics - Exploring implication of technological developments.* Lund university.

Hellström D and Olsson J (2023) Let's go thrift shopping: Exploring circular business model innovation in fashion retail. In: *18th Academy of Innovation, Entrepreneurship, and Knowledge (ACIEK) Conference* Madrid, Spain.

Hjort K, Hellström D, Karlsson S, et al. (2019) Typology of practices for managing consumer returns in internet retailing. *International Journal of Physical Distribution & Logistics Management* 49(7): 767-790.

Holzwarth M, Janiszewski C and Neumann MM (2006) The Influence of Avatars on Online Consumer Shopping Behavior. *Journal of Marketing* 70(4): 19-36.

Homburg C, Jozić D and Kuehnl C (2017) Customer experience management: toward implementing an evolving marketing concept. *Journal of the Academy of Marketing Science* 45(3): 377-401.

Hood N, Urquhart R, Newing A, et al. (2020) Sociodemographic and spatial disaggregation of e-commerce channel use in the grocery market in Great Britain. *Journal of Retailing and Consumer Services* 55: 102076.

Howard JA and Sheth JN (1969) *The theory of buyer behavior.* Ney Work, NY: John Wiley & Sons.

Hoyer WD (1984) An Examination of Consumer Decision Making for a Common Repeat Purchase Product. *Journal of Consumer Research* 11(3): 822-829.

Huijben JCCM, Verbong GPJ and Podoynitsyna KS (2016) Mainstreaming solar: Stretching the regulatory regime through business model innovation. *Environmental Innovation and Societal Transitions* 20: 1-15.

Hurley RF and Hult GTM (1998) Innovation, Market Orientation, and Organizational Learning: An Integration and Empirical Examination. *Journal of Marketing* 62(3): 42-54.

Hübner A, Holzapfel A and Kuhn H (2016a) Distribution systems in omni-channel retailing. *Business Research* 9(2): 255-296.

Hübner A, Kuhn H and Wollenburg J (2016b) Last mile fulfilment and distribution in omni-channel grocery retailing: A strategic planning framework. *International Journal of Retail & Distribution Management* 44(3): 228-247.

Hübner A, Wollenburg J and Holzapfel A (2016c) Retail logistics in the transition from multi-channel to omni-channel. *International Journal of Physical Distribution & Logistics Management* 46(6/7): 562-583.

Hänninen M, Kwan SK and Mitronen L (2021) From the store to omnichannel retail: looking back over three decades of research. *The International Review of Retail, Distribution and Consumer Research* 31(1): 1-35.

Ignat B and Chankov S (2020) Do e-commerce customers change their preferred last-mile delivery based on its sustainability impact? *The International Journal of Logistics Management* 31(3): 521-548.

IKEA (n.d.-a) *Transforming into a circular business*. Available at: https://about.ikea.com/en/sustainability/a-world-without-waste (accessed 26 March 2023).

IKEA (n.d.-b) *Zero emissions for home deliveries*. Available at: https://about.ikea.com/en/sustainability/becoming-climate-positive/zero-emissions-for-home-deliveries (accessed 26 March 2023).

Jain NK, Gajjar H and Shah BJ (2021) Electronic logistics service quality and repurchase intention in e-tailing: Catalytic role of shopping satisfaction, payment options, gender and returning experience. *Journal of Retailing and Consumer Services* 59: 102360.

Jiang P and Rosenbloom B (2005) Customer intention to return online: price perception, attribute-level performance, and satisfaction unfolding over time. *European Journal of Marketing* 39(1/2): 150-174.

Jonsson P (2008) *Logistics and supply chain management.* New York: McGraw Hill Higher Education.

Kahn KB (2018) Understanding innovation. *Business Horizons* 61(3): 453-460.

Kohli AK and Jaworski BJ (1990) Market Orientation: The Construct, Research Propositions, and Managerial Implications. *Journal of Marketing* 54(2): 1-18.

Kühn F, Lichters M and Krey N (2020) The touchy issue of produce: Need for touch in online grocery retailing. *Journal of Business Research* 117: 244-255.

Lagorio A and Pinto R (2021) Food and grocery retail logistics issues: A systematic literature review. *Research in Transportation Economics* 87: 100841.

Lambert D, Stock JR and Ellram LM (1998) *Fundamentals of logistics management.* London: McGraw-Hill Higher Education.

Lamberti L (2013) Customer centricity: the construct and the operational antecedents. *Journal of Strategic Marketing* 21(7): 588-612.

Langley CJ and Holcomb MC (1992) Creating logistics customer value. *Journal of Business Logistics* 13(2): 1-27.

Larke R, Kilgour M and O'Connor H (2018) Build touchpoints and they will come: transitioning to omnichannel retailing. *International Journal of Physical Distribution & Logistics Management* 48(4): 465-483.

Lehner M, Mont O and Heiskanen E (2016) Nudging – A promising tool for sustainable consumption behaviour? *Journal of Cleaner Production* 134: 166-177.

Lemon KN and Verhoef PC (2016) Understanding Customer Experience Throughout the Customer Journey. *Journal of Marketing* 80(6): 69-96.

