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Analysing the Logistics Space near Cape Town International Airport in Comparison to the Seaport and Dry Port Environments

Masilonyane Mokhele

(A. Prof Masilonyane Mokhele, Cape Peninsula University of Technology, PO Box 652, Cape Town 8000, mokhelem@cput.ac.za)

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1 ABSTRACT

One focal point on the interconnections between transport and land-use patterns is the concentration of economic activities near airports. However, the literature typically analyses the environs of airports without drawing comparisons with other transhipment zones, such as seaports and inland ports. To contribute towards filling this literature gap, the paper analyses the monthly rental values of warehousing, industrial, retail, and office properties in the vicinity of Cape Town International Airport, compared with those around the Port of Cape Town and Belcon inland/ dry port, South Africa. Property rental data were scraped on 10 December 2025 from the website of Property 24, a leading South African property listing company. Following the cleaning process, the dataset comprised 240 data points: 105 industrial listings, 106 warehouse listings, 25 office listings, and four retail listings across the three transhipment precincts. However, only 186 street addresses were successfully geocoded in Python, forming the foundation for spatial analysis. Using QGIS, RStudio and SPSS for spatial and statistical analysis, the results showed that the mean rental values for industrial, warehouse, and office properties were highest in areas near the airport, followed by those near the port, and lowest around the inland port. The findings provide evidence that, relative to other transhipment precincts analysed, the airport environs may constitute a distinct industrial, warehouse and office property sub-market.

Keywords: Cape Town International Airport, Port of Cape Town, Belcon dry port, transhipment precincts, City of Cape Town

2 INTRODUCTION

One core area of the nexus between transportation technology advancements and land-use patterns is the concentration of economic activities near airports (Mokhele & Geyer, 2018), in line with the normative models of the so-called airport-led development. Proposing the idealised composition and spatial form of urban development near airports, these models are epitomised by the airport city and aerotropolis. Although the airport city conception encompasses various distinct categories (Conway, 1993), it is typically used to promote urban development in the immediate vicinity of airports (Kasarda, 2009). As the airport city evolves, intensifies and matures, urban development is expected to radiate outward, subsequently resulting in the spatial form of the aerotropolis, which could extend to a radius of about 20km from the airport (Kasarda & Lindsay, 2011). Policymakers, spatial planners, airport authorities, and developers across the world use these models to market and strategically guide the economic activity mix and spatial form of urban development, which is understood to be related to the airport's core aviation functions.

Despite its insights, the existing literature on the airport-urban development nexus analyses the environs of airports without comparing them with other transhipment zones within a given territory, particularly seaports and inland/ dry ports. The concept of transhipment points is akin to what Palander (1935) eloquently referred to in his seminal work as transport points connected to other transport points by transport lines. Intermediate transport points, therefore, have special transfer benefits when they are transhipment points or junctions (Hoover, 1948).

Various transhipment nodes are crucial for facilitating logistics processes and global trade amid intensifying globalisation (Chen et al., 2017), and therefore have the potential to shape development patterns and the spatial economy in their territories. Reflecting on the importance of ports, the UN Trade & Development (2025) argues that maritime transport is the backbone of global trade, accounting for over 80% of the volume of goods transported worldwide. Seaborne trade has evolved and gained traction over time, influenced by the increasing containerisation, the growth of developing economies and the shifting global patterns of production and consumption (UN Trade & Development, 2025). In this evolving economic milieu, the concept of an inland or dry port has been used to shift intermodal terminals inland and reduce traffic congestion at seaports (Bayene et al., 2023). While seaports undoubtedly dominate in terms of the volume of

goods transported globally, the International Air Transport Association (n.d.) reports that air transport accounts for approximately 35% of the value of global trade, reflecting the important role airports play in supply chains and logistics. Globally, cargo tonne kilometres increase year on year, reflecting the importance and growth of the air cargo market (International Air Transport Association, 2025).

To contribute towards extending the literature and filling the gap above (i.e., the lack of a comparative analysis of transhipment precincts), the paper analyses the rental value of properties in the vicinity of Cape Town International Airport, South Africa, in comparison to the values around the Port of Cape Town and Belcon inland port. The paper addresses the following research question: Do the environs of the airport represent a unique property sub-market compared to the Port of Cape Town and Belcon inland port? As detailed in the Methods section, the analysis focused on the monthly rental values of warehousing, industrial, retail, and office premises in and around the studied transhipment precincts.

