Shopping Centre Operations Amid the Digital Divide: The Role of Anchor Stores

Aiswarya Giridharan

A Thesis

in

The Department

of

Supply Chain & Business Technology Management

Presented in Partial Fulfilment of the Requirements

for the Degree of Master of Supply Chain Management at

Concordia University

Montréal, Quebec, Canada

July 2024

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

By: Aiswarya Giridharan

Entitled Shopping Centre Operations Amid the Digital Divide: The Role of Anchor Stores

and submitted in partial fulfillment of the requirements for the degree of

Master of Supply Chain Management

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

Signed by the final Examining Committee:

_____ Chair
Dr. Satyaveer Chauhan

_____ Examiner
Dr. Arman Sadreddin

_____ Examiner
Dr. Isaac Elking

_____ Examiner
Dr. *John-Patrick Paraskevas*

_____ Supervisor
Dr. Xiaodan Pan

Approved by

_____
Dr. Rustam Vahidov Chair of Department

_____
Dr. Anne-Marie Croteau Dean of John Molson School of Business

Abstract

Shopping Centre Operations Amid the Digital Divide: The Role of Anchor Stores

Aiswarya Giridharan

This study investigates how anchor store clusters within shopping centres interact with internet inequality and socio-economic inequality to influence foot traffic. Foot traffic data from over 400 shopping centres owned by Regency Centres spanning 2017 to 2019 are analysed. We use Principal Component Analysis (PCA) to explore the configuration of anchor store clusters. Key findings include: 1) Higher internet inequality correlates with increased foot traffic, suggesting a preference for in-store shopping, while overall socio-economic disadvantages have minimal impact on overall foot traffic. 2) Specific anchor store clusters, such as diverse non-essential, diverse essential, budget-mix, grocery, and home clusters, significantly enhance foot traffic. In contrast, clusters focusing on health and personal care weaken the effect due to their narrow-range nature. 3) Internet inequality and anchor store types create complex behaviour patterns, with increased reliance on diverse hardline, essential goods, budget-mix, and grocery and home improvement clusters in areas with limited internet access. 4) Some anchor store clusters are significantly beneficial for socio-economically disadvantaged populations facing internet access challenges, emphasizing the value of accessing a broad range of goods in one location, particularly in diverse non-essential and essential general merchandise stores, along with budget-mix and healthcare-oriented stores. These findings suggest that strategic anchor store placement as a means to mitigate the impacts of digital disparities and enhance shopping centre performance, underscoring the importance of inclusive retail environments.

***Key Words*:** Shopping centres, anchor stores, foot traffic, digital divide, internet inequality, socio-economic disparities

Acknowledgement

I would like to express my deepest gratitude to all those who supported me throughout the completion of this thesis.

First and foremost, I am thankful to my thesis advisor, Dr. Xiaodan Pan, for her invaluable guidance, encouragement, and unwavering support throughout this research journey. Dr Xiaodan's profound knowledge and commitment to academic excellence have not only shaped the direction of this thesis but have also inspired me to pursue the highest standards in my research endeavors.

I am also indebted to the members of my thesis committee, Dr. Satyaveer Chauhan, Dr. Arman Sadreddin, Dr. Isaac Elking, and Dr. John-Patrick Paraskevas, for their constructive critique and valuable suggestions that have enriched the content and methodology of this thesis. I am grateful to Truong-Son Ma, whose collaboration and assistance in data collection, and analysis have contributed significantly to the findings presented in this thesis.

Finally, I would like to thank my partner and my family for their unconditional love, patience, and encouragement throughout this academic journey. Their unwavering belief in me has been a constant source of motivation. Additionally, I am grateful to my friends for their camaraderie, moral support, and occasional distractions that provided much-needed breaks during intense research phases.

Table of Contents

List of Figures

List of Tables

1. Introduction

Shopping centres are integral to the retail ecosystem, offering diverse shopping and social experiences, from traditional enclosed malls to open-air complexes. These centres are critical for community engagement and economic activity, serving as both marketplaces and social gathering spaces (Vernor and Rabianski, 1993). Measured by foot traffic, their success is a direct indicator of retail health and consumer interest (Kenton, 2022). The evolution of consumer behaviour towards more integrated shopping experiences emphasizes the need to adapt to both modern lifestyle demands and technological advancements.

The rise of e-commerce, fueled by advancements in digital technology and greater Internet penetration, has significantly reshaped traditional retail models, presenting both challenges and opportunities for physical shopping centers (Alves et al., 2021). Between 2015 and 2019, e-commerce in the United States grew robustly, with an average annual growth rate of approximately 14% (Young, 2022), indicating a major shift in consumer purchasing patterns. This surge in online shopping, known for its convenience and variety, poses a threat to physical stores by potentially reducing their foot traffic (Luo et al., 2020; Melis et al., 2015; Weltevreden, 2007).

In response, brick-and-mortar retailers are innovating to maintain competitiveness. They focus on creating competitive advantages through strategic pricing, enhancing customer experiences, and improving service quality to build brand loyalty and provide memorable shopping experiences (Brüggemann and Olbrich, 2022; Vojvodić, 2019). Additionally, to adapt to this evolving retail landscape, physical retailers are increasingly adopting hybrid models like "order-online-pickup-offline" (Yang et al., 2021). These strategies reflect their adaptability to changing consumer behaviors and the dynamic nature of retail operations, ensuring that physical stores remain a significant component of the retail ecosystem despite the growth of online shopping.

In the context of increasing e-commerce activity, there is an urgent need to for shopping centers to redefine their role within the evolving retail landscape (Liulin, 2024). Anchor stores, encompassing a mix of essential and non-essential retailers, are critical for driving significant foot traffic and supporting the economic stability of shopping centres. These stores not only draw consumers but also create a synergistic effect that benefits surrounding businesses. The strategic placement and inherent draw of these anchors are crucial for maintaining high visitation levels, thereby enhancing the commercial viability of shopping centres (Damian et al., 2011; Yi and Gim, 2018).

Research highlights that despite the popularity of online shopping, a significant digital divide leads many individuals to prefer in-store shopping. This preference is influenced by various factors, including extra fees associated with online purchases, restrictions on using food assistance benefits online, lack of internet access, and limited online product selection flexibility (Jin, 2024). The digital divide comprises two main components: internet inequality and socio-economic inequality. Notably,

the internet's potential to bridge these gaps is constrained, especially for consumers who lack both access to physical stores and reliable internet connectivity (Dennis et al., 2007). Additionally, digital inequality is often exacerbated by underlying socio-economic disparities, disproportionately affecting marginalized and vulnerable populations (Correa, 2023).

In regions affected by the digital divide, characterized by internet and socio-economic inequalities, anchor stores can become critical access points for goods and services that are otherwise challenging to obtain online. These stores can serve as a counterbalance to internet inequality, enhancing their attractiveness and potentially increasing foot traffic, especially in areas with limited digital connectivity. Moreover, socio-economically disadvantaged populations often contend with lower internet penetration and limited technological capabilities (Salemink et al., 2017). As a result, certain anchor stores within shopping centers are strategically positioned to serve these groups, helping to mitigate the impact of both internet and socio-economic inequalities on shopping behaviors and access to essential services.

In this study, we aim to address three research questions: (1) How does unequal access to internet infrastructure impact foot traffic to shopping centres? (2) In what ways do the characteristics of anchor store clusters modify the relationship between internet inequality and foot traffic to shopping centres? (3) How do socio-economic disparities, such as the population aged 65 and above, poverty levels, lower educational attainment, and disability rates, further influence the interaction between internet inequality and anchor store clusters on foot traffic to shopping centres?

The findings demonstrate how digital infrastructure and socio-economic factors interact within retail environments, anchor stores, in shaping consumer behaviour. We show that higher internet inequality correlate with increased foot traffic, indicating a preference for in-store shopping due to limited online access, though socio-economic disadvantages do not significantly impact overall foot traffic. The presence of specific anchor store clusters, such as diverse non-essential, diverse essential, budget-mix, grocery, and home clusters, significantly boosts foot traffic. Conversely, clusters focusing on a narrow range of health and personal care products generally deter foot traffic. Moreover, our findings indicate that, in areas with poor internet access, there is a marked dependence on diverse hardline, essential goods, budget-mix, and grocery and home improvement clusters, reflecting preferences influenced by digital accessibility constraints. Notably, certain anchor store clusters are found to be particularly impactful for socio-economically disadvantaged populations facing internet access challenges.

This study enhances our understanding of the interplay between digital access and physical retail environments, emphasizing the need for retail strategies that accommodate diverse consumer needs in areas with digital disparities. It offers strategic insights for retail developers, policymakers, and community planners on optimizing shopping centre performance amid internet and socio-economic

challenges. By underscoring the pivotal role of anchor stores in mitigating these divides, the research provides guidance on developing targeted strategies that improve spatial accessibility, economic resilience, and community engagement in shopping centres. These findings are particularly relevant for retail developers seeking to design inclusive spaces, policymakers aiming to bridge the digital divide, and community planners focused on fostering economic resilience and social cohesion.

2. Literature Review

2.1 Shopping centres

A shopping centre is a collection of independent retail stores, services, and a parking area conceived, constructed, and maintained by a management firm as a unit (Britannica, T. Editors of Encyclopaedia, 2024, July 19). Shopping centres, encompassing both traditional enclosed malls and open-air strip centres, serve as crucial commercial hubs. Enclosed shopping malls are large, indoor spaces housing a variety of stores, while strip centres feature stores arranged in a row, sharing a building but lacking centralised internal access for the public (Shopping mall definition, 2022; Nikita, 2013; Vernor and Rabianski, 1993). Vernor and Rabianski (1993) broadly define shopping centres to include both of these configurations. El-Adly (2007) observes a significant shift in the role of shopping centres, evolving from mere retail destinations to community hubs that integrate dining, entertainment, and social activities, thus altering consumer perceptions and expectations.

The success of shopping centres is often gauged by foot traffic, a key performance metric indicating the number of visitors entering and moving within the space. High foot traffic typically correlates with increased sales, making it a vital indicator of retail performance (Kenton, 2022; Nicasio, 2019). Retailers must attract visitors, align labour with traffic patterns, and convert visits into sales to remain profitable (Perdikaki et al., 2017). Extensive research has identified various factors that influence consumer foot traffic in shopping centres. Key elements include comfort (such as parking availability, cleanliness, and security), entertainment options (like live music and special events), a diverse mix of tenants, product quality and pricing (essence), mall accessibility (convenience), the mall's external appearance and reputation (luxury), and the degree to which customers feel connected to the shopping centre (Anselmsson, 2006; El-Adly, 2007; El Hedhli et al., 2013).

2.2 Anchor stores

Anchor stores are critical to the success of shopping centers, serving as key drivers of foot traffic due to their strategic importance. Damian et al. (2011) define anchor stores as prominent retailers that significantly enhance the appeal of their shopping centers. Typically characterized by their large size and limited number, these stores attract customers through their renowned brand names and competitive pricing advantages (Leung et al., 2024). Furthermore, the reputation associated with their brands is known to boost foot traffic, not only within the stores themselves but also in surrounding areas

(Kiriri, 2019). Vernor and Rabianski (1993) introduce the concept of "shadow anchors," referring to high-traffic retailers located outside the shopping centre yet significantly contribute to its foot traffic.

These anchor stores are typically categorized into retail and service sectors. The retail sector, essential for distributing goods to consumers, includes stores such as grocery, clothing, electronics, and appliances (Burt and Carralero-Encinas, 2000). The service sector, which includes industries like education, health, leisure, and personal care, is increasingly acknowledged for its contribution to employment and economic growth (Foster et al., 2002; Kumar et al., 2020). This study focuses exclusively on retail anchor stores within shopping centers, excluding shadow anchors, and identifies them as the principal drivers of consumer foot traffic.

Another key concept related to anchor stores is the tenant mix. Kirkup and Rafiq (1994) define tenant mix as the arrangement of different retailers within a shopping centre, a concept expanded by Calvo-Porral and Lévy-Mangín (2018), who emphasise that a diverse tenant mix, including anchor stores, enhances the shopping environment and drives foot traffic. Our study incorporates the concepts of anchor stores and tenant mix to examine how the characteristics of anchor store clusters influence foot traffic. Research indicates that anchor stores significantly boost a shopping centre's drawing power and total sales, establishing themselves as crucial components of the tenant mix (Burnaz and Topcu, 2011; Damian et al., 2011).

2.3 Digital divide

The "digital divide" describes the unequal access to and usage of information and communication technologies (ICTs) among various socioeconomic groups. This gap is characterized by differing opportunities to connect to the internet and other digital tools, affecting individuals, households, businesses, and regions significantly (OECD, 2001: p5). In the retail sector, this divide hinders consumer access and participation in online sales channels. It imposes transaction costs on consumers who lack the skills, resources, and motivation needed to efficiently use online shopping platforms (van Dijk, 2012).

