Master's Thesis:

Paradoxical Tensions and Responses in Last-Mile Logistics Ecosystems



Eric Haynes (s1008467) email: Eric.Haynes@student.ru.nl MSc International Business Nijmegen School of Management Radboud University Supervisor: Prof. Dr. Kristina Lauche Second Examiner: Arjen Verhoeff Word Count: 16,397 14/6/2021

Table of Contents

Abstract		2
1. Intro	2	
	1.1 Collaborative Sustainability Efforts in Supply Chain Logistics	2
	1.2 Paradoxes, Tensions, and Responses	4
2. Theoretical Background		5
	2.1 Paradoxes and Sustainability	ϵ
	2.2 Paradox Theory	7
	2.3 Paradoxical Tensions Typology	ç
	2.3.1 Belonging Tensions	9
	2.3.2 Performing Tensions	10
	2.3.3 Organising Tensions	10
	2.3.3 Learning Tensions	10
	2.3.4 Coopetition in Collaborative Ecosystems	11
3 Methodo	12	
	3.1 Research Design	12
	3.2 Data Collection	14
	3.3 Data Analysis with Sensitizing Concepts	15
	3.4 Research Ethics	18
4. Results		19
	4.1 Goals	19
	4.1.1 Financial Sustainability	20
	4.1.2 Environmental Sustainability	23
	4.1.6 Social Sustainability	24
	4.2 Role Definitions	25
	4.3 Collaborative Efforts	28
	4.3.1 Strategic Alignment	28
	4.3.2 Operational Processes	29
	4.3.3 Knowledge and Capacities	31
	4.4 Future Plans, Concerns, and Outlook	34
	4.5 COVID-19 Impacts	35
5. Discuss	ion	36
	5.1 Belonging Tensions	37
	5.2 Performing Tensions	37
	5.3 Organising Tensions	38
	5.4 Learning Tensions	39
	5.5 Vicious and Virtuous Cycles	39
	5.6 Practical Implications	40
	5.7 Theoretical Implications	41
	5.8 Limitations	41
	5.9 Directions for Further Research	42
6. Conclusion		42
	6.1 Critical Reflection	43
Reference	S	44
Appendix		48
Interview Guide		48
Research Integrity Form		49
	Research Integrity Form	

Abstract

As managerial and academic interest in sustainable development grows, organisations face new challenges in implementing feasible solutions to address environmental, financial, and social concerns. For distribution chains, 'last-mile' solutions have been devised by academics and practitioners alike to address sustainability in logistics systems. This paper, through the perspectives of multiple stakeholders within last-mile logistics ecosystems, seeks to explore tensions that are intrinsically paradoxical and responses to them that could potentially lead to sustainable solutions in the last mile of logistics chains. This study affirms paradox theory as a valid lens through which to view interorganisational collaborations and elucidates the most predominant drivers toward vicious cycles which create barriers to long-term sustainability in last-mile logistics ecosystems.

1. Introduction

1.1 Collaborative Sustainability Efforts in Supply Chain Logistics

Developments in new technology and a growing pool of academic literature point to sustainability as an increasingly pertinent goal for organisations. Corporate sustainability has grown to encapsulate societal goals such as ecological protection, social equity, and economic development, which parallel traditional goals of profitability and long-term growth (Wilson, 2003; Zhang et al., 2017). This model of sustainable development has been widely referred to as the triple bottom line (Gimenez et al., 2012; Kleindorfer et al., 2009). However, many key actors in organisations find meeting and consistently pursuing sustainable development goals along the triple bottom line challenging as a result of prevailing tensions (Chapardar, 2016). These tensions stem from the need to simultaneously address objectives that may be conflicting in nature, such as pursuing ecological sustainability whilst retaining profitability. Addressing this conundrum, mathematical models have been devised along the triple bottom line model to provide insights to managers on how to incorporate environmental, social, and economic sustainability into their business models (Mota et al., 2014). Aiming toward sustainability efforts while being evaluated by organisational and public stakeholders results in a high degree of complexity when making decisions (Ozanne et al. 2016). This study addresses this decision-making while taking a paradox perspective as per Smith and Lewis's (2011) Dynamic Equilibrium Model to explore the balance between tensions and how key actors respond to them, by considering two last-mile logistics living labs in the Netherlands and the United Kingdom. Given the nature of last-mile logistics ecosystems - both in terms of managing sustainability challenges and the differences in goals among a plurality of key actors - these collaborations, tensions, and responses lend themselves to being explored through a paradox lens (Smith and Lewis, 2011).

An area in which organisations have examined their sustainability efforts is in supply chain logistics. Various stakeholders in supply chains have addressed sustainability concerns through collaborations in last-mile logistics environments. In essence, last-mile logistics ecosystems involve a variety of stakeholders (i.e., suppliers, customers, activists, and local governmental bodies) who collaborate in the final leg of the supply chain wherein the product is delivered to its end-user (Harrington et al., 2016; Linton et al., 2007). The intent of this collaboration is to address sustainability challenges that result from transportation activities through a combination of efficient supply chain management and organisational design (Harrington et al., 2016). In terms of triple bottom line sustainability, transportation activities can have economic impacts such as traffic congestion, barriers to mobility, and increased delivery costs (Korzhenevych et al., 2014). Carbon emissions and noise pollution from heavy and inefficient traffic flows also impose negative environmental and social impacts (Korzhenevych et al., 2014; Ranieri et al., 2018). As a way to reduce these external costs, collaborators in a last-mile logistics ecosystem could elect to utilise only electric vehicles for final deliveries, often positioned as a viable solution to reducing air pollution related to urban freight transportation (Taefi et al., 2016). However, the decision to acquire electric vehicles could result in increased costs, ultimately affecting profitability. In this illustration, a tension exists between employing electric vehicles for environmental considerations while maintaining a sustainably viable cost structure.

Within the arena of supply chain management, the last mile, i.e., delivering finished products to the final customer, is considered to be "the most expensive, least efficient, and most polluting sections of the entire logistics chain" (Macharis and Melo, 2011). Therefore, analysing how actors in the last mile strive toward sustainable development goals allows for an aggregate view of the product's impact from raw material extraction to end-user (Linton et al., 2007). The collaboration process in these ecosystems, including goal formulation, may involve several internal and external stakeholders: firms, non-governmental organisations, local governments, customers, and research institutes (Linton et al., 2007), with the cooperation between these actors being paramount for the realization of sustainable development goals in the supply chain (Chen et al., 2017). Given a wide variety of potentially conflicting goals - either between internal and external stakeholders or working toward triple bottom line goals in last-mile logistics collaborations - balancing tensions on a continual basis is vital in achieving sustainability. For example, while last-mile logistics solutions have been initiated and targeted at reducing externalities, local governments have aimed to reduce emissions in more than 260 low-emissions zones in cities across 12 EU member states (Transport & Environment, 2018). In August of 2020, Bristol City Council in the United Kingdom announced their intentions to implement "Clean Air Zones" which enforce restrictions such as bans on diesel vehicles in the city centre in an attempt to encourage the use of more environmentally conscious transportation options

(Bristol.gov.uk., 2020; Gogarty, C., 2020). These regulations are aimed at decreasing emission in urban centres, but freight companies are required to comply while simultaneously uncovering avenues to maintain an acceptable degree of profitability. In fact, freight companies have already been observed violating these regulations (Gogarty, C., 2020). Thus, the difference between the local council's goal of lowering emissions in the city centre, and the freight company's profit objectives exhibit a paradox to be managed.





source: Bristol City Council (Bristol.gov.uk)

1.2 Paradoxes, Tensions, and Responses

Using a paradox perspective, the intricacies of the alignment and orchestration processes can be explored more holistically. Although alignment and orchestration of sustainable goals have been viewed through a multi-stakeholder perspective (Harrington et al., 2016; Katsela & Browne, 2019), exploring which paradoxical tensions materialize, and the subsequent managerial responses can illuminate how to confront sustainability tensions more efficiently in last-mile logistics ecosystems. Moreover, corporate sustainability requires recognizing various actors, many of whose goals are in direct conflict to that of the firms' and whose logics may contradict that of managers (Maon et al. 2008; Hahn et al., 2015). Applied to sustainable logistics, wherein goals and orchestration efforts often conflict, a paradox perspective can advance the understanding of these tensions as a continual and persistent issue that key stakeholders experience and manage.

This study focuses on describing tensions in last-mile logistics ecosystems from a paradox lens, according to Smith and Lewis's (2011) Dynamic Equilibrium Model of Organizing, and how various partners in the collaboration respond to the tensions found. Exploring these tensions from a paradox lens and the subsequent responses is practically relevant for field practitioners, as it provides insight into a complex business ecosystem focused on a plurality of goals. Given that this is an emerging phenomenon that has not been widely tested, particularly within the context of sustainability logistics, an in-depth exploratory approach is appropriate (Linton et al., 2007). Furthermore, theory based on paradoxical tensions, latent drivers for competition and cooperation in logistics environments, and perspectives on sustainability governance and management are tested and refined.

Overall, the **goal** for this research is to explore how key stakeholders deal with paradoxical tensions and their responses to these tensions in urban last-mile logistics ecosystems via a phenomenological lens. **The question** that will be answered in light of this research are: *How do actors in last-mile logistics ecosystems deal with tensions they encounter?*

2. Theoretical Background

The point of departure in terms of theoretical considerations is paradox theory, utilising this lens to explore the underlying tensions in last-mile logistics ecosystems and how key actors experience and respond to them. Last-mile logistics ecosystems have been examined in existing literature via a diverse set of theoretical foundations including institutional theory, game theory, and contingency theory (Jennings and Zandbergen 1995; Olsson et al. 2019). Game theory, for example, is utilised by Allen et al. (2017) to address the fair distribution of captured value from collaborations in a last-mile logistics ecosystem. However, Allen et al. (2017) conclude their discussion that cooperative game theory may not reflect operational reality in that calculations of fair value distribution for stakeholders fluctuates as a result of the dynamic nature of parcel distribution. Cristillo et al. (2018) employ a contingency theory lens to examine the performance of crowdsourced logistics efforts in the last mile of delivery. Insights gleaned from this study highlight the moderating effects that coalignment and the organisation's environment have on performance (Cristillo et al., 2018). While contingency theory offers a perspective on persisting organisational tensions, especially when discussing the alignment of goals and fit between the external and internal environments, it still assumes that alignment necessarily engenders organisational efficacy (Smith and Lewis, 2011). This

chapter details the theoretical background of this study by first describing theoretical conceptualisations of sustainability. Thereafter, paradox theory including the Dynamic Equilibrium Model of Organizing (Smith and Lewis, 2011) is detailed.

2.1 Paradoxes and Sustainability

Paradox theory offers a unique and promising lens through which tensions related to stakeholders' experiences and responses in last-mile logistics ecosystems can be explored. Paradoxes, in this case, are defined as interrelated yet contradictory elements that exist simultaneously and persist over time (Smith and Lewis, 2011). Characteristic of these elements are the underlying tensions that are rational when isolated, yet contradictory when juxtaposed such as tensions that can arise when making steps toward reducing an organisation's ecological footprint while simultaneously focusing on a leaner cost model (Ozanne et al., 2016). Additionally, these tensions require response strategies that address both paradoxical elements simultaneously (Smith and Lewis, 2011). This means that if an actor's goal is to formulate a low-cost transportation model, reducing carbon emissions must be simultaneously pursued, as opposed to viewed as a trade-off.