3 LITERATURE REVIEW

As emphasised by Usman et al. (2021), the urban property market is characterised by price variation, which may be influenced by several spatial, social, and physical variables, arguably making it a composite of separate submarkets. Market analysis, therefore, requires segmentation to delineate the property market into distinct groups that are relatively homogenous within themselves, while heterogeneous with others. Sub-markets were introduced as an important analytical tool in the 1950s and 1960s, and the resultant research in property market segmentation has arguably improved the accuracy of property pricing. However, most segmentation studies have focused on the housing market with less attention on the commercial property market. Similar to the housing market, the commercial or non-housing property market is complex and heterogeneous and warrants attention on the market segmentation (Usman et al., 2021).

Aligned with the discussion above, Dunse, Leishman and Watkins (2002) argue that the spatial variation in urban property values is specifically due to the influence of the physical attributes of the property stock across different sections of the city. Two approaches dealing with this variation in property values have been developed. On the one hand, as noted earlier, markets can be interpreted as composed of interrelated sub-markets, each of which may exhibit different price or rental values. On the other hand, price and rental variations can be explained through trade-off theories of locational choice (Dunse, Leishman & Watkins, 2002).

In a study of the office real estate market in Tokyo, Japan, Matsuo et al. (2024) found that the presence or absence of amenities significantly impacted both rent and vacancy rates. Amenities have been perceived and interpreted differently in the literature, with numerous studies classifying them into neighbourhood, on-site, and worker amenities (Sivitanidou, 1995). Neighbourhood amenities include, for instance, the office's proximity to complementary facilities, such as restaurants and retail stores. Neighbourhood amenities are shared among various neighbouring office buildings and thus have a strong public element. By contrast, on-site amenities are private, as their benefits are restricted to tenants in the individual buildings and therefore serve as a differentiating factor from other premises. In this regard, neighbourhood amenities are exogenous, making it difficult for a property owner to directly influence them through capital investment. However, on-site amenities can be directly influenced by the individual property owners (Matsuo et al., 2024).

Sivitanidou (1995) argue that within multi-nodal metropolises, business rent variation across nodes should be attributed not only to differences in their amenity endowments but also to differences in their institutional frameworks. Coupled with a set of firm amenities reflecting traditional demand-side influences (such as access to the central business district, freeways, and airports) and various worker amenities (education quality, levels of crime, access to shopping opportunities, and the ocean), supply-side attributes, such as the availability of appropriately zoned land, and density restrictions, were found to play a crucial role in influencing price variations in office-commercial rents (Sivitanidou, 1995).

In another study, Franco and Cutter (2022) found that, on the one hand, open space, typically an amenity considered to be jointly valuable to firms and households, had either weak or non-robust effects on non-residential property values. On the other hand, the amenities of coastal access, air pollution, weather and crime levels appeared to have stable correlations with property values. In contrast, amenities that are likely valued only by firms, such as accessibility and proximity to concentrations of skilled labour, showed strong and significant correlations with non-residential properties (Franco & Cutter, 2022).

4 STUDY AREA

The study focused on the urban development precincts that are contiguous with the transhipment nodes of Cape Town International Airport, the Port of Cape Town, and the Belcon inland/ dry port in the City of Cape Town municipality, Western Cape province, South Africa. The subject development nodes are Airport Industria/ Airport City, Paarden Eiland, and Parow Industria, respectively (Fig. 1). The studied precincts are considered among the main industrial areas in the City of Cape Town municipality, with varying spatial economic attributes, backgrounds and histories, as highlighted below. It is important to note that the study did not examine areas within the seaport, the inland port, or the airport landholdings.

