



# Article Urban Shopping Malls and Sustainability Approaches in Chilean Cities: Relations between Environmental Impacts of Buildings and Greenwashing Branding Discourses

Liliana De Simone <sup>1,\*</sup> and Mario Pezoa <sup>2</sup>

- <sup>1</sup> Department of Applied Communications, Faculty of Communications, Pontificia Universidad Católica de Chile, Santiago 8320000, Chile
- <sup>2</sup> Department of Architecture, Universidad Diego Portales, Santiago 8320000, Chile; mario.pezoa@mail.udp.cl
  - \* Correspondence: rldesimo@uc.cl; Tel.: +569-921-85528

Abstract: This article seeks to discuss the recent discrepancies between the environmental effects of large retail buildings located in urban centers and the media and corporate discourses that these retailers have on the environment and sustainability to the public and to local authorities. By using mixed methods of quantitative and qualitative data analysis of two of the biggest shopping centers in Santiago de Chile, this exploratory research seeks to inaugurate an interdisciplinary academic discussion on the relevance of comparing the media discourses about sustainability issued by urban developers and the physical effects that massive private buildings create in their surroundings. By using the retail resilience theoretical framework, this research seeks to understand the disruption in retail systems, both from socio-economic and environmental indicators. Comparing the environmentally sensitive discourses promoted by Chilean retailers in advertising campaigns and corporate speeches with the environmental effects that large retail buildings brought to the surrounding areas in terms of urban deforestation and increasing superficial temperature, this paper probes that greenwashing campaign are not only used to impact corporate legitimacy with consumers and investors but also to deliberately diminish the environmental responsibilities of private developers in vulnerable urban areas.

Keywords: shopping malls; retail urban systems; sustainability; greenwashing

# 1. Introduction

In a society increasingly informed and worried about environmentally conscious measures that can tackle de current climate crisis, it is crucial to revise the effects that more prominent buildings have in urban ecological ecosystems.

In the past decades in Santiago de Chile, the most significant private investments in urban real estate have been retail-led developments by local and foreign capitals. Private retail developments have changed the landscapes of consumption that were traditionally located in centric areas by building extensive retail facilities, mainly through new enclosed shopping centers.

This article discusses the recent discrepancies between the environmental effects of large retail buildings in urban centers and the media and corporate discourses that these retailers have on the environment and sustainability.

In the past years, two immense shopping centers were built in very dense urban areas in Santiago de Chile, bringing together the social concerns about its effects in the former urban retail systems of traditional stores and open street commerce. The developers considered extensive marketing and social campaigns about the green impacts these shopping malls would bring to the city to revert these concerns and obtain the local authorities' construction permissions. Its architectural programs included green facades,



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**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). open roof parks, and electro cyclo-inclusivity infrastructure, promising a new era in retailled development and receiving great supping from local authorities.

Nevertheless, this paper probes that these discourses on sustainability by retail developments can be addressed as a case of "greenwashing," an advertising campaign that promised a "greener" city with no further evidence nor plan. Using MDVI measurements and heat maps comparisons of the shopping mall areas in two different times –before construction and nowadays—this study claims that the environmental effects of installing two enclosed retail buildings in Santiago de Chile were wildly misguided. Moreover, the urban deforestation brought by the shopping malls increased the local temperature, making them more vulnerable to ecological collapse.

On the other hand, the opening of the enclosed shopping facility meant the deterioration of the former retail formats, bringing long-end vacancies of commercial districts in the surroundings of the newly open malls, mainly because of the rising effects of the rental tariff. In a commercial gentrification process, smaller tenants and former merchants were forced to sell to multinational tenant firms, who later rented these stores to international retail chains of restoration and services. These expulsion and replacement processes raise more questions about how socially sustainable a big, enclosed shopping mall is installed in town centers and how resilient retail systems can be when greenwashing corporate campaigns and investments capital converge in city projects.

This article seeks to prove the necessity of mixed methods in the discussion and ex-post evaluations of urban developments as an exploratory study between discourse analysis methods from communications and social sciences and quantitative measures from statistical geography and georeferenced data. The first indicator measured was the change in Surface Temperature in degrees Celsius, generating with heat map islands for every case, and the second was the Normalized Vegetation Index (NDVI). For both cases, multispectral Landsat 5 and Landsat 8 satellite images were used, obtained from the Glovis viewer of the United States Geological Survey (USGS Global Visualization Viewer GloVis).

The article is divided into five parts. First, we discuss the role of retail developments in a neoliberal governance framework, in which transnational capitals of de-territorialized investments play a significant role in local development. Secondly, we discuss the concepts of resilience in retail systems in town centers and how local sustainability can be addressed from an economic, social, and environmental perspective in the neoliberal governance transnational context. As an addition to this discussion, the paper discusses new debates on (un)sustainable projects and "greenwashing," a marketing concept that needs to be addressed from the environmental sciences as a new tool of global investments for tackling urban policies and melting local opposition to change in the retail sector.

Following, the papers introduce the Chilean case as a paradigmatic example of a current socio-Ambiental crisis. Two paradigmatic retail cases were built under the claim of sustainable development: Mall Costanera Center and Mall Plaza Egaña. The cases are analyzed in two dimensions. Firstly, measurements of superficial heat and vegetation index are compared two times –before and after the construction of the mega malls. Secondly, the developer's discourse on their investment's effects on their surroundings is analyzed in terms of sustainability, ecology, and resilience.

Finally, the paper discusses the discrepancies these results bring and point out the need to address these social and environmental phenomena with a future research agenda on discourses of sustainability and the internal coherence of the actions of developers within cities.

# 2. Theoretical Discussions

This section will discuss four major issues that are relevant to acknowledge the discrepancies between sustainability media discourse in retailers' branding campaigns and the environmental effects of the enclosed shopping centers these retailers build in cities.

## 2.1. Neoliberal Urban Governance and Retail-Led Urbanism

In a process of liberalization of the real estate market, the construction of retail megastructures in consolidated town centers has been seen as one more example of the financial mechanisms that shape our cities, putting corporate governance as a key actor in urban planning and urban policy discussion [1], affecting the urban sustainability of commercial neighborhoods [2], mediating urban sociability through consumer and consumeristic practices [3], and challenging local cultural landscapes [4] through shopping resilience processes of adaptation, crisis, and replacement [5].