The digital divide is primarily driven by two fundamental factors: internet-related infrastructure and socio-economic determinants that affect technology adoption rates (Gallardo, 2020). Specifically, the internet infrastructure factor includes variables such as the proportion of households lacking computing devices (desktops, laptops, smartphones, tablets), the percentage of households without any internet connection (including those without subscriptions to services like cellular data plans or dial-up), and average internet speeds for downloading and uploading. On the socio-economic side, key determinants include the individual poverty rate, the percentage of the non-institutionalized civilian population with disabilities, the proportion of the population aged 65 and older, and the percentage of individuals aged 25 and older who have not completed high school.

Disparities in digital access profoundly impact consumer behavior and foot traffic to physical retail stores. Consumers adept with technology often prefer online shopping, relegating physical stores to a secondary role. This preference raises concerns among traditional brick-and-mortar retailers about potential displacement by e-commerce platforms (Doherty and Ellis-Chadwick, 2010). Grassl (2011) observes that enhanced access to information and technology, along with increased transparency in business operations, can reduce information asymmetry, thereby reshaping traditional retail practices and foot traffic patterns. Recent findings, such as those by Weinandy et al. (2023), underscore the critical role of social media in driving foot traffic to physical stores, indicating that strategic use of digital platforms can bridge the digital divide and boost in-store visits.

This study is most relevant to Paraskevas et al. (2024), who explore the efficacy of omnichannel and online fulfilment offerings as tools for retailers to expand product access and improve sales among diverse populations affected by the digital divide. Focusing on two aspects of the digital divide—internet infrastructure inequality and socioeconomic inequality (Gallardo, 2020)—the research finds that e-commerce fulfillment strategies effectively mitigate issues related to internet infrastructure. However, the socioeconomic components of the digital divide demand greater attention. They highlight that while not all fulfilment offerings are equally effective for vulnerable populations—those in poverty, over 25 with less than a high school education, those aged 65 and older, and individuals with disabilities—careful selection of omnichannel or online fulfilment options can aid these groups.

2.4 Central study

Understanding the dynamics of shopping centre operations is pivotal in an era marked by digital divides. These elements crucially shape foot traffic patterns and overall shopping centre performance. Resources and appropriation (RA) theory (Van Dijk's, 2012) suggests that social disparities result in uneven resource distribution, affecting access to internet-enabled devices and participation in digital commerce. Barriers such as slow internet speeds, outdated technology, and cumbersome online retail navigation, coupled with the risk of service disruptions, exacerbate these challenges. Moreover, Sud and VanSandt (2015) emphasize the importance of inclusive growth and poverty alleviation through identity rights and inclusive practices, underscoring the role of socio-economic factors in consumer behaviour and shopping centre traffic.

Exploring the dynamics of shopping center operations within the context of digital divides is crucial for understanding their ethical image. Ethical branding and customer perceived ethicality (CPE) suggest that consumers favor brands that align with their ethical values, potentially improving the business performance of organizations that uphold such values (Sierra et al., 2017). Moreover, Rashkova et al. (2024) highlight that organizations can significantly impact socio-economic disparities by fostering mindfulness—an ethically minded awareness focused on the present. This mindfulness helps curb habitual behavior and heightens sensitivity to societal issues. For shopping centers, an

enhanced understanding of the digital divide could lead to the adoption of practices that not only address social inequalities but also create a more inclusive shopping environment for disadvantaged groups (Rashkova et al., 2024).

By bridging operational strategies with ethical considerations, shopping centers can better address the multifaceted challenges posed by the digital divide. In this study, we posit that the transactional challenges stemming from the digital divide might drive increased customer footfall to physical retail locations such as shopping centres. The theoretical framework used in this study's empirical analysis is outlined in Figure 1. Focusing on Regency Centres, we explore three primary research questions: (1) How does unequal access to internet infrastructure affect foot traffic in shopping centres? (2) How do the characteristics of anchor store clusters alter the relationship between internet inequality and shopping centre foot traffic? (3) How do socio-economic disparities—such as the proportion of the population aged 65 and above, poverty rates, lower educational levels, and disability prevalence—moderate the interplay between internet inequality and anchor store clusters in influencing shopping centre foot traffic?

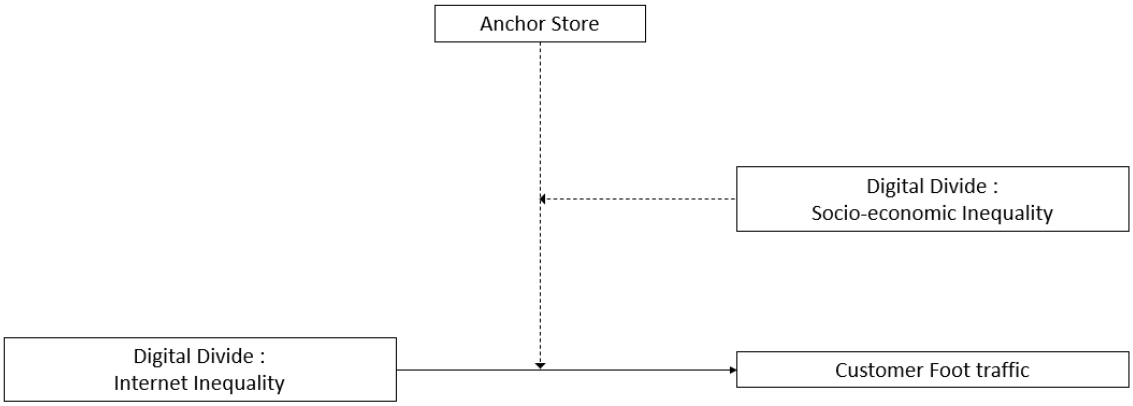

Figure 1 : Theoretical Model

3. Research Methodology

3.1. Data collection

To enhance our understanding of store visits within shopping centres, we analyse data from Regency Centres. Regency Centres is a retail REIT with operations in 16 states in the United States (Regency Centres, 2022). The primary dependent variable, customer foot traffic of the Regency Centre is collected from Placer.ai, a specialized firm engaged in the collection and analysis of foot traffic data ("Mall Foot Traffic Data for Any Property," 2022). In light of this research, we acquired weekly consumer foot traffic data from over 400 shopping centres owned by Regency Centres, located in 259 cities. The dataset spans from 2017 to 2019.

Retail anchor store information was derived from publicly accessible 10-K reports, which detail the anchor stores associated with each shopping centre (Annual filings, 2022). In this study, we categorize anchor stores into mid-tier constructs as per the North American Industry Classification System (NAICS).[1] Table 1 illustrates the mid-tier classification of anchor stores, providing specific examples from each sector. We employ Principal Component Analysis (PCA) to identify and visualize clustering characteristics among retail outlets across different categories. This technique reduces dimensionality, simplifying the management of high-dimensional data and enhancing the ease of data visualization and interpretation (Jolliffe, 2002; Johnson and Wichern, 2007).

The data on the digital divide is sourced from the Social Determinants of Health (SDOH) Database. Initially, we gather data on internet adoption rates across various counties. To quantify internet inequality, we introduce a metric, DDI_INT_{cy}. This metric is formulated by standardizing the inverse of the internet adoption rate to achieve a mean of zero and a standard deviation of one. Similar to Gallardo (2020), we also create a DDI_SEC_{cy} score that comprises four factors indicative of either anticipating lagging technology adoption or perpetuating disparities that impede adoption within a given locale (Hsieh et al., 2011; Sipior et al., 2011). These factors include (1) individual poverty rate (POV_{cy}), (2) the percentage of non-institutionalized civilian population with any disability (DIS_{cy}), (3) percentage of the population aged 65 and over ($AGE65_{cy}$), and (4) percentage of people aged 25 and over with less than a high school diploma ($LTHS_{cy}$). Initially, we standardized each of these measures to a mean of zero and a standard deviation of one. The DDI_SEC_{cy} score is a composite score, assigning equal weight to each component.

In our models, while considering DDI_INT_{cy} and DDI_SEC_{cy} as separate variables and decomposing DDI_SEC_{cy} into its subcomponents the variables may be correlated with each other. In line with previous studies (e.g., Eroglu and Hofer, 2011; Wiersema and Zhang, 2011; Yu, 2008), we incorporate controls to mitigate potential confounding effects. We first conduct separate regressions, estimating the overall socioeconomic inequality score and each of its four components against the internet inequality score. Subsequently, we derive residuals from these regressions and utilize them to replace the original values of these variables in the estimation models. Finally, we standardize all variables related to the digital divide to enable comparison of estimation coefficients.

To control for potential confounding effects on foot traffic at shopping centres, we include control variables such as shopping centres' gross leasable area (GLA_{iy}), number of leased stores (STO_{iy}), county population (POP_{cy}), per capita income (INC_{cy}), and average household size (SIZ_{cy}). This methodology isolates the specific impacts of key variables—anchor store clusters, internet

[1] NAICS classification framework ensures consistent categorization of businesses across different geographical regions and economic sectors, enhancing comparability.

inequality, and socio-economic inequality—ensuring a more accurate analysis. Table 2 provides summary statistics for the main variables in our analysis and Table 3 provides the correlations for these variables, demonstrating limited associations among the variables.

Table 1: Anchor Stores Categorisation

NAICS Codes and Description		NAICS Codes and Description		NAICS Codes and Description		Anchor Store Examples	Count Variables for PCA
441	Motor vehicle and parts dealers	4413	Automotive parts and accessories retailers	441330	Automotive parts and accessories retailers	O'Reilly Auto Parts, Firestone Complete Auto Care, West Marine	AUTO_CT
444	Building material and garden equipment and supplies dealers	4441	Home material and supplies dealers	444110	Home centres	Home Depot, Lowe's, The Tile Shop	BDGD_CT
		4442	Lawn and garden equipment and supplies retailers	444240	Nursery, garden centres, and farm supply retailers	Family Farm & Home, Orchard Supply & Hardware	
445	Food and beverage retailers	4451	Grocery and convenience retailers	445110	Supermarkets and other grocery retailers (except convenience retailers)	Ralphs, Jimbo's Naturally, Albertsons, Vons	FDBV_CT
		4453	Beer, wine, and liquor retailers	445320	Beer, wine, and liquor retailers	Total Wine And More, Beverages & More!, Apple Jack Liquors	
449	Furniture, Home Furnishings, Electronics, and Appliance Retailers	4491	Furniture, floor covering, window treatment and other home furnishings retailers	449110	Furniture retailers	Pottery Barn Outlet, Crate & Barrel, Bassett Furniture, Urban space	FURN_CT
		4492	Electronics and appliance retailers	449210	Electronics and appliance retailers	Best Buy	ELEC_CT
455	General merchandise retailers	4551	Department stores	455110	Department stores	Kohl's, JCPenney, Nordstrom Rack, TJ Maxx, Buy Buy Baby	DEPT_CT
		4552	Warehouse clubs, supercentres, and other general merchandise retailers	455211	Warehouse clubs and supercentres	Costco, Bj's, Wholesale Club, Target, Walmart, K-Mart	WCSC_CT
				455219	All other general merchandise retailers	Dollar Tree	DISC_CT
456		4561		456110	Pharmacies and drug retailers	CVS, Rite Aid, Longs Drug,	HLCR_CT

	Health and personal care retailers		Healthcare and personal care retailers	456120	Cosmetics, beauty supplies, and perfume retailers	Ulta Beauty, Sephora	
				456130	Optical goods retailers	One Hour Optical	
458	Clothing, clothing accessories, shoe, and jewellery retailers	4582	Shoe retailers	458210	Shoe retailers	Shoe Carnival, Famous Footwear	SOFT_CT
		4583	Jewellery, luggage, and leather goods retailers	458310	Jewellery retailers	Jewellery Exchange, Bailey's Fine Jewellery	
459	Sporting goods, hobby, musical instruments, book, and miscellaneous retailers	4591	Sporting goods, hobby, and musical instrument, retailers	459110	Sporting goods retailers	Dick's Sporting Goods, Sports Basement, Academy Sports	SPEC_CT
				459120	Hobby, toy, and game retailers	Hobby Lobby, Michaels, The Cheshire Cat Gallery, Toys "R" Us	
				459130	Sewing, needlework, and piece goods retailers	Jo-Ann Fabrics	
				459140	Musical instrument and supplies retailers	Guitar Centre	
		4592	Book retailers and news dealers	459210	Book retailers and news dealers	Barnes & Noble, Bookstar, Fairfield University Bookstore	
		4594	Office supplies, stationary, and gift retailers	459410	Office supplies and stationary retailers	Staples, OfficeMax, Office Depot	
				459420	Gift, novelty, and souvenir retailers	Party City	
		4595	Used merchandise retailers	459510	Used merchandise retailers	Goodwill	
		4599	Other miscellaneous retailers	459910	Pet and pet supplies retailers	Petco, Centinela Feed & Pet Supplies, Pet Smart	