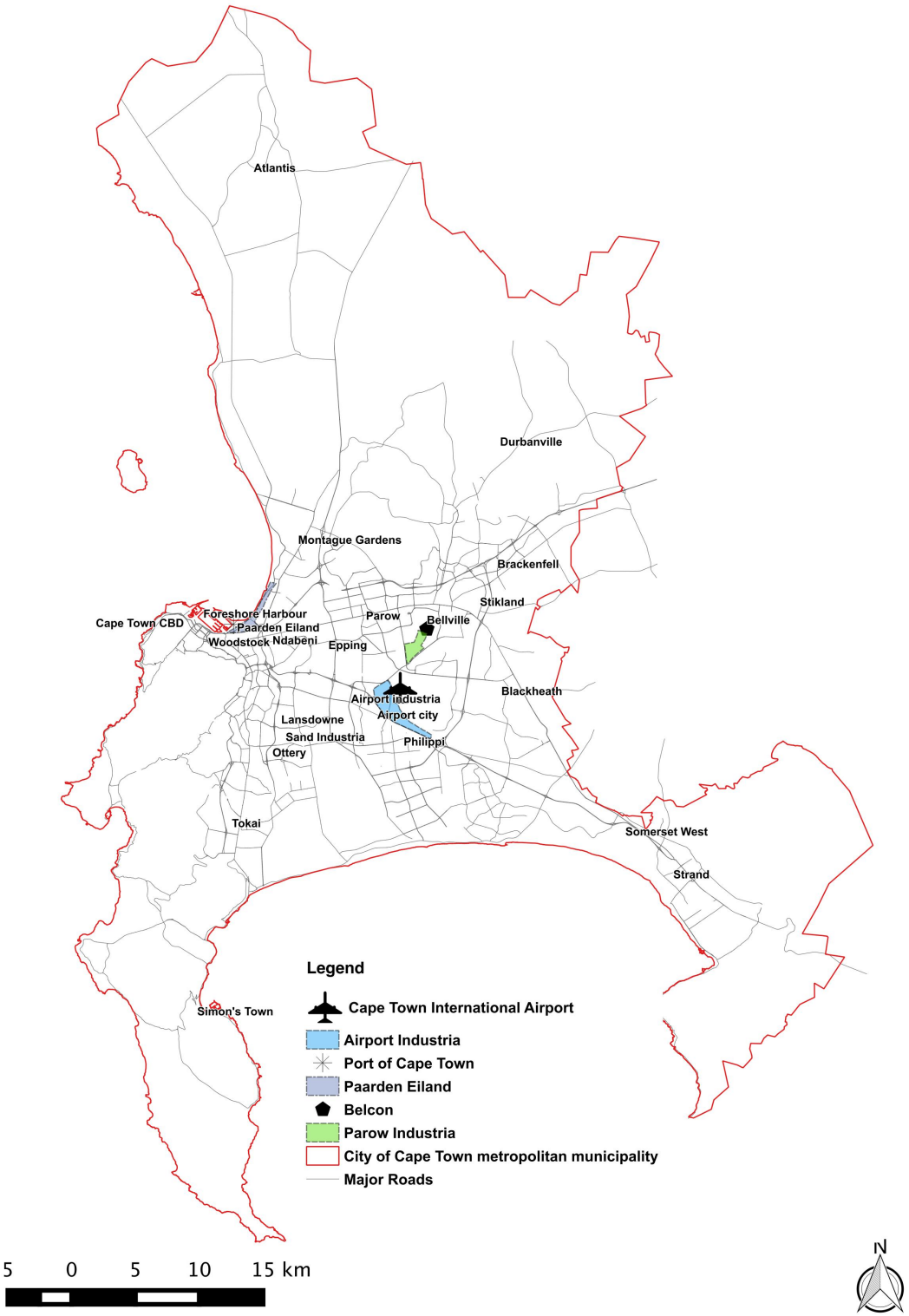

Fig. 1: Location of Cape Town International Airport relative to the surrounding municipalities.

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Established in 1954, Cape Town International Airport is the second-busiest airport in South Africa after OR Tambo International Airport in Gauteng province. It is also the only international airport and one of the two commercial passenger airports in the Western Cape province. Origins of urban development in the vicinity of the airport can be traced to the government's concerted efforts to promote industrial development, where in 1981, about 130 ha of land in this area was zoned for industrial purposes, albeit most of the landholdings were undeveloped at the time (Mokhele, 2017). A trend in the development of warehousing and storage facilities near the airport was particularly evident in the 1990s (City of Cape Town municipality, 2002).

The Port of Cape Town is also the second-largest seaport in South Africa, after the Port of Durban in KwaZulu-Natal province. Paarden Eiland, situated in the environs of the port, has a long spatial economic development history. The literature notes that, with the increasing scale and intensity of manufacturing in Cape Town in the mid-20th century, a search for more expansive and affordable land naturally led to the establishment of new industrial zones in, among other areas, Paarden Eiland. The area was developed mainly in the 1960s (Mokhele & Fisher-Holloway, 2024). In the mid 1990s, Paarden Eiland notably boasted a prime industrial rental rate that was about three percent higher than the municipal average (City of Cape Town municipality, 2002).