The infrastructure for massive consumption of goods, experiences and services has been approached by recent urban literature as one of the symbols of the new economic logic of global capitalism, receiving various disciplinary approaches. Its effects on the rearticulation of the economic logic of global production [6], the distribution and consumption of goods have been analyzed by contemporary geography and sociology as symbols of the functioning of post-Fordist global markets [7,8], which agglomerate fluctuating capital in strategically articulated nodes in the territory, to generate real estate capital gains, re-finance investments in the territory, and generate new speculation markets.

Along these lines, the mass retail space, such as power centers, category killers, and shopping malls in general, would be seen and used by developers as a speculative investment tool of a social-spatial nature, with which to produce a mediated city by and for consumption. This new production of the urban realm seen from consumption leaves behind the traditional interpretation of urbanism as the spatial organization of the social relations of production (based on industrialization as a promoter of urbanization) and requires a new understanding of the dialectical relationship social (production-consumption) and spatial (city) structures, in terms of Edward Soja [9]. This new dialectic between consumption and the city can be coined in an unprecedented way under the concept of *retail urbanism* or retail-led urbanism [10]. Retail urbanism, then, would be the expression of an urban organization, operation, morphology, and landscape, which correspond to a consumer society of global spatial dispersion, and where shopping malls are consolidated as a way of produce the city, the landscapes, and the sociability through the retail space, with social and spatial components defined by the general relations of reproduction of global capital and not necessarily based on the local logics that give rise to traditional retail systems.

Following Harvey [11], this has not been an exclusively economic process, but also a political and symbolic one: the change in the economic–spatial organization would have had its beginnings in the global installation of neoliberal urban governance, both in the modes of production and in the ideological frameworks of social structure [12]. This approach would have generated a global panorama where the real estate market, including urban retail, has been subject to the speculation of the economic curves of crisis and boom, characterized by the high volatilization of real estate and its assets. By becoming a financial market, the retail real estate business uses tools that used to be designed for other types of investments—debt securitization, real estate securitization, transaction of lease flows in international stock markets, financialization of real estate projects with bonds, and income from prospective rental. At the same time, this process makes use of social discourses with high symbolic content through advertising campaigns, corporate strategies, and advertising of anchor concepts, which permeate the social debates and propose retail brands as central axes of social interactions.

This process, seen from a Lefebvrean logic [13], has a fundamental political basis, which implies the consideration of the effects of the dispersion of retail in scales not only urban but also legal and discursive.

#### 2.2. Resilience, Local Sustainability, and Retail Systems

Recent works for the cases of Brazil [14,15], Spain [6,16], and Chile [8,17] verify that these financialized articulations of the real estate business follow global trends, which have led to an accelerated dynamism of the land and real estate market, and that it has already

brought dramatic speculative bubbles in various latitudes. In this scenario, the retail infrastructure is playing a role yet to be elucidated, where the adaptability and resilience capacity of retail systems is affected by multiple factors [18], which do not depend only on the retail system's own capabilities to face these systemic dynamics. In the case of large retail areas that are installed as capital investments in the city center, we can affirm that their arrival has a great impact on the metropolitan market for land in town centers [19], either through the revitalization of the market near the malls, the promotion of the opening of new retail districts, or the closing of smaller businesses that lack adaptation skills to the new economic challenges [20].

The resilience of retail centers in town centralities introduced by Wrigley and Dolega as a way to measure the performance of UK town centers during and after the global economic crisis [20]. In this and other studies conducted by these scholars, it is stated that de-adaptation capacities and adaptability possibilities of retail centers in urban areas are determined by several conditions, and yet, further research is needed to fully understand these processes of reorganization. The fragile ecologies of commercial areas located in cities involve a systemic comprehension of the forces implied in the production and consumption of the urban form. Including retailers, advertisers, policy makers, local authorities, town managers, and local consumers is necessary to understand the multiple variables implied in retail resilience.

Nevertheless, retail resilience is often implied as the economic resilience of a commercial district that is being subject to changes and disruptions, where local places and local governments must confront global forces and create a solution for survival within environmental and social inclusion limits and goals [21]. This strategic approach to resilience, which combines social and environmental sustainability objectives through innovation and alteration processes, requires a dynamic perspective when observing retail systems that are hit by the arrival of big shopping malls into traditional commercial centralities.

In these cases, the disruption caused by the new mass retail building in land prices; rental prices; pedestrian and automobile traffic; atmospheric and acoustic pollution; vacancy and replacement rates; urban communication landscaping (advertising and billboards); are just some of the multiple factors that can be monitored in the retail system evolution. The possibilities of former commercial stores to decline, survive or thrive after the arrival of the new big retail neighbor depends on the previous local tenant mix, the newly arrived tenant offer, and the socio-cultural system in which the shopping mall is inserted. In this point, local history and cultural practices of consumers are strongly involved in the responses towards the new consumption landscape, making it socially sustainable because of the protective responses of local consumers and the innovative responses of local tenants oriented to 'resist' [3].

Nevertheless, the indicators of ecological sustainability are harder to measure and acknowledge by consumers and local authorities. If the retail system is disrupted by the arrival of a new big shopping center that brings pollution and traffic, it is more often a matter of legal accountability and urban policy than a matter of adaptations and resilience.

#### 2.3. Greenwashing and Brand Discourses in Retail Sector

The resistance of local consumers and tenants towards big shopping malls being built in residential and commercial areas has been studied through ethnographic and sociological lenses [3,22]. Cases in Chile's Castro Island [23] and in Gezi Park in Istanbul, Turkey [24], for example, show how social conflict and environmental debates converge at the moment a shopping mall is built in town centers.

One of the most used new tactics to promote and socialize big urban projects of this kind is to deploy branding campaigns that orient marketing strategies towards a dissolution of possible conflicts with the local community. In this area, environmental and corporate communication sciences have contributed with a new term to explain the extents of this social campaign: greenwashing. According to the Encyclopedia of Corporate Social Responsibility, greenwashing refers to the '... practice of falsely promoting an organization's environmental efforts or spending more resources to promote the organization as green than are spent to engage in environmentally sound practices' [25]. As a deceptive advertising form, greenwashing serves to embed a 'green' aura to a social and environmentally conflictive project, but without referring to any indicator that can offer future accountability and evaluations. By doing so, (un)sustainable urban development is also installed through discourses, marketing and corporate speeches.