Table 2: Summary Statistics

Variable	Mean	Std. dev.	Min	Max
FTRAFFIC_ln	10.07	0.98	0.00	12.94
DDI_INT	0.00	1.00	-2.06	3.32
DDI_SEC	0.00	1.00	-2.63	6.35
AGE65	0.00	1.00	-1.41	5.97
LTHS	0.00	1.00	-2.46	3.28
POV	0.00	1.00	-2.77	4.99
DIS	0.00	1.00	-2.04	6.74
ANC_01_ NSS_DIV	0.00	1.00	-0.53	8.52
ANC_02_ESS_SPL	0.00	1.00	-5.99	3.52
ANC_03_NSS_HRD	0.00	1.00	-3.95	8.28
ANC_04_BDG_DIS	0.00	1.00	-7.97	5.99
ANC_05_BDG_MIX	0.00	1.00	-5.13	8.73
ANC_06_ESS_GEN	0.00	1.00	-7.86	5.49
ANC_07_HLC_SFT	0.00	1.00	-5.80	8.94
ANC_08_GRO_HMI	0.00	1.00	-3.36	5.70
ANC_09_ESS_DIV	0.00	1.00	-4.77	4.62
ANC_10_GRO_HMF	0.00	1.00	-5.27	5.39
GLA	0.00	1.00	-1.30	10.66
STO	0.00	1.00	-1.08	9.44
POP	0.00	1.00	-0.83	4.42
SIZ	0.00	1.00	-2.97	3.14
INC	0.00	1.00	-2.17	4.24

Table 3: Correlation Table

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
FTRAFFIC_ln	1.00																					
DDI_INT	-0.06	1.00																				
DDI_SEC	0.10	-0.04	1.00																			
AGE65	0.00	-0.02	0.67	1.00																		
LTHS	0.15	-0.02	0.29	-0.17	1.00																	
POV	0.05	-0.04	0.28	-0.33	0.19	1.00																
DIS	0.02	-0.02	0.71	0.57	-0.31	0.04	1.00															
ANC_01_ NSS_DIV	0.26	-0.08	0.02	0.04	-0.03	-0.03	0.04	1.00														
ANC_02_ESS_SPL	0.06	-0.10	-0.09	-0.16	0.11	0.08	-0.15	-0.04	1.00													
ANC_03_NSS_HRD	0.03	0.04	0.03	0.05	0.03	-0.04	0.01	0.04	-0.07	1.00												
ANC_04_BDG_DIS	0.05	0.03	0.01	0.00	-0.02	0.00	0.04	-0.01	0.00	0.08	1.00											
ANC_05_BDG_MIX	0.05	-0.01	-0.01	-0.03	0.01	0.02	0.00	-0.05	-0.01	-0.12	0.01	1.00										
ANC_06_ESS_GEN	0.14	-0.06	0.04	0.03	0.00	0.00	0.05	0.04	-0.10	-0.04	0.03	0.06	1.00									
ANC_07_HLC_SFT	-0.06	-0.01	0.00	-0.01	0.07	-0.01	-0.06	-0.05	0.01	0.01	-0.01	0.01	0.04	1.00								
ANC_08_GRO_HMI	0.16	0.05	-0.09	-0.09	-0.05	-0.02	-0.02	-0.03	0.10	0.04	0.05	0.01	0.06	0.00	1.00							
ANC_09_ESS_DIV	0.27	-0.11	0.08	0.04	0.09	-0.01	0.04	-0.01	-0.04	0.02	0.03	0.05	0.06	-0.04	0.00	1.00						
ANC_10_GRO_HMF	0.18	-0.03	0.02	0.01	0.08	-0.01	-0.05	0.02	0.04	0.01	-0.02	0.06	-0.03	0.01	0.01	0.10	1.00					
GLA	0.45	-0.05	-0.02	-0.02	0.05	-0.02	-0.05	0.50	0.01	-0.03	0.05	0.04	0.16	-0.21	0.15	0.15	0.14	1.00				
STO	0.36	-0.12	0.00	0.00	0.02	-0.02	0.00	0.89	0.17	0.03	0.05	0.00	0.19	-0.14	0.03	0.18	0.07	0.60	1.00			
POP	0.10	0.23	0.06	-0.20	0.61	0.14	-0.32	0.01	0.10	0.08	-0.03	0.02	-0.03	0.03	-0.03	0.02	0.04	0.04	0.03	1.00		
SIZ	0.11	-0.05	-0.02	-0.19	0.70	-0.12	-0.40	-0.04	0.06	-0.01	0.03	0.04	0.03	0.06	-0.01	0.07	0.06	0.05	0.01	0.37	1.00	
INC	-0.03	-0.66	-0.18	0.10	-0.11	-0.21	-0.20	0.12	-0.01	0.00	-0.08	-0.05	0.04	0.02	-0.11	-0.02	0.04	0.08	0.12	-0.19	-0.15	1.00

3.2. PCA analysis for anchor store clusters

To determine cluster dimensions for the retail anchor stores, we apply Principal Component Analysis (PCA). PCA aims to elucidate the variance-covariance structure within a group of variables, creating a smaller set of linear combinations that are easier to understand. Essentially, PCA reduces a data set with many interconnected variables while preserving the variation among the principal components (PCs). It does this by converting the original variables into uncorrelated PCs, ordered such that the first few components capture most of the variation in the original data set (Jolliffe, 2002; Johnson and Wichern, 2007).

The PCA's eigenvalues and eigenvectors for anchor stores in the retail sector are shown in Tables 4 and 5, respectively. We select principal components that explain 95% of the overall variance (Jolliffe and Cadima, 2016). According to our calculations, we maintain the first ten principal components. This process makes it easier to reduce the dimensionality of the data while maintaining relevant dataset variance. Table 6 provides interpretations for each principal component, detailing the main retail categories represented by each. Specifically, it highlights the types of retail anchor stores that significantly influence each component, identified by higher loadings (either >0.3 or <-0.3).

Table 4: Principal Components (Eigenvectors) for Retail Anchor Stores

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.023	0.633	0.184	**0.184**
Comp2	1.390	0.210	0.126	**0.310**
Comp3	1.180	0.106	0.107	**0.418**
Comp4	1.074	0.176	0.098	**0.515**
Comp5	0.899	0.011	0.082	**0.597**
Comp6	0.888	0.025	0.081	**0.678**
Comp7	0.863	0.015	0.079	**0.756**
Comp8	0.848	0.109	0.077	**0.833**
Comp9	0.739	0.125	0.067	**0.900**
Comp10	0.614	0.132	0.056	**0.956**
Comp11	0.482	.	0.044	1.000

Note: Boldface indicates retained principal components.

Table 5: Principal Components (Eigenvectors) for Retail Anchor Stores

Variable	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6	Comp7	Comp8	Comp9	Comp10	Comp11
WCSC_CT	0.102	**-0.548**	-0.008	0.031	0.206	**0.590**	0.008	-0.022	**0.509**	0.150	0.125
FDBV_CT	-0.025	**0.621**	-0.009	0.077	0.160	0.026	-0.037	**0.452**	**0.474**	**0.389**	0.019
HLCR_CT	0.206	**0.408**	0.113	0.099	-0.255	**0.365**	**0.542**	**-0.502**	0.087	-0.039	-0.129
DISC_CT	0.196	0.134	0.046	**0.711**	**0.385**	0.023	**-0.321**	-0.287	-0.197	0.030	0.249
DEPT_CT	**0.538**	-0.093	-0.241	0.021	0.078	-0.002	-0.125	0.064	-0.133	0.254	**-0.732**
SOFT_CT	**0.336**	-0.161	-0.118	0.156	**0.322**	**-0.404**	**0.640**	0.242	0.113	-0.225	0.159
SPEC_CT	**0.438**	0.150	-0.182	-0.081	-0.271	-0.031	**-0.399**	0.009	**0.375**	**-0.597**	0.125
AUTO_CT	0.101	0.181	**0.437**	**-0.496**	**0.646**	0.074	-0.082	-0.134	-0.042	-0.240	-0.112
BDGD_CT	0.158	-0.059	**0.596**	0.253	-0.234	0.289	0.030	**0.556**	-0.240	-0.202	-0.074
ELEC_CT	0.207	-0.182	**0.572**	0.003	-0.227	**-0.499**	-0.098	-0.259	**0.330**	**0.333**	0.015
FURN_CT	**0.486**	0.058	-0.082	**-0.370**	-0.107	0.127	0.001	0.068	**-0.362**	**0.378**	**0.558**

Note: Boldface indicates large (positive or negative) loadings.

Table 6: Classification and Interpretation of Principal Components for Anchor Store Cluster

Category	Component	Anchor	Interpretation
Diverse Nonessential	Comp1	Diverse Nonessential ANC_01_ NSS_DIV	Principal Component 1 (Comp1) is characterized by substantial positive loadings (exceeding 0.3) on a distinct cluster of retail sectors, including department stores (0.538), softline retailers (0.336), speciality retailers (0.438), and furnishing retailers (0.486). This component, denoted as ANC_01_ NSS_DIV, encapsulates a varied array of non-essential retail segments within the shopping centre. The configuration of Comp1 underscores its analytical utility in gauging the breadth and depth of discretionary consumer shopping experiences offered.
	Comp3	Diverse Hardline ANC_03_NSS_HRD	Principal Component 3 (Comp3) exhibits strong positive loadings (greater than 0.3) on three specific retail categories: automobile retailers (0.437), building and gardening retailers (0.596), and electronic retailers (0.572). This pattern identifies Comp3 as encapsulating the variety of non-essential hardline retail sectors, which is aptly designated ANC_03_NSS_HRD. This component is instrumental in assessing the scope of shopping experiences available for consumers interested in hardline products.
Essential-Oriented	Comp2	Special Essential ANC_02_ESS_SPL	Principal Component 2 (Comp2) is defined by notable positive loadings (above 0.3) on two key retail sectors: food and beverage retailers (0.621), and health and personal care retailers (0.408). Concurrently, this component shows notable negative loadings (below -0.3) on warehouse clubs and supercentres (-0.548), highlighting a relative underrepresentation of these sectors in Comp2's profile. This configuration illustrates Comp2's focus on specialized essential retail offerings, which has been labeled ANC_02_ESS_SPL. The component serves as a critical metric for assessing the diversity of special essential retail services available within the shopping centre.
	Comp6	General Essential ANC_06_ESS_GEN	Principal Component 6 (Comp6) is characterized by significant positive loadings (above 0.3) on warehouse clubs and supercentres (0.590), and health and personal care retailers (0.365), indicating its strong association with large-scale, essential general merchandisers and specialized health sectors. Concurrently, this component shows notable negative loadings (below -0.3) on softline retailers (-0.404) and electronic retailers (-0.499), highlighting a relative underrepresentation of these sectors in Comp6's profile. Designated as ANC_06_ESS_GEN, this component crucially evaluates the diversity of one-stop shopping experiences, particularly catering to consumers prioritizing health and personal care products alongside general merchandise.
	Comp9	Grocery and General Essential ANC_09_ESS_DIV	Principal Component 9 (Comp9) is distinguished by strong positive loadings (above 0.3) on warehouse clubs and supercentres (0.509), food and beverage retailers (0.474), specialty retailers (0.375), and electronic retailers (0.330). This indicates a broad association with essential general merchandisers and diverse specialty sectors, facilitating a comprehensive range of shopping needs. Conversely, this component displays notable negative loadings (below -0.3) on furniture retailers (-0.362), which are underrepresented in Comp9's profile. Labeled ANC_09_ESS _DIV, this component is critical for assessing the diversity of one-stop shopping experiences, uniquely catering to consumers with varied and specific essential shopping demands.
Budget-Oriented	Comp4	Budget-Discount Products	Principal Component 4 (Comp4) is distinguished by substantial positive loadings (above 0.3) on discount stores (0.711), which indicates a strong association with value-oriented retail options. In contrast, this component exhibits notable negative loadings (below -0.3) on automobile retailers (-

		ANC_04_BDG_DIS	0.496) and furnishing retailers (-0.370), suggesting a divergence from higher-end or specialized product categories. Comp4 has been designated ANC_04_ BDG_DIS, emphasizing its focus on essential discount retail clusters. This component plays a vital role in evaluating the range and accessibility of budget-conscious shopping experiences available to consumers.
	Comp5	Budget-Mix Products ANC_05_BDG_MIX	Principal Component 5 (Comp5) demonstrates significant positive loadings (above 0.3) across three retail categories: discount retailers (0.385), softline retailers (0.322), and automobile retailers (0.646). This pattern suggests that Comp5 captures a combination of essential budget-focused general merchandisers along with non-essential softline and automobile retail sectors, collectively labeled ANC_05_BDG_MIX. This component is instrumental in evaluating the diversity of shopping experiences for consumers who are budget-conscious yet also seek specialized softline and automobile products.
Health and Softline	Comp7	Healthcare and Softline ANC_07_HLC_SFT	Principal Component 7 (Comp7) is characterized by strong positive loadings (above 0.3) on healthcare and personal care retailers (0.542) and softline retailers (0.640), indicating a significant association with both essential health services and non-essential softline goods. Conversely, this component exhibits substantial negative loadings (below -0.3) on discount retailers (-0.321) and specialty retailers (-0.399), suggesting these categories are less representative within this component's framework. Labeled as ANC_07_HLC_SFT, Comp7 is integral for assessing the diverse but special shopping experiences, spanning essential healthcare services to non-essential apparel and textile offerings.
Grocery and Home	Comp8	Grocery and Home Improvement ANC_08_GRO_HMI	Principal Component 8 (Comp8) shows significant positive loadings (above 0.3) on food and beverage retailers (0.452) and building and gardening retailers (0.556), highlighting its strong affiliation with sectors catering to daily essentials and home improvement needs. This component also demonstrates substantial negative loadings (below -0.3) on healthcare and personal care retailers (-0.502), indicating a diminished representation of these categories within Comp8's domain. Designated as ANC_08_GRO_HMI, this component is vital for evaluating the diversity of specialized shopping experiences, particularly serving consumers focused on obtaining everyday necessities and engaging in home enhancement projects.
	Comp10	Grocery and Home Furnishing ANC_10_GRO_HMF	Principal Component 10 (Comp10) is characterized by significant positive loadings (above 0.3) on food and beverage retailers (0.389), electronic retailers (0.333), and furnishing retailers (0.378), showcasing its strong affiliation with both essential grocery items and non-essential consumer goods in electronics and home furnishings. This component also exhibits notable negative loadings (below -0.3) on specialty retailers (-0.597), indicating these are less prevalent within Comp10's scope. Designated as ANC_10_GRO_HMF, this component plays a crucial role in evaluating the diversity of one-stop shopping experiences that cater to a broad spectrum of consumer needs, from essential groceries to non-essential home products.