The third focus area, Belcon, is a dry port directly connected to the Port of Cape Town via rail. In 2010, Transnet Freight Rail officially opened the Belcon terminal, which serves as an inland port and an extension of the Port of Cape Town, focusing on rail-based container consolidation. Positioned about 30km from the port, this facility allows truckers to increase the number of loads per day by avoiding traffic congestion and delays in and out of the city, as well as congestion at the port itself.[1]

5 RESEARCH DESIGN AND METHODS

This section presents the overarching research design, the units of analysis, and the data collection and analysis methods employed in the study.

5.1 Research design

The study employed a quantitative comparative research design (Iranifard & Roudsari, 2022), using statistical and spatial analysis to compare the monthly rental values of warehousing, industrial, retail, and office properties in the environs of Cape Town International Airport, the Port of Cape Town, and the Belcon inland port.

5.2 Units of analysis

The study's units of analysis were the warehousing, industrial, retail, and office premises advertised for rent in the vicinity of Cape Town International Airport, the Port of Cape Town, and the Belcon inland port. This focus distinguishes the paper from previous related studies (for example, Mokhele, 2025), which used land parcels rather than individual establishments as units of analysis. A key limitation of land parcel-based studies is that they do not account for the potential influence of what Sivitanidou (1995) refers to as on-site amenities, as a single land parcel may accommodate multiple buildings or units with differing amenity provisions and value.

5.3 Data sources

Generally, data on land transactions are scarce in cities, whereas data on rental prices are relatively frequent (Fuss, Koller & Weigand, 2021). Property rental data were scraped on 10 December 2025 from the website of Property 24, a leading South African property listing company. Property 24 was selected because it is a platform widely used by both property agents and individual property owners to advertise properties for sale and rent. The data scraped from Property 24 comprised 361 data points: 218 industrial listings, 114 warehouse listings, 25 office listings, and four retail listings across the three transhipment precincts. To avoid distortions due to the typical conflation of and overlaps between the "industrial" and "warehouse" land-use/ economic activity categories, the industrial listings that did not mention warehouse were categorised under "industrial". In contrast, the industrial listings that mentioned "warehouse" were included under the warehouse category.

[1] https://www.freightnews.co.za/article/belcon-forever-a-white-elephant-or-the-port-of-cape-towns-saviour

The data scraped from the website were cleaned by removing duplicates and entries for which the average monthly rental price per square metre (m2) could not be determined, where, for instance, the monthly rental value or the extent of the property were missing. After discarding 121 entries, the cleaned data comprised 240 data points, as discussed in detail in the results section.

Furthermore, to prepare for the spatial analysis, the street addresses from the web-scraped data were geocoded in Python using the Google Maps application programming interface (API). The total number of geocoded data points was 186, after omitting the entries without accurately formatted street addresses. It is, however, important to note that the omitted data points were still valid and included in the statistical analysis.

5.3.1 Data analysis methods

Statistical and spatial analyses were performed to identify similarities and differences in property rental values across the three transhipment precincts, particularly to determine whether a unique property sub-market existed in the environs of the airport, or by implication, at the other two transhipment precincts.

5.3.2 Statistical analysis

The monthly rental information from the three transhipment precincts was combined into a single Excel spreadsheet and loaded into IBM statistical package for social sciences (SPSS) version 29 for analysis. Basic statistical analysis was then conducted on the 240 data points. The data were split in SPSS to disaggregate the analysis by the transhipment precincts and the four land-use categories analysed.

5.3.3 Spatial analysis

Spatial analysis of the 186 successfully geocoded points was conducted to compare the three transhipment precincts. Because of the relatively small population, the points were analysed at an aggregated level, without distinguishing between the warehouse, industrial, retail and office categories. After obtaining the coordinates through the geocoding process outlined in Section 5.3, the analysis and map visualisation were performed in QGIS and RStudio.

The first tool employed in QGIS, kernel density, estimates the density of features within an area and creates a smoothly tapered surface for each point (ESRI, 2019). In the study, the features whose densities were calculated were the geocoded warehousing, industrial, retail, and office premises advertised for rent across the three transhipment precincts.