Levitt T (1960) Marketing Myopia. *Harvard Business Review* 38(4): 45-56.

Lim S, Wang L and Srai J (2017) Wal-Mart's Omni-Channel Synergy. *Supply Chain Management Review* September/October: 30-37.

Lim SFWT, Jin X and Srai JS (2018) Consumer-driven e-commerce: A literature review, design framework, and research agenda on last-mile logistics models. *International Journal of Physical Distribution & Logistics Management* 48(3): 308-332.

Lim SFWT and Srai JS (2018) Examining the anatomy of last-mile distribution in e-commerce omnichannel retailing: A supply network configuration approach. *International Journal of Operations & Production Management* 38(9): 1735-1764.

Lim SFWT and Winkenbach M (2019) Configuring the Last-Mile in Business-to-Consumer E-Retailing. *California Management Review* 61(2): 132-154.

Lincoln YS and Guba EG (1985) *Naturalistic inquiry.* Newbury Park, California: Sage.

Linder M and Williander M (2017) Circular Business Model Innovation: Inherent Uncertainties. *Business Strategy and the Environment* 26(2): 182-196.

Liu X, He M, Gao F, et al. (2008) An empirical study of online shopping customer satisfaction in China: a holistic perspective. *International Journal of Retail & Distribution Management* 36(11): 919-940.

Magretta J (2002) Why business models matter. *Harvard Business Review* 80(5): 86-133.

Mangiaracina R, Marchet G, Perotti S, et al. (2015) A review of the environmental implications of B2C e-commerce: a logistics perspective. *International Journal of Physical Distribution & Logistics Management* 45(6): 565-591.

Marino G, Zotteri G and Montagna F (2018) Consumer sensitivity to delivery lead time: a furniture retail case. *International Journal of Physical Distribution & Logistics Management* 48(6): 610-629.

Massa L and Tucci CL (2014) Business Model Innovation. In: Dodgson M, Gann DM and Phillips N (eds) *The Oxford Handbook of Innovation Management*. Oxford University Press, pp.0.

McKendrick JH (1999) Multi-Method Research: An Introduction to Its Application in PopulationGeography. *The Professional Geographer* 51(1): 40-50.

McKinnon AC and Tallam D (2003) Unattended delivery to the home: an assessment of the security implications. *International Journal of Retail & Distribution Management* 31(1): 30-41.

McKinsey & Company (2021) *Disruption and Uncertainty – The State of Grocery Retail 2021: Europe*. Available at: https://www.mckinsey.com/~/media/mckinsey/industries/retail/our%20insights/the%20path%20forward%20for%20european%20grocery%20retailers/disruption-and-uncertainty-the-state-of-grocery-retail-2021-europe-final.pdf (accessed 24 May 2021).

Mentzer JT, Gomes R and Krapfel RE (1989) Physical distribution service: A fundamental marketing concept? *Journal of the Academy of Marketing Science* 17(1): 53-62.

Metz P, Burek S, Hultgren TR, et al. (2016) The Path to Sustainability-Driven Innovation. *Research-Technology Management* 59(3): 50-61.

Meyer C and Schwager A (2007) Understanding customer experience. *Harvard Business Review* 85(2): 116.

Miles MB, Huberman AM and Saldaña J (2018) *Qualitative data analysis : a methods sourcebook.* Thousands Oaks, California: Sage.

Miller JA (1977) Studying satisfaction, modifying models, eliciting expectations, posing problems, and making meaningful measurements. *Conceptualization and measurement of consumer satisfaction and dissatisfaction*. 72-91.

Mingers J (2015) Helping business schools engage with real problems: The contribution of critical realism and systems thinking. *European Journal of Operational Research* 242(1): 316-331.

Mittal V, Kumar P and Tsiros M (1999) Attribute-Level Performance, Satisfaction, and Behavioral Intentions over Time: A Consumption-System Approach. *Journal of Marketing* 63(2): 88-101.

Mollenkopf DA, Frankel R and Russo I (2011) Creating value through returns management: Exploring the marketing–operations interface. *Journal of Operations Management* 29(5): 391-403.

Moore RS, Collier JE, Williams Z, et al. (2020) Perceived market orientation in the product return experience and its impact on post-purchase behavior. *Journal of Marketing Theory and Practice* 28(3): 213-225.

Muñoz-Villamizar A, Velázquez-Martínez JC, Haro P, et al. (2021) The environmental impact of fast shipping ecommerce in inbound logistics operations: A case study in Mexico. *Journal of Cleaner Production* 283: 125400.

Naidoo M and Gasparatos A (2018) Corporate environmental sustainability in the retail sector: Drivers, strategies and performance measurement. *Journal of Cleaner Production* 203: 125-142.

Naylor G, Kleiser SB, Baker J, et al. (2008) Using transformational appeals to enhance the retail experience. *Journal of Retailing* 84(1): 49-57.

Neligan A, Baumgartner RJ, Geissdoerfer M, et al. (2022) Circular disruption: Digitalisation as a driver of circular economy business models. *Business Strategy and the Environment* ahead-of-print(ahead-of-print).