Note: Cut-off rating considered 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good), or 0.71 (excellent) (MRC Cognition and Brain Sciences Unit, n.d.)

3.3 Estimation models

We explore how the digital divide interacts with anchor stores in affecting foot traffic. First, in equation (1), we focus on the direct impact of internet inequality, socio-economic inequality, and anchor store cluster characteristics on foot traffic. Second, in equation (2), we add the two-way interactions between internet inequality and anchor store cluster characteristics and explore its impact on foot traffic. Third, in equation (3), we include the three-way interaction between internet inequality, anchor store cluster characteristics, and socio-economic inequality and explore its impact on foot traffic.

We applied linear regression with multiple fixed effects—including state ($STAT\_EF_s$), CBSA (Core-Based Statistical Area - $CBSA\_EF_b$), DMA (Designated Market Area - DMA_EF_d), county (CNTY_EF$_c$), center (CNTR_EF$_i$), year (YEAR_EF$_y$), and week (WEEK_EF$_t$)—in our estimation (Guimarães and Portugal, 2010; Gaure, 2013). Robust standard errors were used to account for heteroscedasticity and serial correlations (Kiefer et al., 2000). In all the equations $FTRAFFIC_{icsdbty}$ denotes the number of customer visits to a particular store outlet i located in county c of the state s, in the d DMA and b CBSA during week t of the year y, and $\varepsilon_{icsdbty}$ represents the error term. ANC_{iy} denotes a vector of anchor store clusters.

$$ln(FTRAFFIC_{icsdbty}) = \beta_0 + \beta_1 \cdot DDI\_INT_{cy} + \beta_2 \cdot DDI\_SEC_{cy} + \beta_3 \cdot ANC_{iy} + \beta_4 \cdot GLA_{iy} + \beta_5 \cdot POP_{cy} + \beta_6 \cdot INC_{cy} + \beta_7 \cdot SIZ_{cy} + \beta_8 \cdot STO_{iy} + \beta_9 \cdot STAT\_EF_s + \beta_{10} \cdot DMA\_EF_d + \beta_{11} \cdot CBSA\_EF_b + \beta_{12} \cdot CNTY\_EF_c + \beta_{13} \cdot CNTR\_EF_i + \beta_{14} \cdot YEAR\_EF_y + \beta_{15} \cdot WEEK\_EF_t + \varepsilon_{icsdbty}$$

Equation (1)

$$ln(FTRAFFIC_{icsdbty}) = \beta_0 + \beta_1 \cdot DDI\_INT_{cy} + \beta_2 \cdot DDI\_SEC_{cy} + \beta_3 \cdot ANC_{iy} + \beta_4 \cdot DDI\_INT_{cy} \cdot ANC_{iy} + \beta_5 \cdot GLA_{iy} + \beta_6 \cdot POP_{cy} + \beta_7 \cdot INC_{cy} + \beta_8 \cdot SIZ_{cy} + \beta_9 \cdot STO_{iy} + \beta_{10} \cdot STAT\_EF_s + \beta_{11} \cdot DMA\_EF_d + \beta_{12} \cdot CBSA\_EF_b + \beta_{13} \cdot CNTY\_EF_c + \beta_{14} \cdot CNTR\_EF_i + \beta_{15} \cdot YEAR\_EF_y + \beta_{16} \cdot WEEK\_EF_t + \varepsilon_{icsdbty}$$

Equation (2)

$$ln(FTRAFFIC_{icsdbty}) = \beta_0 + \beta_1 \cdot DDI\_INT_{cy} + \beta_2 \cdot DDI\_SEC_{cy} + \beta_3 \cdot ANC_{iy} + \beta_4 \cdot DDI\_INT_{cy} \cdot DDI\_SEC_{cy} + \beta_5 \cdot DDI\_INT_{cy} \cdot ANC_{iy} + \beta_6 \cdot DDI\_SEC_{cy} \cdot ANC_{iy} + \beta_7 \cdot DDI\_INT_{cy} \cdot ANC_{iy} \cdot DDI\_SEC_{cy} + \beta_8 \cdot GLA_{iy} + \beta_9 \cdot POP_{cy} + \beta_{10} \cdot INC_{cy} + \beta_{11} \cdot SIZ_{cy} + \beta_{12} \cdot STO_{iy} + \beta_{13} \cdot STAT\_EF_s + \beta_{14} \cdot DMA\_EF_d + \beta_{15} \cdot CBSA\_EF_b + \beta_{16} \cdot CNTY\_EF_c + \beta_{17} \cdot CNTR\_EF_i + \beta_{18} \cdot YEAR\_EF_y + \beta_{19} \cdot WEEK\_EF_t + \varepsilon_{icsdbty}$$

Equation (3)

4. Estimation Results

This study investigates the complex interplay between internet inequality, socio-economic inequality, and anchor store cluster characteristics, examining their collective impact on customer foot traffic to shopping centres. Model 1.1 establishes the direct effects of internet inequality, vulnerable socio-economic populations, and anchor store clusters on foot traffic. In Model 1.2, we introduce a series of two-way interaction terms between internet inequality and anchor store clusters, exploring how the characteristics of these clusters modify the relationship between internet inequality and foot traffic. Model 1.3 further incorporates three-way interaction terms to assess how socio-economic disparities affect the dynamics between internet inequality and anchor store clusters in influencing foot traffic to shopping centres.

4.1. The direct effect of internet inequality, socio-economic inequality, and anchor stores

Our initial exploration examines the direct effects of disparities in internet infrastructure and socio-economic conditions on foot traffic to shopping centres. The results presented in Table 7 consistently demonstrate a significant positive correlation between internet inequality and foot traffic: Model 1.1 shows a coefficient of 0.083 ($p<0.001$), Model 1.2 records 0.080 ($p<0.001$), and Model 1.3 posts 0.115 ($p<0.001$). These findings indicate that regions with higher internet inequality, reflecting a pronounced digital divide, experience increased in-store foot traffic. Conversely, socio-economic disadvantage does not significantly impact foot traffic, suggesting that these macroeconomic factors may not strongly influence retail foot traffic. This absence of correlation highlights the need for further research into specific socio-economic attributes that affect populations particularly vulnerable to digital access deficiencies, such as seniors, individuals with limited education, those in poverty, and people with disabilities, to better understand their nuanced impacts.

Our analysis explores the influence of anchor store cluster characteristics on foot traffic. Model 1.1 highlights that specific clusters, both non-essential and essential, significantly enhance foot traffic. Notably, the non-essential cluster ANC_01_NSS_DIV, with a significant coefficient of 0.025 ($p<0.001$), has a considerable impact. This cluster, encompassing a variety of non-essential shopping sectors, acts as a robust indicator of discretionary consumer spending within the shopping centre. Furthermore, essential-oriented clusters such as ANC_06_ESS_GEN and ANC_09_ESS_DIV also markedly boost foot traffic, with coefficients of 0.014 ($p<0.001$) and 0.010 ($p<0.001$), respectively. ANC_06_ESS_GEN is crucial for assessing one-stop shopping environments that focus on health and general merchandise. In contrast, ANC_09_ESS_DIV spans from specialized to general essential retail sectors, offering a detailed perspective on one-stop shopping experiences.

Additionally, Model 1.1 reveals that clusters blending non-essential and essential retail significantly increase foot traffic. For instance, the budget-oriented cluster ANC_05_BDG_MIX, with a coefficient of 0.003 ($p<0.05$), captures the interplay between essential and non-essential retail. This

cluster, which includes discount stores, softlines, and automobile sectors, provides insights into the varied preferences of budget-conscious consumers. Grocery and home-related clusters like ANC_08_GRO_HMI and ANC_10_GRO_HMF also significantly impact foot traffic, with coefficients of 0.005 ($p<0.05$) and 0.012 ($p<0.001$), respectively. ANC_08_GRO_HMI targets daily essentials and home improvement sectors, emphasizing the diversity of specialized shopping experiences available. Meanwhile, ANC_10_GRO_HMF covers a range from essential groceries to non-essential electronics and furnishings, crucial for understanding the varied needs of consumers across different shopping experiences.

However, the findings also reveal that not all retail cluster formations are equally effective in attracting customers. For example, the study identifies a negative impact associated with ANC_07_HLC_SFT, which has a coefficient of -0.005 ($p<0.001$), suggesting that clusters primarily composed of health and personal care along with softline retailers may deter foot traffic due to their limited product range or specialized nature. Additionally, clusters such as ANC_02_ESS_SPL, ANC_03_NSS_HRD, and ANC_04_BDG_DIS showed no statistically significant effect on foot traffic. ANC_02_ESS_SPL integrates specialized essential services like food and health care, reflecting the diversity of essential services within the shopping centre, while ANC_03_NSS_HRD and ANC_04_BDG_DIS focus on non-essential hardline goods and discount retail, respectively, targeting different consumer interests from durable goods to budget-conscious shopping.

4.2. The interaction effect of internet inequality, socio-economic inequality, and anchor stores

We further explore the interaction effects between disparities in internet adoption, socio-economic conditions, and anchor store clusters on foot traffic to shopping centres, uncovering complex influences on customer foot traffic. Interestingly, although anchor cluster characteristics such as ANC_02_ESS_SPL and ANC_03_NSS_HRD did not demonstrate a statistically significant direct impact on foot traffic in Model 1.1, these characteristics amplify the positive impact of internet inequality on foot traffic. The interaction coefficients, DDI_INT * ANC_02_ESS_SPL and DDI_INT * ANC_03_NSS_HRD, are 0.009 ($p<0.001$) and 0.007 ($p<0.001$) respectively, indicating a strengthening influence when combined with disparities in internet access. Specifically, ANC_02_ESS_SPL combines special essential retail sectors such as food and beverage with health and personal care, serving as a key measure of specialized essential service diversity within the shopping centre. ANC_03_NSS_HRD captures diverse non-essential hardline retail, thereby providing insights into consumer interests in durable goods.

Secondly, three anchor store clusters—ANC_05_BDG_MIX, ANC_08_GRO_HMI, and ANC_09_ESS_DIV—not only exhibit a directly positive effect on foot traffic in Model 1.1, but also enhance the positive impact of internet inequality on foot traffic. The coefficients for DDI_INT * ANC_05_BDG_MIX, DDI_INT * ANC_08_GRO_HMI, and DDI_INT * ANC_09_ESS_DIV, are

0.002 ($p<0.001$), 0.008 ($p<0.001$), and 0.011 ($p<0.001$), respectively. ANC_05_BDG_MIX combines essential and non-essential retail, focusing on discount, softline, and automobile products to cater to diverse budget-conscious shopping preferences. ANC_08_GRO_HMI emphasizes its role in providing for daily grocery essentials and home improvement needs, thus assessing the diversity of home-related shopping experiences. While ANC_09_ESS_DIV spans a broad spectrum of special and general essential retail sectors, crucial for evaluating comprehensive one-stop shopping experiences.

We anticipate that socio-economically disadvantaged populations may increasingly rely on specific anchor store clusters in regions with pronounced internet inequality. Although ANC_01_ NSS_DIV typically mitigates the positive impact of internet inequality on foot traffic, the triple interaction term DDI_INT * ANC_01_ NSS_DIV * DDI_SEC is positive and significant, exhibiting a coefficient of 0.006 ($p<0.1$). ANC_01_NSS_DIV encompasses a variety of non-essential retail sectors, offering a broad perspective on discretionary consumer spending within the shopping centre.

Moreover, while the interaction terms DDI_INT * ANC_4_BDG_DIS and DDI_INT * ANC_7_HLC_SFT do not show significance in Model 1.2, the three-way interactions with socio-economic disadvantage— DDI_INT * ANC_4_BDG_DIS * DDI_SEC and DDI_INT * ANC_7_HLC_SFT * DDI_SEC —are both positive and significant in Model 1.3, with coefficients of 0.005 ($p<0.001$) and 0.011 ($p<0.001$) respectively. ANC_04_BDG_DIS focuses primarily on discount retail, distancing itself from more upscale sectors like automobiles and furnishings and highlighting its role in providing budget-friendly shopping options. ANC_07_HLC_SFT bridges essential health services with non-essential softline products, offering insight into a diverse yet specialized range of shopping experiences. These findings indicate that such anchor store clusters hold particular appeal for socio-economically disadvantaged groups in areas lacking robust internet access, likely reflecting their unique needs and shopping preferences.