Sustainable development, in accordance with a triple bottom line framework, is defined as an integration of social, economic, and environmental goals (Gimenez et al., 2012; Kleindorfer et al., 2009). The complexity inherent in pursuing these three overarching goals means that achieving sustainable development creates tensions that cannot simply be resolved but must be accepted as continual paradoxical pressures (Ozanne et al., 2016; Smith and Lewis, 2011). This complexity persists since strategic responses required to address social, economic, and environmental goals are interrelated, yet often contradictory to one another, requiring a response strategy that embraces these three elements simultaneously (Ozanne et al., 2016). For example, strategy formulation for a stakeholder in a last-mile logistics environment may be aimed at environmental protection and economic competitiveness using electric vehicles for final customer delivery. However, the higher cost of employing electric vehicles may jeopardize the competitive positioning of a freight company. Therefore, a paradox perspective is positioned to address sustainable development since it allows for the exploration of the triple bottom line sustainability model as an inherently cohesive whole consisting of conflicting fragments (Ozanne et al., 2016).

Utilising a paradox lens also forgoes the need for actors to assess the opportunity cost of prioritizing ecological, social, and economic goals over another. This trade-off approach has garnered criticism given its view of sustainability goals as a zero-sum game (Hahn et al., 2015; Ozanne et al. 2016). Moreover, in last-mile logistics ecosystems ignoring the holistic nature of sustainability

concepts and stipulating that trade-offs are a necessity ignores the need for collaboration among stakeholders. Instead, the goals which make up the triple bottom line can be considered as paradoxical, simultaneously overlapping whilst in direct conflict. A common theme in triple bottom line sustainability literature is that the mitigation of certain environmental impacts may also impose economic and socio-political impacts (Starik and Rands, 1995). Therefore, looking at paradoxical tensions in reaching sustainability goals allows for a more nuanced approach in terms of theory on sustainability and the complex response strategies required of stakeholders.

2.2 Paradox Theory

Smith and Lewis (2011) propose a dynamic equilibrium based on paradox theory as an alternative to contingency approaches and conceptualise paradoxes as a construction of underlying tensions. As an alternative to contingency theory, a paradox perspective argues that long-term sustainability is reliant on continuous efforts to accept and meet conflicting demands simultaneously (Smith and Lewis, 2011). In contrast to contingency theory, rather than explaining drivers in the choice between exploration and exploitation, for example, paradox theory is equipped to explore how organisations attend to both of these demands. Additionally, a paradox lens allows for the exploration of the nature of the tension between conflicting demands.

Utilising a paradox view also allows for more nuanced perspectives by framing these underlying tensions as elements which coexist whilst also contradicting one another (Smith and Lewis, 2011), tensions which have been notably characteristic when considering sustainability concerns (Chapardar, 2016). It is proposed by Smith and Lewis (2011) that paradoxical tensions exist as latent concepts which persist as a result of organisational complexity and the need to adapt to situational factors. These latent tensions are rendered salient as a result of two broad categories of factors: environmental factors and actors' paradoxical cognition (Smith and Lewis, 2011). The environmental factors outlined are goal plurality, organisational change, and resource scarcity. To illustrate, the complexity of organisational goals exists in an organisation as a latent tension. This tension is rendered salient to key actors when managing strategies to achieve these goals. (Jarzabkowski et al., 2013). As organisations struggle to align their strategies to meet paradoxical goals, conflicting demands require actors to embrace interrelated and contradictory elements simultaneously. Performing tasks aimed at accomplishing competing goals may also be due to differences in values or views of failure or success (Jazabkowski et al., 2013). Individuals can also struggle to attend to conflicting demands in their individual roles on a micro level in inconsistent tasks.

According to Smith and Lewis (2011), once these latent tensions become salient under environmental conditions, response strategies require addressing this tension by first accepting the paradoxical tension and simultaneously embracing conflicting elements. In addition to exploring which tensions key actors experience, how they manage their responses is also indicative of how the tension can be dealt with in a sustainable manner and on a continual basis.

How managers respond to these salient tensions within this cycle is viewed as a key driver in resolving a paradox in a manner which leads to a virtuous cycle and thereby sustainability in the long run (Ozanne et al. 2016). When underlying paradoxes are managed poorly or conflicts exacerbated, this may result in a vicious cycle. For example, if one stakeholder's interest is ignored in favour of another actor's, a vicious cycle may occur, compounding the negative effects of an existing tension. In last-mile logistics, access restrictions to city centres as a result of local ordinances could cause delivery routes to be longer than necessary. This would increase emissions in other zones while delaying delivery times (Allen et al., 2017). This ultimately exacerbates the issue in the long run. A response which properly attends to the paradox and incorporates the need to meet delivery times whilst lowering emissions simultaneously, on the other hand, could lead to a virtuous cycle (Smith and Lewis, 2011).

Further, Smith and Lewis (2011) propose drivers of vicious and virtuous cycles once paradoxical tensions are rendered salient. Vicious cycles, they posit, originate in defensive positioning and emotional angst when facing contradictions. In these responses, actors signal distrust by overemphasizing controls while committing to a singularly focused short-term goal. Virtuous cycles, by contrast, are characterized by responses which accept the nature of the paradox. Acceptance may also warrant capitalizing on creative and collaborative opportunities (Beech et al., 2004). In these cycles, adopting a paradoxical mindset has been found to open discussions, nurture emotional equanimity in decision-making, and enable actors to productively pursue their goals (Smith and Lewis, 2011). In terms of attaining sustainability, a dynamic equilibrium approach: (1) enables creativity and organisational learning, (2) fosters resilience and flexibility, and (3) unleashes human potential (Smith and Lewis, 2011). Responses which attend to paradoxical demands can result in virtuous cycles, building on competencies and resulting in a more proactive and sustainable organisation (Tsoukas and Cunha, 2017). Smith and Lewis's (2011) Dynamic Model of Organizing is visualised below wherein virtuous cycles are viewed as paths to embracing paradoxical tensions and therefore, lead to potential sustainable solutions.

Figure 2: Dynamic Equilibrium Model of Organizing



Source: adapted from Smith and Lewis (2011)

2.3 Paradoxical Tensions Typology

Smith and Lewis (2011) propose four categories of organisational paradoxical tensions that are intrinsic to alignment and orchestration: belonging, performing, organizing, and learning. Given the symbiotic nature of actors in last-mile logistics ecosystems, these tensions are particularly relevant. It's also posited that, over time as managers move from defensive positions attempting to subvert paradoxes to accepting paradoxes and embedding them into organisational responses, these tensions coevolve with one another (Jazabkowski et al., 2013).

2.3.1 Belonging Tensions

Belonging tensions manifest when the individual actors converge and/or diverge from the identity of the collective of which they are a part (Smith and Lewis, 2011). In a last-mile logistics collaboration, this tension refers to preserving the individual organisational identity while simultaneously contributing to the collective identity of the ecosystem. Belonging tensions are reflected in the organisational culture, values, roles, and group membership (Smith and Lewis, 2011; Ozanne et al. 2016). Glynn (2000), for example, illustrates that conflicting organisational identities result in opposing responses to conflict resolution and, by extension, creates differing views on how organisational resources should be allocated. These paradoxes engage actors' defenses, thereby exacerbating the conflict (Lewis, 2000). By examining stakeholder's perceptions of their identity within the collaboration as well as their grouping of other internal and external stakeholders and how they assess the differences in values, indicators toward belonging paradoxes can be gleaned.

2.3.2 Performing Tensions

Performing tensions come from the plurality of stakeholders' goals and strategies (Smith and Lewis, 2011; Ozanne et al. 2016). The nature of these goals is also relevant. For sustainability purposes, for example, economic and environmental goals can be quantitatively measured where social goals are subjective (Ozanne et al. 2016). Exploring key actors' goals and how they balance them with the goals of other stakeholders can uncover potential performing tensions.

2.3.3 Organising Tensions

Organising tensions can be seen as the tension between competition and cooperation or trying to attain stability in a flexible system. This can also be categorised as 'coopetition' or the need to simultaneously collaborate and compete with one another (Bengtsson & Kock, 2000). Organising tensions can also manifest as a result of conflicting processes, designs, or structures and are often most obvious during periods of organisation change or realignment (Ozanne et al. 2016; Jazabkowski et al., 2013). Organising, in this sense, also means a continual process of managing forces that affect trust and commitment while simultaneously maintaining structure and efficiency (Lewis, 2000). In logistics ecosystems, organising tensions can be observed through examining how stakeholders balance the need for efficiency with the need to adapt either for sustainability purposes or to the goals of other actors.

2.3.3 Learning Tensions

Learning tensions relate to pressures that exist between exploring new possibilities and exploiting previous knowledge by building on it (Smith and Lewis, 2011). Holding on to exploiting core competencies can hinder an organisation's ability to innovate (Ozanne et al., 2016). More so than the other three types of tensions, learning tensions account for a time factor. Therefore, knowing what actors have learned in the past and how those lessons have been applied to core competencies can highlight how new capacities develop over time. Tensions can arise, for example, when actors assume that innovation is unnecessary in the face of a dynamic change (Lewis, 2000).

2.3.4 Coopetition in Collaborative Ecosystems

Given the increasing amount of collaborative projects in which organisations are engaging, be they last-mile logistics ecosystems, joint ventures, or learning alliances, simultaneously pursuing cooperative and competitive strategies is definitively paradoxical and creates tensions (Anderson, 1990; Khanna et al. 1998). Coopetition, as a construct, is inherently contradictory, consisting of two directly opposing yet interlocking logics. However, the acceptance of this dyadic and paradoxical emergent relationship should be emphasized in the establishment of a coopetitive relationship (Bengtsson & Kock, 2000). This view forgoes the traditional view of competition as a pejorative term relating to conflicting goals and actions between rivals. Instead viewing competition and cooperation as diametrically opposed forces that can coexist and even complement one another and contribute to a competitive advantage lends itself well to viewing organisational relationships through the lens of paradox theory. In a traditional sense, competition is viewed as an externalized conflict, however, in more tightly knit networks, in this case last-mile logistics ecosystems, the opposing logics of interaction are more pronounced in goal setting and orchestration processes (Bengtsson & Kock, 2000). This can be attributed to a plurality of actors pursuing a multitude of goals (Soh et al., 2019; Jarzabkowski et al., 2013). Simultaneously pursuing all stakeholder views and goals can cause these paradoxical tensions.

Systematizing competitive and cooperative elements specifically in logistics systems, Kozina and Pieczonka (2017) identify seven structural determinants each of which facilitate a dichotomous dimension of cooperation and competition. These determinants are as follows: objectives, tasks and functions, grouping of items, functional dependencies, hierarchical dependencies, decision-making powers, and formalization of activities. Each of these seven structural determinants can be identified within the logistics system as contributing to conflict or concord. For example, objectives can be formulated in alignment or goals can diverge creating incompatibilities between goal formulation and orchestration (Kozina and Pieczonka, 2017). The coexistence and paradoxical implications of these tensions can fall into these four categories and require recognition managerial action.

3 Methodology

3.1 Research Design

Seeking to explore the paradoxical tensions that key actors in last-mile logistics collaborations experience and respond to, this research has been conducted by means of an exploratory qualitative

multiple case study (Langley and Abdullah, 2011; Yin, 2003). Examining data from a phenomenological viewpoint best suits the exploratory nature and scope of this research. A case study, as defined by Myers (2013) utilizes empirical evidence from documents and interviews from multiple organisations where the phenomena is studied in context. A multiple case study design allows for exploring paradoxical tensions as nested in these two last-mile logistics environments (Yin 2003). A qualitative research approach is most appropriate for this study given the practical context of sustainability in last-mile logistics as well as the experiences of stakeholders in the two living labs (Myers, 2013).

This exploratory study takes an inductive approach following the Gioia methodology while using sentizing concepts derived from paradox theory literature (Gioia et al., 2012). Theoretical constructs from Lewis and Smith's (2011) Dynamic Equilibrium Model of Organizing such as the four-tension typology and two cycles are used as aggregate dimensions that are extracted from the open coding process. These theoretical concepts are ultimately used to abstract first order concepts, therefore allowing the constructs to emerge from the empirical data. The emphasis on exploring paradox theory concepts within the context of last-mile logistics living labs is also well-suited to this style of inductive research (Langley and Abdullah, 2011).