Nenonen S and Storbacka K (2021) Market-shaping: navigating multiple theoretical perspectives. *AMS Review* 11(3-4): 336-353.

Nenonen S, Storbacka K and Windahl C (2019) Capabilities for market-shaping: triggering and facilitating increased value creation. *Journal of the Academy of Marketing Science* 47(4): 617-639.

Nicolae LI, TĂNĂSescu D and Popa V (2013) Customer Expectations Management. *Valahian Journal of Economic Studies* 4(3): 91-100.

Nußholz J (2017) Circular Business Models: Defining a Concept and Framing an Emerging Research Field. *Sustainability* 9(10): 1810.

Näslund D (2002) Logistics needs qualitative research – especially action research. *International Journal of Physical Distribution & Logistics Management* 32(5): 321-338.

Oliver RL (1980) A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal of Marketing Research* 17(4): 460-469.

Oliver RL (1981) Measurement and Evaluation of Satisfaction Processes in Retail Settings. *Journal of Retailing* 57(3): 25.

Oliver RL (1993) Cognitive, Affective, and Attribute Bases of the Satisfaction Response. *Journal of Consumer Research* 20(3): 418-430.

Olsson J, Hellström D and Pålsson H (2019) Framework of Last Mile Logistics Research: A Systematic Review of the Literature. *Sustainability* 11(24): 7131.

Olsson J, Hellström D and Vakulenko Y (2023) Customer experience dimensions in last-mile delivery: an empirical study on unattended home delivery. *International Journal of Physical Distribution & Logistics Management* 53(2): 184-205.

Olsson J, Osman MC, Hellström D, et al. (2022) Customer expectations of unattended grocery delivery services: mapping forms and determinants. *International Journal of Retail & Distribution Management* 50(13): 1-16.

Ostermeier M, Heimfarth A and Hübner A (2022) Cost-optimal truck-and-robot routing for last-mile delivery. *Networks* 79(3): 364-389.

Osterwalder A and Pigneur Y (2010) *Business model generation: a handbook for visionaries, game changers, and challengers.* John Wiley & Sons.

Page-Thomas K, Moss G, Chelly D, et al. (2006) The provision of delivery information online: a missed opportunity. *International Journal of Retail & Distribution Management* 34(4/5): 258-277.

Pantano E and Pizzi G (2020) Forecasting artificial intelligence on online customer assistance: Evidence from chatbot patents analysis. *Journal of Retailing and Consumer Services* 55: 102096.

Pantano E and Priporas C-V (2016) The effect of mobile retailing on consumers' purchasing experiences: A dynamic perspective. *Computers in Human Behavior* 61: 548-555.

Parasuraman A, Zeithaml VA and Berry LL (1985) A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing* 49(4): 41-50.

Parasuraman A, Zeithaml VA and Berry LL (1988) SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing* 64(1): 12-40.

Patterson PG and Spreng RA (1997) Modelling the relationship between perceived value, satisfaction and repurchase intentions in a business-to-business, services context: an empirical examination. *International Journal of Service Industry Management* 8(5): 414-434.

Piotrowicz W and Cuthbertson R (2014) Introduction to the Special Issue Information Technology in Retail: Toward Omnichannel Retailing. *International Journal of Electronic Commerce* 18(4): 5-16.

Porter ME (1996) What Is Strategy? *Harvard Business Review* 74(6): 61-78.

PostNord (2020) *E-barometern (2019)*. Available at: https://dhandel.se/wp-content/uploads/2020/02/e-barometern-arsrapport-2019.pdf (accessed 04 November 2021).

Postnord (2023) *E-barometern årsrapport (2022)*. Available at: https://storage.pardot.com/862341/16768759040SmoLffE/e_barometern_a__rsrapport_2022.pdf (accessed 28 Feb 2023).

Puccinelli NM, Goodstein RC, Grewal D, et al. (2009) Customer Experience Management in Retailing: Understanding the Buying Process. *Journal of Retailing* 85(1): 15-30.

Punakivi M, Yrjölä H and Holmström J (2001) Solving the last mile issue: reception box or delivery box? *International Journal of Physical Distribution & Logistics Management* 31(6): 427-439.

PWC (2023) *Last mile delivery in times of uncertainty - Retail Monitor 2023*. Available at: https://www.pwc.nl/en/insights-and-publications/services-and-industries/retail-and-consumer-goods/last-mile-delivery.html#speed (accessed 24 Feb 2023).

Pålsson H (2018) *Packaging Logistics: Understanding and managing the economic and environmental impacts of packaging in supply chains.* Kogan Page Publishers.

Pålsson H and Olsson J (2023) Current state and research directions for disposable versus reusable packaging: A systematic literature review of comparative studies. *Packaging Technology and Science* 36(6): 391-409.

Pålsson H, Pettersson F and Winslott Hiselius L (2017) Energy consumption in e-commerce versus conventional trade channels - Insights into packaging, the last mile, unsold products and product returns. *Journal of Cleaner Production* 164: 765-778.