Table 7: Estimation Results: Internet Inequality, Socio-Economic Inequality, and Anchor Stores

FTRAFFIC_ln	Model 1.1	Model 1.2	Model 1.3
DDI_INT	**0.083*** (0.014)**	0.080*** (0.014)	0.115*** (0.016)
DDI_SEC	0.002 (0.011)	-0.003 (0.011)	-0.003 (0.011)
ANC_01_ NSS_DIV	**0.025*** (0.006)**	0.018** (0.006)	0.019** (0.006)
ANC_02_ESS_SPL	-0.002 (0.004)	0.001 (0.004)	-0.002 (0.004)
ANC_03_NSS_HRD	-0.003 (0.002)	-0.001 (0.002)	-0.008 (0.005)
ANC_04_BDG_DIS	-0.001 (0.001)	-0.001 (0.001)	-0.000 (0.001)
ANC_05_BDG_MIX	**0.003* (0.001)**	0.004** (0.002)	0.006* (0.003)
ANC_06_ESS_GEN	**0.014*** (0.002)**	0.013*** (0.003)	0.022*** (0.005)
ANC_07_HLC_SFT	**-0.005*** (0.001)**	-0.005*** (0.001)	-0.002+ (0.001)
ANC_08_GRO_HMI	**0.005* (0.002)**	0.006* (0.003)	0.011** (0.004)
ANC_09_ESS_DIV	**0.010*** (0.003)**	0.012*** (0.003)	0.007* (0.003)
ANC_10_GRO_HMF	**0.012*** (0.002)**	0.011*** (0.002)	0.006* (0.002)
DDI_INT * ANC_01_ NSS_DIV		-0.006*** (0.002)	0.003 (0.002)
DDI_INT * ANC_02_ESS_SPL		**0.009*** (0.003)**	0.003 (0.002)
DDI_INT * ANC_03_NSS_HRD		**0.007*** (0.002)**	0.006* (0.003)
DDI_INT * ANC_04_BDG_DIS		-0.001 (0.001)	0.001 (0.001)
DDI_INT * ANC_05_BDG_MIX		**0.002* (0.001)**	0.002 (0.002)
DDI_INT * ANC_06_ESS_GEN		-0.001 (0.001)	-0.007** (0.002)
DDI_INT * ANC_07_HLC_SFT		-0.000 (0.001)	0.011*** (0.003)
DDI_INT * ANC_08_GRO_HMI		**0.008*** (0.002)**	0.011*** (0.002)
DDI_INT * ANC_09_ESS_DIV		**0.011*** (0.003)**	0.006** (0.002)
DDI_INT * ANC_10_GRO_HMF		0.004 (0.003)	-0.004 (0.002)
DDI_INT * DDI_SEC			0.004 (0.006)
ANC_01_ NSS_DIV * DDI_SEC			0.001 (0.002)
ANC_02_ESS_SPL * DDI_SEC			-0.019*** (0.005)
ANC_03_NSS_HRD * DDI_SEC			-0.004 (0.004)
ANC_04_BDG_DIS * DDI_SEC			0.003** (0.001)
ANC_05_BDG_MIX * DDI_SEC			0.000 (0.002)
ANC_06_ESS_GEN * DDI_SEC			0.005 (0.004)
ANC_07_HLC_SFT * DDI_SEC			0.010*** (0.002)
ANC_08_GRO_HMI * DDI_SEC			-0.002 (0.002)
ANC_09_ESS_DIV * DDI_SEC			-0.006+ (0.004)
ANC_10_GRO_HMF * DDI_SEC			-0.013*** (0.003)
DDI_INT * ANC_01_ NSS_DIV * DDI_SEC			**0.006+ (0.003)**
DDI_INT * ANC_02_ESS_SPL * DDI_SEC			-0.012*** (0.003)
DDI_INT * ANC_03_NSS_HRD * DDI_SEC			-0.008*** (0.002)
DDI_INT * ANC_04_BDG_DIS * DDI_SEC			**0.005** (0.002)**
DDI_INT * ANC_05_BDG_MIX * DDI_SEC			0.001 (0.002)
DDI_INT * ANC_06_ESS_GEN * DDI_SEC			-0.008*** (0.002)
DDI_INT * ANC_07_HLC_SFT * DDI_SEC			**0.011** (0.004)**

DDI_INT * ANC_08_GRO_HMI * DDI_SEC			-0.004 (0.003)
DDI_INT * ANC_09_ESS_DIV * DDI_SEC			-0.014** (0.005)
DDI_INT * ANC_10_GRO_HMF * DDI_SEC			-0.007** (0.003)
L.FTRAFFIC_ln	0.817*** (0.018)	0.816*** (0.018)	0.810*** (0.018)
GLA	-0.129*** (0.032)	-0.135*** (0.033)	-0.154*** (0.035)
STO	-0.023** (0.007)	-0.018** (0.007)	-0.019** (0.007)
POP	0.570* (0.224)	0.677** (0.223)	0.567* (0.229)
SIZ	-0.075*** (0.020)	-0.095*** (0.023)	-0.067* (0.028)
INC	-0.088*** (0.020)	-0.116*** (0.020)	-0.120*** (0.021)
STAT_EF	Included	Included	Included
DMA_EF	Included	Included	Included
CBSA_EF	Included	Included	Included
CNTY_EF	Included	Included	Included
CNTR_EF	Included	Included	Included
YEAR_EF	Included	Included	Included
WEEK_EF	Included	Included	Included
CONS	1.828*** (0.181)	1.845*** (0.181)	1.884*** (0.182)
N	58449.000	58449.000	58449.000
F	221.049***	155.229***	108.082***
r2	0.941	0.941	0.941
r2_a	0.941	0.941	0.941

Note: Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

5. Extended Analysis

To further elucidate the impact of socio-economic challenges, we examined the influence of four specific characteristics—individual poverty rate (POV), the percentage of non-institutionalized civilian population with any disability (DIS), the percentage of the population aged 65 and over (AGE65), and the percentage of people aged 25 and over with less than a high school diploma (LTHS)—by incorporating these variables into comprehensive models in Table 8.

In Model 2.3, the variable AGE65 was introduced to explore the reliance of seniors on particular anchor store clusters within contexts of significant internet access disparities. Non-essential clusters such as ANC_01_NSS_DIV and ANC_03_NSS_HRD, which encompass a mix of non-essential and hardline retail sectors, significantly benefit this demographic (DDI_INT * ANC_01_ NSS_DIV * AGE65: 0.013, $p < 0.001$; DDI_INT * ANC_03_NSS_HRD * AGE65: 0.014, $p < 0.01$). Additionally, clusters that blend non-essential and essential retail—specifically ANC_05_BDG_MIX and ANC_07_HLC_SFT—play a critical role for seniors. These clusters not only provide special cost-effective shopping options but also access to special essential healthcare and softline products, proving to be essential in areas with restricted internet access (DDI_INT * ANC_05_BDG_MIX * AGE65: 0.035, $p < 0.001$; DDI_INT * ANC_07_HLC_SFT * AGE65: 0.011, $p < 0.001$). These findings underscore the importance of targeted retail configurations to meet the needs of elderly populations in digitally divided environments.

Model 2.4 integrates the variable LTHS to explore the reliance of individuals with limited educational attainment on specific anchor store clusters. The cluster ANC_06_ESS_GEN, known for facilitating one-stop shopping experiences with a comprehensive range of general merchandise, health products, and personal care items, along with warehouse clubs and supercentres, is especially significant for this demographic. The interaction term DDI_INT * ANC_06_ESS_GEN * LTHS is statistically significant (0.009, $p < 0.001$), underscoring the vital role of this cluster in providing essential goods and services to those with lower educational attainment, particularly in regions with pronounced digital disparities.

Model 2.5 integrates the individual poverty rate (POV) to evaluate its impact on customer foot traffic in relation to specific anchor store clusters amidst significant internet inequality. The anchor cluster ANC_03_NSS_HRD, which offers a broad range of shopping options for durable goods plays a pivotal role for economically disadvantaged populations, (DDI_INT * ANC_03_NSS_HRD * POV: 0.004, $p < 0.1$). The cluster ANC_06_ESS_GEN, specializing in comprehensive one-stop shopping experiences that include general merchandise along with health and personal care products, also exhibits a significant positive effect (DDI_INT * ANC_06_ESS_GEN * POV: 0.011, $p < 0.001$). This indicates its essential role in providing necessary goods and services to populations living below the poverty line,

highlighting the importance of such clusters in facilitating access to essential resources in areas affected by digital disparities.

In Model 2.6, we examine the impact of the DIS variable, representing the percentage of the population with any disability, on customer foot traffic. For ANC_04_BDG_DIS cluster, which evaluates the range of shopping options available for budget-conscious consumers, the positive significance of the three-way interaction term DDI_INT * ANC_04_BDG_DIS * DIS in Model 2.6 (0.010, $p < 0.01$) indicates that those with disabilities increasingly depend on budget-conscious shopping options offered by this cluster, especially in environments with significant internet inequality. This highlights the pivotal role of such clusters in providing accessible and necessary shopping solutions to a vulnerable segment of the population.

Table 8: Estimation Results: Internet Inequality, Socio-Economic Inequality (AGE65, LTHS, POV, and DIS) and Anchor Stores

FOOTTRAFFIC_ln	Model 2.1	Model 2.2	Model 2.3	Model 2.4	Model 2.5	Model 2.6
DDI_INT	0.107*** (0.023)	0.093*** (0.023)	0.108*** (0.026)	0.107*** (0.026)	0.135*** (0.027)	0.116*** (0.024)
AGE65	0.224*** (0.047)	0.216*** (0.048)	0.254*** (0.064)	0.185*** (0.046)	0.244*** (0.049)	0.327*** (0.057)
LTHS	-0.039 (0.030)	-0.056+ (0.031)	-0.062* (0.031)	-0.068* (0.034)	-0.050 (0.031)	-0.027 (0.031)
POV	-0.003 (0.004)	-0.003 (0.004)	-0.001 (0.005)	0.001 (0.004)	-0.009* (0.004)	-0.004 (0.004)
DIS	0.025+ (0.015)	0.021 (0.015)	0.017 (0.016)	0.015 (0.016)	0.032* (0.016)	0.014 (0.016)
ANC_01_ NSS_DIV	0.024*** (0.006)	0.018** (0.006)	0.014* (0.006)	0.018** (0.007)	0.026*** (0.007)	0.018** (0.006)
ANC_02_ESS_SPL	-0.002 (0.004)	0.000 (0.004)	0.011* (0.005)	-0.004 (0.004)	-0.004 (0.004)	0.001 (0.005)
ANC_03_NSS_HRD	-0.002 (0.002)	-0.001 (0.002)	-0.010 (0.007)	0.002 (0.002)	-0.010** (0.003)	-0.005+ (0.003)
ANC_04_BDG_DIS	-0.001 (0.001)	-0.001 (0.001)	-0.005* (0.002)	-0.002 (0.001)	-0.004*** (0.001)	0.002 (0.002)
ANC_05_BDG_MIX	0.003* (0.001)	0.004* (0.002)	0.011*** (0.003)	0.005* (0.002)	0.007*** (0.002)	-0.001 (0.003)
ANC_06_ESS_GEN	0.013*** (0.003)	0.012*** (0.003)	0.016** (0.006)	0.010** (0.003)	0.026*** (0.004)	0.013*** (0.003)
ANC_07_HLC_SFT	-0.005*** (0.001)	-0.005*** (0.001)	-0.001 (0.001)	-0.006*** (0.001)	-0.002 (0.001)	-0.006*** (0.001)
ANC_08_GRO_HMI	0.004 (0.002)	0.005+ (0.003)	0.012*** (0.003)	0.003 (0.003)	0.006* (0.003)	0.009** (0.003)
ANC_09_ESS_DIV	0.010*** (0.003)	0.012*** (0.003)	0.005 (0.004)	0.012*** (0.003)	0.011*** (0.003)	0.014*** (0.003)
ANC_10_GRO_HMF	0.012*** (0.002)	0.011*** (0.002)	0.004 (0.003)	0.010*** (0.002)	0.007*** (0.002)	0.013*** (0.002)
DDI_INT * ANC_01_ NSS_DIV		-0.007*** (0.002)	-0.003+ (0.002)	-0.002 (0.002)	-0.009*** (0.002)	-0.008** (0.002)
DDI_INT * ANC_02_ESS_SPL		0.009*** (0.003)	0.009** (0.003)	0.003 (0.002)	0.008** (0.003)	0.007* (0.004)
DDI_INT * ANC_03_NSS_HRD		0.007*** (0.002)	0.015*** (0.003)	0.006** (0.002)	0.012*** (0.002)	-0.001 (0.003)
DDI_INT * ANC_04_BDG_DIS		-0.001 (0.001)	-0.004** (0.002)	0.000 (0.001)	-0.004*** (0.001)	0.006* (0.003)
DDI_INT * ANC_05_BDG_MIX		0.002* (0.001)	0.010*** (0.003)	0.005*** (0.001)	-0.005*** (0.001)	-0.005 (0.003)
DDI_INT * ANC_06_ESS_GEN		-0.000 (0.001)	-0.002 (0.002)	-0.004+ (0.002)	0.004* (0.002)	-0.005* (0.002)
DDI_INT * ANC_07_HLC_SFT		0.000 (0.001)	-0.000 (0.001)	0.001 (0.002)	-0.009*** (0.002)	0.004+ (0.002)
DDI_INT * ANC_08_GRO_HMI		0.008** (0.002)	0.005* (0.002)	0.009*** (0.002)	-0.006** (0.002)	0.016*** (0.003)
DDI_INT * ANC_09_ESS_DIV		0.010*** (0.003)	0.014*** (0.003)	0.008** (0.003)	0.011*** (0.003)	0.011*** (0.003)
DDI_INT * ANC_10_GRO_HMF		0.003 (0.003)	-0.001 (0.003)	-0.002 (0.003)	0.005+ (0.003)	0.003 (0.003)