As Bowen and Aragon point out, the selective disclosure of positive information through marketing campaigns for promoting a project or a product, without the full disclosure of the negative outcomes of the project or a product, seeks to create an overly positive corporate image [26]. For these authors, greenwashing branding campaigns are defined by: (1) a decision to disclose the information and/or (2) a deliberate action to greenwash a project or a product (3) that is initiated by companies and is (4) beneficial to firms, but at the same time, it is socially and environmentally costly to the rest of society.

In the retail sector, greenwashing can be observed in the promotional campaign prior to the building process of big retail outlets and in the marketing campaign for consumer engagement, which is periodically deployed by retailers inside shopping malls.

Even if most of the consumers shows disbelief on the green promises made by retailers [27], recent studies probes that the main goal of corporate greenwashing is not to convince consumer, but to attract investors interested in 'greenwashed' investments [28]. The environmentally sustainable performance is then measured by ratings and indexes that are used by global investors to create corporate legitimacy strategies. In a business and corporate communication ethics debate, greenwashing in the retail sector has been approached from its effects on consumers' and investors' performances [29]. Nevertheless, further studies are strongly needed to comprehend the physical and urban effects these greenwashing discourses have in vulnerable territories.

#### 2.4. The Chilean Case: Retail Urban Concentration

The socio-urban effects that shopping malls generate in the urban territory have been widely reviewed by authors such as Crawford [30] and Zukin [31]. The phenomenon of its multiplication in vulnerable socio-economic contexts, mainly in cities in developing countries, allows us to argue that its success is due precisely to its effective insertion in the media and symbolic discourses about the city [32]. In this scenario, shopping malls would be the few spaces that are able to meet the demands of security, comfort, and cleanliness in cities, offering spaces to gather and socialize that governments cannot offer.

The discussion on the relevance of the location and size of the retail infrastructure within contemporary cities is a debate in the making [19], where cases, such as Istanbul in Turkey [33], Lisbon in Portugal [34], Mexico City [35], or Barcelona in Spain [36], show diverse results regarding the strategies of installing shopping malls in the city, and the resilience of the traditional commercial activity in front of these retail systems disruptions.

In this process, although commerce in the city continues to develop under guidelines that could respond to the traditional dynamics of centrality, new types of commerce have been installed in the Latin American metropolises, modifying the dynamics of urban development. In response to the new modes of retail, typical of postmodern consumer society, this retail infrastructure has modified the nature of the commercial activity, transforming these new buildings into nodes of intense social activity.

Chilean shopping malls have been a regional case study as they have become successful models of urban regeneration developed by private companies. Built on central areas of the main Chilean cities, shopping malls are characterized as real estate developments in dense regions of historical centrality. The models of leasing exploitation of commercial and para-commercial spaces inaugurated a capital gains capture model that combines real estate income from exploited urban land [37] and a network of innovative financial and banking services managed by the owners of the shopping centers themselves. These urban and financial retail facilities have established in the Chilean market, granting access to credit to thousands of families with low and middle income that do not obtain approval in the traditional banking system. This innovation and expansion of retails systems across the nation lead Chile to be the country with more square meters of gross leasable area (GLA) in Central and South America, even compared to a developed country by the Retail Index [38].

For the rest, Chilean retail is a market clustered with few players. There are five large shopping center exploitation conglomerates. They have more than 150 shopping malls distributed throughout the nation, and they are leading the South American retail players, having subsidiaries in Peru, Argentina, Brazil, Colombia, and Mexico. Unlike the history of retail in other latitudes, Chilean actors are characterized by family offices linked to the retail trade of the late 19th and early 20th centuries. In effect, Chilean shopping centers are the complexity and evolution of the modern department store. The families that originally imported these models are today the ones that have evolved into the business of construction and operation of shopping centers. In other words, the shopping centers and the main anchor stores are owned by the same owners, allowing both economic and corporate control that identifies the Chilean case as a unique case of international success, obtaining various awards in the sector.

This evolution of the model highlights the Chilean case for its retail resilience, demonstrating, as has been observed in previous studies [39,40], the still persistent influence of the original merchant families in the complexity of the retail business. Under global standards, the particularities of the Chilean retail model have been the main reasons that allow them to overcome the onslaught of the global economic crises that have affected trade in recent decades, especially during the so-called Asian Crisis (2000) and the Crisis Subprime (2008). At the same time, it has allowed Chilean retail to adapt at an unprecedented speed to e-commerce, on the one hand, and to the experience center model, on the other. Far from the obsolescence observed in shopping centers in different latitudes, the Chilean model establishes online and offline urban marketplaces. Both the logistics operations of warehousing and distribution of online commerce are concentrated, but also the experiences of post-consumption are re-signified-commercial of a center of intensity of cultural, pedagogical, and even citizen activities linked to consumption spaces.

The Chilean retail model stands out from its continental peers by having conformed to a financial asset model based on land titles, and the securitization of the lease flows of the tenant mix businesses. This has allowed Chilean retail to participate in the international asset market with enormous success [41]. For this reason, Chilean retail is a leading actor in corporate discourses on economic success, social welfare, and development, even having a significant presence in political lobbies and decision-making groups.

The corporate discourses of Chilean retail have allowed it to position itself globally in an increasingly competitive market when it comes to valuing "green" resources (those whose precepts and methods propose a proactive effect in the face of the global climateenvironmental crisis). By offering the construction of urban, downtown, environmentally responsible shopping centers that promote pedestrianization and public transport over the use of the car. Chilean retail has consolidated a corporate discourse adhering to the concept of medium and socio-environmental sustainability, loaded with ecological proposals. In addition to advertising campaigns focused on recycling, circular economy, and the decrease in the use of plastics during the last decade, Chilean retail has been a pioneer in installing a public agenda on caring for the environment [42], even joining efforts with NGOs and foundations to promote changes of attitude in the population.

This environmental concern by retailers is a key factor in determining its social role, as it drives the corporate social responsibility annual strategies. The reasons why Chilean retailers have chosen to stand out in ecological agendas may still be studied, but one reason could be that the Chilean climate crisis has been taken seriously by many other social actors.