Quantis (2018) *Measuring fashion: insights from the environmental impact of the global apparel and footwear industries*. Available at: https://quantis-intl.com/measuring-fashion-report (accessed 30 Nov 2022).

Ranieri L, Digiesi S, Silvestri B, et al. (2018) A review of last mile logistics innovations in an externalities cost reduction vision. *Sustainability (Switzerland)* 10(3).

Rao S, Goldsby TJ, Griffis SE, et al. (2011) Electronic Logistics Service Quality (e-LSQ): Its Impact on the Customer's Purchase Satisfaction and Retention. *Journal of Business Logistics* 32(2): 167-179.

Rigby D (2011) The future of shopping. *Harvard Business Review* 89(12): 65-76.

Robledo MA (2001) Measuring and managing service quality: integrating customer expectations. *Managing Service Quality: An International Journal* 11(1): 22-31.

Rooderkerk R, de Leeuw S and Hübner A (2023) Advancing the marketing-operations interface in omnichannel retail. *Journal of Operations Management* n/a(n/a).

Roy Dholakia R and Zhao M (2010) Effects of online store attributes on customer satisfaction and repurchase intentions. *International Journal of Retail & Distribution Management* 38(7): 482-496.

Saghiri SS, Bernon M, Bourlakis M, et al. (2018) Omni-channel logistics special issue. *International Journal of Physical Distribution and Logistics Management* 48(4): 362-364.

Sandberg E (2013) Understanding logistics-based competition in retail – a business model approach. *International Journal of Retail & Distribution Management* 41(3): 176-188.

Santa-Maria T, Vermeulen WJV and Baumgartner RJ (2021) Framing and assessing the emergent field of business model innovation for the circular economy: A combined literature review and multiple case study approach. *Sustainable Production and Consumption* 26: 872-891.

Santa-Maria T, Vermeulen WJV and Baumgartner RJ (2022) The Circular Sprint: Circular business model innovation through design thinking. *Journal of Cleaner Production* 362: 132323.

Schmitt B (1999) Experiential Marketing. *Journal of Marketing Management* 15(1-3): 53-67.

Seybold PB (2001) Get Inside the Lives of Your Customers. *Harvard Business Review* 79(5): 80-89.

Shah D, Rust RT, Parasuraman A, et al. (2006) The Path to Customer Centricity. *Journal of Service Research* 9(2): 113-124.

Sharma A, Grewal D and Levy M (1995) The customer satisfaction/logistics interface. *Journal of Business Logistics* 16(2): 1-21.

Sheth JN, Sisodia RS and Sharma A (2000) The antecedents and consequences of customer-centric marketing. *Journal of the Academy of Marketing Science* 28(1): 55-66.

Shih H-p, Lai K-h and Cheng TCE (2013) Informational and Relational Influences on Electronic Word of Mouth: An Empirical Study of an Online Consumer Discussion Forum. *International Journal of Electronic Commerce* 17(4): 137-166.

Singh R and Rosengren S (2020) Why do online grocery shoppers switch? An empirical investigation of drivers of switching in online grocery. *Journal of Retailing and Consumer Services* 53: 101962.

Sorescu A, Frambach RT, Singh J, et al. (2011) Innovations in Retail Business Models. *Journal of Retailing* 87: S3-S16.

Spens KM and Kovács G (2006) A content analysis of research approaches in logistics research. *International Journal of Physical Distribution & Logistics Management* 36(5): 374-390.

Sridhar S and Srinivasan R (2012) Social Influence Effects in Online Product Ratings. *Journal of Marketing* 76(5): 70-88.

Srivastava M and Kaul D (2014) Social interaction, convenience and customer satisfaction: The mediating effect of customer experience. *Journal of Retailing and Consumer Services* 21(6): 1028-1037.

Stank TP, Daugherty PJ and Ellinger AE (1999) Marketing/Logistics Integration and Firm Performance. *The International Journal of Logistics Management* 10(1): 11-24.

Statista (2022a) *Global parcel shipping volume between 2013 and 2027 (in billion parcels)*. Available at: https://www.statista.com/statistics/1139910/parcel-shipping-volume-worldwide/ (accessed 26 March 2023).

Statista (2022b) *Retail e-commerce sales worldwide from 2014 to 2026* Available at: https://www.statista.com/statistics/379046/worldwide-retail-e-commerce-sales/ (accessed 26 March 2023).

Statista (2023) *Fashion Worldwide*. Available at: https://www.statista.com/outlook/dmo/ecommerce/fashion/worldwide (accessed 23 July 2023).

Stein A and Ramaseshan B (2016) Towards the identification of customer experience touch point elements. *Journal of Retailing and Consumer Services* 30: 8-19.

Swan JE and Trawick IF (1980) Satisfaction related to predictive vs. desired expectations. In: Hunt HK and Day RL (eds) *Refining concepts and measures of consumer satisfaction and complaining behavior*. Bloomington: School of Business, Indiana University, pp.7-12.

Tax SS, McCutcheon D and Wilkinson IF (2013) The Service Delivery Network (SDN):A Customer-Centric Perspective of the Customer Journey. *Journal of Service Research* 16(4): 454-470.