DDI_INT *AGE65			0.012** (0.005)			
ANC_01_ NSS_DIV * AGE65			-0.006 (0.006)			
ANC_02_ESS_SPL * AGE65			0.012* (0.005)			
ANC_03_NSS_HRD * AGE65			-0.018 (0.012)			
ANC_04_BDG_DIS * AGE65			0.002 (0.005)			
ANC_05_BDG_MIX * AGE65			0.006 (0.005)			
ANC_06_ESS_GEN * AGE65			0.018* (0.007)			
ANC_07_HLC_SFT * AGE65			0.000 (0.002)			
ANC_08_GRO_HMI * AGE65			0.010* (0.005)			
ANC_09_ESS_DIV * AGE65			0.003 (0.005)			
ANC_10_GRO_HMF * AGE65			0.003 (0.004)			
DDI_INT * ANC_01_ NSS_DIV * AGE65			**0.013*** (0.004)**			
DDI_INT * ANC_02_ESS_SPL * AGE65			0.004 (0.003)			
DDI_INT * ANC_03_NSS_HRD * AGE65			**0.014** (0.005)**			
DDI_INT * ANC_04_BDG_DIS * AGE65			-0.016** (0.005)			
DDI_INT * ANC_05_BDG_MIX * AGE65			**0.035*** (0.008)**			
DDI_INT * ANC_06_ESS_GEN * AGE65			-0.010*** (0.003)			
DDI_INT * ANC_07_HLC_SFT * AGE65			**0.011*** (0.003)**			
DDI_INT * ANC_08_GRO_HMI * AGE65			-0.002 (0.003)			
DDI_INT * ANC_09_ESS_DIV * AGE65			-0.001 (0.002)			
DDI_INT * ANC_10_GRO_HMF * AGE65			-0.021*** (0.005)			
DDI_INT * LTHS				0.002 (0.004)		
ANC_01_ NSS_DIV * LTHS				-0.003 (0.003)		
ANC_02_ESS_SPL * LTHS				-0.015** (0.005)		
ANC_03_NSS_HRD * LTHS				-0.007 (0.004)		
ANC_04_BDG_DIS * LTHS				0.001 (0.001)		
ANC_05_BDG_MIX * LTHS				-0.005* (0.002)		

ANC_06_ESS_GEN * LTHS				0.006 (0.005)		
ANC_07_HLC_SFT * LTHS				0.002 (0.002)		
ANC_08_GRO_HMI * LTHS				-0.008** (0.003)		
ANC_09_ESS_DIV * LTHS				-0.013*** (0.004)		
ANC_10_GRO_HMF * LTHS				-0.014*** (0.003)		
DDI_INT * ANC_01_ NSS_DIV * LTHS				-0.008*** (0.002)		
DDI_INT * ANC_02_ESS_SPL * LTHS				-0.004 (0.004)		
DDI_INT * ANC_03_NSS_HRD * LTHS				0.000 (0.002)		
DDI_INT * ANC_04_BDG_DIS * LTHS				-0.006*** (0.002)		
DDI_INT * ANC_05_BDG_MIX * LTHS				-0.007*** (0.002)		
DDI_INT * ANC_06_ESS_GEN * LTHS				**0.009*** (0.002)**		
DDI_INT * ANC_07_HLC_SFT * LTHS				-0.001 (0.002)		
DDI_INT * ANC_08_GRO_HMI * LTHS				-0.014*** (0.004)		
DDI_INT * ANC_09_ESS_DIV * LTHS				-0.009** (0.003)		
DDI_INT * ANC_10_GRO_HMF * LTHS				0.002 (0.003)		
DDI_INT * POV					-0.000 (0.004)	
ANC_01_ NSS_DIV * POV					-0.010*** (0.002)	
ANC_02_ESS_SPL * POV					-0.013*** (0.002)	
ANC_03_NSS_HRD * POV					-0.001 (0.002)	
ANC_04_BDG_DIS * POV					0.004** (0.001)	
ANC_05_BDG_MIX * POV					-0.000 (0.002)	
ANC_06_ESS_GEN * POV					0.001 (0.002)	
ANC_07_HLC_SFT * POV					0.008*** (0.002)	
ANC_08_GRO_HMI * POV					-0.005** (0.002)	
ANC_09_ESS_DIV * POV					-0.005* (0.002)	
ANC_10_GRO_HMF * POV					-0.014*** (0.002)	
DDI_INT * ANC_01_ NSS_DIV * POV					-0.004+ (0.002)	

DDI_INT * ANC_02_ESS_SPL * POV					-0.003 (0.004)	
DDI_INT * ANC_03_NSS_HRD * POV					**0.004+ (0.003)**	
DDI_INT * ANC_04_BDG_DIS * POV					-0.007*** (0.002)	
DDI_INT * ANC_05_BDG_MIX * POV					-0.016*** (0.002)	
DDI_INT * ANC_06_ESS_GEN * POV					**0.011*** (0.002)**	
DDI_INT * ANC_07_HLC_SFT * POV					-0.013*** (0.003)	
DDI_INT * ANC_08_GRO_HMI * POV					-0.021*** (0.005)	
DDI_INT * ANC_09_ESS_DIV * POV					-0.017*** (0.004)	
DDI_INT * ANC_10_GRO_HMF * POV					-0.001 (0.003)	
DDI_INT * DIS						0.018*** (0.004)
ANC_01_ NSS_DIV * DIS						0.002 (0.002)
ANC_02_ESS_SPL * DIS						-0.006 (0.004)
ANC_03_NSS_HRD * DIS						-0.004 (0.004)
ANC_04_BDG_DIS * DIS						0.005+ (0.003)
ANC_05_BDG_MIX * DIS						-0.005 (0.004)
ANC_06_ESS_GEN * DIS						-0.004 (0.004)
ANC_07_HLC_SFT * DIS						-0.001 (0.001)
ANC_08_GRO_HMI * DIS						0.002 (0.002)
ANC_09_ESS_DIV * DIS						0.001 (0.003)
ANC_10_GRO_HMF * DIS						-0.003 (0.003)
DDI_INT * ANC_01_ NSS_DIV * DIS						-0.002 (0.002)
DDI_INT * ANC_02_ESS_SPL * DIS						-0.012*** (0.003)
DDI_INT * ANC_03_NSS_HRD * DIS						-0.015*** (0.004)
DDI_INT * ANC_04_BDG_DIS * DIS						**0.010** (0.003)**
DDI_INT * ANC_05_BDG_MIX * DIS						-0.013** (0.004)
DDI_INT * ANC_06_ESS_GEN * DIS						-0.008*** (0.002)
DDI_INT * ANC_07_HLC_SFT * DIS						0.000 (0.002)

DDI_INT * ANC_08_GRO_HMI * DIS						-0.003 (0.003)
DDI_INT * ANC_09_ESS_DIV * DIS						-0.011*** (0.003)
DDI_INT * ANC_10_GRO_HMF * DIS						-0.001 (0.003)
L.FTRAFFIC_ln	0.817*** (0.018)	0.815*** (0.018)	0.814*** (0.018)	0.810*** (0.018)	0.809*** (0.018)	0.812*** (0.018)
GLA	-0.124*** (0.032)	-0.132*** (0.033)	-0.151*** (0.037)	-0.165*** (0.036)	-0.169*** (0.038)	-0.144*** (0.039)
STO	-0.022** (0.007)	-0.018** (0.007)	-0.017* (0.007)	-0.012+ (0.008)	-0.027*** (0.007)	-0.021** (0.007)
POP	1.016*** (0.250)	1.135*** (0.258)	1.200*** (0.284)	1.277*** (0.264)	1.527*** (0.276)	1.008*** (0.266)
SIZ	-0.093*** (0.020)	-0.112*** (0.022)	-0.110*** (0.025)	-0.120*** (0.022)	-0.136*** (0.023)	-0.048+ (0.025)
INC	-0.082*** (0.023)	-0.113*** (0.023)	-0.117*** (0.025)	-0.136*** (0.024)	-0.107*** (0.024)	-0.115*** (0.024)
STAT_EF	Included	Included	Included	Included	Included	Included
DMA_EF	Included	Included	Included	Included	Included	Included
CBSA_EF	Included	Included	Included	Included	Included	Included
CNTY_EF	Included	Included	Included	Included	Included	Included
CNTR_EF	Included	Included	Included	Included	Included	Included
YEAR_EF	Included	Included	Included	Included	Included	Included
WEEK_EF	Included	Included	Included	Included	Included	Included
CONS	1.835*** (0.180)	1.854*** (0.181)	1.867*** (0.182)	1.904*** (0.181)	1.909*** (0.183)	1.875*** (0.181)
N	58449.000	58449.000	58449.000	58449.000	58449.000	58449.000
F	218.129***	164.498***	115.008***	125.334***	128.758***	134.328***
r2	0.941	0.941	0.941	0.941	0.941	0.941
r2_a	0.941	0.941	0.941	0.941	0.941	0.941

Note: Robust standard errors in parentheses. + p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

Table 9: Summary Results: Foot Traffic Drivers Amid Internet Inequality and Socio-Economic Inequality

Category	Component	Anchor	Direct effect	Moderating effect Amidst internet inequality					
			Anchor store clusters	Without SE disparities	With SE disparities				
					Overall	AGE65	LTHS	POV	DIS
			Model 1.1	Model 1.2	Model 1.3	Model 2.3	Model 2.4	Model 2.5	Model 2.6
Diverse Nonessential	Comp1	Diverse Nonessential ANC_01_ NSS_DIV	0.025***		0.006+	0.013***			
	Comp3	Diverse Hardline ANC_03_NSS_HRD		0.007***		0.014**		0.004+	
Essential-Oriented	Comp2	Special Essential ANC_02_ESS_SPL		0.009***					
	Comp6	General Essential ANC_06_ESS_GEN	0.014***				0.009***	0.011***	
	Comp9	Grocery and General Essential ANC_09_ESS_DIV	0.010***	0.011***					
Budget-Oriented	Comp4	Budget-Discount Products ANC_04_BDG_DIS			0.005**				0.010**
	Comp5	Budget-Mix Products ANC_05_BDG_MIX	0.003*	0.002*		0.035***			
Health and Softline	Comp7	Healthcare and Softline ANC_07_HLC_SFT	-0.005***		0.011**	0.011***			
Grocery and Home	Comp8	Grocery and Home Improvement ANC_08_GRO_HMI	0.005*	0.008***					
	Comp10	Grocery and Home Furnishing ANC_10_GRO_HMF	0.012***						

Note: + p<0.1, * p<0.05, ** p<0.01, *** p<0.001.

6. Discussion and Implications

6.1 Discussion

This research delves into the nuanced interplay between internet inequality, socio-economic disparities, and anchor store cluster characteristics, evaluating their collective influence on customer foot traffic within shopping centres. The study uncovers that regions with higher internet inequality paradoxically experience increased foot traffic. This suggests that as the digital divide widens, more consumers may opt for in-person shopping experiences, possibly due to limited online shopping accessibility or preferences for physical retail interactions.

Our findings show that while socio-economic disadvantages do not generally impact foot traffic significantly at a macroeconomic level, inequality in internet does play a significant role in driving foot traffic. Furthermore, the presence of specific anchor store clusters can greatly influence consumer behaviour. For instance, diverse non-essential anchor clusters (ANC_01_NSS_DIV), which include a variety of discretionary consumer sectors, along with the general essential cluster (ANC_06_ESS_GEN) that focuses on comprehensive shopping solutions for health-related goods and general merchandise, substantially enhance foot traffic. In contrast, the health and softline anchor cluster (ANC_07_HLC_SFT), primarily comprising health and personal care stores along with softline retailers, may actually deter foot traffic due to its specialized and limited product range.