A multiple case study design also allows for a robust exploration of emerging concepts given the richness of the case data as well as a broader exploration of the research question (Eisenhardt, 1989). This research design allows for an explorative elaboration of constructs emphasizing higher-order themes and conceptual development whilst accounting for the rich nature of gathered data (Langley and Abdallah, 2011; Eisenhardt, 1989; Myers, 2013; Gioia et al., 2012.) The epistemological foundations are, therefore, most prevalent in the actors' interpretations and understandings of organisational tensions and their successive actions. Emergent generalizable patterns from the various cases can also be used to explore vicious and virtuous cycles in managing a paradoxical tension.

The cases involved in this study are two last-mile logistics living labs, one operating in the Netherlands and the other in the United Kingdom. Data was collected in interviews with relevant stakeholders participating in these living labs. The Heyendaal case in the Netherlands is a last-mile logistics collaboration which utilises a city and campus hub where goods are bundled and subsequently delivered via zero-emissions vehicles to a university campus, a university of applied sciences campus, and a university hospital. Relevant stakeholders in the Heyendaal living lab are the two university campuses, the university hospital, the city and campus hub organisations, the local municipality, and suppliers.

Figure 3: Heyendaal Living Lab Flowchart



Figure 4: Proposed Zero Emissions Zones in Nijmegen



Source: insight collected from interviews

The living lab in the United Kingdom is the Bristol-Bath Freight Consolidation Centre (BBFCC) which serves participating retailers and suppliers in both the Bath and Bristol metropolitan areas in the southwest of England using electric vehicles (see figure 1). The criteria for case study selection for last-mile logistics ecosystems are that the collaboration must be two or more years old and existing within a European urban environment. These criteria are to ensure a degree of maturity for the last-mile logistics ecosystem to explore how tensions have emerged in the past, which persist, and what actors view as persistent tensions. This allows for exploring stakeholder responses as potential templates to dealing with tensions in the future that could lead to virtuous cycles. These

urban logistics environments are in line with Harrington et al. (2016) and their definition of final delivery processes in urban environments. This is in order to ensure both a degree of maturity as well as comparability across cases. The cases are last-mile logistics ecosystems in which multilateral alignment interaction is sought to achieve collaboration to provide value for end-customers or businesses. Case studies, which focus on exploring and understanding the dynamics in a given setting, is an appropriate method for exploring the tensions that actors experience at multiple levels (Eisenhardt, 1989; Myers, 2013).

3.2 Data Collection

Semi-structured interviews have been recorded, transcribed verbatim, and coded. This process ensures both the trustworthiness and confirmability of the collected data. Pre-formulated questions seek to explore which paradoxical tensions managers experience and what their responses are to them. Questions concerning paradoxical tensions are devised along the paradox theory typology proposed by Smith and Lewis (2011). Semi-structured interviews, in this case, allow for more rich data collection and opportunities for the interviewee to add insight or clarity to their responses. Structured questions are mixed with improvisational follow-up questions to ensure both a degree of consistency across interviews as well as credibility to the data (Myers, 2013). In order to determine more robust results, participants representing various stakeholders are interviewed to gain insight into the nested tensions within each respective level of the collaboration.

Prior to interviews with relevant participant stakeholders, desk research including document and content analysis pertaining to each respective case was collected and analysed. Content analysis related to pertinent progress reports, local regulations, and stakeholder presentations aided in semi-structured interview question formulation in addition to using analyses as a way to triangulate findings from interview transcripts. The interview participants represent multiple levels in the last-mile logistics ecosystem. Examples of these representatives are suppliers, the municipality, the logistics hub providers, end-users, and other research parties. Across seven semi-structured interviews including nine participants, data was collected from a number of relevant actors in last-mile logistics ecosystems including project managers, logistics providers, and researchers. The interview transcripts corresponding to participants 6 and 7 were conducted previously by other researchers and are utilised in this study in order to include the perspective of a supplier and the local municipality. The interviewees and their roles were assigned numbers as detailed in figure 5 below Figure 5: Interview Participants

Interview Participants			
Participant 1	Researcher Bristol-Bath		
Participant 2	Researcher Heyendaal		
Participant 3	Project Manager		
Participant 4	Manager RUMC		
Participant 5	Logistics Provider		
Participant 6	Municipality		
Participant 7	Supplier		

3.3 Data Analysis with Sensitizing Concepts

Specification of operationalized concepts a priori was done in order to accurately measure theoretical constructs that are used as empirical grounding of emergent concepts found through data analysis (Langley and Abdallah, 2011; Eisenhardt, 1989; Myers, 1997; Gioia et al., 2012). Moreover, these theoretical constructs are utilized in order to guide the interview protocol as well as content and data analyses (appendix 1). These theoretical constructs are used as sensitizing concepts to guide lines of inquiry in an interview and are grounded in the participants' perspectives. As theoretical concepts emerge throughout the open coding process, sensitizing concepts based on Smith and Lewis's (2011) paradox typology are used to organize data and explore the experiences of interviewees through a theoretical lens. Using belonging, organising, performing, and learning tensions as sensitizing concepts allow for the exploration of that data to be grounded in the experiences of the respondents, therefore, allowing for a rich set of data that reflects paradox theory phenomenologically. Exploring which concepts emerge most prominently for actors based on paradox theory concepts both achieves practical relevance as well as fits within the scope of the research question. Ultimately, the coding process will culminate in a set of aggregate dimensions using sensitizing concepts from paradox theory (Gioia et al., 2012; Smith and Lewis, 2011).

Data collected from interviews is first subject to informant first-order coding which is progressively abstracted to higher-order dimensions using sensitizing concepts (Langley and Abdullah, 2011). These aggregate dimensions are subsequently compared and contrasted against existing theoretical constructs and ultimately serve as further contributions to theory. While the coding scheme may lead to indicators of specific established theoretical constructs, relevant emerging concepts are also noted and considered. In order to contribute to robust results from the semi-structured interviews as well as to triangulate data, desk research is carried out. This is done to further provide context to interviews as well act as an additional source of data which can augment the establishment of themes.

The data from the interview transcripts was organized into emergent themes relevant to exploring the prevailing and persistent tensions that actors experience. Utilising a constant comparative method (Glaser & Strauss, 1967) beginning with the empirical data, five overarching categories emerged as constant across participants, yet distinct in their contribution to the initial research goal in exploring these tensions and responses in last-mile logistics ecosystems. These emergent themes and empirical examples are visualised in figure 6.

Figure 6: Coding Scheme and Sensitizing Concepts

Empirical Examples



The intent of laying out the research process in this way ensures transparency and reproducibility. The responses will also be put through member checks by sending transcripts to participants to ensure their original meaning has been captured and reported in proper form.

3.4 Research Ethics

Vital to ensuring the integrity research process are informed consent and confidentiality of all participants involved in the study (Israel and Hay, 2006). To ensure this research is done ethically and transparently, participants were informed prior to initiating interviews about the specific intent of this study including the research goal and the manner in which data is being collected. Moreover, the identity of individual participants will remain anonymous, established in a confidentiality agreement between the participant and the researcher. Given the tight-knit relational networks involved in last-mile logistics collaborations, participants' identities as well as collected data will remain private. Prior to interviews, members will be asked verbally for consent regarding the recording and transcription of interview material. Since interviews were held virtually, participants were asked to state their consent explicitly for recording the interview audio. In addition to clarifying questions throughout the interview process, coded results and reported findings will be provided to the participants. Interview participants also received and signed consent forms indicating their consent for interview data being used in this study.

4. Results

The results below highlight numerous pressures that actors experience in last-mile logistics ecosystems. Among the most prevalent that emerged from the data is the plurality of goals between actors, particularly when discussing financial sustainability goals. Additionally, definitions in the roles and responsibilities of various actors were notable in that they display belonging tensions which have emerged in last-mile logistics ecosystems. Collaborative efforts in terms of strategic alignment, operational process, and in the context of actors' plurality of knowledge and capacities were also prominent emergent themes across all interviews.

4.1 Goals

In discussing the triple bottom line sustainability goals with interview participants in last-mile logistics ecosystems it became clearer that the prioritisation of social, environmental, and financial goals and orchestration efforts differ substantially between actors though all participants agreed that the goals were fundamentally aligned. Moreover, while the purpose of last-mile logistics ecosystems is to create long-term sustainable solutions, the definition of sustainability also differed between parties. Key findings from interviews represent these differences in priorities, definitions, and orchestration efforts. The most prominent and recurring theme across all interviews was related to the financial feasibility and sustainability of a last-mile logistics collaboration. Participant 6 noted four sustainability goals for the municipality that guide policy formulation related to sustainability:

"Sustainability is one of the four main goals. We have an attractive city. We have a sustainable city, we have an economically resilient city and we have the social city as four main objectives. It's not just for mobility, but it's for our whole city policy. And we assign our projects to one of one or more of those objectives." (Municipality, Participant 6)

4.1.1 Financial Sustainability

The most salient and recurring theme across all interviews was the financial feasibility of a last-mile logistics ecosystem. Financial feasibility was often discussed in tandem with questions pertaining to which actor should bear the responsibility of paying the extra costs associated with last-mile logistics.

"It's the ongoing fight of who is going to or should pay the last extra mile." (Logistics Provider, Participant 5)

"It works fine, but the difficulty is suppliers. It's financially driven. We have a city hub, but suppliers want to deliver on the city hub, but the last mile has to be paid. And that's now the difficulty. Who's going to pay the last mile?" (Researcher, Participant 2)

"The good business case, that's the most important thing. And then the delivery for the last mile, that costs extra money. So there has to be a solution for that. And I also hear that for the suppliers, the last mile within the city centre or a busy area such as the campus, that takes most of the time." (Municipality, Participant 6)

"I think that's ultimately helpful for the viability of the company, to keep that in mind at all times. How much is it sustainable, is it profitable enough for us, so that we can still earn something from it. It's not all about transportation." (Supplier, Participant 7)

Often interview participants noted that the most substantial barrier to sustainable operations were costs. If this cost barrier could not be overcome, often the case with smaller suppliers, they were far less likely to use a consolidation centre.

"It costs money and the question is who's going to pay for it and we noticed that at the moment and suppliers who already have a contract with the contract prices and other appointments. They are not very keen to work with us at the city hub. But, when we all have a tender and we ask or demand them to work to deliver through the city hub, then they are willing to take part." (Project Manager, 3)

One participant also noted that for some suppliers, delivering directly rather than through a hub is easier in addition to less costly. According to one participant, cost-benefit analyses often show that delivering directly with proprietary electric vehicles is more financially appealing.

"I really don't know how that's going to work or how it's going to work and what decisions the suppliers are going to make. Because it costs money and now it's too easy to deliver to the Radboud UMC or to the Radboud University because there's no need to use a city hub." (Manager, Participant 4).

"So the investment in, say, the cost-benefit analysis does not mean that it is profitable for[suppliers] to use it now, for example. Because then you have the same service, only you have changed the transport to electric." (Supplier, Participant 7)

One of the participants from the logistics provider also remarked that despite being more sustainable, the higher costs discourage suppliers from taking part in last-mile logistics collaborations.

"They [suppliers] are still going for the cheapest option rather than the cleanest" (Logistics Provider, Participant 5)

A proposed solution that gained some traction at the Heyendaal living lab is to demand that goods be delivered and bundled via a consolidation centre. This demand would be made through the contracts between suppliers, the city hub operators, and the procurement offices and would require suppliers to pay for their goods to be delivered through a city hub with zero emissions vehicles. Initially, the focus for these contracts were to be on the larger suppliers, however, these demands end up placing a cost burden on suppliers.