Teas RK (1993) Expectations, Performance Evaluation, and Consumers' Perceptions of Quality. *Journal of Marketing* 57(4): 18-34.

Teece DJ (2018) Business models and dynamic capabilities. *Long Range Planning* 51(1): 40-49.

Thredup (2022) *Resale report*. Available at: https://www.thredup.com/resale/ (accessed 26 Jan 2023).

Tracy SJ (2013) *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact.* West Sussex: Wiley-Blackwell.

Trusov M, Bucklin RE and Pauwels K (2009) Effects of Word-of-Mouth versus Traditional Marketing: Findings from an Internet Social Networking Site. *Journal of Marketing* 73(5): 90-102.

Tsai Y-T and Tiwasing P (2021) Customers' intention to adopt smart lockers in last-mile delivery service: A multi-theory perspective. *Journal of Retailing and Consumer Services* 61: 102514.

Tukker A (2004) Eight types of product–service system: eight ways to sustainability? Experiences from SusProNet. *Business Strategy and the Environment* 13(4): 246-260.

Tura N, Hanski J, Ahola T, et al. (2019) Unlocking circular business: A framework of barriers and drivers. *Journal of Cleaner Production* 212: 90-98.

United Nations Climate Change (2018) *UN Helps Fashion Industry Shift to Low Carbon*. Available at: https://unfccc.int/news/un-helps-fashion-industry-shift-to-low-carbon (accessed 30 Nov 2022).

United Nations environment programme (n.d.) *Retail*. Available at: https://www.unep.org/explore-topics/resource-efficiency/what-we-do/sustainable-lifestyles/retail (accessed 26 March 2023).

Unnikrishnan S, Fovargue H, Urani D, et al. (2022) *Sustainability in Retail Is Possible—But There's Work to Be Done*. Available at: https://www.bcg.com/publications/2022/sustainability-in-retail (accessed 26 March 2023).

Vakulenko Y, Hellström D and Hjort K (2018) What's in the parcel locker? Exploring customer value in e-commerce last mile delivery. *Journal of Business Research* 88: 421-427.

Vakulenko Y, Shams P, Hellström D, et al. (2019a) Online retail experience and customer satisfaction: the mediating role of last mile delivery. *The International Review of Retail, Distribution and Consumer Research* 29(3): 306-320.

Vakulenko Y, Shams P, Hellström D, et al. (2019b) Service innovation in e-commerce last mile delivery: Mapping the e-customer journey. *Journal of Business Research* 101: 461-468.

van Loon P, Deketele L, Dewaele J, et al. (2015) A comparative analysis of carbon emissions from online retailing of fast moving consumer goods. *Journal of Cleaner Production* 106: 478-486.

Vargo SL and Lusch RF (2004) Evolving to a New Dominant Logic for Marketing. *Journal of Marketing* 68(1): 1-17.

Vargo SL and Lusch RF (2008) Service-dominant logic: continuing the evolution. *Journal of the Academy of Marketing Science* 36(1): 1-10.

Verhoef PC, Kannan PK and Inman JJ (2015) From Multi-Channel Retailing to Omni-Channel Retailing: Introduction to the Special Issue on Multi-Channel Retailing. *Journal of Retailing* 91(2): 174-181.

Verhoef PC, Lemon KN, Parasuraman A, et al. (2009) Customer Experience Creation: Determinants, Dynamics and Management Strategies. *Journal of Retailing* 85(1): 31-41.

Viet NQ, de Leeuw S and van Herpen E (2023) The impact of social vs environmental sustainability information disclosure on consumer choice of delivery time with varying sustainability concerns. *International Journal of Physical Distribution & Logistics Management* 53(11): 26-52.

von Briel F (2018) The future of omnichannel retail: A four-stage Delphi study. *Technological Forecasting and Social Change* 132: 217-229.

Wagner G, Schramm-Klein H and Steinmann S (2020) Online retailing across e-channels and e-channel touchpoints: Empirical studies of consumer behavior in the multichannel e-commerce environment. *Journal of Business Research* 107: 256-270.

Wollenburg J, Hübner A, Kuhn H, et al. (2018) From bricks-and-mortar to bricks-and-clicks: Logistics networks in omni-channel grocery retailing. *International Journal of Physical Distribution & Logistics Management* 48(4): 415-438.

Woodruff RB (1997) Customer value: The next source for competitive advantage. *Journal of the Academy of Marketing Science* 25(2): 139.

Wygonik E and Goodchild A (2011) Evaluating CO2 emissions, cost, and service quality trade-offs in an urban delivery system case study. *IATSS Research* 35(1): 7-15.

Wygonik E and Goodchild AV (2018) Urban form and last-mile goods movement: Factors affecting vehicle miles travelled and emissions. *Transportation Research Part D: Transport and Environment* 61: 217-229.

Xing Y, Grant DB, McKinnon AC, et al. (2011) The interface between retailers and logistics service providers in the online market. *European Journal of Marketing* 45(3): 334-357.

Xu M, Ferrand B and Roberts M (2008) The last mile of e-commerce - Unattended delivery from the consumers and eTailers' perspectives. *International Journal of Electronic Marketing and Retailing* 2(1): 20-38.