The study further highlights how interactions between internet inequality, socio-economic inequality, and anchor store clusters can compound effects on foot traffic. The findings reveal that although certain anchor store clusters, such as special essential (ANC_02_ESS_SPL) and diverse hardline (ANC_03_NSS_HRD), may not generally drive increased foot traffic, they become crucial for customers in areas with significant internet disparities. Moreover, these conditions also heighten reliance on various other types of anchor store clusters. Budget mix (ANC_05_BDG_MIX), grocery and home improvement (ANC_08_GRO_HMI), and grocery and general essential (ANC_09_ESS_DIV) clusters see increased patronage in regions with limited internet access, contrasting with reduced activity at diverse nonessential clusters (ANC_01_NSS_DIV). These results suggest that customers react to the challenges brought on by internet inequality in complex and nuanced ways. For example, when facing limited internet accessibility, customers reduce shopping activities at broadly diversified, non-essential retail clusters and instead focus on more specialized shopping options and stores that offer essential items. Given one key feature of the internet shopping experience is to enable customers to compare a wide variety of options quickly and easily, these results indicate that customers with limited internet access may seek to replicate this diversity of options through shopping at speciality retail outlets that offer a smaller product range but with more depth of options for those products.

It is particularly noteworthy that clusters such as budget discount (ANC_04_BDG_DIS) and healthcare and softline (ANC_07_HLC_SFT), which might not initially show a direct impact, significantly amplify the positive effects of internet inequality on foot traffic when intersecting with specific socio-economic conditions. These findings suggest that socio-economically disadvantaged populations exhibit a pronounced reliance on certain anchor store clusters, especially under limited internet access conditions, indicating a customized dependency based on their unique shopping needs and economic constraints. Socio-economically disadvantaged customers facing internet access challenges are particularly active in shopping centres with ancho store clusters like ANC_01_NSS_DIV, which offer a diverse set of options. These consumers often seek to minimize the time and cost associated with traveling to multiple locations, hence a single location offering a wide selection of items delivers substantial value. Additionally, these customers prioritize shopping at discount (ANC_04_BDG_DIS) and healthcare/softline retailers (ANC_07_HLC_SFT), highlighting the importance of these outlets as critical resources for disadvantaged consumers who cannot rely on the internet for affordable and essential healthcare products.

The comprehensive analysis conducted across various socio-economic models underscores the pivotal role of anchor store clusters in moderating the effects of internet inequality across diverse demographic groups. Importantly, the findings provide evidence of significant nuances between disparate underserved populations that must be considered when evaluating the expected impact of socio-economic inequality on retailer foot traffic in areas cauterized by high levels of internet inequality. These results reveal how certain clusters are uniquely positioned to specifically cater to the distinct needs of different populations in these regions. For example, the results show that when facing internet access deficiencies, elderly individuals prioritize shopping at clusters that provide a diverse of non-essential goods (ANC_01_ NSS_DIV), despite a general decline in shopping activity in these stores in areas with high levels of digital disparity. Additionally, individuals with limited educational backgrounds or those living below the poverty line depend significantly on clusters that offer one-stop shopping experiences with a comprehensive range of general merchandise, health products, personal care items (e.g. ANC_06_ESS_GEN), underscoring the need for equitable access to diverse essential goods and services. Additionally, the reliance of individuals with disabilities on budget-conscious clusters (ANC_04_BDG_DIS) highlights the imperative for inclusive shopping solutions that are accommodating to all community members. These results serve to emphasize the critical importance of recognizing and prioritizing appropriate shopping environments in regions marked by digital disparities to ensure access to critical goods and services for disadvantaged consumers.

6.2 Implications

In response to the decline in the shopping center industry, as noted by Liulin (2024), there is an urgent need to redefine their role within the evolving retail landscape. The migration towards online shopping platforms has considerably decreased traditional foot traffic, necessitating a strategic

transformation of shopping centers. Joshi and Gupta, (2020) argue that these centers must evolve from simple retail locations to multifunctional hubs that support social interaction, entertainment, relaxation, and leisure, thereby becoming vital, adaptive public spaces that meet dynamic societal needs.

This study underscores the strategic necessity of developing specialized anchor store clusters within shopping centers to address the unique needs of consumers, particularly in areas characterized by notable internet disparities and socio-economic disparities. These insights are invaluable for policymakers, urban planners, and retail professionals navigating the complex retail dynamics. Kunc et al. (2022) emphasize that these shopping centers must operate within a framework that accommodates diverse stakeholder interactions, which are crucial to their profitability and growth. By fostering vibrant, accessible, and equitable spaces, shopping centers can adapt effectively to evolving conditions and meet the needs of a broad consumer base.

Policymakers are urged to implement robust interventions that not only bridge internet access gaps but also promote the development of retail environments as inclusive hubs. Borghetti et al. (2021) suggest that strategies fostering polycentricity can enhance the inclusivity of retail spaces by creating sustainable and accessible local areas with diverse services. These environments should particularly focus on supporting disadvantaged populations who rely more on physical retail due to digital connectivity and accessibility constraints.

Urban planners and retail professionals should meticulously design shopping centers that incorporate a varied mix of anchor store clusters, ranging from basic necessities to specialized services. As noted by Leung et al. (2024), such a strategy ensures that shopping centers transform into essential community assets that provide vital resources and spaces for disadvantaged groups, thereby enhancing their quality of life and societal integration.

Our study emphasizes that incorporating ethical practices and fostering a mindfulness of social justice within shopping center operations is critical. Sierra et al. (2015) highlight that fostering a positive ethical climate can enhance customer perceived ethicality and positively influence brand equity. Rashkova et al. (2024) point out that promoting interconnectedness and ethical awareness helps address societal challenges, enhancing the social and economic fabric of communities. This holistic strategy ensures that shopping centers achieve economic objectives while also creating inclusive and ethical environments that cultivate community trust.

By strategically applying the insights from this study, stakeholders can better tailor shopping centers to the intricate factors influencing foot traffic, essential in the context of declining physical retail due to the surge in online shopping (Keels, 2021). Despite this shift, there remains a robust demand for in-store shopping, particularly in regions with high internet access and socio-economic disparities. This underscores the necessity for shopping centers to be inclusive, adaptive, and responsive, maintaining their relevance as essential community hubs, meeting the needs of diverse populations.

7. Conclusions and Limitations

Shopping centres, integral to retail landscapes, face both challenges and opportunities shaped by evolving consumer behaviour and technological advancements. The advent of e-commerce has reshaped traditional retail paradigms, posing challenges such as potential foot traffic declines as consumers opt for online convenience (Luo et al., 2020; Melis et al., 2015; Weltevreden, 2007). However, this digital shift also presents opportunities for shopping centres to innovate, integrating digital platforms to enhance customer engagement and operational efficiencies (Young, 2022). The strategic placement of anchor stores emerges as pivotal in sustaining foot traffic and bolstering economic viability amidst digital disruptions (Damian et al., 2011; Yi and Gim, 2018). Moreover, disparities in internet inequality and socio-economic inequality underscore the industry's complexity, influencing consumer access and shopping behaviours (Salemink et al., 2017). Addressing these challenges through targeted strategies not only mitigates risks but also positions shopping centres to thrive in a digitally-driven marketplace, fostering resilience and community connectivity (Vernor and Rabianski, 1993).

In this study, we aim to offer insights into the intricate interactions between digital connectivity, retail environments, and community engagement within shopping centres. Specifically, this study explores three research questions aimed at understanding the intricate dynamics within shopping centres amidst digital and socio-economic disparities. Firstly, it investigates how unequal access to internet infrastructure impacts foot traffic to shopping centres. Secondly, it examines the ways in which the characteristics of anchor store clusters modify the relationship between internet inequality and shopping centre foot traffic. Lastly, it explores how socio-economic disparities, including factors such as population demographics and educational attainment, further influence the interaction between digital access and anchor store dynamics in shaping shopping centre foot traffic patterns.

The findings highlight the complex interplay between digital infrastructure and socio-economic factors in retail environments, emphasizing the need for nuanced retail strategies to address the diverse consumer needs in areas with significant digital disparities. Key insights include:

1) Higher internet inequality is associated with increased foot traffic, suggesting a preference for in-store shopping due to limited online access. However, overall socio-economic disadvantages do not significantly affect foot traffic at a macroeconomic level.

2) The presence of specific anchor store clusters, including diverse non-essential, diverse essential, budget-mix, grocery and home clusters, substantially increases foot traffic. In contrast, clusters focusing on a narrow range of health and personal care products tend to deter foot traffic due to their narrow-range nature.

3) Intricate behavioural patterns emerge from the interactions between internet inequality and anchor store types. For instance, in areas with poor internet access, there is a heightened reliance on

diverse hardline, essential goods, budget-mix, and grocery and home improvement clusters, indicating shopping preferences shaped by digital accessibility constraints.

4) Certain anchor store clusters are vital for socio-economically disadvantaged populations facing internet access challenges. These groups highly value the convenience of accessing a wide range of goods in one location, particularly in diverse non-essential stores, and essential general merchandise stores, and also prioritize budget-mix and healthcare-oriented stores.

Overall, stakeholders are advised to embed ethical practices and promote organizational mindfulness for social justice within shopping center operations (Sierra et al., 2015; Rashkova et al., 2024). This study underscores the urgent need to create and sustain diverse, specialized anchor store clusters that meet the varied needs of consumers, particularly in settings characterized by pronounced digital and socio-economic disparities. Policymakers are urged to implement comprehensive strategies that not only address internet access disparities but also reposition retail environments as holistic community hubs. Transforming shopping centers into essential community assets can provide critical resources and social spaces for disadvantaged groups, enhancing their quality of life and participation in society. Furthermore, urban planners and retail professionals can adeptly adjust shopping centers to address the factors influencing foot traffic, securing their relevance in an era where online shopping is diminishing the role of traditional brick-and-mortar stores (Keels, 2021). By focusing on creating vibrant, accessible, and equitable spaces, shopping centers can adeptly adapt to changing retail landscapes, effectively meeting the diverse needs of their communities.

This study acknowledges several limitations. Primarily, by concentrating solely on anchor store clusters within shopping centers, broader retail dynamics may be overlooked, particularly given the rising influence of e-commerce on consumer behavior. Future research should evaluate how online shopping activities, from general to specialized merchandise, affect foot traffic in shopping centers (Pan et al., 2024). Additionally, this study does not comprehensively explore the diversity of internet access types (broadband and cellular), transportation options (public transit, private vehicles, and bicycles), or the range of consumer disabilities (hearing impairment, vision impairment, cognitive disability ambulatory disability, self-care disability, and independent living population with a disability), all of which could significantly impact consumer behavior and shopping patterns. Addressing these gaps will enable future research to build upon the findings of this study, developing more comprehensive strategies to enhance the performance and inclusivity of shopping centers amidst evolving digital and socio-economic landscapes.

8. References

Agency for Healthcare Research and Quality. (n.d.). Social Determinants of Health (SDOH) Data & Analytics. Retrieved from https://www.ahrq.gov/sdoh/data-analytics/sdoh-data.html

Alves, S., da Fonseca, M. J. S., Garcia, J. E., de Oliveira, L. C., & Teixeira, A. (2021,June). The Omnichannel Strategy in Portuguese Companies: An Overview. In 2021 16th Iberian Conference on Information Systems and Technologies (CISTI) (pp.1-6). IEEE. https://doi.org/10.23919/CISTI52073.2021.9476612

Anselmsson, J. (2006). Sources of Customer Satisfaction with Shopping Malls: A Comparative Study of Different Customer Segments. The International Review of Retail, Distribution and Consumer Research, 16(1), 115-138. https://doi.org/10.1080/09593960500453641

Annual Reports | Financial Information | Investor Relations | Regency Centres Corporation. (2022, April). https://investors.regencycentres.com/financial-information/annual-reports

Borghetti, F., Colombo, C. G., Longo, M., Mazzoncini, R., Cesarini, L., Contestabile, L., & Somaschini, C. (2021). 15-Min Station: A Case Study in North Italy City to Evaluate the Livability of An Area. Sustainability, 13(18), 10246. https://doi.org/10.3390/su131810246

Britannica, T. Editors Of Encyclopaedia (2024,July 19). Shopping Centre. Encyclopedia Britannica. https://www.britannica.com/topic/shopping-centre

Brüggemann, P., & Olbrich, R. (2022, June). The Impact of Pandemic Restrictions on Offline and Online Grocery Shopping Behavior-New Normal or Old Habits? In Digital Marketing & eCommerce Conference (pp.224-232). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-05728-1_24

Burnaz, S., & Topcu, Y. I. (2011). A Decision Support on Planning Retail Tenant Mix in Shopping Malls. Procedia - Social and Behavioral Sciences, 24, 317-324. https://doi.org/10.1016/j.sbspro.2011.09.124

Burt, S., & Carralero-Encinas, J. (2000). The Role of Store Image in Retail Internationalisation. International Marketing Review, 17(4/5), 433-453. https://doi.org/10.1108/02651330010339941

Calvo-Porral, C., & Lévy-Mangín, J.-P. (2018). Pull Factors of The Shopping Malls: An Empirical Study. International Journal of Retail & Distribution Management, 46(2), 110-124. https://doi.org/10.1108/IJRDM-02-2017-0027

Correa, J., Ulloa-Leon, F., Vergara-Perucich, F., Aguirre-Nuñez, C., & Truffello, R. (2023). Infrastructural Inequality: Exploring The Emergence of Digital Classes in The Metropolitan

Area of Santiago, Chile. Bulletin of Geography. Socio-Economic Series, (62), 107-122. https://doi.org/10.12775/bgss-2023-0037

Damian, D., Curto, J., & Pinto, J. (2011). The Impact of Anchor Stores on The Performance of Shopping Centres: The Case of Sonae Sierra. International Journal of Retail & Distribution Management, 39(6), 456-475. https://doi.org/10.1108/09590551111137994

Dennis, C., Jayawardhena, C., Tiu Wright, L., & King, T. (2007). A Commentary on Social and Experiential (E-) Retailing And (E-) Shopping Deserts. International Journal of Retail & Distribution Management, 35(6), 443-456. https://doi.org/10.1108/09590550710750322

Doherty, N. F., & Ellis-Chadwick, F. (2010). Internet Retailing: The Past, The Present and The Future. International Journal of Retail & Distribution Management, 38(11/12), 943-965.