"...it's way too expensive. There's a very big gap between them doing it themselves and bringing it to the hub and the tariffs that the hub asks, and the service level of the hub they were not satisfied with it. And a lot of these suppliers have already optimized routes, so they could take the campus out of it. But then they still have other customers in the Nijmegen area. But the focus was initially on these big suppliers. And now different issues came up. That's good, because then we can also through research through practice [...] But, if it costs anything extra, you're not willing to pay for that. So I'm not going to pay for it because I can do it myself in a cheaper way." (Researcher, Participant 2)

In the case of Bristol, this led to the subsidisation of last-mile logistics costs. Though because of this funding system, the consolidation centre was never able to be fully financially independent. Participant 1 also claimed that:

"...financial support of the local authorities were key in the longevity of this scheme." (Researcher, Participant 1)

Therefore, the city council decided to halt the funding. According to Participant 1:

"I actually think they were right to stop funding the other consolidation centre, because it was running for 10 years more and they never reached critical demand. So why should you pay for something that's not really giving, I mean you can support it for a while then what's the point also, because if you want to get a stronger output in terms of reductions, you need to implement something that is bigger or stronger - or with a stronger impact anyway. So they are funding these new microconsolidation centres now for only 1 year. Uh, so it's just to help them to start. And then they know it is lasting only for 1 year. So they have to find their own customers which is, of course, easier with the establishment of the Clean Air Zone. Because people get used to this kind of service and they just use it for the future after the year has gone. So I think it was quite a good uh decision from the council." (Researcher, Participant 1)

This funding scheme ultimately did not lead to a financially sustainable project. Participant 1 noted that instead of supporting the project financially, a stronger communication campaign could have been more instrumental in formulating a financially sustainable last-mile logistics collaboration. Participant 6, additionally, noted attempts to communicate the value of using a consolidation hub in terms of efficiency and traffic reduction.

"...the most difficult things have been covered so the financial sustainability is being covered by local authorities. So it wasn't like a genuine, um you know, economic balance. Or financial balance. It was more forced and false because it was supported by local authorities in financial terms. And, a stronger communication campaign: awareness, training, education could have been like key to making it more financially sustainable in a more genuine way." (Researcher, Participant 1).

" I tried to tell that's the benefits for the suppliers of not having to drive into a crowded city centre or a crowded canvas and lose a lot of time doing that, because there are traffic jams or something. So the efficiency that they win. It's not just their win, but it has to be used to make the whole supply chain more efficient." (Municipality, Participant 6)

Participants also noted a past attempt to convince suppliers to deliver through a last-mile logistics hub which served the city centre, however, it had to be funded by the local municipality and is not entirely financially feasible for the suppliers and logistics providers involved.

"...they gave it a try in Nijmegen. And Nijmegen was one of the first cities in the Netherlands already 15 years ago, where they said, with subsidies with binnenstad service, they said to local retailers in the inner city, please if you order your stuff, don't give your address but give the address of the Binnenstad service which is a hub, which is still there, which is very small. And then the transport companies and your supplies, they drop it off over there and they transport it in a zero emissions way to your store. But this cross-docking and this extra chain, extra transshipment point, it costs money. So it was and who pays for it , that's basically always a problem. Especially if it's a shoe store with 10 boxes, which already tried to put their costs down, or they're not going to pay for it, who's going to pay for it, so the municipalities subsidized it partly." (Researcher, Participant 2)

"[...] they got a lot of funding in the beginning, but it has to stop. Yeah, you want to have sustainability long-term. Yeah. And I think their business case is not feasible. Okay. I hear from other logistic companies that they say well, it's not a sustainable business case that they have." (Municipality, Participant 6)

Participant 6 highlighted a potential driver for the lack of financial feasibility in terms of both strategy and operational procedures.

"I think you have to, to approach them [logistics companies] and not the little shops because they are not really interested in this topic. They are not really interested in who delivers it, but they want it not to be more expensive and they want their stuff on time. That's all they are interested in. [...] So they are more idealistic and not real entrepreneurs." (Municipality,

Participant 6)

Ultimately, the question of environmental sustainability depends first on the financial feasibility of a last-mile logistics collaboration and aligning a significant number of actors to do so. In some cases, the local authorities have subsidized such projects such as in Bristol and in Nijmegen. With the zero emissions zone to be implemented in Nijmegen in 2025, actors involved in the Heyendaal living lab have continued to ask who will ensure financial feasibility. This sentiment is unanimous across all interviews and the question of who can or should pay for sustainable logistics solutions is still crucial.

4.1.2 Environmental Sustainability

In Bristol and Bath, one of the first elements of last-mile logistics ecosystems that was researched was the environmental impact. The focus of the funded preliminary research was concerned with looking into the impact on emissions as noted by Participant 1.

"To do the evaluation of the consolidation centre, they basically wanted to understand what the difference was with the business as usual scenario, let's say so not using a consolidation centre and using a consolidation centre. So there were like two scenarios. And we had identified specific indicators like reduction of number of efficient vehicles, reduction of number, reduction of polluting emissions, like CO2, particulate matter and NOx." (Researcher, Participant 1).

Additionally, attaining sustainability goals was perceived to be a secondary goal to reducing costs and primarily used to improve their image. In both the Heyendaal living lab and the Bristol-Bath Freight Consolidation Centre, reducing costs was a higher priority than environmental sustainability. Two participants noted that taking part in a last-mile logistics collaboration was done to improve their image only so long as costs were adequately covered. In Bristol, many of the extra costs were covered by subsidies from the local municipality and, therefore, remained financially sustainable for the duration of the funding scheme.

"But in terms of costs, if it costs extra, if you want to transport it in a different way, then in practice, the main driver is reducing costs and not sustainability. So what should sustainability cost? What are we willing to pay for? extra costs? To make it more sustainable? I mean, sustainable? It's kind of a buzzword." (Researcher, Participant 2)

"And I think that the consolidation centre was something that they were doing more for an image reason. Creating the image. Okay, rather than providing the service, so as long as they could cover costs, they were happy. Because they were making money from others they had other services, other branches where they were where they were making money. So they had this cost covered partially from customers, and partially from the council." (Researcher, Participant 1).

On the contrary, one participant noted that image in terms of branding may also deter suppliers from utilising a consolidation hub given that parcels would be delivered in differently labelled vehicles. Therefore, the concern for some suppliers is that they could be held responsible for the service level through no fault of their own.

"They want their own branding and they are afraid that if someone delivers their parcel, for example, in a wrong way they will be held accountable for it." (Municipality, Participant 6)

Another participant, a logistics provider, noted that the translation between sustainable solutions and orchestration at the operation level is often missing. This perceived misfit between the strategic sustainable goals and operational level complications are discussed later, however it displays a performing tension given the plurality of goals and divergence in decision making (Smith and Lewis, 2011).

"...hey we're going to have sustainable solutions, but it doesn't translate into an operational level." (Logistics Provider, Participant 5)

4.1.6 Social Sustainability

As one of the triple bottom line goals, social sustainability and impact was addressed the least across all interviews. However, the most salient issue related to social sustainability in the context of last-mile logistics was livability in urban centres. To illustrate livability, participant 2 noted that in tandem with reducing CO2 emissions, last-mile logistics ecosystems should also account for their contribution to traffic congestion as well as aim to reduce their spatial footprint.

"Making the last mile more not only sustainable in terms of emissions, but also more efficient by reducing kilometers. And that's my main interest. So we're talking a lot in the Netherlands about decarbonizing the last mile, especially in urban areas, not only because of carbon CO2 emissions, but also because air pollution is high-density (residential) areas. But, I think it should also be about reducing the spatial footprint. And that relates to other aspects of livability" (Researcher, Participant 2)

"We are trying to improve public transport [...] But we also stimulate carpooling and e-bikes and mobility as a service, etc. And so, with all the campus partners, we work together intensively to get the campus better, accessible and better livable." (Municipality, Participant 6)

The Clean Air Zone that was announced by the Bristol City Council and is soon expected to be implemented on a wider scale was also aimed at reducing the impact of freight traffic on urban livability and public health.

"And they are going to, they've been, the council has been designing policies in the last 10 to 15 years to reduce the impact of transport on public health and quality, let's say. So, at the moment, they're going to establish, for example, a measure that is called Clear Air Zone." (Researcher, Participant 1)

Public policies like that in Bristol are also expected to be proposed on a wider scale in the United Kingdom in an attempt to reduce urban freight traffic and make cities more liveable. A similar series of emissions zones have also been proposed in the Netherlands and in 2025, Nijmegen will implement a series of zero emissions zones aimed at reducing traffic congestion and CO2 emissions.

A notable difficulty in last-mile logistics schemes that was brought up by Participant 2 was that some of the solutions that suppliers could employ could, in fact, exacerbate traffic congestion if they elect to outsource the last leg of their deliveries.

"...we did an analysis on the different routes, if a certain supplier would outsource their deliveries to the campus to the hub. And what you saw is that it could reduce CO2 emissions. But if they only outsource, they had a very dense network and a lot of delivery addresses." (Researcher, Participant 2)

4.2 Role Definitions

Interview participants also identified various roles within last-mile logistics ecosystems. In this study, defining the roles in a last-mile logistics ecosystem also often included answers to questions pertaining to project funding. For example, Participant 1 remarked in relation to the Bristol-Bath Consolidation centre, that though the local city council had subsidised the consolidation centre, the voluntary nature of the last-mile logistics ecosystem implied a need to convince actors to join the collaboration.

"It's a voluntary scheme. So it becomes much harder to convince/persuade businesses to get involved. why? I found that businesses who are happy with their deliveries don't want to change. So as it is very, very delicate, let's say, for commercial reasons." (Researcher, Participant 1)

Participant 1 continued to explain that a voluntary ecosystem is perhaps not the ideal role for the local government. Instead, mandatory policies could be implemented on a national level in order to drive behavioural change toward sustainable solutions.

"If you want to achieve specific targets in terms of reduction (of CO2), I mean you need to be strong, you can't just make it voluntary, otherwise people don't change especially if there is a commercial interest." (Researcher, Participant 1)

"So all local actors are pointing at the municipality. I would like to have access to the city also with my diesel, I would like to have exceptions because I'm, I have a cargo bike bla bla bla, and what you see so that's one point. I think this is a separate topic and the role of the municipality in general but what you see right now, and I saw it in my PhD as well, and

that's important also for the institutions is that capacity and enthusiasm and motivation with only one person." (Researcher, Participant 2)

Additionally, a role for the municipality, as receivers, was also said to be in steering their suppliers toward delivering through a city hub using procurement contracts. These contracts obligate the suppliers to deliver via zero emission transport. Participant 6, an individual from the municipality explained further that in addition to enforcing a zero emissions zone and including zero emissions requirements into procurement contracts, the municipality could also play a role in facilitating locations to which goods can be bundled and delivered.

"For instance, the gemeente [municipality] they're also asking in their tenders about specific logistics." (Researcher, Participant 1).

"Yeah, it's very important for us. Yeah. We have sustainable procurement. We have rules for it. That's it. has to be as sustainable as possible. And we tried to procure in a way that stimulates other movements to, for example, our public transport." (Municipality, Participant 6)

"...role as a municipality in enforcement and the zero emission zones. And in facilitating, okay. So maybe you can facilitate a location where goods can be transported from one vehicle to another. Yeah. And also the charging facilities for electric trucks. Make sure they are there enough." (Municipality, Participant 6)

However, in both the Heyendaal living lab and the Bristol-Bath Freight Consolidation centre, implementing ordinances which would create more stringent requirements, such as larger zero emissions zones have become politically unattractive, even though they may incentivise change in delivery behaviour. The municipality also formulated policies in addition to zero emissions zones which are targeted at behavioural changes.

"So there are three program lines that we made, together it's influencing the behaviour of people through the companies, the employers and we have the campus approaches in Nijmegen and in Arnhem. For example, also behavioural change with big road works when there's a lot of congestion due to the roadworks, we want to say, well, well there's an alternative, like the e-bike, or public transport [...] so, we have the infrastructural measures and we have the behavioural change measures." (Municipality, Participant 6)

"What I believe is that the bigger the zone you create, the more you create an incentive to make a change. I think it [resistance to creating a larger zero emissions zone] is political." (Researcher, Participant 2)

The responsibility of steering suppliers to deliver through consolidation hubs could also be extended to other parties. This applies especially for larger volume deliveries.