Yin RK (2018) *Case Study Research and Applications.* Thousand Oaks, California: Sage.

Yoo J and Park M (2016) The effects of e-mass customization on consumer perceived value, satisfaction, and loyalty toward luxury brands. *Journal of Business Research* 69(12): 5775-5784.

Zalando (n.d.) *Extending the life of fashion: Creating new business models for a more circular future*. Available at: https://corporate.zalando.com/en/our-impact/extending-life-fashion (accessed 28 June 2023).

Zeithaml VA, Berry LL and Parasuraman A (1993) The Nature and Determinants of Customer Expectations of Service. *Journal of the Academy of Marketing Science* 21(1): 1-12.

Zentes J, Morschett D and Schramm-Klein H (2017) Cross-channel Retailing. In: Zentes J, Morschett D and Schramm-Klein H (eds) *Strategic Retail Management*. Wiesbaden: Springer Gabler, pp.95-114.

Zomerdijk LG and Voss CA (2010) Service Design for Experience-Centric Services. *Journal of Service Research* 13(1): 67-82.

Zott C and Amit R (2007) Business Model Design and the Performance of Entrepreneurial Firms. *Organization Science* 18(2): 181-199.

Zott C, Amit R and Massa L (2011) The Business Model: Recent Developments and Future Research. *Journal of Management* 37(4): 1019-1042.

Zucchella A and Previtali P (2019) Circular business models for sustainable development: A "waste is food" restorative ecosystem. *Business Strategy and the Environment* 28(2): 274-285.

Appendices

Appendix I: Interview guide study B

Section 1: Household dynamics

Purpose: To achieve an overall picture of the household dynamics.

1. What is the occupation of the adults in the household?
2. What is the age and gender of children in the household?
3. Does anyone in the family have an allergy or food preference (lactose free, gluten free)?
4. Do you have any hobbies or interests that may affect your shopping habits?
5. Do you have any pets? If yes, how many and what kind?
6. Please describe an average day for the household.
7. When do you leave the house?
8. When does work start? End?
9. When does school start? End?
10. Do the children go to daycare after school?
11. How many days a week do you have extra activities?
12. Do you eat meals together as a family?

Section 2: Grocery shopping habits

Purpose: To map and understand the grocery shopping habits prior to using the unattended home delivery service.

13. Who does most of the food shopping in the home?
14. How do you get to and from the store?
15. Do you do your grocery shopping at one or at multiple different stores?
16. Where do you usually do your grocery shopping?
17. Did you join any loyalty programs to these stores?
18. Do you feel like you spend a lot of time shopping for groceries?
19. Do you enjoy going to the grocery store?
20. How does walking through a grocery store make you feel?

21. To pay for your groceries do you normally go to the self-checkout or the cashier?
22. Do you prefer to buy a lot of items at once or fewer items more often?
23. What do you normally buy when you buy groceries?
24. Do you plan meals or buy a lot of food allow yourself to be inspired?
25. Have you ever bought anything online? If yes, how often do you order things online?
26. What do you normally buy online?
27. Which online stores do you normally order from?
28. Have you ever bought your groceries online?
29. If so, from which retailer?
30. How was your experience previously with buying groceries online?

Section 3: Comfort with technology use

Purpose: To understand and get insights into the users' comfort with technology use.

31. Do you use a smart phone?
32. Do you have apps on your phone?
33. What sort of apps do you have on your phone?
34. Do you feel like you are capable in using smart phones and apps?
35. Are you one who enjoys testing new technology?

Section 4: Expectations of the unattended delivery service

Purpose: To describe and understand the expectations of the unattended delivery service.

36. Why did you opt to be a part of this project?
37. Do you have any expectations for this experience?
38. How do you think this will affect your life?
39. Do you have any concerns about how unattended delivery service and the app will work?

Appendix II: Respondents study C

The selected households had extensive online shopping experience and used the unattended delivery service with varying frequency (see Table A1). All households primarily received e-grocery orders, while once in a while some received other products as well (e.g., apparel). The households were upper middle-class, dual-income households located in the suburbs of Helsingborg, Sweden. Eight households comprised two adults and at least two underage children, with the ninth household comprising only two adults. Indicative of early adopters, the selected households showed strong interest in innovation and technological development, providing extensive feedback to modify and refine the service.

Table A1. Descriptive information of the respondents

Respondent(s)	Gender	Age group	Household composition (adults; children)	Occupation (respondent; partner)	Online shopping frequency non-grocery	Online shopping frequency grocery	Use of unattended delivery service
Respondent A1 Respondent A2	Female; Male	51-60 51-60	2; 0	Quality Manager; Purchasing Manager	Every two months	Tried once	Every two weeks
Respondent B	Female	31-40	2; 2	Teacher; Entrepreneur	Every week	Every week	Every two weeks
Respondent C	Male	31-40	2; 2	Operations Manager; Real Estate Assistant	Every week	Tried once	Every month
Respondent D	Female	41-50	2; 3	Project Manager; Sales Manager	Every week	Every week	Every month
Respondent E	Female	41-50	2; 2	Financial Officer; Senior Engineer	Every month	Every week	Every week
Respondent F	Female	41-50	2; 2	Senior Engineer; Marketing Manager	Every week	Every month	Every two months
Respondent G	Male	31-40	2; 2	Senior Engineer; Accountant	Every month	Every month	Every month
Respondent H	Male	41-50	2; 2	Technical Manager; Project Manager	Every week	Every week	Every week
Respondent I	Male	41-50	2; 2	Project Manager; HR Manager	Every two months	Tried once	Every two weeks

Appendix II: Interview guide study C

Section 1: Introduction and implementation

Purpose: To achieve an overall picture of the introduction and implementation of the system.