In fact, Chile is presented as an exceptional case study for climate issues. According to article 4.8 of the United Nations Framework Convention on Climate Change (UNFCCC),

Chile is considered a country highly vulnerable to the phenomenon of climate change [43]. Moreover, especially its central area, which is where 40% of its population is located and 60% of the gross domestic product is produced. This is how the city of Santiago de Chile is witnessing a process of accelerated desertification due to the advance of the Atacama Desert towards the south, which is decreasing the glaciers and the snow cover of the Cordillera de Los Andes, drying the Maipo River basin [44] and directly affecting 8 million inhabitants who see their future compromised living in this city of Santiago.

#### **Case Studies**

Two paradigmatic cases of the city of Santiago de Chile were chosen based on their size and effects on urban planning: Mall Costanera Center in Figure 1 (CENCOSUD Holding), a mega-complex of retail, hotels, offices, and parking facilities located in the downtown area of Providencia district (Figure 2), which includes the largest shopping mall in the country and the tallest tower in Latin America; and the case of Mall Plaza Egaña in Figure 3 (Mall Plaza Holding), the first mall to present itself as a "green mall," installed in the limits of the residential district of La Reina and the commercial district of Ñuñoa (Figure 4).



**Figure 1.** View of the Costanera Center complex (Source: Reprinted with permission from ref. [45]. Copyright 2014 Jaime Villaseca).

Both cases were chosen because they deployed intense marketing and branding campaigns during its construction processes, promising a 'green' and sustainable urban shopping mall. They were built into formerly active retail systems, mainly of small stores and dense residential areas.

In the past decade, both areas have been subjects of heavy real estate development of commercial and office projects.

- Project name: Costanera Center
- Owners: CENCOSUD S.A.
- Location: Av. Andrés Bello 2425, Commune of Providencia, Santiago de Chile.
- Built area:128,000 m<sup>2</sup> leasable area
- Construction Year: 2002–2012
- Investment: US \$500 million
- Stores: 301 commercial stores
- Project name: Mall Plaza Egaña
- Owners: MALL PLAZA S.A.
- Location: Av. Larraín with Av. Ossa, Commune of La Reina. Santiago de Chile.

- Built area: 80,000 m<sup>2</sup> leasable area
- Construction Year: 2011–2013
- Investment: US \$175 million.
- Stores: 120 commercial stores



**Figure 2.** An aerial view of the Costanera Center (Source: Reprinted with permission from 2021 Google Earth).



Figure 3. Mall Plaza Egaña project image (Source: Adapted from ref [46]).



Figure 4. An aerial view of the Mall Plaza Egaña (Source: Reprinted with permission from 2021 Google Earth).

## 3. Materials and Methods

The overall objective of this study was to compare corporate and communicational Chilean retail speeches when talking about sustainability versus the actual environmental effects of the implementation of its buildings and retail projects in the city.

The mixed methods used in this study are presented as exploratory research on the relations between greenwashing discourses and environmental countereffects in urban retail systems. As an experimental, interdisciplinary approach, its goal is to propose a work-in-progress between urban communication studies and environmental sciences.

Two specific objectives were considered for this study:

- On the one hand, the qualitative study of the discourses on ecology and the environment of the two largest private retail conglomerates in Chile, with the highest number of shopping malls built in the country.
- On the other, the quantitative study of the ex-ante and ex-post situation of environmental indicators in retail systems. Looking to compare the changes and effects of the retail infrastructure on the consolidation of sustainable neighborhoods.

The discursive content analysis method was used for the first specific objective, applied to official documents issued during the past ten years by two retail holding companies (Cencosud and Mall Plaza). The documents considered were corporate reports, financial records, press releases, televised advertising, and posts on social networks such as Instagram and Facebook.

The live coding method was used in the first cycle and the axial value coding in the second cycle [47], seeking to recognize the discourses, words, and concepts used by

both actors when considering their shopping malls as green, sustainable buildings and ecological or environmentally beneficial for its urban environment.

The study of 16 financial documents, administrative reports, and management reports of two case studies was considered within the discursive analysis of secondary sources: CENCOSUD with the Mall Costanera Center [48–55], Mall Plaza with the Mall Plaza Egaña [56–63]. The evolution of the company's referred mission, vision, and values was observed through the analysis of these documents. The retail business concepts' changes were evidence and information on each holding company's respective national and international investments, its leading media and advertising campaigns, and its development prospects in the city.

For the analysis of advertising and marketing speeches, the review of 100 videos of advertising campaigns of both holding companies, broadcast on national open television between 2010 and 2016 and archived on the YouTube platform, and a post on social networks (Facebook and Instagram) was considered. All these documents were analyzed with the one diagnosed with NVivo version 11 analysis software.

For the second specific objective, a two-time measurement of two environmental indicators related to the immediate environmental effects of the construction of retail buildings in the neighborhoods was considered. Both indicators seek to identify the evolution of environmental conditions in the context of two variables: surface temperature and vegetation.

The first indicator measured was the change in Surface Temperature in degrees Celsius (TS), generating with heat map islands for every case, and the second was the Normalized Vegetation Index (NDVI). For both cases, multispectral Landsat 5 and Landsat 8 satellite images were used, obtained from the Glovis viewer of the United States Geological Survey (USGS Global Visualization Viewer GloVis).

The use of satellite images to estimate the presence and vigor of vegetation and changes in the temperature of the earth's surface corresponds to one of the most developed methodologies during the last decades, due to the availability of satellite images from different sensors: MODIS, LANDSAT, VIRRS, among others. Remote sensing is presented as one of the fastest, optimal, and lowest-cost ways to analyze environmental changes on the earth's surface, both rural and urban [64,65].

The NDVI and TS methodologies correspond to one of the most used methodologies to calculate the presence and vigor of vegetation in the case of the first and the temperature of the earth's surface in the case of the second. Despite research that puts into discussion or raises variations of these indices [66], the parameters and combination of spectral bands proposed by the United States Geological Survey (USGS) continue to be used and validated through the use of multispectral satellite images in Geographic Information Systems in multiple case studies [67].

Regarding the amount of urban greenery and increase in surface temperature, many investigations [68,69] show a correlation between the lower presence and vigorousness of vegetation represented in lower values of NDVI and higher values surface temperature, in which materials, reflections, and emissions of a big building make a big impact in desertificated cities.

The retail systems analyzed correspond to images retrieved for February of the years 2011 and 2019, respectively, considering it as the peak month of summer. Therefore, with higher temperature and less cloudiness for the city of Santiago. It should be noted that the Landsat satellite passes through Chile between approximately 11:30 am. and 12:30 pm., so the results obtained correspond to that time in February.