Global and local Moran's I were also applied to measure spatial autocorrelation to examine the data's pattern and identify the similarities or discrepancies within the dataset (Yamada, 2024; Chen, 2023; Westerholt, 2022). Moran's I estimates typically range from -1 to +1 (Overmars et al., 2003), where negative values indicate that dissimilar values are closer together and positive values indicate that similar values are clustered. In contrast, a value of zero indicates that the data are randomly distributed. In Moran's I statistics, the p-value indicates statistical significance, where values below 0.05 are statistically significant, implying that the observed pattern is not due to random chance.

6 RESULTS

As noted in Section 5.3 above, the cleaned property rental data comprised 240 data points, including 106 warehouses, 105 industrial properties, 25 office properties and four retail properties across the three transhipment precincts. However, the successfully geocoded data used for spatial analysis comprised 186 points. Against this backdrop, this section presents the results of the statistical and spatial analyses comparing the monthly rental values of warehouse, industrial, retail, and office properties near Cape Town International Airport (Airport Industria/ Airport City), the Port of Cape Town (Paarden Eiland), and the Belcon inland port (Parow Industria).

6.1 Densities and land-use category mix

The kernel density estimations in Fig. 2 identify areas with a high concentration of warehouse, industrial, retail and office premises, where green indicates low-intensity areas and red marks high-intensity zones. Kernel density results show that the high density values were found in the vicinity of the Port of Cape Town, followed by the environs of the airport and Belcon inland port (Fig. 2). Notably, the data points in the environs of the airport were more spatially spread out compared to Parow Industria and Paarden Eiland.