40. When was the reception box installed? For how long have you been using it?
41. How often/frequently have you used the unattended delivery service to receive deliveries through it?
42. What type of products did you receive using the unattended delivery service? From which retailers did you order it?
43. Who in the household wanted to test the unattended delivery service? Who orders and who collects the deliveries?
44. How was the overall experience? What are the positive and negative aspects of the experience?
45. Was there anything that surprised you about the unattended delivery service?

Section 2: The transformation process

Purpose: To map and understand the transformation processes that lead to a new experience.

46. How has your attitude towards unattended delivery services changed?
47. How has your (grocery) shopping behavior changed? (Volume, frequency, types of products, retailers, etc.)
48. How has your total spending on groceries been affected?
49. Have you discussed the unattended delivery service with co-workers, friends, and family? What have you shared with them? How do they react?
50. How has unattended delivery service affected your life and your family life? If you can, please think of some examples.
51. You've been using the unattended delivery service for some 6 months now and did your grocery shopping online. How has this affected your social interaction?
52. What was it like to buy groceries since you started using the unattended delivery service? How was the experience? Why?
53. Did you notice any other changes since you started using the unattended delivery service?

Section 3: The unattended delivery service system

Purpose: To understand and get insights into the interviewees perception of the unattended delivery system.

54. Please describe in your own words how the unattended delivery system works.
55. The unattended delivery service is connected to an App. Please describe your thoughts about that. What do you like, dislike, what would you change?
56. What do you think of the reception box? Did everything work? What do you think is positive and negative about the box? What would you like to change?
57. What do you think about the deliveries to the reception box? How well have these deliveries worked?
58. How well did this service integrate into your daily life? What aspect? How? and why?
59. What are your main advantages/disadvantages of the unattended delivery system?
60. Have you experienced problems with the system? What was the problem? Why did it occur? How was it recovered/handled?
61. What do you think of the retailer's website? How does it feel when you visit/interact with the retail website?

Section 4: Results

Purpose: To describe and understand the results of the implementation.

62. Which benefits did the unattended delivery system provide for you and your household? How valuable were these benefits?
63. What did you gain from using these unattended delivery services?
64. Is there anything you had to give up when you started using the unattended delivery service?
65. What are the most important factors for you when evaluating your experience with the unattended delivery service?
66. What do the other members of your household think about the unattended delivery service? Which factors are important for them?
67. What did you learn from participating in this pilot project?
68. In how far did the unattended delivery system fulfill your expectations?

Section 5: Reflections on the experience

Purpose: To provide a holistic view on the experience and to put it into perspective.

69. How does using the unattended delivery differ from going to a physical grocery store?
70. Do you still go to a physical grocery store? Why?
71. Do you prefer going to the physical store or using unattended delivery? Why?
72. Between unattended and attended delivery services, which one do you prefer? Why?
73. Is there anything you would like to change about this service? What, how and why?

Section 6: Future thoughts

Purpose: To understand in how far unattended delivery services are considered as potential solutions for future deliveries from the consumers perspective.

74. Do you think you will continue to use unattended home delivery services in the future? Why?
75. After using this service for a while now, would you be willing to pay for the unattended delivery system? How much would you be willing to pay?
76. Do you think unattended home delivery services will break through, become very common (prevail)?
77. Is there anything that you would like to add? Is there anything we have missed?
    Is there anything you have noticed that you would like to bring to our attention?

Appendix III: Research quality study C

This study implemented well-established measures to ensure trustworthiness throughout the research process. Research quality often is evaluated in terms of construct validity, internal validity, external validity, and reliability. Multiple measures were employed in this research to ensure rigor in the research design, data collection, and data analysis (see Table A2).

Table A2. Trustworthiness of the study and findings.