The processing of the images to obtain the Surface Temperature indicators and the Normalized Vegetation Index (NDVI) was as follows:

Glovis USGS Landsat 5 and 8 image download and TAR file decompression Obtaining constants from the MTL text file, according to Table 1.

Name	LANDSAT 5	LANDSAT 8	
	Band 6	Band 10	Band 11
Radiance_Mult_Band	-	$3.3320 imes10^{-4}$	$3.3320 imes10^{-4}$
Radiance_Add_Band	-	0.10000	0.10000
Radiance_Maximun_Band	15.303	-	-
Radiance_Minimun_Band	1.238	-	-
K1_Constant_Band	607.76	774.8853	480.8883
K2_Constant_Band	1260.56	1321.0780	1201.1442

Table 1. Constants from Glovis USGS.

1. Calculation of Spectral Radiance. Spectral Radiance is defined as "the amount of radiant flux (energy per unit time, waltios, W) per unit wavelength (microns, um) radiated (emitted) in a cone per unit solid angle (steradian, steradians, sr) by a source whose area (As) is measured in meters.

The formula used to use the same place names that the MTL file of the constants has is the following:

((Radiance\_Maximum\_Band\_6 - Radiance\_Minimum\_Band6)/ (1)(Qua tize\_Cal\_Max\_Band\_6-Quantize\_Cal\_Min\_Band\_1) × ("Banda 6") + Radiance\_Minimum\_Band\_6

Considering the values of the constants generates the following calculation:

$$((15.303 - 1.238)/(255 - 1)) \times ("Banda 6") + 1.238$$

The result corresponds to a file in raster format called RadBan6 (Radiance Band 6) with the radiance values for each pixel of  $30 \times 30 \text{ m}^2$  in the study area.

Surface temperature calculation for LandSat 5. Once the radiance is obtained, the 2. formula for calculating the surface temperature for Landsat 5 in degrees Celsius is applied, which is the following:

Then: For band 6: (1260.56/ln ((607.76/RadBan6) +1) - 273.15 The result is a file in raster format TS2011 (Surface Temperature 2011)

3. Calculate the NDVI (Normalized Difference Vegetation Index) for Landsat 5. The Normalized Difference Vegetation Index, better known as NDVI for its acronym in English, is a vegetation index that is used to estimate the quantity, quality and development of the vegetation based on the measurement of the intensity of the radiation of certain bands of the electromagnetic spectrum that the vegetation emits or reflects. The generic NDVI calculation is represented by the following formula:

$$(NIR - VIS)/(NIR + BIS)$$

where for Landsat 5 the following bands were used:

VIS: Visible red (band 3 on Landsat 5)

NIR: Near Infrared (Band 4 on Landsat 5)

From this calculation, a raster file called NDVI is obtained with values from -1 for those areas with less vigor and presence of vegetation to 1 for those areas with greater vigor and presence of vegetation.

4. Calculate the PV (Percentage of Vegetation). The PV Corresponds to the area identified with vegetation cover in each pixel of  $30 \times 30$  m<sup>2</sup> of the Landsat satellite image in percentage. The formula for calculating the PV is as follows:

where: NDVI: File obtained from step 7 NDVImin: Minimum cell value of the NDVI calculation in step 4. NDVImax: Maximum cell value of the NDVI calculation in step 4.5.

Then:

$$PV = (NDVI - (-1/1) - 1) 2$$

From this calculation, a raster file called PV is obtained with values from 0 to 1, 0 being those where the proportion of vegetation is less than 1 where the proportion of vegetation is greater.

#### 4. Results

The results have been initially divided according to their specific objective.

## 4.1. Qualitative Methods

For the analysis of the speeches on sustainability issued in retail in the cases studied, two initial categories emerged: the "material dimension of retail," referring to figures, footage, investments, investment projects, locations, constructions, and quantifications in general about retail projects in the city; and the "socio-symbolic dimension of retail," referring to the imaginaries, concepts, messages, debates, value proposals, and communicational projects of retail and its consumer/user communities. In this second category, two relevant subcategories were found: the retail conceptualization of community and society and culture and cultural heritage. Data related to the "link with the community" and "culture and social contributions" were coded. In these last categories, you will mainly find references to practices and campaigns to protect the environment.

4.1.1. Results of Analysis of Sustainable Discourses in the CENCOSUD/Mall Costanera Center Case

The discursive analyzes of the CENCOSUD documents suggest a vision of the urban that is operational and focused on the real estate business. Their reports address the city's issue from the real estate assets bought and sold that year, their value, and the risks this transaction presents for shareholders. CENCOSUD addresses the effects of its shopping malls in the urban space from its conflicts and threats to its shareholders' business and avoids making the mentions that Mall Plaza makes about the community role of its retail ventures.

The reference to practices to protect the environment takes shape as the years go by. Starting in 2009 as a discourse linked to the company's sustainability, used indifferently to refer to the sustainability of the retail business, over the years, this concept begins to evolve towards a more ecosystemic interpretation of sustainability, both in its environmental and social dimensions, as economic.

In 2012, CENCOSUD raised the corporate campaign that framed their investments as examples of "Neourbanism," a term they defined as "... the idea of having spaces within our cities in concordance with new technologies and in line with an interconnected world. With designs that tend towards energy efficiency and favor the concentration of activities to reduce road impacts and improve pedestrian spaces" [70].

Executives linked to the firm proposed Mall Costanera Center as the icon of this "neourbanism": "... Costanera Center is a mainly pedestrian mall, where the people arrive on foot, so cars have not been a problem. In fact, there is an over-stock of parking lots," one executive stated in the press [71].

This pedestrian nature of the urban retail facilities has been presented multiple times by the holding as its main environmental sustainability proposal: "We seek to generate profitability, but at the same time worrying about building social and environmental value," the holding company declares, adding that "They work (we) for generating valuable relationships with our main stakeholders: Employees, Clients, Suppliers, Community and Environment." [55] (p. 8). For CENCOSUD, there is a financial background to the issue of sustainability. The retail company is eloquent when it comes to raising its retail business vision as a priority of its insertion in the city, where contributions to the community and the environment are only valued in their translation into an instrumental value, or, said of otherwise, in added value: "For Cencosud, sustainability is related to the development of a long-term business model. This implies assuming the commitment and responsibility with our stakeholders to generate not only economic value, but also social and environmental value" [55] (p. 7).