El-Adly, M. (2007). Shopping Malls Attractiveness: A Segmentation Approach. International Journal of Retail & Distribution Management, 35(11), 936-950. https://doi.org/10.1108/09590550710828245

El Hedhli, K., Chebat, J.-C., & Sirgy, M. J. (2013). Shopping Well-Being at The Mall: Construct, Antecedents, and Consequences. Journal of Business Research, 66(7), 856-863. https://doi.org/10.1016/j.jbusres.2011.06.011

Eroglu, C., & Hofer, C. (2011). Lean, Leaner, Too Lean? The Inventory-Performance Link Revisited. Journal Of Operations Management, 29(4), 356-369. https://doi.org/10.1016/j.jom.2010.05.002

Foster, L. S., Haltiwanger, J. C., & Krizan, C. J. (2002). The Link Between Aggregate and Micro Productivity Growth: Evidence from Retail Trade. http://dx.doi.org/10.3386/w9120

Gallardo, R. 2020. “2019 digital divide index (DDI)”, Purdue Centre for Regional Development. Available At http://pcrd.purdue.edu/ddi.

Gaure, S. (2013). OLS With Multiple High Dimensional Category Variables. Computational Statistics and Data Analysis, 66, 8-18. https://doi.org/10.1016/j.csda.2013.03.024

Grassl, W. (2011). Hybrid Forms of Business: The Logic of Gift In The Commercial World. Journal Of Business Ethics, 100(Suppl 1), 109-123. https://doi.org/10.1007/s10551-011-1182-5

Guimarães, P., & Portugal, P. (2010). A Simple Feasible Procedure to Fit Models with High-Dimensional Fixed Effects. The Stata Journal, 10(4), 628-649. https://doi.org/10.1177/1536867X1001000406

Hsieh, J. P.-A., A. Rai, M. Keil 2011. Addressing Digital Inequality for The Socioeconomically Disadvantaged Through Government Initiatives: Forms of Capital That Affect ICT

Utilization. Information Systems Research, 22(2), 233-253. https://doi.org/10.1287/isre.1090.0256

Jin, X., & Tong, D. (2024). Impacts of COVID-19 on Food Access: An Examination of People's Food Shopping Methods Change. International Regional Science Review, 47(4), 411-442. https://doi.org/10.1177/01600176241237172

Johnson, R.A. and Wichern, D.W. (2007), Applied Multivariate Statistical Analysis, 6th Ed., Pearson Prentice Hall, Upper Saddle River, N.J. https://www.pearson.com/en-us/subject-catalog/p/applied-multivariate-statistical-analysis-classic-version/P200000006217/9780137980963

Jolliffe, I.T. (2002), Principal Component Analysis, 2nd ed., Springer, New York, doi: 10.1007/b98835. http://dx.doi.org/10.1007/b98835

Jolliffe, I. T., & Cadima, J. (2016). Principal Component Analysis: A Review and Recent Developments. Philosophical Transactions of The Royal Society A: Mathematical, Physical and Engineering Sciences, 374(2065), 20150202. https://doi.org/10.1098/rsta.2015.0202

Joshi, K., & Gupta, S. (2020). A Study to Assess the Impact of Footfalls and Category Mix on Mall Performance. International Journal of Engineering Technologies and Management Research, 5, 22-32.

Keels, G. N. (2021). Brick-And-Mortar Retail Stores Disappearing in The Digital Age: Marketing Strategies for Sustainability (Doctoral Dissertation, University of Maryland University College).

Kenton, W. (2022, December 19). Foot Traffic: Definition, Tracking, Ways to Increase. Investopedia. Retrieved From https://www.investopedia.com/terms/f/foot-traffic.asp

Kiefer, N. M., Vogelsang, T. J., & Bunzel, H. (2000). Simple Robust Testing of Regression Hypotheses. Econometrica, 68(3), 695-714

Kiriri, P. N. (2023). Determinants of Shopping Mall Attractiveness: The Case of Shopping Malls In Nairobi, Kenya. https://doi.org/10.26417/ejes.v5i1.p258-270

Kirkup, M., & Rafiq, M. (1994). Managing Tenant Mix in New Shopping Centres. International Journal of Retail & Distribution Management, 22(6), 29-37. https://doi.org/10.1108/09590559410070303

Kumar, M. S., Raut, R. D., Narwane, V. S., & Narkhede, B. E. (2020). Applications of Industry 4.0 to Overcome The COVID-19 Operational Challenges. Diabetes & Metabolic Syndrome: Clinical Research & Reviews, 14(5), 1283-1289. https://doi.org/10.1016/j.dsx.2020.07.010

Kunc, J., Križan, F., Novotná, M., & Bilková, K. (2022). Social Dimension of Shopping Centres Operation: Managerial Perspectives. Sustainability, 14(2), 709. https://doi.org/10.3390/su14020709

Leung, D., Liu, P., & Zhou, T. (2024). Competition, Agglomeration, and Tenant Composition in Shopping Malls. Real Estate Economics, 52(2), 552-576. https://doi.org/10.1111/1540-6229.12442

Liulin, P. (2024). The Evolution of Shopping Centres and Development Prosp. Moscow Economic Journal, 183-200. https://doi.org/10.55186/2413046x_2023_9_2_77

Luo, X., Zhang, Y., Zeng, F., & Qu, Z. (2020). Complementarity and Cannibalization of Offline-to-Online Targeting: A Field Experiment on Omnichannel Commerce. Mis Quarterly, 44(2). https://doi.org/10.25300/MISQ/2020/15630

Mall Foot Traffic Data for Any Property. (2022). Placer.ai. https://www.placer.ai/solutions/shopping-centres/

Melis, K., Campo, K., Breugelmans, E., & Lamey, L. (2015). The Impact of The Multi-Channel Retail Mix on Online Store Choice: Does Online Experience Matter? Journal Of Retailing, 91(2), 272-288. https://doi.org/10.1016/j.jretai.2014.12.004

MRC Cognition and Brain Sciences Unit. (N.D.). Thresholds. Retrieved From https://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/thresholds

Nicasio, F. (2019, November 11). The Ultimate Guide to Foot Traffic and People Counting. Foot Traffic and People Counting for Retail & Facilities - Dor Blog. https://www.getdor.com/blog/2019/11/11/foot-traffic-people-counting/

Nikita. (2013, April 4). Difference Between Mall and Shopping Centre http://www.differencebetween.info/difference-between-mall-and-shopping-centre

OECD (2001), "Understanding the Digital Divide", OECD Digital Economy Papers, No. 49, OECD Publishing, Paris, https://doi.org/10.1787/236405667766.

Pan, X., Li, G., Dresner, M., & Mantin, B. (2024). Exploring The Impacts of Ecommerce Activities on The Spatial Resilience Of Warehouse Clubs: The Role Of Retail Agglomeration. International Journal of Physical Distribution & Logistics Management, 54(4), 392-417. https://doi.org/10.1108/IJPDLM-12-2022-0365

Paraskevas, J. P., Pan, X., Elking, I., & Park, K. H. (2024). Bridging The Digital Divide in Online Retailing: The Effect of a Strategic Focus on E-Commerce Fulfillment Offerings. Production And Operations Management. https://doi.org/10.1177/10591478241261254

Perdikaki, O., Kumar, S., & Sriskandarajah, C. (2017). Managing Retail Budget Allocation Between Store Labor and Marketing Activities. Production And Operations Management, 26(9), 1615-1631. https://doi.org/10.1111/poms.12733

Rashkova, Y., Moi, L., & Cabiddu, F. (2024). Addressing The Societal Challenges in Organizations: The Conceptualization of Mindfulness Capability for Social Justice. Journal Of Business Ethics, 189(2), 249-268. https://doi.org/10.1007/s10551-023-05357-5

Regency Centres. (2022). Our Markets. https://www.regencycentres.com/properties/our-markets

Salemink, K., Strijker, D., & Bosworth, G. (2017). Rural Development in The Digital Age: A Systematic Literature Review on Unequal ICT Availability, Adoption, And Use in Rural Areas. Journal Of Rural Studies, 5. https://doi.org/10.1016/j.jrurstud.2015.09.001

Shopping Mall Definition: 234 Samples. (2022). Law Insider. Retrieved March 5, 2022, From https://www.lawinsider.com/dictionary/shopping-mall

Sierra, V., Iglesias, O., Markovic, S., & Singh, J. J. (2017). Does Ethical Image Build Equity in Corporate Services Brands? The Influence of Customer Perceived Ethicality on Affect, Perceived Quality, and Equity. Journal Of Business Ethics, 144, 661-676. https://doi.org/10.1007/s10551-015-2855-2

Sipior, J. C., B. T. Ward, R. Connolly 2011. The Digital Divide And T-Government in The United States: Using the Technology Acceptance Model to Understand Usage. European Journal of Information Systems, 20(3), 308-328. https://doi.org/10.1057/ejis.2010.64

Sud, M., & VanSandt, C. V. (2015). Identity Rights: A Structural Void in Inclusive Growth. Journal Of Business Ethics, 132, 589-601.4, 360-371. https://doi.org/10.1007/s10551-014-2359-5

van Dijk, J. A. 2012. "The Evolution of The Digital Divide-The Digital Divide Turns to Inequality of Skills and Usage", Digital Enlightenment Yearbook 2012, IOS Press, pp. 57-75. https://www.researchgate.net/publication/283144603_The_evolution_of_the_digital_divide_The_digital_divide_turns_to_inequality_of_skills_and_usage

Vernor, J. D., & Rabianski, J. (1993). Shopping Centre Appraisal and Analysis. Appraisal Institute Chicago, IL. https://ai.appraisalinstitute.org/eweb/DynamicPage.aspx?Action=Add&ObjectKeyFrom=1A83491A-9853-4C87-86A4-F7D95601C2E2&WebCode=ProdDetailAdd&DoNotSave=yes&ParentObject=CentralizedOrderEntry&ParentDataObject=Invoice%20Detail&ivd_formkey=69202792-63d7-4ba2-bf4e-a0da41270555&ivd_cst_key=00000000-0000-0000-0000-000000000000&ivd_prc_prd_key=F5B4422F-610C-429C-A0D7-679C584478C6

Vojvodić, K. (2019). Brick-And-Mortar Retailers: Becoming Smarter with Innovative Technologies. Strategic Management-International Journal of Strategic Management And Decision Support Systems In Strategic Management, 24(2).

Weinandy, T. J., Chen, K., Pozo, S., & Ryan, M. J. (2023). Twitter-Patter: How Social Media Drives Foot Traffic to Retail Stores. Journal Of Marketing Analytics, 1-19. https://doi.org/10.1057/s41270-023-00209-7

Weltevreden, J. W. (2007). Substitution Or Complementarity? How The Internet Changes City Centre Shopping. Journal Of Retailing and Consumer Services, 14(3), 192-207. https://doi.org/10.1016/j.jretconser.2006.09.001

Wiersema, M. F., & Zhang, Y. (2011). CEO Dismissal: The Role of Investment Analysts. Strategic Management Journal, 32(11), 1161-1182. https://doi.org/10.1002/smj.932

Yang, G., Zhao, L., & Kong, N. (2021). "Order-Online-And-Pickup-Offline" Strategy for Online Direct Sale of Time-Sensitive Commodities. RAIRO-Operations Research, 55, S999-S1011. https://doi.org/10.1051/ro/2020019

Yi, Y. M., & Gim, T. H. T. (2018). What Makes an Old Market Sustainable? An Empirical Analysis on The Economic and Leisure Performances of Traditional Retail Markets in Seoul. Sustainability, 10(6), 1779. https://doi.org/10.3390/su10061779

Young, J. (2022, February 4). Early Estimates: US Ecommerce Grows 14.2% In 2021. Digital Commerce 360. Retrieved From https://www.digitalcommerce360.com/2022/02/04/early-estimates-us-ecommerce-grows-14-2-in-2021/

Yu, F. F. (2008). Analyst Coverage and Earnings Management. Journal Of Financial Economics, 88(2), 245-271. https://doi.org/10.1016/j.jfineco.2007.05.008