Quality criteria	Tactics	Implemented measures
Construct validity Extent to which the study measures the intended constructs	-Engage knowledge experts in relevant functions -Key informants review draft report	-Joint experience exchange seminars to collect feedback from practitioners. -Practitioners and respondents reviewed the manuscript -Investigators checked interview transcripts against recordings
Internal validity Degree to which the study establishes a trustworthy causal relationship	-Engage key informants providing access and information -Pattern matching -Explanation building -Rival explanations -Logic models	-Multiple investigators analyzed the data independently -The analysis clearly links the data to prior and emerging theory -Each data collection cycle ended with analyzing and describing preliminary results as a basis for joint experience exchange seminars -Comparison of predicted patterns with observed empirical patterns -Carefully developed propositions and actively considered rival explanations
External validity Extent to which the study findings can be generalized analytically.	-Engage intended audience -Use theory	-Engaged with practitioners as part of the research project -Anchored in theory and extant scientific literature -Clearly defined criteria for selecting early adopters in collaboration with practitioners -Thoroughly documented the respondent selection and generated rich descriptions of household characteristics -Rich descriptions of contextual factors facilitate analytical generalization
Reliability Consistency and repeatability of study findings.	-Establish a chain of evidence -Documentation of the research process	-Detailed documentation of the research process -A standardized interview protocol was used to conduct the semi-structured interviews -Recorded interviews transcribed verbatim -Analytical constructs well-defined and grounded in the extant literature -Inter-coder agreement checks

Appendix IV: Interview guide study D

This interview guide was developed for multiple key stakeholders to provide a basis for developing and validating the circular business model. The interview guide was developed based on business model literature and structured based on the Business Model Canvas (Osterwalder and Pigneur 2010). Each interview started with watching a video that introduced the business model concept and its key components. Before going into the details of the business model components, participants were asked broad and open questions to give participants room to elaborate on their own thoughts.

Part 1 – Value propositions and customer segments

1. What value do you think the digital service can deliver?
2. For e-retailers? User? Charities? Other actors?
3. What needs could be fulfilled by this service?
4. Who can the service target and create value for?
5. Who do you see as important customers, i.e., the actors who might be willing to pay for the service?
6. Who do you see as important users? What does the target audience look like?

Part 2 – Let's go deeper into value proposition canvas.

Customer Jobs

7. Describes what customers and users feel they want to achieve. It can be whether they are trying to perform a specific task, solve a problem or fulfil a need.
8. What can be the functional, social, and emotional values of the service?
9. What needs can be met?

Customer Pains

10. What limitations do you see with the service?
11. What are the main difficulties and challenges of the service?
12. What risks do you see with the service?
13. What can prevent customers and users from using the service?
14. What could be perceived as too expensive with the service?
15. Is there anything in the service that risks underperforming?
16. What common mistakes could occur?
17. What could create negative emotions with the service? What feelings?

18. What negative social consequences exist?
19. What could keep customers and users awake at night?

Customer Gains

20. What opportunities do you see with the service?
21. What do you think is positive and gratifying about the service?
22. Do you see a marketing opportunity in the service? CSR?
23. How would the service make everyday life easier for customers and users?
24. What savings can be created by the service?
25. What do you think customers and users are looking for in a service like this?
26. What are the expectations for the service and what would it take to go beyond these expectations?
27. What would increase the likelihood of starting to use or take part in the service?
28. What are the positive social consequences of the service?
29. What is the dream for the customer or user?
30. What would determine whether the customer or user sees the service as successful or unsuccessful?

Part 3 – Channels and customer relationships

31. Through which channels can the service reach out to its customers and users?
32. Does the choice of channel matter? Are there better or worse channels?
33. Which channels are most cost-efficient?
34. How are we integrating them with customer routines?
35. What do you think the relationship might look like between the service and its customers and users?
36. How are the customer segments integrated with the business model?

Part 4 – Feasibility: Key partners, key activities, key resources

Key Partners

37. Which actors can be important partners for the service?
38. What are your thoughts on the choice of e-retailers and charities that are part of the service? Are there others?
39. How could these contribute resources and activities?

Key Activities

40. What do you think are the most important activities for the business model?
41. Which activities are the primary drivers of customer relationship?
42. Where does our distribution channel provide value-add?

Key Resources

43. What do you think are the most important resources for the service?
44. Which significant resources do our distribution channels require?
45. What significant resources do our customer relationships require?
46. Which significant resources do our revenue streams require?

Part 5 – Viability: Cost structure and revenue streams

Cost Structure

47. What are the main costs of the service?
48. What resources and activities would be the most expensive?
49. Which costs are most critical our business structure?
50. What primary resources are the most expensive?
51. What primary activities are the most expensive?

Revenue Streams

52. For what value are our customers and users willing to pay?
53. Are there other actors that might be willing to pay?
54. What are your thoughts on digital advertisement in the service? Are there better or worse methods for advertising?
55. What method would they prefer to use for paying?
56. How much does each revenue stream contribute to overall revenues?

Printed by Media-Tryck, Lund 2023 NORDIC SWAN ECOLABEL 3041 0903

About the author

JOHN OLSSON grew up bilingual in a German-Swedish family in a suburb of Frankfurt, Germany. He completed his undergraduate studies in Business Engineering (BSc) at Technische Hochschule Mittelhessen (University of Applied Sciences) in Germany, before moving to Sweden for his postgraduate studies in Supply Chain Management (MSc) at Linnaeus University. Embarking on an academic path, he commenced his research education in 2018 within the division of Packaging Logistics at Lund University. His research focuses on last-mile delivery services in retail from the consumer perspective.

LUND UNIVERSITY

Division of Packaging Logistics
Department of Design Sciences
Faculty of Engineering

ISBN 978-91-8039-743-8