In this regard, CENCOSUD has used urban transport as a new sustainability flag, even when they are not large projects or urban scale implementations. For example, the "Vamos en Bici" or the "Recicla Tu Bici" campaigns ("come by bike" and "recycle your bike"), both from 2014, are oriented in this line. However, it is only found that in the first eight, bicycle racks were installed throughout the country. In the second, 65 bicycles were received, which were later given to the Municipality of Pudahuel, a low-income district. Too low numbers to be considered a successful sustainable campaign.

In 2015, in an internal diagnosis that CENCOSUD made of its shopping centers in the country, the holding company proposes the axis of sustainability as a "community relations strategy," which allows "... to position its different brands as a good neighbor that contributes and contributes to social development" [54] (p. 10). Thanks to this, CENCOSUD became "one of the four Chilean companies to integrate the select Dow Jones Sustainability Emerging Markets Index and one of the three Latin American companies in the "Food and Staples Retailing" industry, which belong to the Dow Jones Index" [54].

This recognition is in direct benefit of the reputation worldwide in terms of sustainability. As indicated, this is of great relevance for investors and other stakeholders due to the rigor with which Dow Jones analyzes the session of companies on economic, social, and environmental issues [53]. Entering this standard at a global level raises the CEN-COSUD ranking and turns the company's bonds and shares into attractive international stock investments.

Sustainability, therefore, is used as an instrumental value in raising the company's stock market visibility in global financial rankings. The real impacts of these actions in the city ecological systems were never defined in the revised documents.

Some of the projects that allowed the holding company to capitalize on this concept of environmental responsibility have to do with small actions and campaigns linked to the somewhat operational idea of sustainability. For example, CENCOSUD's primary campaign in this area in 2016 was the management of its "3R: Reuse, Reduce and Recycle" waste [55]. To implement adequate management of waste from its operations and reduce the amount of waste sent to landfills, CENCOSUD shopping facilities recycled their advertising materials, made PVC, and reconverted them into "accessories with high added value." This campaign, which, although it only aims at reuse and resale and not at reduction or recycling, earned it recognition in the field of innovation and was considered by both holding companies and global rankings as a " ... Positive impact for the environment, since it prevents these wastes from reaching landfills" [55].

#### 4.1.2. Results of Analysis of Sustainable Discourses in the Mall Plaza/Mall Plaza Egaña

Mall Plaza, since 2009, already refers to its shopping centers as "urban centers" that function as public spaces, even if they are not. Over the years, he refines his discourse regarding the role he plays in the community.

In 2011, the "occupied public square" concept began to stand out as a synonym to refer to its retail spaces [58]. Along with this, a more detailed description of the environmental measures that have been taken during the year begins: "Each one (of our shopping malls) has collaborated so that our chain has been transformed into meeting spaces, where Visitors enjoy collective experiences of entertainment and culture, where they meet the latest trends and connect with nature through our multiple outdoor proposals. Our challenge is to continue to overcome borders so that more people continue to live the Mall Plaza experience" [57] (p. 13). The "connection to the natural" begins to emerge in an imprecise way, but it is exemplified in the documents with images of green spaces built within the corridors of shopping centers. Specific sustainability policies were described in detail in 2012. There is constant mention of the creation of the "Living Library" project and the role of Mall Plaza as a promoter of culture in the communities in which it is present [59] (p.10). In 2014, emphasis was placed on "sustainable environmental management" as a fundamental part of its Corporate Social Responsibility policies [61]. This management focuses on communication campaigns to discourage the use of plastic and promote bicycles and pedestrians when arriving at its shopping centers.

The primary marketing campaigns developed by Mall Plaza since 2016 have aimed to promote behavioral changes in consumers and the communities associated with its urban retail ventures. By review of the advertising issued by the company, it was possible to recognize more than 20 campaigns published between 2009 and 2016 that were associated with the disincentive for the use of plastic in its malls, the promotion of urban gardens, the dissemination of clothing recycling campaigns, and the installation of parking for electromobility and bicycles. In this line, Mall Plaza Egaña was always used as the flagship mall for these promotions, establishing itself as the "first sustainable and carbon-neutral mall in Chile," according to the company. In 2011, Plaza presented its urban retail project as the "first sustainable mall," proposing to measure the emission of greenhouse gases produced during the construction of the new Mall Plaza Egaña, in the district of La Reina: "... This project will become a milestone in the history of the company, by becoming the first sustainable mall in the country," explained Fernando de Peña, executive vice president of Mall Plaza in a press release that gave the start of its construction [58].

Indeed, Mall Plaza Egaña was proposed as a "sustainable mall, both in its design and in its operation" [58], so the measurement of the impact of its construction was aligned in the corporate documents with the company's objective. At its inauguration, the mall presented a plan that considered calculating the greenhouse gases (GHG) produced by the operation of the shopping center, proposing itself as a national milestone in the retail industry: "What Mall Plaza introduces with the measurement of its carbon footprint will serve to spread this practice in this and other industries, which we hope will translate into technological innovation efforts to lower the footprint of our entire productive apparatus," [72].

Thus, this mall became the industrial and marketing icon in terms of retail investments, incorporating landscaping areas and interior green areas, and being internationally certified under the LEED standard (Leadership in Energy and Environmental Design) with the LEED seal in the Gold category awarded by the US Green Building Council in 2015. According to this certification, the LEED seal guarantees an energy reduction of between 15% and 20% compared to a traditional mall, and considerable savings in water consumption, thanks to the reuse of technologies and the efficient use of resources. Along with the above, according to the company, this shopping center has waste management plans, air conditioning, and preferential parking, among others. This initiative included a comprehensive recycling plan, a high-efficiency thermal power plant, a 6400 m<sup>2</sup> façade of green walls, an electric vehicle charger, a bicycle rack for 900 bicycles, and a direct connection to the public bicycle circuit, the Metro system, and public transportation.

This urban retail project meant the company obtained the award from the International Council of Shopping Centers (ICSC) "Best of the Best Viva Awards Sustainability" in 2016 for the development and value proposition of Mall Plaza Egaña.