"I think that's because of the big volumes and you can set that through procurement policies." (Researcher, Participant 2)

However, there is currently no central actor to coordinate procurement policies. Therefore, a joint procurement initiative could remedy the disjunct nature of the different procurement offices. This represents an organizing tension in the collaboration as per Smith and Lewis's (2011) definition.

"... right now we are the only hospital, the only UMC where they try things out for a living lab for the last mile. So when the procurement we do that with all the other hospitals and all the other UMCS yeah, they have to go with us. When we buy toilet paper, we do it with all the hospitals and we are not alone. And that we have to meet for the zero emissions zone. For the living lab, there's no need for the other hospitals. So that's yeah, that's right now a bit difficult. And when they also have the same wishes, zero emissions. And it's a lot easier. So for me, it's a key in the procurement and also with all the other hospitals in Nijmegen and around Nijmegen to buy things together." (Manager, Participant 4)."

In addition to demanding suppliers to deliver through a city hub through joint procurement contracts as highlighted earlier, Participant 4 highlighted that in order to accomplish this, relationships between the three receiving organisations need to be further brokered. However, it was not clear which party should lead this collective initiative.

"...maybe not UMC's role [to broker relationships], but when we want to succeed... I think we have to see it as a collective initiative with parties from within the campus, but also outside of the campus." (Manager, Participant 4)

This further illustrates the complication in defining roles in this case. In some cases, the difference in technology also affects the definition of roles. For example, Participant 2 expressed that logistics providers need to invest in their ICT systems in order to process larger volume deliveries. However, asking logistics providers to invest in upgrading their ICT systems is ultimately asking for too much of an investment.

"And the city hub doesn't have that. And it's... I think it's asking them to invest in such a system is not... You can't ask them of them." (Project Manager, Participant 3)

Participant 6, in addition, explained that while the municipality could act in a facilitating role, it is ultimately the responsibility of the logistics hubs to discover a manner of sustaining their own operations.

"So the logistical companies, they have to develop their own hub and their own business case and they have to get their own clients [...] They have to do what they are good in and we are doing what we are good at. And if they expect more from us, we want to hear it." (Municipality, Participant 3)

This means that while capacities need to be developed in order to effectively and sustainably bundle and deliver to end-users, the collective action required of actors is perceived by actors to be contradictory to the need to develop capacities on an individual level.

4.3 Collaborative Efforts

As discussed, the overarching goals of actors in a last-mile logistics ecosystem are aligned, the details in how last-mile deliveries are orchestrated from suppliers to urban consolidation hubs and then to customers are disagreed upon between actors. At times, bottlenecks in this type of collaborative scheme exist on account of stakeholders' resistance to sharing data with competitors.

"So, consolidation centre is one example of them but usually stakeholders and especially businesses they're not really collaborative because they won't share data or resources with their competitor so that's another very important topic to explore the value produced, perceived, and acquired by stakeholders involved in a collaborative scheme (Researcher, Participants 1)."

"So the logistical companies are aware that they have to be more efficient and cleaner, their customers ask for it, and the city is working on the zero emission zone." (Municipality, Participant 6)

This difficulty in collaboration also is perceived to be a result of the non-uniform nature of various stakeholders involved in last-mile logistics.

"We look at these logistical service providers, because they are the visible pain of our ordering behaviour. And they have to change, we find, but I mean, they deliver what we ask as customers and as shippers. And so you also need to involve these other two parties, at least these two parties, you also have local municipalities, authorities, etc. And, I mean, these are not uniform stakeholders. I mean, even at the receiving side, we have us as researchers at these institutions, we have the procurement offices, we have the other employees who just order products. So it's you - you have different subgroups per stakeholder, which makes it complicated. So, communication and collaboration is important." (Researcher, Participant 2)

Collaboration on both a strategic and operational level and contradictory efforts between the two was another emergent theme across all interviews. Participant 3 noted that one antecedent to better collaboration would be tangible advantages to all stakeholders involved - most notably, lower costs.

"I think when they see the advantages, then lower costs, I think then they're going to work together. But, I think now we're not that far... I think a lot of people also, in the whole chain from supplier to delivery at the hub, there are advantages but now, we don't see it." (Project Manager, Participant 3)

4.3.1 Strategic Alignment

Overall, the collaboration between receivers in the case of the Heyendaal living lab in terms of joint procurement decisions was perceived to be working well. However, alignment with other actors including logistics service providers on an operational level has proved to be time consuming

and difficult. Many of these strategic level discussions between actors are currently occurring within the context of the impending zero emissions zone.

"And our purchase department from the three organisations are working well together. In the beginning, we all had our own tender, all three organisations. But at the moment, we were looking into our different tenders, and we tried to do it together. And we always at the moment - And that's a big effort from the purchase department - We're always asking to deliver through our city hub. That's a very good result. It doesn't always work out like we want to, but at least we're asking, or we are demanding in our tenders that they have to deliver through the city hub." (Project Manager, Participant 3)

"..our relationship with the - with the moving company, our city hub, logistics service provider, how we call it - takes a lot of time at the moment. We have some problems there. What takes a lot of time at the moment to align. So that's at the moment and my day to day work for a living lab." (Project Manager, Participant 3)

"It's a nice project. It's necessary. You can see that the government also wants zero emission zones in the big cities... I think the overall the goals are quite aligned with when the three organisations. I think they have the same vision also long term in the sense of sustainability for example, safety, that kind of thing." (Manager, Participant 4)

Joint procurement from receivers, has also been proposed as a strategic tool to drive sustainable delivery behaviour. However, these joint procurement contracts have yet to be implemented fully and may not match the operational capacities of logistics providers or suppliers.

"And uhm, then HAN and Radboud would have to join forces to start tendering together. That is really something for the future. I don't see that happening yet." (Supplier, Participant 7)

"So for me, it's a key in the procurement and also with all the other hospitals in Nijmegen and around Nijmegen to buy things together." (Logistics Provider, Participant 5)

Participant 7 also described how actors could also collaborate on a strategic level in terms of agreements on performance indicators and success metrics to make goals more immediately tangible.

"KPIs and all that sort of thing and more, that makes it easier to ultimately make a logistics hub a success." (Supplier, Participant 7)

4.3.2 Operational Processes

While discussions between parties concerning strategic level decision-making have gone well, the heterogeneous nature of the stakeholders and the differences in operational processes have made further collaboration efforts difficult. These operational processes also include differences in individual internal ICT systems. One participant mentioned that a group of receivers are currently searching for an overarching ICT system that can connect to three receiving parties, namely, two university campuses and a university hospital. Ideally, this would remove the hindrance that the receivers experience in terms of their operations.

"Our processes are not aligned from the three organisations and that's logical because we are three different organisations, but when you're working together, it's very difficult to find a way to work together. To make it work." (Project Manager, Participant 3)

"There are three different ICT systems. And it's very difficult to get them aligned. Every organisation has its own systems and it's very difficult to get one system working for all three organisations - to look into their systems and not change the system from the different organisations. But, we're looking into an overarching system." (Researcher, Participant 2)

Another emergent operational level concern that was consistent across all interviews was the ability to bring enough volume to an urban consolidation centre. In some cases, the ability to deliver in larger volumes is due to the capacities of a logistics provider. However, financial feasibility is also crucial in convincing suppliers to deliver through an urban consolidation centre. As participant 1 noted, this behavioural change could also be driven through consumer demand.

"[I]t could be having customers that ask you to be sustainable. That's the main driver. So, customers and consumers are the main drivers always. So, if my customers want to buy a more sustainable product, I need to offer more sustainable products. That means not just the product itself- the materials, but the whole chain of the product." (Researcher, Participant 1)

As participant 1 noted, this behavioural change could also be driven through consumer demand. In this case, consumers of retailers in Bristol demand that shops receive goods through zero emissions means.

"I think when it's a chance for us when the city hub delivers once a day, on the campus on the Radboud UMC, and from there, we can transport it to the Radboud university or the HAN or the ROC. It's a chance, but we are not a distribution centre." (Manager, Participant 4)

"...A wall of lockers where we can deliver goods for students and employees of the university. We're trying to get our city hub working to get volume to the city hub." (Researcher, Participant 2)

Participant 7 noted in addition that for suppliers, one operational concern is control as once goods are bundled and sent from a consolidation hub, the supplier is no longer in control of the delivery to their intended customer.

"[...]A wall of lockers where we can deliver goods for students and employees of the university. We're trying to get our city hub working to get volume to the city hub." (Supplier, Participant 7) Another sustainability solution to address operational concerns have been parcel lockers which are to be located centrally between the three receiving organisations.

"A wall of lockers where we can deliver goods for students and employees of the university. We're trying to get our city hub working to get volume to the city hub. At the moment. And I started the small project so far with construction logistics, construction and service logistics. There has been a tender since half April, well, we asked our our constructors, for the first time to make plans for their construction, construction logistics." (Project Manager, Participant 2)

Also notable in terms of operational processes is that there are differences between cities that could have far-reaching implications on logistics providers. For example, if a city has a high-density commercial area, this could strain the logistics provider far more than a low-density commercial area. In Bath, the pedestrianisation of the city centre has affected logistics providers and receivers as both parties have had to operate within an exclusively pedestrian zone.

"And in Bath, there were more independent retailers involved so it was a bit different, but it's a very different case because in Bath their whole area was pedestrianized." (Researcher, Participant 1)

These operational level concerns that emerge in these last-mile cases often follow strategic level decision-making processes. However, as interview participants have indicated, it takes far more time, effort, and communication to align processes.

4.3.3 Knowledge and Capacities

A crucial element of the collaboration efforts in these last-mile logistics ecosystems are the knowledge and capacities of stakeholders both internally and externally. For external stakeholders, namely customers of retailers, Participant 1 explained that consumer awareness plays a crucial role in driving retailers to demand their suppliers to bundle and deliver in a sustainable manner through a consolidation centre. Participant 7, when discussing justifications for suppliers using their own electric vehicles to deliver to their final customer, also explained that using an urban consolidation hub involves a large variety of other stakeholders who lack the knowledge required to deliver in various volumes. Therefore, participant 7 interpreted the process of partnering with a logistics hub as a sizable investment in terms of transferring knowledge and managing people.

"And what we found not only the consolidation centre, but also in the other decarbonisation projects that I was involved in, in the last year was that consumers are never aware about how much carbon they produce when they do online shopping or when they buy something in a shop. So I think transparency is missing. Awareness is missing, and they play perhaps the biggest role in this story." (Researcher, Participant 1) "That also saves us a lot of transferring knowledge and managing the people remains the same. So nothing changes, except the transport [...] Campus is interesting for us via the hub, because they have a lot of volume. We also have a lot of customers with very few volumes. That is sometimes difficult." (Supplier, Participant 7)

This awareness, in the case of Bristol, was also missing among some of the retailers. Effectively, retailers were receiving their goods through a consolidation centre which delivered using zero emissions vehicles. However, when asked to evaluate the service of the consolidation centre, many were unaware it existed. Therefore, an important element in involving the entire supply chain is to make customers, retailers, and logistics providers aware of what sustainable last-mile logistics solutions are in place and how they could change their operations. Notable here as well is a lack of communication between strategic level and operational level decision-makers.

"[T]hey had no idea there was the consolidation centre in place, they were receiving goods through the consolidation centre. So they weren't actually able to evaluate the service provided by the consolidation centre. So they were evaluating the service provided by DHL. Okay, so they didn't know what the consolidation centre was, how it worked, why it is established the consolidation centre, and why they were part of the scheme. And this is because being part of the chain means that you don't make decisions about the way you receive goods, you just manage the store. And being part of the consolidation centre was a head office decision." (Researcher, Participant 1)

The need for more internal awareness was a sentiment echoed by Participant 2 as well who claimed that awareness needs to be raised between all stakeholders in the Heyendaal living lab. So far, this lack of communication has contributed to the confusion around the definition of roles as well.