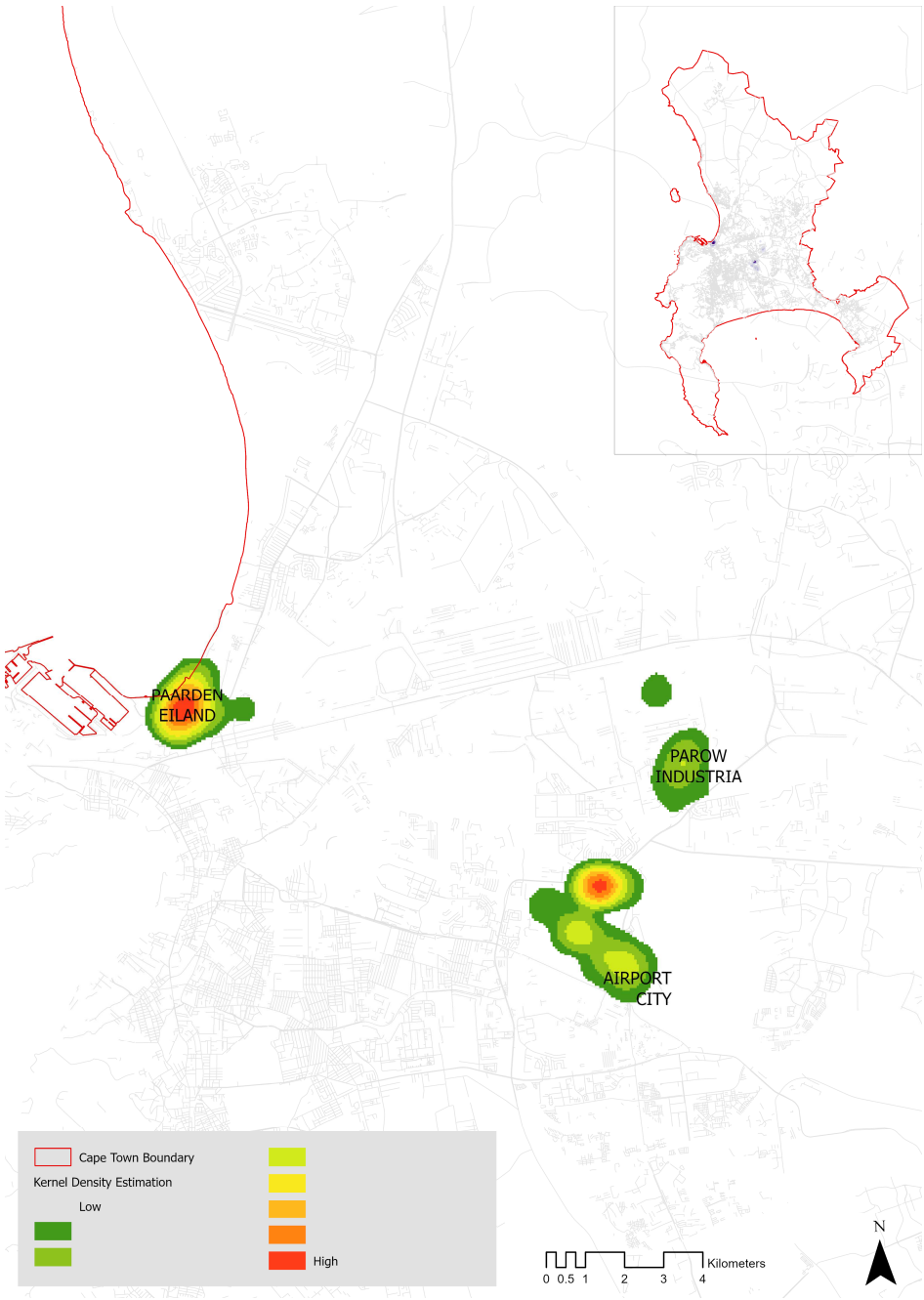

Fig. 2: Kernel density values

Building on the kernel density presentation above, it was also essential to investigate the economic activity or land-use composition across the three transhipment zones. As shown in Fig. 3, in Airport Industria, the majority of the advertised properties were warehouses, followed by industrial and office premises. Notably, no retail properties were advertised for rent near the airport. In Paarden Eiland, the majority were industrial properties, followed by warehousing, office and retail properties. In Parow Industria, most entries were industrial properties, followed by warehousing, office and retail properties. Overall, the number of retail properties was relatively low across the study areas, cementing the transhipment precincts' primary roles as industrial and logistics zones. Only Paarden Eiland reflected a fair number of office properties, albeit still lower than the other land-use categories within the precinct (Fig. 3).

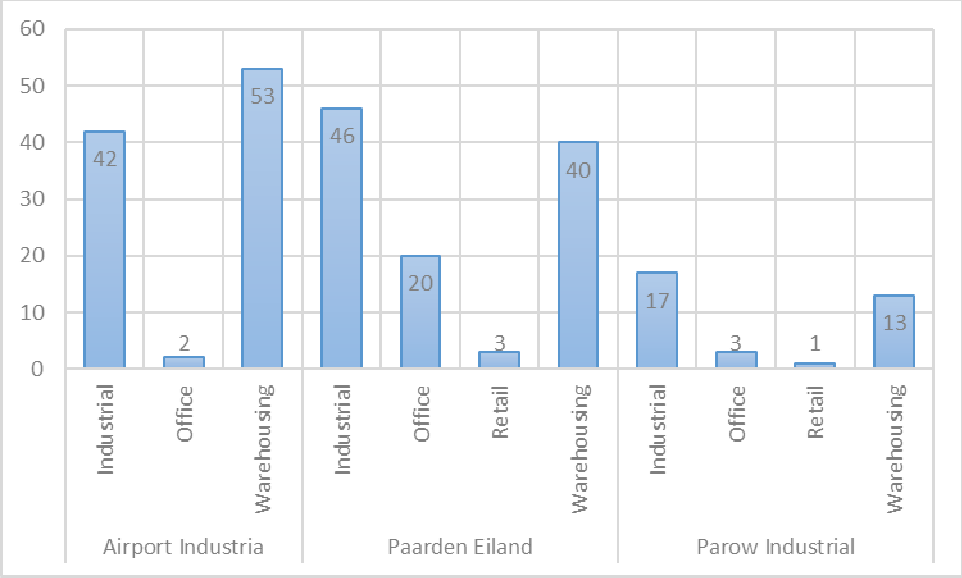

Fig. 3: Number of advertised properties at Airport Industria, Paarden Eiland, and Parow Industria.