Mall Plaza Egaña has been the communicative icon of numerous advertising campaigns from the retail holding company, carrying out a media campaign entitled "#ElMedioAmbienteNosUne (The Environment Unites Us). This campaign proposed environmental awareness in 2017 with a music festival and cultural activities dedicated to environmental issues, with advertising slogans used in social networks, media campaigns, and television spots that included phrases such as "the environment unites us," "let's stop polluting the planet," "let's create a circular economy," "let's start reusing," and "reduce, recycle and reuse." Another campaign in 2016, called #SoyCeroPlastico (I'm Zero Plastic), was also recorded and launched in Mall Plaza Egaña. It proposed eliminating plastic bags in stores and their replacement by recycled cloth bags given away at the mall. It was disseminated in the media with phrases like "there are causes that unite us all," "here all the bags fit," "I am 0% plastic and you?".

Both campaigns studied, among others, were successful in installing sustainable themes in the national advertising debate.

#### 4.2. Quantitative Methods

Based on the survey of Surface Temperature indicators in LandSat 5 and Landsat 8 satellite images, it was possible to estimate the actual environmental effects of the installation of these shopping centers in their respective neighborhoods.

It was analyzed by comparing satellite images that considered a radius of 1 km around the mall to prove the changes in surface temperatures that the buildings brought after their initial operations.

# 4.2.1. Results of Surface Temperature Analysis Case Mall Costanera Center

For both years, the surface temperature map (Figure 5) shows high temperatures near the Mall Costanera Center sector, especially towards 2019 instead of 2011, and lower temperatures around the Mapocho River and its surrounding parks that function as a superficial temperature mitigator. There are temperatures above 30 degrees in some sectors on the roof of the shopping center and its sidewalks on Avenida Vitacura and Andrés Bello.



Figure 5. Surface Temperature analysis of the Costanera Center mall.

# 4.2.2. Results of the Normalized Vegetation Index Mall Costanera Center

The results show a lower presence of vegetation in 2019 than in 2011 in the Costanera Center Mall sector and around Providencia, Nueva Providencia, and Apoquindo Avenues, a middle-high income area. A general decrease in the vigorousness of the vegetation in the quarter stands out, and the reduction in the value of the vegetation index within the Costanera Center property stands out, which in 2011 identified vigorous vegetation present. In 2019 it presented values close to null.

One possible effect has to do with the construction work of the mall that was still active in 2011 versus the total presence of metallic reflective materials in 2019, corresponding to the ceilings, appliances, and facilities that are currently observed in the aerial image (Figure 6).



Figure 6. Results of the Normalized Vegetation Index for the Costanera Center mall.

4.2.3. Results of Surface Temperature Analysis Case Mall Plaza Egaña

For both years, the surface temperature map shows high temperatures near the Plaza Egaña shopping center sector and lower temperatures around the San Carlos river, which works as a surface temperature mitigator (Figure 7). Despite the certifications obtained and the environmental mitigation projects considered, the images show that temperatures above 30 degrees are observed on the roof of the shopping center in some sectors and the pedestrian sidewalks of Avenida Ossa and Avenida Larraín.



Figure 7. Results of the Normalized Vegetation Index for the Costanera Center mall.

4.2.4. Results of the Normalized Vegetation Index Mall Plaza Egaña

The results show a lower presence and vigor of vegetation in the Plaza Egaña Mall sector and around Ossa and Irarrázaval Avenues concerning the observable vegetation in 2011.

A general decrease in the vigorousness of the vegetation in the sector stands out, and the reduction in the index in the square that is located in front of the mall (Plaza Egaña) stands out, which identified vigorous vegetation present in 2011 and presents values close to null in 2017 (Figure 8).



Figure 8. Results of the Normalized Vegetation Index for Mall Plaza Egaña.

Of particular interest, in this case, would be to consider the general changes suffered in the vegetation of the areas surrounding the mall. This is relevant since the arrival of this urban retail venture boosted surrounding real estate investments, raising land prices, and attracting investors in high-rise real estate projects, mainly residential for the middle classes. This is evidenced in the decrease in the vegetation index in the most more significant avenues that surround the shopping center, so it is inferred that, although the mall project could have a sustainable proposal, obtaining certifications and awards for the project, its collateral effects in the immediate context of the city do not follow the same development patterns.

# 5. Discussion

One of the main findings in this comparison based on a mixed research method is that the discourses on sustainability and the environment that retailers deploy, whether through corporate or marketing means, are not aligned with their real environmental effects in the city.

In the first case, the Costanera Center has brought an enormous disruption in the before and after heat map. We can observe that, besides the claims that the shopping mall was going to include green parks in the road, bike lanes, and greener and pedestrian sidewalks, these actions did not reverse the environmental effects of this mega building in the neighborhood. By rising the superficial temperature by more than 5 °C, the effects of the shopping mall in this retail system are climatically adverse. The concentration of the changes in superficial temperature can be observed in the heat map, and even if the project built greener sidewalks than before, the heat point that the location of the mall in the map represents allows us to question the real effects of the sustainable claims its promoter make. This commercial area cannot be addressed as a highly resilient retail system. Even if all its corporate communication to consumers, investors, and public authorities has been framed as that, its effects on sustainable resilience are questionable and should not be presented as a positive outcome.

In the second case, Mall Plaza Egaña is even more dramatic. Even by building a green façade, a passive air conditioning system, a green rooftop, the building disrupted the surroundings by rising superficial temperature in more than 5 °C. In this case, it is important to acknowledge that the shopping mall arrival initiated a high-rise residential development in the close surroundings of the retail building. Since its opening in the area, the once two stories' houses were demolished, and a 20-story building was rapidly built in their replacement. This is also evident in the comparisons of the Normalized Vegetation Index, where the dynamization brought in the commercial avenues of the retail

system meant a replacement of the former smaller businesses by bigger, less sustainable commercial formats.

This is an evident example of the complexity of the retail resilience concept explained by Dolega and Celińska-Janowicz [18]. As an adaptative resilience example, this retail system reacted through the reorganization and re-orientation of commercial units, in which the recovery was made through the replacement of small-scale businesses by bigger stores, responding to a more intense commercial activity in the surroundings of the mall. In this case, the retail resilience of the sector has adapted at a higher level if seen in economic terms but has challenged the system equilibrium in sustainable ways, both social and environmental terms.