"We're thinking about that now, I think that the living lab is taking place and what the aim is and what should be done that should be communicated more broadly within these institutions. With people in procurement offices, with other departments, ordering goods, people are not aware of their ordering behaviour -that's basically the case - whether they're ordering as a customer, as a consumer an individual like you will meet, or whether they're doing that in a professional way. So that could be raised." (Researcher, Participant 2).

In Nijmegen, management has also decided to implement parcel lockers where customers can pick up parcels which have been delivered with zero emissions vehicles through a consolidation centre rather than having them delivered to their homes or offices. For this to be effective, according to the Project Manager, this awareness takes time and an awareness campaign. Additionally, the time it takes to implement both operation and behavioural changes is an important facet of last-mile deliveries. In this case, it involves getting parcels delivered to the urban consolidation hub and subsequently to a central point where they can be received.

"But also, the pakketautomaat this locker, this wall of lockers takes a lot of time because we have to inform our employees how to change their processes. So, we are looking into the processes and how we can change them. So this locker wall works for us. And also we want to investigate what are the revenues for students and employees. So that takes a lot of time." (Project Manager, Participant 3)

"And, instead of driving around to 20 different drops at the campus, they can drop at one or two lockers. I believe that might be a solution. But, then you have to talk with facility managers. Where can we place the locker? And above all, this is basically the problem in a nutshell, you have to motivate the receivers. You order something at the campus to have it dropped at the locker instead of at your desk. And as a receiver being an individual being an institution, we have a lot of power. And by extension the supplier." (Researcher, Participant 2)

An obstacle to getting goods delivered also was the logistics provider's volume capacity. Participant 3 explained that the current partner has moving experience, however, they do not have the capacity to scale up to the required volume that the receivers are ordering. Participant 6, echoed this sentiment by describing the conditions under which logistics companies operate as insufficient for implementing a larger scale consolidation hub.

"...with today's knowledge, our partner is a moving company with not much logistics experience. And now we're getting further in the process of bringing in volume to the, to the, to the company, to the city hub. Yeah, that's not an advantage. That's, at the moment, I think the biggest problem is that they don't have any logistics, or they have logistics experience in their own moving company, but not on this scale. And yeah, I think that's the big problem, how they have to deal with it." (Project Manager, Participant 3)

"And, and there are some logistics companies who are interested in hubs but they don't know where to start. Or they lack the conditions." (Municipality, Participant 6)

Within stakeholders involved in the Heyendaal living lab, actors often meet with each other and external parties in order to learn from others' experiences. This has proved to be an effective way of communicating the aim of the living lab, however, there was a perceived mismatch among participants with the translation of this communication into operational procedures.

"We have a lot of meetings. What I noticed at the moment is that there are very, very many other cities and universities and organisations that are looking into this problem. And in that network, there are a lot of meetings where we try to learn from each other's experiences." (Project Manager, Participant 3)

Actors also explained that they expect to experience differences in capabilities in terms of responding to imminent legal demands such as proposed zero emissions zones. One participant explained the extra costs of doing businesses that would accompany operations within the zero emissions zones would disproportionately affect smaller suppliers. Larger companies, on the other hand, were perceived to have a greater capacity to invest in sustainable solutions such as electric vehicles considering forthcoming changes to legislation.

"These are professional companies ...I mean they also earn not only by supplying but also by optimizing their logistics. So in some way, they are already concerned with doing it in an efficient and also maybe sustainable way. So in a couple of years time, we will have a zero emission zone in 30 to 40 cities in the Netherlands, in Nijmegen it will probably include the campus. So in. Yeah, it will be gradually implemented. And eventually, they have to supply the campus in an in zero emission way with an electric vehicle. And the big companies know that this is coming. So they also start investing in vehicles or in different ways of supplying. So they are concerned with it, and they have the power - investment power to purchase, in a couple of years time, clean vehicles and in term reorganize their supply chain." (Researcher, Participant 2)

"So we can take into account and invest in it and maybe the big companies can invest in electric trucks or vans and they can establish a hub to do the last mile electric for smaller companies that can't invest in electric vehicles because it's too expensive yet." Municipality, Participant 6)

4.4 Future Plans, Concerns, and Outlook

In Bristol, an upcoming implementation of Clean Air Zones has prompted local authorities to shift their funding toward smaller consolidation centres. As illustrated earlier, the municipal authorities had decided to halt funding to a larger consolidation centre as it never became financially independent. Participant 1 shared that this was a warranted action from the city council and that smaller freight consolidation hubs could serve as a feasible alternative.

"So they are funding these new microconsolidation centres now for only 1 year. Uh, so it's just to help them to start. And then they know it is lasting only for 1 year. So they have to find their own customers which is, of course, easier with the establishment of the Clean Air Zone. Because people get used to this kind of service and they just use it for the future after the year has gone. So I think it was quite a good decision from the council." (Researcher, Participant 1)

As the municipality of Nijmegen plans to implement a zero emissions zone in 2025, stakeholders at the Heyendaal living lab indicated that many changes have to be made in order to meet those requirements. Participant 4 in particular indicated that going forward, the responsibility to meet those requirements will be primarily on suppliers.

"So, I believe in the next year, suppliers have homework on how they are going to act in a few years when there are zero emissions zones. And when they wait it's also too late and when there are zero emissions zones the party says pop up who will do the last mile. (Manager, Participant 4)"

Participants 6 and 7 also noted that the Heyendaal living lab in particular is seen as a step in the learning process. Knowledge gleaned from which can ideally be transferred to other last-mile logistics projects.

"So it's uh, it's really still in its infancy. I hope that we will learn a lot in the near future and that we will be able to apply that more often." (Supplier, Participant 7) "I see this living lab project as one of the solutions to obtain this goal. So sustainability and accessibility. But for us, it's also important that we learn from it and that we can get knowledge that we can apply on other other hubs. And I think because it's also a sign of scientific research, that it's open data and we can share it with other entrepreneurs and other companies, so they can have the advantage of it too." (Municipality, Participant 6)

4.5 COVID-19 Impacts

Another noteworthy theme that emerged throughout each interview was the impact of the current COVID-19 pandemic on last-mile logistics operations. Particularly, participants noted delays in policy implementation as well as operational disruptions. The demand for certain goods such as printing paper has also been reduced as a result of the pandemic and this further exacerbates complications around getting an adequate volume to the hub.

"Yeah, at first, we started with bringing volume to the city. Because when there's no volume at the city hub, we don't have a project, we have nothing. So we started with several suppliers to talk about living lab, other city hubs for some of the suppliers. It worked. So we, at the moment, have I think four or five suppliers that deliver the goods through the city hub. And corona, of course, made it difficult because we have a supplier from paper - printing paper that delivers through the hub. And, yeah, there's nobody printing at the moment, or very less. So there's not much volume there." (Project Manager, Participant 3)

Priorities have also shifted since the beginning of the pandemic. As one of the most influential actors in the Heyendaal living lab case is a large hospital, one participant explained how priorities in relation to the living lab have changed.

"Yeah, well, when we have that - when we can create that, then it works. But that's difficult. And now you also see the priority, it's COVID now. Corona. There's a huge pressure on our supply chain. The alternatives from articles were very fast. They're fairly busy with Corona. So the last mile of the living lab, it's nice. But the priority went down. It's not that important anymore. Yeah, of course, you have to fix corona." (Manager, Participant 4)

"Also corona, it blurs the living lab in some way. In the hospital they have other stuff on their mind." (Researcher, Participant 2)

In addition to the COVID-19 pandemic, Brexit was also pointed to by a participant as an impactful event which has shifted operational procedures and political priorities.

"Now, it was a couple of years ago, but it's going to start this year. I think they've been a bit delayed because of you know, COVID-19, Brexit, everything that's happened. So yeah, it should happen this year." (Researcher, Participant 1)

5. Discussion

The goal of this paper was to explore how key actors deal with paradoxical tensions that they encounter in last-mile logistics ecosystems. Given the explorative nature of this study, the empirical findings from interviews with actors in last-mile logistics ecosystems were used to uncover consistent and emergent themes. In this section, these emergent themes will be discussed in the context of paradox theory and mapped on to Smith and Lewis's (2011) paradox typology. From the data through a paradox theory lens, we can derive four major statements concerning tensions in these sustainability-oriented last-mile logistics ecosystems. These tensions and responses result in vicious or virtuous cycles. A synopsis of the most salient findings are as follows and visualised in figure 7:



Figure 7: Empirical Findings Mapped to Paradox Typology

- 1) The most persistent complication is deciding on who is financially responsible for ensuring sustainability in the last mile.
- 2) There is a significant rift between strategic-level decision-making and operational-level decision-making causing delays between planning and orchestrating last-mile deliveries.
- 3) Specific tasks are unclearly delegated to certain stakeholders and there is no form of centralised decision-making or oversight.
- 4) There is a strong reluctance to behavioural change and previously successful manners of making profits are not necessarily viable in a last-mile logistics ecosystem. Due to a need to change business models, actors may veer away from involvement with sustainable last-mile logistics projects in order to pursue financial goals.

5.1 Belonging Tensions

The most pertinent and recurring theme that emerged from the data was the financial sustainability of last-mile logistics collaborations. More specifically, actors differ in opinion when it comes to discussions of which party should bear the financial responsibilities. Given that competing roles and identities are not agreed on between actors, this highlights an ongoing belonging tension in last-mile logistics environments. Additionally, the three sustainability goals differ significantly between actors. For example, the logistics provider must remain financially viable while conducting their core business while also attending to the demands within the living lab. While financially feasibility is a vital goal for all actors, the salience of a financial burden also differs. This is particularly prominent in discussions about suppliers' ability to operate sustainability when zero emissions zones are enacted in 2025. This implies that for a last-mile logistics collaboration consisting of a plurality of stakeholders, operation while achieving multiple sustainability goals is contingent on balancing this belonging tension, attending to the heterogeneous nature of these goals, priorities, and values. The belonging tension existing as a result of shifting priorities in a triple bottom line sustainability model in this case is also aligned with Ozanne et al. (2016) in that belonging tensions emerge as actors' priorities on social, environmental, and financial sustainability differ. These belonging tensions in last-mile logistics environments are important for all actors to be aware of, allowing them to define their roles and membership within the ecosystem in order to collaborate effectively. Given that participants perceived ensuring financial feasibility of last-mile logistics collaborations as an antecedent to pursuing environmental goals, for example, emissions reduction, defining the roles and responsibilities of actors within these collaborations is vital.

5.2 Performing Tensions

As illustrated, details in terms of goals between various stakeholders are not aligned. While the overarching goals are aligned, there are nevertheless details which contradict one another. These different goals also lead to a plurality of success metrics. These success metrics vary by stakeholder to include CO2 emissions, timely deliveries, traffic reduction, and profits. The plurality of these actors and their goals as well as the disparate nature of various success metrics are indicative of performing tensions (Smith and Lewis, 2011). Performing tensions in this study are grounded most evidently between strategic alignment endeavours and orchestration on an operational level. The demands made on a strategic level, as perceived by interview participants, often do not translate into the operational level.

In aligning these two levels and their respective goals, clearer success measures could be agreed upon and worked toward. Though social sustainability may be considered a more subjective goal, specifying, for example, traffic reduction aimed at improving urban livability is a more clearly defined goal. The more quantitative nature of financial and environmental sustainability goals makes this goal definition clearer as well (Ozanne et al., 2016) Likewise, organisational capabilities, such as ability to bundle goods and deliver in larger volumes, should be considered in strategy formulation. Also noteworthy is that operational capabilities could shift with further restrictions as well as additional knowledge and awareness. A paradox lens allows viewing the alignment between strategic and operational decision-making levels as a necessity on a continual basis.