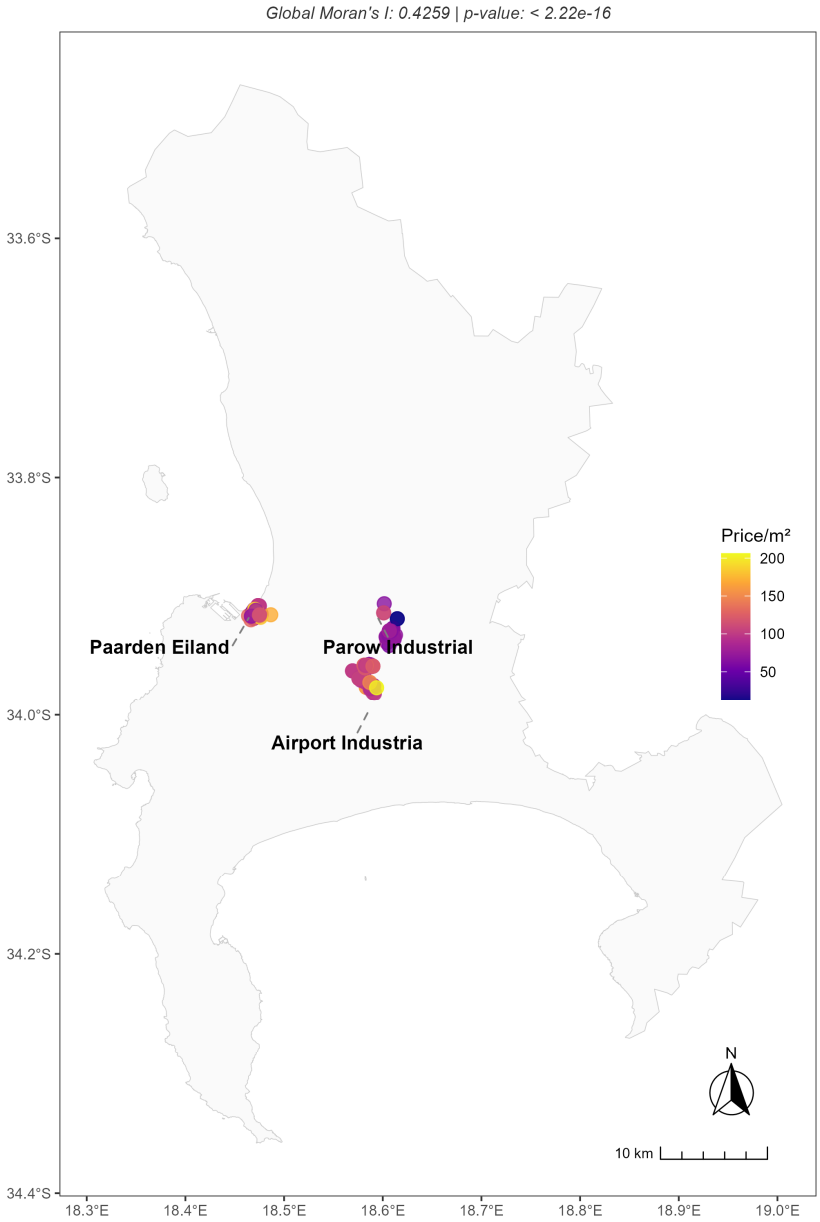

Fig. 4: Geographical distribution of the rental price variation (Global Moran's I)

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6.2 Aggregated rental value variations between the transhipment precincts

The Global Moran's *I* yielded a value of 0.4322, indicating spatial clustering within the dataset. This suggests that premises with high rental prices tended to be located close to one another, and that lower-priced properties were similarly clustered. The *p*-value of < 2.22e-16 confirms that the observed pattern is statistically significant and unlikely to have occurred by chance. Fig. 4 shows that properties in Airport Industria near the airport and Paarden Eiland near the port had higher rental prices per m^2. In contrast, Parow Industrial was characterised by medium to low rental prices per m^2.

The Local Moran's *I* statistics are presented in Table 1 below. For Paarden Eiland, Moran's *I* statistic of 0.2158 implies that properties with similar price per m^2 were located near one another. This result is statistically significant, indicating spatial clustering in the area. In Airport Industria, clustering was slightly higher with a value of 0.3774, reflecting the tendency for properties with similar prices to be spatially concentrated. The *p*-value is significant for this location as well. In contrast, Parow Industria recorded a value of -0.0125, which is close to zero, with a *p*-value of 0.39768. This result is not statistically significant, suggesting that the distribution of monthly rental prices per m^2 in Parow Industria was spatially random.

Metric	Location	Moran's *I* Estimate	P-value	Observation Count
Moran's *I* statistic	Paarden Eiland	0.2158	>0.001	79
Moran's *I* statistic 1	Airport Industria	0.3774	>0.001	78
Moran's *I* statistic 2	Parow Industria	-0.0125	0.39768	29

Table 1: Moran's I statistics.

6.3 Disaggregated rental value variations between the transhipment precincts

The descriptive statistics results, disaggregated by transhipment precincts and the four land-use categories, are displayed in Table 2 and discussed in the subsections hereunder. Monthly rental variations within and between the precincts could potentially be influenced by differences in neighbourhood and on-site amenities (Dunse, Leishman & Watkins, 2002). Overall, the highest mean was ZAR177.5/m^2 for two office properties at Airport Industria, followed by ZAR139/m^2 for office premises at Paarden Eiland. The findings show that office properties have a higher rental value than warehousing, industrial, and retail properties across the three transhipment precincts.

Precinct	Category	N	Min	Max	Range	Mean	Std. Dev
Airport Industria	Industrial	42	69.6	204.6	135.0	104.6	24.9
	Office	2	150.0	205.0	55.0	177.5	38.9
	Warehousing	53	67.5	157.1	89.6	109.3	27.7
Paarden Eiland	Industrial	46	66.0	175.7	110.0	98.6	24.4
	Office	20	71.1	206.3	135.1	139.0	40.1
	Retail	3	114.8	116.7	1.9	116.0	1.1
	Warehousing	40	75.0	120.0	45.0	91.9	13.2
Parow Industrial	Industrial	17	12.0	115.0	103.0	65.1	24.6
	Office	3	65.0	80.0	15.0	70.0	8.7
	Retail	1	110.0	110.0	-	110.0	-
	Warehousing	13	60.0	110.0	50.0	74.3	12.3

Table 2: Disaggregated descriptive statistics.

6.3.1 Warehouse rental values

The mean monthly warehouse rental value was highest at Airport Industria (ZAR109.3/m2), near the airport, followed closely by Paarden Eiland at ZAR91.9/m2. The mean value of advertised warehouses was lowest at Parow Industria, at ZAR74.3/m2.

6.3.2 Industrial rental values

The mean industrial monthly rental value was highest at Airport Industria at ZAR104.6/m2, with the widest range at ZAR135/m2, followed by Paarden Eiland at ZAR98.6/m2. The mean industrial value was lowest at Parow Industria at ZAR65.1/m2. The findings indicate that, unlike in the mid 1990s when the industrial rental rate in Paarden Eiland was three percent higher than the municipal average (City of Cape Town municipality, 2002), the November 2025 rental rates were slightly higher in the vicinity of the airport.

6.3.3 Office rental values

The mean office rental value was highest at Airport Industria at ZAR177.5/m2, albeit only two properties were recorded. Paarden Eiland followed with an office rental value of ZAR139/m2. The office mean value was lowest at Parow Industria at ZAR70/m2, with only three properties recorded.

6.3.4 Retail rental values

The mean advertised retail rental value was highest at Paarden Eiland at ZAR116.7/m2, followed closely by Parow Industria at ZAR110/m2. As observed earlier in the paper, no retail property was advertised for rent in the vicinity of the airport.

7 CONCLUSION

The aim of the paper was to analyse the rental value of warehouse, industrial, office and retail properties in the vicinity of Cape Town International Airport, in comparison with values around the Port of Cape Town, and the Belcon inland/ dry port. The specific objective was to ascertain if the airport environs, in contradistinction to the other two transhipment precincts, represented a unique property market. Using QGIS, SPSS and RStudio to analyse the monthly rental data scraped from a prominent property-listing company, the results show that the mean rental values for industrial, warehouse, and office properties were highest near the airport, followed by those in the vicinity of the port, and lowest around the inland port. Global Moran's I showed a stronger clustering of similar rental values in the environs of the airport, followed by Paarden Eiland, while estimates in Parow Industria were not statistically significant.

Despite the densities that are higher in the vicinity of the Port of Cape Town and the absence of retail properties advertised for rent near the airport, the study's findings show that, from the perspective of rental values, it can be argued that airport environs may potentially constitute a distinct warehousing, industrial, and office property sub-market. Spatial planning efforts could leverage this unique position to, among other objectives, appropriately guide the municipality's spatial economy and maximise the agglomeration economies in the vicinity of the airport.

Despite the paper's insights, it has two main limitations. Firstly, the cross-sectional study's main limitation is that rental information was collected at a single point in time (i.e., November 2025) and may not provide a comprehensive picture of the dynamics of property rental value near the airport, relative to the seaport and the inland port environs. Secondly, the study relied on the scraping of a single website.

To address these limitations, it is recommended that future research consider different property listing websites, include sale prices, and scrape data at different times to identify trends and patterns in the warehouse, industrial, office and retail property values in the vicinity of transhipment zones.

8 ACKNOWLEDGEMENT

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