Far from minimizing its impacts, retail systems that surround mega facilities of closed, air-conditioned, and glazed commercial buildings show environmental effects characterized by the reduction of the surrounding vegetation and the consequential rise in surface temperature, measurable through satellite images. These ecological effects are resounding and show changes so radical that they can be measurable in periods of less than ten years between one moment and another.

These findings suggest that the impacts of enclosed shopping center-type urban retail models, although promoted and built as pedestrian and "green" adaptations, do not exceed their real territorial effects. They become hubs of heat and dryness that can seriously intervene in urban ecosystems, increase greenhouse effects, and finally, increase terrestrial temperature and the subsequent impact on climate change.

This is especially relevant when considering that both cases studied have resulted from successful communication campaigns on sustainability, where measurable financial effects have been generated thanks to the incorporation of "green" speeches, promotion of recycling campaigns, and proposals for eco-sustainable design.

These findings suggest that, despite the marketing communication campaigns aimed at changes in consumer behavior, with well-intentioned retailers proposing the necessary cultural and commercial changes to face the environmental challenge, these urban retail facilities are consolidated as the significant environmental disruptors of urban ecosystems.

Therefore, these findings are in dialogue with the recent literature on retail resilience. Given that said academic discussion is aimed at recognizing the resilient processes of commercial infrastructure when adapting to new urban circumstances [73], it is essential to comment on the effects of the translation of suburban formats to densely urban models, such as the enclosed shopping mall [74].

For the rest, it is evident that, in a neoliberal governance model, where urban initiatives are subject to corporate visions of real estate success over quality in the construction of the city, these buildings have as well become attractors of capital and reconfigurators of centralities in already populated areas [75]. In this way, its disruptive effects on urban ecosystems are expressed in the elevation of building heights and densities, the increase in the constructability criteria of the properties, the elimination of parks and other green areas seen as under-utilized, and the incorporation of glazed and metallic materials to replace previous residential wood and brick architectures. All these effects are not necessarily associated with the investment of the mall building, but they are measurable urban effects in the satellite images around it.

On the other hand, the sustainability discourses with which retailers propose themselves as sustainable initiatives are striking. Despite being laudable examples of environmental awareness, their effects are not very measurable at the communicational level. Many could fall into what is known as greenwashing or green image-washing. With few accountability strategies, these retailers propose themselves as media actors on issues of high sensitivity to citizens, generating probable communicational impacts in the community with the dissemination of debates on ecology and the environment but are not conditioned by the real effects that their investments have in the territory. This could even be considered as a case of greenwashing that falls under the banner of false advertising. Finally, it is relevant to highlight the financial valuation process that this relationship with the community and the environment implies. Although there are no direct profit motives in many of the initiatives declared by CENCOSUD and Mall Plaza, which were aimed to reduce carbon footprints, promote pedestrianization, and discourage the use of plastic, these campaigns do end up being translated into international corporate stock market recognitions. Through these corporate "good intentions," retail companies managed to win international awards and recognition from the industry. They managed to be included in good practices in financial rankings. They increased their visibility as a "green" company locally and internationally and managed to be included in exclusive lists of green investors, obtaining reserved financial capital. Based on self-declared corporate discourses by companies and not on scientific studies by uninvolved third parties, this accountability proposes a challenge in international certification systems, and even more, in the possibility of a genuine social contract based on the protection of the environment.

## 6. Conclusions

This experimental work brings light to a recent interdisciplinary concern that regards, urban retail, marketing, corporate communication environmental studies. As a work in-progress, it aims to inaugurate a path of further, more profound studies on the accountability and legitimacy that should be demanded to urban developers. Moreover, in vulnerable territories, prone to social injustices, climate degradation, and economic disruption, such issues must be discussed in an interdisciplinary discussion on public policy and urban regulation.

As it was stated in this paper, many urban developers use "green" concepts to promote their projects to a wide audience, instrumentalizing sustainable discourses in advertising, marketing, and branding campaigns that allow them to divert the attention of its effects in the urban systems.

The two cases studied proved that big retail brands use sustainability as a way to sell, engage and promote their investments to their stakeholders. However, the corporate discourses are translated and managed from a merely discursive aspect, relating more to its financial prosperity than a greener future for all citizens. For the Santiago de Chile cases, it is urgent to acknowledge the dramatic power of ecological disruption that the reconfiguration of these retail systems by mass shopping malls brought to the observed neighborhoods.

Due to probable causes associated with the new materiality of the roof surfaces and the emissions that their operations generate in the environment, the malls developed notorious ex-post effects on the quality of urban ecosystems, putting vulnerable territories in danger.

This paper concludes that, for both cases, the disruption in these urban retail systems by the arrival of a megamall determined a rapid detriment of the environmental quality by warming up of the surface temperature and provoking urban deforestation. The study confirms the contradictory tension caused by retailers' corporate and retail discourses in Santiago de Chile versus the environmental effects of their buildings in their urban surroundings.

As a strategy to be valued by international investment funds and global stock markets, where financial matters prevail over the local effects of the asset portfolio, both studied cases bring light to the greenwashing phenomena that are increasingly being studied by social sciences. However, far from generating improvement effects in sustainability indicators, these cases studied caused a considerable increase in surface temperatures in their surroundings, putting the general sustainability of the urban system at risk. Therefore, further interdisciplinary studies must address these contradictions. Moreover, retail developers must be made accountable by a public debate that proposes new urban sustainability agendas.

However, many other factors remain to be studied and compared. For example, besides its local effects, it is still necessary to study whether these retail projects can promote broader discussions on public policy and urban sustainability in their consumer community.

Nevertheless, these experiences can be seen as learning examples for future commercial resilience projects of urban retail systems. Unfortunately, there are still no clear public policies that guide the planning and installation of these urban megaprojects to pursue a sustainable future.

As a methodological conclusion, this experimental comparison brings many questions into how marketing discourse can be measured, acknowledged, and accountable after there are enunciations to the public. There are no precise methods that can transfer the perceptions of the social impact of these discourses into quantitative indicators.

Finally, it is essential to state that the tension between the discursive communication of retail and its real environmental and ecological effects is a challenge based on accountability and corporate social responsibility. New third parties should be considered in the formulation, evaluation, certification, and approval processes of mega buildings in dense urban areas, acknowledging the existing urban consequences that infrastructures bring to environmentally vulnerable territories.

Thus, this study proposes the importance of creating public policies based on incorporating these concepts in urban planning and local authorities' responsibility for supervision.

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