5.3 Organising Tensions

Given the lack of a central decision-making actor in both last-mile logistics ecosystems, specific tasks were, at the time of this study, not clearly designated. Strategic planning was primarily done by individual stakeholders rather than as a collective. While this empowers other stakeholders to make decisions independent of one another, it allows complications to arise when attempting to align processes. In last-mile logistics collaborations, there is an immense amount of operational coordination in order to deliver efficiently in an environmentally friendly manner. Propositions from stakeholders include reducing delivery times to once or twice a week for multiple stakeholders. However, this may be at odds with the capabilities of logistics providers and suppliers alike. Less frequent deliveries with zero emissions vehicles would, indeed, reduce traffic from the consolidation hub to the delivery point, though more frequent deliveries from several small suppliers may overburden the logistics providers depending on their capacity to handle larger volumes as well as increase traffic flow on arterial roadways. The organizing tension in the last-mile logistics ecosystems emerge from a misalignment in process, practices, and capabilities between strategic and operational levels. This illustration of organising tensions in last-mile logistics collaborations also suggest that decision-making could be more centralised to provide strategic oversight which compensates for the plurality of capabilities and operational processes.

5.4 Learning Tensions

In both Bristol and the Heyendaal, there have been policies proposed aimed at limiting urban traffic and CO2 emissions. In the municipality of Nijmegen in particular, stakeholders involved in the Heyendaal living lab are anticipating the implementation of three zero emissions zones in 2025. In order for all actors' needs to be met sufficiently, there is a perceived need by all participants to change their processes and behaviours. However, despite the changes on the horizon, there is still a reluctance by many to change their behaviours. As Smith and Lewis (2011), if the collective beliefs and assumptions underlying this behaviour does not change, it will become increasingly difficult to keep pace with the contextual changes, in this case the zero emissions zones. Though changes in operations need to be made, some actors are resistant to explore their options - primarily because new options, like delivering through an urban consolidation hub, are financially unsustainable. This tension between exploiting established capabilities and exploring new opportunities to change business practices is highly relevant in this case not only given the changing context in the individual municipalities, but on account of international climate agreements and demands from consumers. In this study, many actors, in response to these new demands and policy changes, have attempted to devise a lower cost model while others have begun using last-mile logistics hubs and adjusted their business models retroactively. In many cases, according to the data, the willingness to collaborate with actors in a last-mile logistics ecosystem is highly dependent on a stakeholder's individual financial leverage. For example, it is far more difficult for smaller suppliers to take part by delivering through a last-mile logistics hub since it increases their costs and is, therefore, no longer a financially viable decision.

5.5 Vicious and Virtuous Cycles

Smith and Lewis (2011) conceptualise the drivers for vicious and virtuous cycles as individual and organisational factors. For vicious cycles, drivers include a cognitive and behavioural drive for consistency, emotional anxiety and defensiveness, and organisational forces for inertia. Participants often noted when discussing last-mile logistics endeavours that collaborations are often not sustainable in the long-run. In fact, many collaborative schemes cease operations due to financial complications. Considering that smaller suppliers, for example, do not see a direct incentive to participate in sustainable last-mile logistics schemes due to their comparatively limited financial leverage and capacities, they often withdraw from collaborative efforts. This is an illustration of defensiveness in this case that often results in consequences related to the sustainability of the collaboration. Therefore, suppliers that are unwilling to collaborate with procurement offices or a last-mile logistics hub often imply difficulties in terms of bringing enough volume for a hub to be financially viable. On the contrary, procurement departments and logistics providers that evade cooperation with smaller suppliers due to their financial position further exacerbate this crucial step in

bringing volume to a hub. However, participants noted that communicating the advantages of consolidating their deliveries proves to be complicated. A common theme that participants also frequently noted is an overall resistance to change, either operationally or behaviourally. This behavioural change, according to some participants, also includes the need for consumers to alter their consumption patterns. This resistance, for example, in ordering behaviour, delivery practices, or procurement schemes also lead to vicious cycles. In terms of these last-mile logistics labs, the consequences of vicious cycles according to Smith and Lewis (2011) are readily apparent in that these collaborations often do not last into the long-term, primarily on account of losing their source of funding. The shifts in role definitions also highlight vicious cycles in these collaborations. Some participants indicated that financial feasibility is only possible with support from local or even national governments while others concluded that suppliers should be responsible for altering their business model to fit the changing institutional contexts, in this case to accommodate for zero emissions zones. Moreover, the roles of the logistics providers and procurement offices also differed between participants. These differences in role definitions cause organisational inertia on a collective level and hamper efforts significantly - either slowing down the process in an attempt to renegotiate roles or, in some cases, halting the collaboration entirely.

Virtuous cycles are a more positive response to paradoxical tension, the enablement of which carries the potential for long-term sustainability (see figure 2). Virtuous cycles are enabled through acceptance of paradoxical tension, emotional equanimity, and dynamic organisational capabilities (Smith and Lewis, 2011). Participants in this study agreed that stakeholders share the overarching goal of fostering sustainable logistics practices and that communication efforts are conducive to longer term collaboration. Additionally, stakeholders do understand the goals and concerns of other parties. To illustrate, both the receivers and the logistics service providers understand that it may be financially unattractive and infeasible for smaller suppliers to deliver through a hub. All parties also understand that behavioural change takes time, role negotiations, and awareness. Though the operational capabilities differ between stakeholders, and are therefore not particularly dynamic, acceptance of the complex paradoxical nature of sustainable last-mile logistics goals do lead to virtuous cycles in these cases. Viewing these tensions as an opportunity to engage in creative collective decision making, however, could also lead to longer-term operational successes.

5.6 Practical Implications

The results of this study provide deeper insight into the tensions which persist in last-mile logistics ecosystems and how actors' responses contribute to vicious and virtuous cycles. Given the importance of sustainability discussions and research, viewing the insights from interview participants through a paradox theory lens allows for a more nuanced perspective on a pertinent sustainability

topic. As last-mile logistics collaborations have yet to be studied in-depth and are poised as solutions aimed at reducing CO2 emissions as well as reducing traffic congestion, Smith and Lewis's (2011) Dynamic Equilibrium Model allows for a more complex understanding of these ecosystems. The application of an inductive approach using sensitizing concepts from paradox theory literature contribute meaningfully to an exploration of this practical topic as well as a deeper understanding of how paradoxical tensions emerge in interorganisational collaborations.

5.7 Theoretical Implications

This study also further confirms Smith and Lewis's (2011) theory insofar as plurality, organisational change, and resource scarcity are the primary drivers for rendering latent tensions salient in last-mile logistics ecosystems. The heterogeneity seen amongst actors and, therefore goals in these cases are particularly pronounced resulting in salient tensions. For instance, the variations in priorities in terms of sustainability goals, particularly financial feasibility, were perceived by participants to be the primary point of contention. The lack of financial resources, in addition to the plurality of goals was also seen as an instigator which led to tensions. This further confirms Smith and Lewis's (2011) theory that resource scarcity is a driving factor which renders latent tensions salient. Given upcoming policy changes concerning environmental sustainability, many actors involved with last-mile deliveries should be aware of these tensions and ways in which they can appear. Rather than leading to a resolution of tensions, the results of this research illuminate which tensions are most prominent, how they come about, and that beginning to embrace these tensions can ultimately contribute to virtuous cycles and, therefore, potential paths to long-term sustainability.

5.8 Limitations

Given the COVID-19 pandemic and its effects on global logistics chains, many of the priorities of various stakeholders have shifted. Researching these ecosystems in the context of this study was therefore not carried out in a typical scenario. Therefore, results may suffer from limitations surrounding the generalisability of the findings of this particular study. Though the effects of the pandemic were striking as an environmental condition, it would have been advantageous to conduct this qualitative study in a manner which more truly reflects the routine operations of last-mile logistics ecosystems. However, the results do offer insight into how such ecosystems perform under the pressure of external circumstances.

COVID-19 measures also resulted in difficulties related to planning interviews. As a result, a suboptimal number of interviews were conducted. Though the data collected was rich and highlighted many of the ongoing tensions and responses by various stakeholders, time constraints hampered the ability to collect interview data. To compensate for this, two interviews conducted previously were

used in the analysis and included in the results. Ideally, this research would have included updated versions of those interviews.

5.9 Directions for Further Research

Further research related to sustainable logistics should aim to understand the practical complications as persisting and contradictory elements. This could aid practitioners in developing cognitive and behavioural complexity in addition to organisational dynamic capabilities. Further explorations should also highlight paradoxical tensions as fundamentally unresolvable. Rather, factors enabling virtuous cycles which could lead to long-term sustainability including organisational capabilities and emotional equanimity should be viewed as means to accept paradoxical tensions whilst incorporating acceptance of tensions into multilateral strategic planning, decision-making, and operational coordination.

6. Conclusion

The aim of this study was to explore paradoxical tensions that actors in last-mile logistics ecosystems experience and how they respond to them. Utilising a paradox lens through which to examine emergent concepts relating to persistent tensions, a number of salient tensions exist on a continual basis within last-mile logistics ecosystems. The most discernible of which relates to the long-term financial sustainability of last-mile logistics collaborations. Additionally, qualitative results from interviews with various actors across two last-mile logistics collaborations highlight drivers toward both virtuous and vicious cycles. By viewing paradoxical tensions as persistent elements which lie latent in sustainable logistics environments, policy, strategy, and processes could be more effectively aligned in order to accommodate these tensions into collective decision-making. Moreover, this study sheds light on the applicability of Smith and Lewis's (2011) paradox theory and dynamic equilibrium model in exploring tensions which emerge in sustainable last-mile logistics collaborations. Though this study provided insight on all four tensions, future studies could further delve into each tension, for example exploring belonging tensions in the context of individual versus collective identities in these ecosystems. As the pressures to devise long-term sustainable solutions become more salient to organisations, this exploration into the nuances in last-mile logistics ecosystems sheds light on the salience of accepting a more complex reality in order to implement solutions which can ensure a sustainable future.

6.1 Critical Reflection

Given current and future climate concerns, looking into sustainable solutions in many aspects and across an enormous variety of industries is incredibly important. Given my background in international business, I relate these issues in the last mile of supply chains, given it's the most expensive and environmentally harmful, to global value chains. Additionally, as the value of goods compounds as they cross international borders as a result of import tariffs, it would be intriguing to examine how this changes priorities in terms of financial, social, and environmental sustainability given how complex it becomes once more stakeholders are added across borders. Having examined global value chains before, focusing on the last mile of a delivery chain showed me how complex these systems are and how much attention and care is required in organising not only the logistics, but the relationships. As displayed in the results of this study, the last mile of deliveries is highly complex practically and strategically and the issues at hand are incredibly nuanced. When it comes to including the entire global value chain of a product, it seems as though sustainability remains a daunting endeavour. However, adopting a paradox lens in tandem with a triple bottom line sustainability model has illuminated a number of persistent complications that are to be balanced rather than resolved completely. It would have also been rewarding to examine other last-mile logistics ecosystems that have emerged and compare the actors' experiences. As cities begin implementing zero emissions zones, particularly across Europe, it will be worthwhile to document the experiences of actors' in organisations as well as changes to traditional business models. Ideally, this study can increase awareness about which complications and tensions to expect and how they can be managed by collectively incorporating them into decision-making. Personally, I acknowledge two major takeaways from this thesis trajectory. The first of which is that I learned a great deal about reflecting the reality of interview participants in viewing their sentiments and statements through a theoretical lens. In the case of this study, I truly felt as though reflecting experiences was a priority and the fulcrum around which this practical issue was explored. Using theoretical or philosophical lenses as tools to examine real-world phenomena is important as it can provide fresh perspectives as well as reinforce the utility of the lenses themselves. In a broader sense, the process of examining this issue through a theoretical lens led to introspection concerning how my views are influenced by my perspective. I think this is important to realise and reinforce beyond this trajectory given that understanding and accepting others' perspectives can help both in terms of acceptance and communication. The second of which is that the axioms around which actors base their decision-making a) have the ability to massively determine outcomes and b) are incredibly difficult to change. An example of this is the prioritisation of financial goals. As this is, of course, an incredibly salient goal, anthropocentrism in discussions about sustainability seems to take center stage and it's extraordinarily burdensome to change the nature of goal prioritisation.

References

- Allen, J., Bektaş, T., Cherrett, T., Friday, A., McLeod, F., & Piecyk, M. et al. (2017). Enabling a Freight Traffic Controller for Collaborative Multidrop Urban Logistics. *Transportation Research Record: Journal Of The Transportation Research Board*, 2609(1), 77-84. <u>https://doi.org/10.3141/2609-09</u>
- Anderson, E. (1990). Two firms, one frontier: On assessing joint venture performance, *Sloan Management Review*, 31(2), pp. 19–30.
- Beech, N., Burns, H., de Caestecker, L., MacIntosh, R., & MacLean, D. (2004). Paradox as invitation to act in problematic change situations. *Human Relations*, 57: 1313–1332.
- Bengtsson, M., & Kock, S. (2000). Coopetition in Business Networks—to Cooperate and Compete Simultaneously. *Industrial Marketing Management*, 29(5), 411-426. <u>https://doi.org/10.1016/s0019-8501(99)00067-x</u>
- *Bristol's Clean Air Zone (CAZ) bristol.gov.uk.* Bristol.gov.uk. (2020). Retrieved 23 April 2021, from <u>https://www.bristol.gov.uk/streets-travel/bristol-caz</u>.
- Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. *International Journal Of Production Economics*, 194, 73-87. https://doi.org/10.1016/j.ijpe.2017.04.005
- Chapardar, H. (2016). Tackling Sustainability Tensions Pragmatically: Implications of Paradoxical Thinking. *Academy Of Management Proceedings*, 2016(1), 16165. <u>https://doi.org/10.5465/ambpp.2016.8</u>
- Clarkson, M. B. E. (1995). A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review*, 20(1), 92–117
- Eisenhardt, K. (1989). Building Theories from Case Study Research. *The Academy Of Management Review*, 14(4), 532. doi: 10.2307/258557
- Gioia, D., Corley, K., & Hamilton, A. (2012). Seeking Qualitative Rigor in Inductive Research. organisational Research Methods, 16(1), 15-31. doi: 10.1177/1094428112452151
- Gimenez, C., Sierra, V., & Rodon, J. (2012). Sustainable operations: Their impact on the triple bottom line. International Journal Of Production Economics, 140(1), 149-159. <u>https://doi.org/10.1016/j.ijpe.2012.01.035</u>
- Glynn, M. A. (2000). When cymbals become symbols: Conflict over organisational identity within a symphony orchestra. *Organisation Science*, *11*(3), 285-298. doi:DOI 10.1287/orsc.11.3.285.12496

- Gogarty, C. (2020). Time-lapse shows flood of cars seeming to defy Bristol Bridge ban. BristolLive. Retrieved 23 April 2021, from <u>https://www.bristolpost.co.uk/news/bristol-news/bristol-bridge-ban-traffic-seemingly-4406424</u>.
- Hahn, T., Pinkse, J., Preuss, L., & Figge, F. (2014). Tensions in Corporate Sustainability: Towards an Integrative Framework. *Journal Of Business Ethics*, 127(2), 297-316. doi: 10.1007/s10551-014-2047-5
- Hall, J. K., & Martin, M. J. C. (2005). Disruptive technologies, stakeholders and the innovation value-added chain: A framework for evaluating radical technology development. *R&D Management*, 35(3), 273–284.
- Harrington, T., Singh Srai, J., Kumar, M., & Wohlrab, J. (2016). Identifying design criteria for urban system 'last-mile' solutions – a multi-stakeholder perspective. *Production Planning & Control*, 27(6), 456-476. <u>https://doi.org/10.1080/09537287.2016.1147099</u>
- Israel, M., and Hay, I, (2006) Research Ethics for Social Scientists. SAGE Publications
- Jarzabkowski, P., Lê, J., & Van de Ven, A. (2013). Responding to competing strategic demands: How organizing, belonging, and performing paradoxes coevolve. *Strategic organisation*, *11*(3), 245-280. https://doi.org/10.1177/1476127013481016
- Jennings, P., & Zandbergen, P. (1995). Ecologically Sustainable organisations: An Institutional Approach. *The Academy Of Management Review*, 20(4), 1015. doi: 10.2307/258964
- Katsela, & Browne. (2019). Importance of the Stakeholders' Interaction: Comparative, Longitudinal Study of Two City Logistics Initiatives. *Sustainability*, 11(20), 5844. <u>https://doi.org/10.3390/su11205844</u>
- Khanna, T., Gulati, R., & Nohria, N. (1998). The dynamics of learning alliances: competition, cooperation, and relative scope. *Strategic Management Journal*, 19(3), 193-210. doi: 10.1002/(sici)1097-0266(199803)19:3<193::aid-smj949>3.0.co;2-c
- Kleindorfer, P., Singhal, K., & Wassenhove, L. (2009). Sustainable Operations Management. Production And Operations Management, 14(4), 482-492. <u>https://doi.org/10.1111/j.1937-5956.2005.tb00235.x</u>
- Korzhenevych, A., Dehnen, N., Bröcker, J., Holtkamp, M., Meier, H., Gibson, G., Varma, A., Cox, V., (2014). Update of the Handbook on External Costs of Transport. FinalReport. European Commission. Issue Number1. 8th January 2014
- Kozina, A., & Pieczonka, A. (2017). Structural Determinants of Conflicts within the Logistics System of an Enterprise. Acta Logistica, 4(2), 19-22. <u>https://doi.org/10.22306/al.v4i2.4</u>
- Langley, A., & Abdallah, C. (2011). Templates and Turns in Qualitative Studies of Strategy and Management. Building Methodological Bridges, 201-235. doi: 10.1108/s1479-8387(2011)0000006007

- Linton, J., Klassen, R., & Jayaraman, V. (2007). Sustainable supply chains: An introduction. *Journal Of Operations Management*, 25(6), 1075-1082. https://doi.org/10.1016/j.jom.2007.01.012
- Luthans, F., & Stewart, T. (1977). A General Contingency Theory of Management. The Academy Of Management Review, 2(2), 181. <u>https://doi.org/10.2307/257902</u>
- Macharis, C. and Melo, S., (2011). *City Distribution and Urban Freight Transport*. Cheltenham: Edward Elgar, pp.56-59.
- Manzhynski, S., & Figge, F. (2019). Coopetition for sustainability: Between organisational benefit and societal good. Business Strategy And The Environment, 29(3), 827-837. <u>https://doi.org/10.1002/bse.2400</u>
- Mota, B., Gomes, M., Carvalho, A., & Barbosa-Povoa, A. (2015). Towards supply chain sustainability: economic, environmental and social design and planning. Journal Of Cleaner Production, 105, 14-27. doi: 10.1016/j.jclepro.2014.07.052
- Myers, M. (2013). Qualitative research in business and management (2nd ed., pp. 73-105). Los Angeles: SAGE.
- Olsson, J., Hellström, D., & Pålsson, H. (2019). Framework of Last Mile Logistics Research: A Systematic Review of the Literature. *Sustainability*, 11(24), 7131. <u>https://doi.org/10.3390/su11247131</u>
- Ozanne, L., Phipps, M., Weaver, T., Carrington, M., Luchs, M., & Catlin, J. et al. (2016). Managing the Tensions at the Intersection of the Triple Bottom Line: A Paradox Theory Approach to Sustainability Management. Journal Of Public Policy & Marketing, 35(2), 249-261. doi: 10.1509/jppm.15.143
- Ranieri, L., Digiesi, S., Silvestri, B., & Roccotelli, M. (2018). A Review of Last Mile Logistics Innovations in an Externalities Cost Reduction Vision. *Sustainability*, 10(3), 782. https://doi.org/10.3390/su10030782
- Smith, W., & Lewis, M. (2011). TOWARD A THEORY OF PARADOX: A DYNAMIC EQUILIBRIUM MODEL OF ORGANIZING. Academy Of Management Review, 36(2), 381-403. <u>https://doi.org/10.5465/amr.2011.59330958</u>
- Soh, Christina & Yeow, Adrian & Goh, Qiwei & Hansen, Rina. (2019). Digital Transformation: Of Paradoxical Tensions and Managerial Responses.

Starik, M., & Rands, G. P. (1995). Weaving an integrated web - Multilevel and multisystem perspectives of ecologically sustainable organisations. Academy of Management Review, 20(4), 908-935

Taefi, T., Kreutzfeldt, J., Held, T., & Fink, A. (2016). Supporting the adoption of electric vehicles in urban road freight transport – A multi-criteria analysis of policy measures in Germany. *Transportation Research Part A: Policy And Practice*, 91, 61-79. https://doi.org/10.1016/j.tra.2016.06.003

- Transport & Environment. (2018). *City bans are spreading in Europe*. Retrieved from <u>https://www.transportenvironment.org/sites/te/files/publications/City%20bans%20are%20spreading%2</u> <u>0in%20Europe_Report.PDF</u>
- Tsoukas, H., and Cunha, M. P. e. (2017). On organisational Circularity: Vicious and Virtuous Cycles in Organizing. Oxford University Press.
- Westley, F., Olsson, P., Folke, C., Homer-Dixon, T., Vredenburg, H., & Loorbach, D. et al. (2011). Tipping Toward Sustainability: Emerging Pathways of Transformation. *AMBIO*, 40(7), 762-780. <u>https://doi.org/10.1007/s13280-011-0186-9</u>

Yin, R. K. (2003). Case Study Research: Designs and Methods (3rd edn). Newbury Park, CA: Sage.

Appendix

- 1. Interview Guide
- 1. Can you briefly introduce yourself, what is your role in the project?
 - a. What are your responsibilities?
 - b. Why are you a part of this project?

2. Who else is involved in the collaboration?

- a. How would you group the other members of collaboration?
- 3. Could you elaborate on how the network has grown and developed up until now?
- 4. What is something that you have learned through this project? and where do you see it going?
 - a. What are some immediate goals for you?
 - b. Do you, overall, feel as the other members (stakeholders) share these goals? Why/why not?
 - i. How do you balance this difference in objectives in your day-to-day?

5. How would you describe your experiences in the collaboration?

- a. What's something that, in your eyes, typically goes very well?
- b. Can you give an example of some specific challenges you have encountered in your role?
- c. How did you respond to 'x' and what was the outcome?
- 6. Looking back at some of the topics we just discussed, which challenges would you describe as being most dominant/recurring?
 - a. Follow up by asking about how challenges were managed

Research Integrity Form - Master thesis

Name: Eric Haynes	Student number: s1008467	
RU e-mail address:	Master specialisation: International Business	
Eric.Haynes@student.ru.nl		

Thesis title: Paradoxical Tensions and Responses in Last-Mile Logistics Ecosystems

Brief description of the study: A qualitative study exploring tensions that emerge among actors in last-mile logistics ecosystems and responses to them.

IF

- providing original work or proper use of references;
- providing appropriate information to all involved in my study;
- requesting informed consent from participants;
- transparency in the way data is processed and represented;
- ensuring confidentiality in the storage and use of data;

If there is any significant change in the question, design or conduct over the course of the research, I will complete another Research Integrity Form.

Breaches of the code of conduct with respect to academic integrity (as described / referred to in the thesis handbook) should and will be forwarded to the examination board. Acting contrary to the code of conduct can result in declaring the thesis invalid

Student's Signature: _____ Date: 14/6/2021

To be signed by supervisor

I have instructed the student about ethical issues related to their specific study. I hereby declare that I will challenge him / her on ethical aspects through their investigation and to act on any violations that I may encounter.

Supervisor's Signature:

Date: