Geography

Extended Essay

The effects of transnational-corporations on urban areas

To what extent has the influx of technological and financial transnational-corporations in the Grand Canal Dock area given rise to disparities between this and the Irishtown-Ringsend area?

Word Count: 4000

Abstract

To what extent has the influx of technological and financial transnational-corporations in the Grand Canal Dock area given rise to disparities between this and the Irishtown-Ringsend area?

This extended essay investigated how the influx of technological and financial transnational-corporations in the Grand Canal Dock area has affected disparities between it and the Irishtown-Ringsend area. These disparities are related to the respective areas' socio-economic and environmental characteristics. To conduct this the City's Prosperity Index[6] was modified based on primary and secondary data that would be available for collection, processing and measurement. Indicators included average salary, environmental quality and old age dependency ratios. The Spearman's Rank Correlation Coefficient was calculated to examine the statistical significance of the relationship between environmental quality in the two areas. Following result comparison, it was concluded that the Grand Canal Dock area was a more developed socio-economic and environmental urban area than the Irishtown-Ringsend area. Moreover, it was noted that due to the density of technological and financial industry that employees in the Grand Canal Dock area on average were more likely to benefit from a higher salary than employees in the Irishtown-Ringsend area. In contrast to the Irishtown-Ringsend area the Grand Canal Dock area benefitted from prior redevelopment which acted as a 'pull factor' giving rise to further development thus enhancing its infrastructure, services and general urban quality. This has meant that the Grand Canal Dock has been subject to centripetal population movements and has given rise to gentrification, further emphasising these disparities between the areas. These transnational-corporations have attracted a relatively young work force which can be seen through the economic health of the area in the dependency ratios presented.

Contents

Page

Introduction

To what extent has the influx of technological and financial transnational-corporations in the Grand Canal Dock area given rise to disparities between this and the Irishtown-Ringsend area?

Ireland's low corporation tax of 12.5%[1] and numerous tax breaks[1] has helped give rise to its ranking of 2nd in the world as the most globalised country, as measured by the KOF Index according to the economic research institute in Zurich[2]. A component of this index is economic globalisation, which accounts for 36% of the overall reading; this aspect encompasses Foreign Direct Investment (FDI) and in this case technological and financial transnational-corporations (TNCs). An example of this FDI prominence can be seen in the Grand Canal Dock (GCD) area, South-Dublin where the TNC Google has their European headquarters. The relevance of this investigation is apparent through the welcome Ireland gives towards these firms and their potential influence on pockets of urban areas. Furthermore they can be seen as one of the most significant catalysts in causing and furthering urban development of one area over another, giving rise to or extending disparities. One area welcoming this form of globalisation was most notably in Silicon Valley, Palo Alto, which has inspired the colloquial renaming of the GCD area as the 'Silicon Docks'[3]. The nucleated nature of these firms in their location understandably impacts upon the intricate workings of the urban city environment thus highlighting the geographical significance of this investigation.

---

[1] H. McDonald, 5th March 2015, '700 US companies now located in Ireland as direct investment soars', Retrieved 28th October 2017, https://www.theguardian.com/world/2015/mar/05/ireland-attracts-soaring-level-of-us-investment

[2] D. MacGuill, 30th August, 2016, 'FactCheck: Is Ireland actually the world's "most globalised" country? , Retrieved 28th October, 2017, http://www.thejournal.ie/ireland-worlds-most-globalised-country-fact-check-2954572-Aug2016/

[3] E. O'Connor, 23rd January 2017, 'The Evolution of Dublin's Silicon Docks', Retrieved 5th January 2018, https://www.rte.ie/events/dublin-tech-summit/2017/0119/846187-the-evolution-of-dublins-silicon-docks/

The purpose of this essay is to investigate and measure the socio-economic and environmental characteristics of the two areas and analyse to what extent these disparities are related to the presence of technological and financial TNCs. Disparities in this context can be defined as differences between the two urban areas, for example where one area benefits from higher employment. My hypothesis maintains that disparities will be evident between the two areas and that due to the technological and financial TNCs, the GCD area will be subject to a higher environmental quality and socio-economic health despite close proximity to the Irishtown-Ringsend (IR) area.

Due to copyright restrictions this image cannot be displayed

Figure 1: Top Right and Left are Google Maps of Grand Canal Dock and Irishtown-Ringsend Area and below arrows pointing to their location within a Dublin Docklands Map.[5]

---

[4] See Bibliography. Retrieved 30th October 2017

[5] McCutcheon Halley Walsh, n.d., 'Dublin Docklands Social Infrastructure Audit 2015', Retrieved October 29th, http://www.dublincity.ie/sites/default/files/content/Planning/OtherDevelopmentPlans/LocalAreaPlans/Documents/DraftDublinDocklandsSocialInfrastructureAudit24thApril2015.pdf

These maps show the actual proximity of the two areas. Prior to investigating disparities in the socio-economic and environmental characteristics there are evident demographic differences between the two areas according to the 'Dublin Docklands Social Infrastructure Audit 2015'[5]. In Figure 1, the bottom map shows the percentage of population between the ages of 22-44 years is 73% and the percentage of non-Irish resident population is 45% within the red-boundary line, compared to the areas within the wider blue boundary line of 62% and 25%, respectively[5]. This shows the disparity in the large potential workforce and range of ethnicities within the GCD area which has both attracted and attributed to the existence of TNCs as they pull in foreign skilled workers for employment and who later reside within the GCD and surrounding areas. From 2006 to 2011 population change in the GCD area contained pockets of 200-500% and up to 1000-6500%, significantly higher than in the IR area which exhibited negative growth of between -30 – 0 %[5]. It is already evident that stark differences between the two areas can be linked to the presence of technological and financial TNCs.

In order to examine the disparities between the two areas and conduct a thorough investigation, I adapted the City Prosperity Index[6] (CPI) designed by the United Nations Human Settlements Programme. This composite index aims at measuring a city's relative productivity, infrastructure, quality of life, equity and social inclusion, environmental sustainability and governance and legislation. While I investigated small urban areas as opposed to whole cities, I compiled some of the indices used to measure a city's prosperity and picked indicators that were most relevant to the characteristics of the areas and the measuring of disparities. I have chosen three indices which each contain an indicator that I can measure for both areas. A mixture of primary and secondary data is used from a range of sources.

Economic Index – Average Salary

As part of the Economic Index in the CPI, productivity and output were measured. I attempted to devise an original and unbiased method to measure the average salary for both areas.

1. I typed in 'Irishtown-Ringsend' and 'Grand Canal Dock' separately into the Google Maps[4] search engine.

    [7]**Figure 2.**

2. When I clicked enter along the left hand side, under the search tab, Google Maps sourced four services or locations for each area.

---

[6]'City Prosperity Initiative', n.d, Retrieved October 18th , 2017 http://cpi.unhabitat.org,
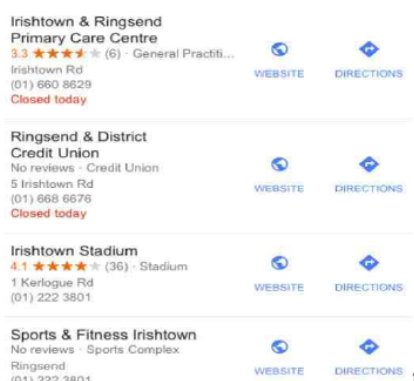
Figure 3.

3. Then I typed in the services that came up, into payscale.ie[7] and sourced the average pay for that job in Dublin in 2017.

4. As some services such as the 'Sports & Fitness Irishtown' had various jobs, I averaged the yearly salary of all of the possible jobs in the 'Fitness Club' section of payscale.ie. using Microsoft Excel.

5. I replicated this method for the two areas and compiled the four salaries to calculate the average salary as a whole for each area. The locations of the services that were randomly selected for both areas are in Table 6 and their calculations are in Table 7 in the Appendix.

Environmental Sustainability – Environmental Quality Survey and Extension

Using a compilation of two environmental quality survey templates[8], I synthesised my own version including four major categories into the headings 'Total Building Score', 'Total Traffic Score', 'Total Green Presence' and 'Total General Score', containing a range of indicators such as design aesthetic, vandalism, traffic presence, green space and street

---

[7] See bibliography for relevant payscale.ie reference for each service sampled. Retrieved 10th January 2018
[8] 'Fieldwork', Retrieved 28th October 2017 https://www.geography-fieldwork.org/gcse/urban/inner-cities/fieldwork/

furniture quality. I chose indicators that were applicable and multi-faceted in approach to both areas and which would be relevant to providing insight into the differences in environmental quality.

1. I went to both areas and conducted a survey of the two areas.

2. I represented the data on a graph using excel to add up the scores of each area and then express them as an overall percentage for each category.

To further investigate the differences in urban environmental quality, I conducted the same survey, 10 times, along the route from Irishtown Stadium, 1 Kerlogue Road, Dublin to the Bord Gáis Energy Theatre, Grand Canal Street.

1. This distance is 1.7km. I stratified the distance, divided it by 10 and took the survey every 170m.

2. I was able to do this using Google Maps which recorded the distance I travelled.

3. I was then able to use this data to conduct a statistical test by calculating the Spearman's Rank Correlation Coefficient.
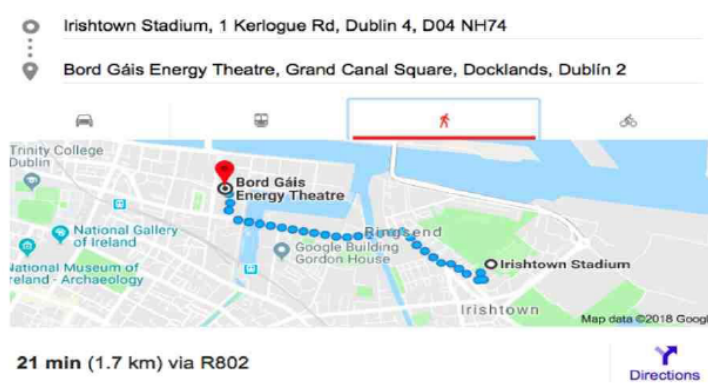
[9] Figure 4.

[9]Retrieved 10th February, 2018
https://www.google.ie/maps/dir/Irishtown+Stadium,+1+Kerlogue+Rd,+Dublin+4,+D04+NH74/Bord+Gáis+Energy+Theatre,+Grand+Canal+Square,+Docklands,+Dubl%C3%ADn+2/data=!4m8!4m7!1m2!1m1!1s0x48670ee6cf1e282f:0x21e7885bb135bd30!1m2!1m1!1s0x48670eed2c9d96a9:0x8d0ab50e181ea3a1!3e2

Productivity Index – Dependency Ratios

Having studied in my geography course that an economic burden exists from a high concentration of old age dependents upon those of working age and how this dependency is closely linked to the economic decline of an area, I wanted to calculate this for both areas.

1. I utilised the Small Area Population Statistics (SAPS) data made available for specific areas through an Interactive map (SAPMAP)[10] which is the census mapping module for Dublin City.

2. This allowed me to gain data for various themes, Theme 1: Dependency Rations >> Old Dependency Ratio (2011).

3. I highlighted the areas of Irishtown-Ringsend and Grand Canal Dock to retrieve the data for the specific areas.

Due to copyright restrictions this image cannot be displayed

Figure 5.

4. Each area corresponded to a reference number, which when highlighted was represented by '2681110016', '26811017' and '268110020' for the IR area. This ensured accuracy as it was possible to check the right area was chosen by viewing its

---

[10] 'Census Mapping Module: Dublin City', Retrieved 5th January, 2018, http://airo.maynoothuniversity.ie/external-content/dublin-city ,

reference number as the IR area contained many varying results. Whereas the GCD area was made up of numerous small area population statistical groups, the data was the same across the whole area and so inaccuracies were unlikely.

Theme 1: Dependency Ratios >> Old Dependency Ratio (2011)	
Name	Old Dependency Ratio (2011)
268110016	31
268110017	19
268110018	11
268110019	12
268110020	16
268111001	18
268111002	11
268111003	16
268111004	0

[12] **Figure 6.**

5. The areas were shaded different colours based on their dependency ratio. This was represented in a legend on the right hand side of the screen, allowing me to retrieve the data for the ratios for each areas.

Legend	
✓ Small Areas	
	0.0 - 4.5
	4.6 - 11.3
	11.4 - 19.3
	19.4 - 29.6
	29.7 - 355.6
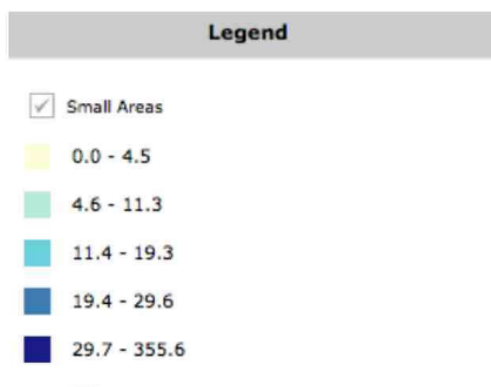
[12] **Figure 7.**

6. In the case of the GCD area the values were between 0.0 and 4.5. I took the middle value (median) which was 2.25. For the IR area I averaged the varying values which came to 22.

Presentation of Results: Economic Index: Average Salaries + Productivity Index:

Dependency Ratios

Average Annual Salary + Old Age Dependency Ratios for Dublin City, Irishtown/ Ringsend, Grand Canal Dock
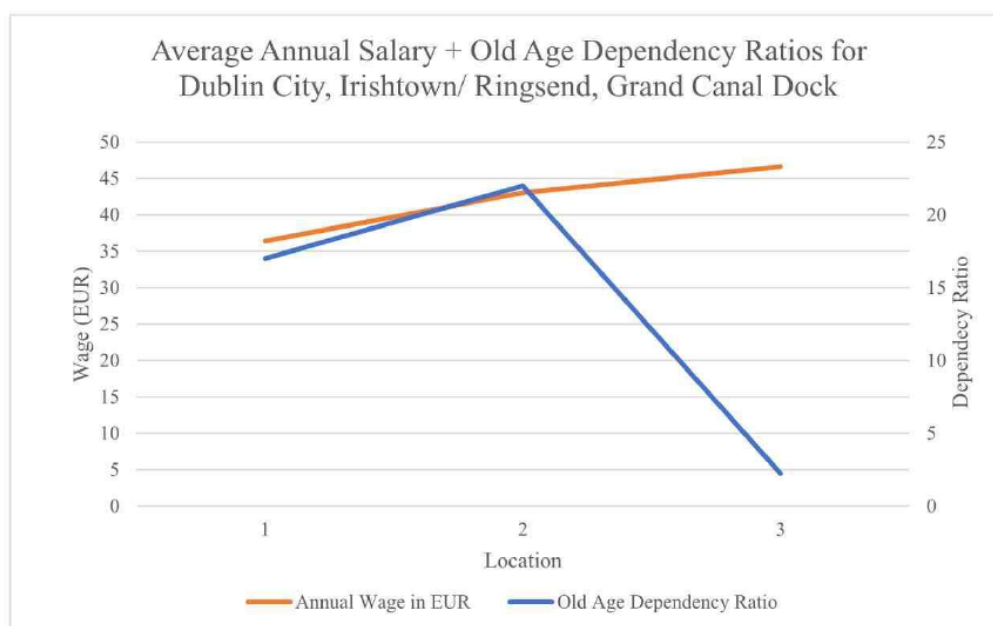
Key
1: Dublin City
2: Irishtown & Ringsend
3: Grand Canal Dock

Graph 1: The Average Salary and The Old Age Dependency Ratios for Dublin City for the IR and the GCD area based on the data from the Economic and Productivity Indices

Presentation of Results: Environmental Sustainability Index – Environmental Quality Survey and Extension
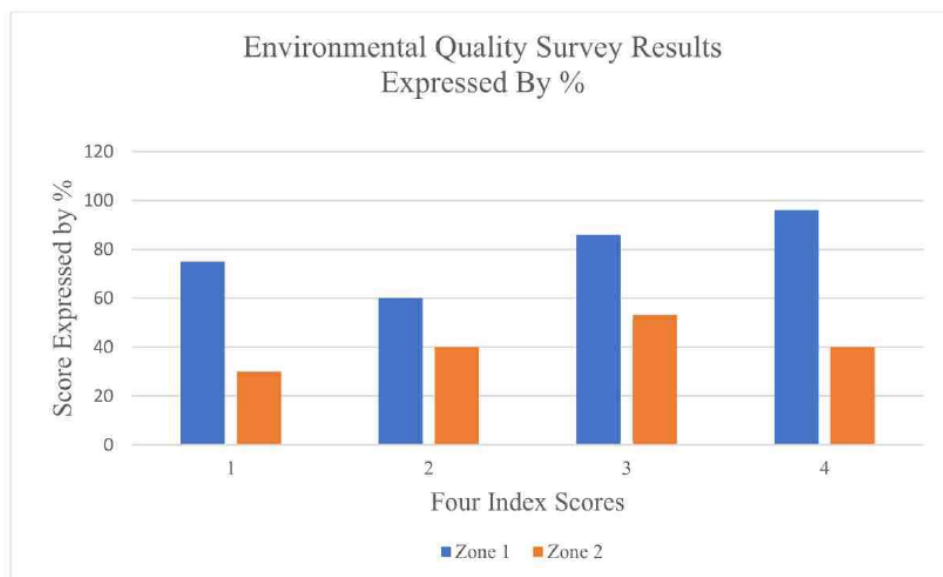
Key
Index 1: Total Building Score
Index 2: Total Traffic Score
Index 3: Total Green Presence
Index 4: Total General Score
Zone 1: Grand Canal Dock
Zone 2: Ringsend/ Irishtown

Graph 2: The Environmental Quality Survey Results for the IR and the GCD area based on the data collected for the Environmental Sustainability Index

Environmental Quality Extension – Statistical Test

Spearman's Rank Correlation Coefficient	(r_s) .755
Number of ranked pairs (n)	10
Critical value	0.649

Table 1: Statistical Test Results, including the (r_s) , (n) and Critical Value

Presentation of Environmental Quality Scores from Statistical Test Results:

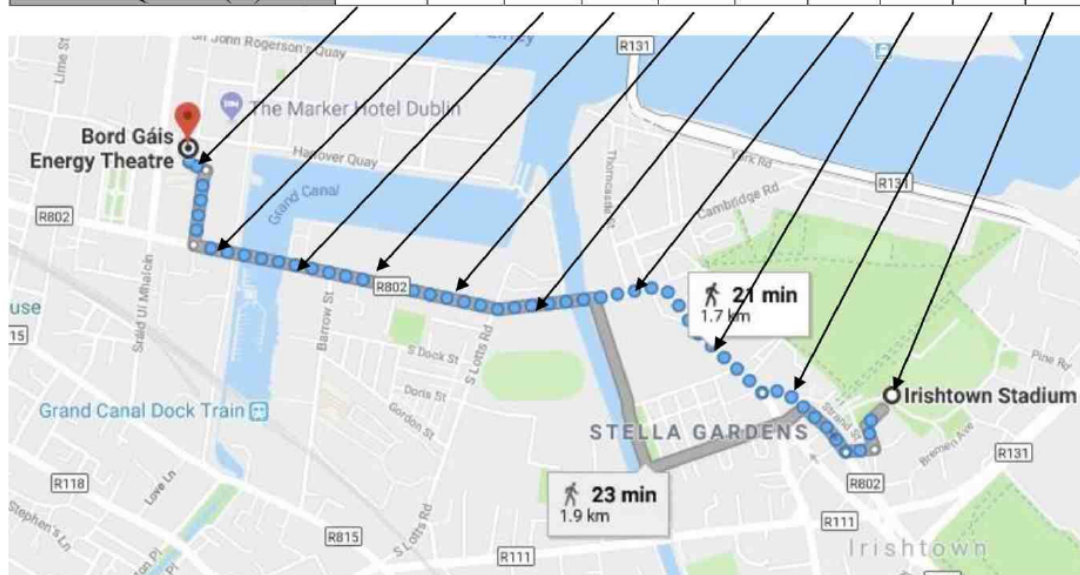| Distance (m)	1700	1530	1360	1190	1020	850	680	510	340	170
Total EQ Score (%)	92%	87%	59%	59%	54%	52%	46%	49%	54%	54%

Figure 8: Google Map Showing Route from the IR to the GCD area with arrows pointing to environmental score expressed as a (%) for each reading.

Following the measurement of the indicators and the data processing, it was possible to view contrasting results for the GCD and the IR areas. In addition, as the results of average salary, dependency ratios and urban environmental quality are all to some extent impacted by the presence of TNCs within the GCD area it was reasonable to accept the hypothesis that they gave rise to the disparities occurring between the results.

The average salaries for the IR and the GCD area are shown in Graph 1. The average for the IR area was 43,041 EUR compared to 46, 628 EUR for the GCD area. This difference of 3,587 EUR makes it apparent that based on the data, average salaries within the GCD area are higher. Furthermore, the figure for the GCD area is somewhat misrepresentative of the scale of TNCs within the area compared to the IR area. This is apparent from the number of TNCs within the GCD area where for example Accenture and Google represent only a small sample of the TNCs present. In comparison, the economic activity in the IR area is comprised of numerous small owner businesses such as hairdressers and betting shops. In contrast, according to payscale.ie and the possible jobs within Google it showed the highest pay at 55,745EUR within the sample for the GCD area, compared to the highest paid job in the IR area which was 50,555 EUR for work in a Credit Union. This figure for the Credit Union does not represent the true nature of the jobs available within this branch in Irishtown-Ringsend as payscale.ie included the salary of the CEO at 109,000 EUR. This brought up the average pay significantly. While it is reasonable to conclude that this position is not available or that the CEO of the Credit Union is not working in this area, for the purposes of ensuring the same data collection this position was included. Despite this, as a random sampling of services which does not perhaps encapsulate the full range of positions and salaries in the two areas, it is a snapshot that shows salary information on payscale.ie[7] most recently updated as of January 6th 2018. It is evident that larger salaries can be found in the GCD area and so the prominence of TNCs allow for those working there to benefit from higher salaries.

]

Similarly, within Graph 1, the dependency ratios are also shown, signifying the effect that such industry has on the demographics of both areas. The GCD area is home to a relatively young population of pre-family life cycle age evidenced by the map in the introduction, namely 67% of those within the red boundary line have no children compared to the blue line of 47%[5]. This was further illustrated by the GCD area having an old age dependency of 2.25 compared to the IR area of 22 and a Dublin City average of 17.

$$\frac{Population\ 64 >}{Working\ Age\ Population\ 15 - 64} \times 100$$

Figure 9.[11]

Old Age Dependency Ratios are calculated using the above formula[11]. In Grand Canal Dock there are just 2.25 of people over 64 for each 100 persons of working age, a significantly smaller burden than that of Irishtown-Ringsend. This statistic provides insight into the nature of the demographics of the two areas and the corresponding economic burden each worker is under to support the non-working populations. Moreover, as both average salary and dependency ratios are superimposed on the same graph it is possible to see the relationship between the two data sets. What is notable is that the GCD area has the highest average salary but lowest old age dependency ratio, while the IR area has the highest old age dependency ratio but median average wage. From this it is possible to deduce that there are significant disparities between the two areas in terms of expected salary and economic burden.

Graph 2 shows that across the different indices for environmental quality that the GCD area scored higher than the IR area. Quoting from the qualitative results stated in the

---

[11] Wisconsin Department of Health Services, 30th of October 2015, 'Age Dependency Ratios', Retrieved 6th of January 2018., https://www.dhs.wisconsin.gov/wish/population/ratio.htm ,

appendix in Table 3, the design aesthetic of Irishtown-Ringsend is "outdated, derelict in appearance" and in reference to vandalism "Phone box window smashed, graffiti on ship doors, litter (cigarette butts)". These observations bolster the hypothesis that the IR area is a less desirable urban environment with less public maintenance or attention to the renewal and maintenance of street furniture, characterized in the Appendix as a "bent bus pole" "missing metal railings" and "chipping paintwork". In comparison, the GCD area boasts a large green space, public bike service and little litter or graffiti. This suggests that an epicentre of public redevelopment and maintenance exists evidenced by its high population density during rush hour times (1pm – lunch hour) and so has been prioritised in terms of aesthetic appearance. The smallest difference in environment quality scores was for the 'Total Traffic Score', where Grand Canal Dock attained 60% and Irishtown-Ringsend 40%. While this difference is still significant but in comparison to the other categories it is relatively small. This could perhaps be attributed to the close proximity of the two areas and so both are subject to similar amounts of traffic flow. When looking at the scores for the individual categories in Table 2 in the Appendix, it is noted that both areas received the same score for 'Parking Services' and 'Traffic Presence' which were low in value, perhaps as both areas are quite central to the city centre and so had high traffic congestion and flow as well as little available parking spaces.

A Spearman's Rank Correlation Coefficient was carried out to test the strength of the relationship between the distance from the IR and GCD area and overall environmental quality. The results are in Table 1 and the null hypothesis was 'there is no statistically significant relationship between distance from Irishtown-Ringsend to Grand Canal Dock and overall environmental quality'. As the Spearman's Rank Coefficient (r_s) of .755 is greater than the critical value of 0.649, the null hypothesis was rejected. This statistical data shows a strong positive relationship between the two variables. Raw data and calculations are in Table 5 in the Appendix. This shows consistency in results found and a consistently higher

environmental quality the further from the Irishtown-Ringsend area but the closer to Grand Canal Dock. This statistical test was crucial in testing the significance between the data sets which proves the validity of the findings of the environmental survey.

In addition, the overall environmental quality scores were kept and represented geographically from where they were taken, expressed as a percentage. It can be seen that in the destination of the Bord Gáis Energy Theatre 92% was achieved in comparison to 54% in the Irishtown Stadium. However, firstly the percentages fall as distance increases from Irishtown Stadium, perhaps as the presence of the greenspace and shrubbery brought up the score, however then the scores continued to increase as Grand Canal Dock became closer. These scores give a reasonable argument that such disparities in urban environmental quality are a product of TNC presence.

These results and the subsequent disparities between the GCD and IR area are validated through how TNCs indirectly and directly gave rise to these disparities. Firstly this was made possible as Grand Canal Dock is in a Strategic Development Zone (SDZ) due to its "potential and need for comprehensive planning and development of the site due to its economic and social importance to the State"[12]. It's development was prioritised with the objective of "regenerating a city quarter, successful urban-place-making, employment creation, community engagement and marketing the Docklands internationally"[12] . This urban planning has contributed to its transformation into an epicentre of TNCs and has allowed the GCD area to surpass the IR area socially, economically and in public infrastructure. Such is emphasised by the findings of the previous environmental quality survey, old age dependency ratios and annual average wage. The hub of high rise apartments, restaurant and coffee amenities catering to its highly skilled and well paid workforce starkly

---

[12] Dublin City Council, 'North Lotts & Grand Canal Dock Planning Scheme', 5th November 2013, Retrieved January 4th 2018, http://www.dublindocklands.ie/sites/default/files/Planning/Planning%20Scheme.pdf

contrasts with the IR area 500metres away where outdated social housing services and decaying public amenities exist.

I was able to observe the indirect impact that these TNCs have as I conducted my environmental quality survey and was able to deduce that the process of gentrification had played a role on disparities between the areas. For example, to order a plain pizza with garlic bread with cheese in a restaurant in the GCD area[13] cost a total of 17.15 EUR compared to 15 EUR in the IR area[14]. This example of the cost differences in food represents how those in receipt of higher pay in TNCs also pay higher prices. Surrounding food and beverage services adjust their prices to the purchasing power of those working and residing in their area. In the GCD area one can expect to receive a higher salary by 3,587 EUR more than in the IR area. Although noting that the average salary for Dublin City per annum is significantly below both areas at 36,399 EUR.

Due to copyright restrictions this image cannot be displayed

[15] **Figure 10.**

In Figure 10 above the photograph represents the density of firms within the GCD area such as Airbnb, IBM, Facebook, Google, LinkedIn, Twitter and TripAdvisor. These TNCs provide an insight into the size of the TNC presence in the GCD area, emphasising the

---

[13] 'Milano Winter Menu', Retrieved January 19th 2018, http://www.milano.ie/Content/files/milano-menu.pdf,
[14] 'Basil Menu', Retrieved January 19th 2018, https://www.zomato.com/dublin/basil-ringsend/menu#tabtop
[15] A. Weckler, 15th May 2014, 'Growing pains of Dublin's Silicon Docks', Retrieved January 19th 2018https://www.independent.ie/business/technology/growing-pains-of-dublins-silicon-docks-30275228.html

significant economic activity in the area compared to that of the IR area. The age of the workforce and the prominence these TNCs hold on the global stage is reflected in the higher average annual salary and low old age dependency ratio for the GCD area. These higher salaries and corresponding disposable income attracts redevelopment projects into the area as more firms compete for this workforce and excess income. This gives rise to infrastructure developments and increased maintenance of the area, thus explaining the environmental quality differences of the two areas. As a consequence of the influx of firms and the re-investment of capital and projects for commercial and residential development, a symbiotic relationship exists between redeveloped areas and the TNC growth in the area, thereby extending disparities between areas. As the GCD area is an established hub of commercial development, other businesses are attracted to this area due to the proximity of services such as banking, law and accountancy and other TNCs. While it grows in economic prosperity, the surrounding urban area of IR is left with poor environmental quality and little economic stimulation, only potentially benefitting from a trickle-down beneficial effect created by the neighbouring Grand Canal Dock.
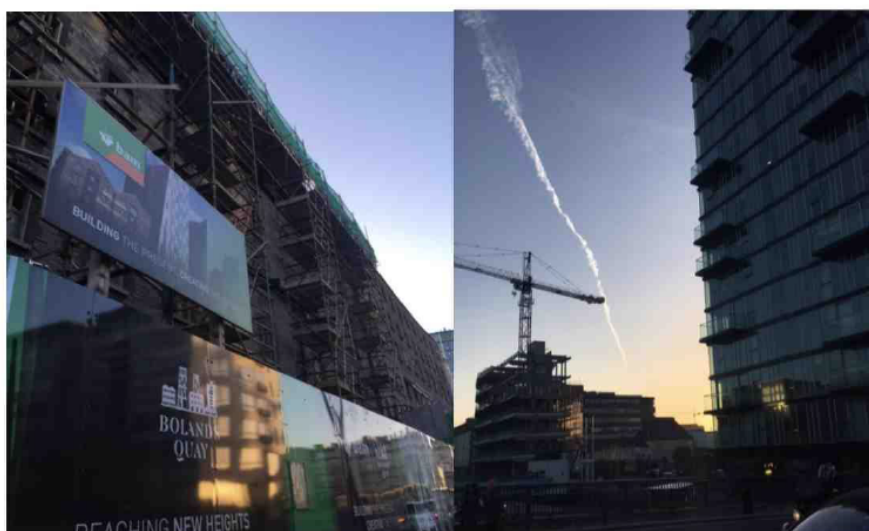

Fig 11. Top Left: Showing redevelopment of Bolands Quay, Top Right: A crane undergoing construction of a building, both in Grand Canal Dock.

In the photos in Figure 11, taken during my investigation there is rejuvenation of many of the GCD's brownfield sites. Urban renewal will continue to extend large disparities to its surrounding Dockland neighbours into the future. Such development can be seen in the photos above where the renewal of brownfield sites of Bolands Quay occurs. Similarly development activity within the GCD area is evident from the presence of cranes.

Other symptoms of gentrification are rising house prices. In a recent article[16], the spike in house prices in Irishtown and Ringsend was said to be a product of the "Google effect"[16], whereby houses within this area are being sold for over 100,000 EUR above their asking price. There is huge demand for residential property on the GCD's outskirts and "it is the tech sector that will be interested in (…) refurbished houses"[16]. It can be concluded that these higher house prices are connected to the influx of TNCs as GCD's properties are limited and relatively expensive compared to the IR area. Moreover, economic segregation will occur as a product of this gentrification, causing those previously native to the IR area having to move to less expensive urban areas and that the emergence of services will also occur within the IR area resulting in unaffordable prices for this demographic. Disparities will be heightened relative to the existing population and when this occurs the IR area will to some extent be assimilated within the Grand Canal Dock area and so disparities will in time be reduced overall but through replacement as opposed to incorporation of the existing IR population. In addition as 80% of the population within the red boundary line live and work in this area the demand for residential property has subsequently spilled over to the IR area, directly linked to the area's main business activity; the TNCs.

---

[16] A. Gallagher, June 13th 2017, 'Smart Irishtown renovations could have Google appeal', Retrieved February 10th 2018, https://www.irishtimes.com/life-and-style/homes-and-property/new-to-market/smart-irishtown-renovations-could-have-google-appeal-1.3117995 ,

Conclusion

As random sampling was used to source services and so average salaries of both areas, the difference in average salary between the GCD and IR area does not fully encapsulate the extent of disparities that would exist if the entire TNC presence had been reflected in this average wage figure. However it does show that despite their close proximity a significant pay difference does exist. The data collected and measured showed disparities that could be associated with TNC presence within the GCD area however if indicators such as gender equality were selected such disparities may not be present nor be connected to TNCs. It is unlikely that this would differ between these areas and more likely to differ drastically across countries holding different standards of development. The accuracy of the statistical test is guaranteed as the sum of $R_x - R_y = 0$ (55-55), proving the ranking is correct[17] and accurate for calculation of the (r_s) value. However a limitation exists as the conduct of the environmental quality survey and extension were highly subjective. This means that the results recorded came from one person, holding a certain perspective on what they deemed an appropriate score for each measurement. This potential subjectivity and flaw in the data collected could be corrected by many people taking part in the survey and thus collating different perspectives over just one and including the range of recorded environmental scores granted to observe the breadth of perspective.

Disparities were evident through the data collected and measured, whereby one can expect to earn 3,587 EUR more if working in the GCD area and be subject to a significantly higher level of environmental quality. These disparities are attributable to the highly skilled jobs available in the GCD area, requiring experience in the technological and corporate world

---

[17] 'Spearman Rank Correlation Coefficient', Retrieved February 8th, 2018, http://www.field-studies-council.org/media/2594645/spearmans-wksheet.pdf

giving higher pay than those in the IR area that did not require this experience nor skill. Furthermore, this workforce within the TNCs in turn attract more public maintenance in the form of green spaces and public bike services and redevelopment into a homogenous modern landscape. A significant disparity exists as the IR area's old age dependency ratio is 22 compared to 2.25 for the GCD area as this area's TNCs create a hub of economic activity thus attracting a young workforce which is the dominant demographic. This contrasts with the IR area which has a lower paid workforce containing an older demographic within an area of poorer environmental quality.

Appendix

Environmental Quality Survey: Quantitative Data		
Indicator	Zone 1	Zone 2
Building Density	1	1
Design Aesthetic	5	2
Visual Maintenance	5	2
Vandalism	4	1
Total Building Score	15	6
Parking Services	2	2
Noise Pollution	3	2
Air Pollution	5	4
Parked Cars	2	0
Traffic Presence	3	3
Total Traffic Score	15	11
Green Space	4	1
Greenery & Shrubbery	4	4
Condition of Greenery	5	3
Total Green Presence	13	8
Path Quality	5	3
Visual Pollution	5	4
Street Furniture Quality	5	0
Wall/ Fence Condition	5	2
General Housekeeping	4	1
Total General Score	24	10
Total EQ Score	67	35

Table 2: Raw Data Collected from Environmental Quality Survey and used in processing Graph 2.

Indicator	Grand Canal Dock	Irishtown-Ringsend
Building Density	Mix of high rise office and apartment buildings closely bordered by banks, shops, restaurants, wide footpath and pedestrian areas between and in front of buildings	Closely packed buildings, narrow streets
Design Aesthetic	Modern in appearance	Outdates, derelict appearing
Visual Maintenance	Many scaffoldings	No viewable maintenance or new public structures

Vandalism	Little to none	Phone box window smashed, graffiti on shop doors, litter (cigarette butts)
Total Building Score		
Parking Services	Garages underground for offices but difficult on street parking	Mainly tight residential on street parking, few spaces free
Noise Pollution	Relatively non-existent as internal parts of Grand Canal not accessible for vehicles, however loud at main road over bridge near Boland's Mill	Constant traffic flow - noisy
Air Pollution	None – on the water, surrounded by greenery, relatively fresh	Not noticeably
Parked Cars	On roads cars parked	Almost everywhere
Traffic Presence	Flow – but no traffic	Similarly – flowing but not heavy
Total Traffic Score		
Green Space	Visible Green areas	Not viewable from many streets but some local parks within area
Greenery & Shrubbery	Along canal and streets, nucleated presence	A lot of trees and shrubbery
Condition of Greenery	Good condition	Also, good condition, however sparsely located in front of residential areas
Total Green Presence		
Path Quality	Restored stone, new and well maintained	Well maintained, however small and outdated bins
Visual Pollution	No ads	On shop windows
Street Furniture Quality	Good, modern, Dublin Bikes Facility – clean and orderly	Bent bus pole, and metal railings/ missing/ bent/ scratched
Wall/ Fence Condition	Clean paintwork	Chipping paintwork
General Housekeeping	Some graffiti however still visually pleasing	Curtains, windows in poor condition (chipping paintwork) and graffiti

Table 3: Qualitative Data for Environmental Quality Survey used in analysis of results.

Environmental Quality Assessment Extension: Statistical Testing										
Indicator	1	2	3	4	5	6	7	8	9	10
Building Density	3	3	3	1	2	3	4	3	4	5
Design Aesthetic	2	3	2	2	2	3	4	4	5	5
Visual Maintenance	2	3	2	2	3	4	4	5	5	5
Vandalism	3	3	2	2	3	3	3	4	5	5
Total Building Score	10	12	9	7	10	13	15	16	19	20
Parking Services	3	2	3	3	3	2	2	2	2	2
Noise Pollution	3	2	2	3	3	3	3	4	4	4
Air Pollution	4	4	4	4	4	4	4	4	5	5
Parked Cars	2	2	2	3	3	2	2	0	5	5
Traffic Presence	2	3	3	2	2	3	2	1	4	4
Total Traffic Score	14	13	14	15	15	14	13	11	20	20
Green Space	4	1	1	1	1	1	1	1	4	4
Greenery & Shrubbery	3	2	2	2	3	3	3	2	2	5
Condition of Greenery	2	3	3	2	3	2	3	3	5	5
Total Green Presence	9	6	6	5	7	6	7	6	11	14
Path Quality	2	3	3	3	3	2	2	3	5	5
Visual Pollution	4	3	2	2	3	3	4	4	5	5
Street Furniture Quality	2	3	2	2	2	3	4	3	5	5
Wall/ Fence Condition	2	3	3	2	2	3	3	4	5	5
General Housekeeping	3	3	3	3	2	2	2	3	4	4
Total General Score	13	15	13	12	12	13	15	17	24	24
Total EQ Score	46	46	42	39	44	46	50	50	74	78
Total EQ Score (%)	54%	54%	49%	46%	52%	54%	59%	59%	87%	92%

Table 4: Results of Environmental Quality Assessment Extension used for statistical testing and represented in Figure 8.

n	Distance from Irishtown-Ringsend to Grand Canal Dock (m)		Environmental Quality Score		Difference d (Rx - Ry)	Difference d^2
	Variable x		Variable y			
	x	Rank x (Rx)	y	Rank y (Ry)		
1	170.0	1.0	46.0	5.0	-4.0	16.00
2	340.0	2.0	46.0	5.0	-3.0	9.00
3	510.0	3.0	42.0	2.0	1.0	1.00
4	680.0	4.0	39.0	1.0	3.0	9.00
5	850.0	5.0	44.0	3.0	2.0	4.00
6	1020.0	6.0	46.0	5.0	1.0	1.00
7	1190.0	7.0	50.0	7.5	-0.5	0.25

8	1360.0	8.0	50.0	7.5	0.5	0.25
9	1530.0	9.0	74.0	9.0	0.0	0.00
10	1700.0	10.0	80.0	10.0	0.0	0.00

Table 5: of processed data of Spearman's Correlation Coefficient calculations from conducting Environmental Quality Extension.

$$r_s = 1 - \frac{6\Sigma d^2}{n^3 - n} = 1 - \left(\frac{6(40.50)}{10^3 - 10}\right) = 1 - \frac{243}{990} = 0.755$$

Equation used to find the Spearman's Correlation Coefficient in Table 1.

Grand Canal Dock: Average Salary Raw Data	
Profession Details	Salary (EUR)
Account Manager	49,910
Project Manager, IT	62,400
Software Engineer	40,000
Search Engine Marketing Strategist	45,316
Network Engineer	39,305
Site Reliability Engineer	74,000
Marketing Executive	32,500
Senior Software Engineer	72,500
Sales Associate	67,000
Technical Programme Manager	87,500
Associate Accountant Manager	40,000
Marketing Manager	50,000
Regional Sales Manager	80,000
Software Developer	40,000
Average	55,745
Duty Manager	25,032
Head Chef	39,995
Sous Chef	30,181
General Manager	50,157
Chef de Partie	24,800
Reservations Manager	28,486
Bar Manager	28,317
Average	32,424
Network Engineer	59,994
Software Engineer	76,200
IP Specialist	50,500
Account Manager	44,000
Data Scientist	48,000
Average	55,739
Management Consultant	46,573
Project Manager, IT	69,634
Analytics Consultant	55,000
Credit, Collections Supervisor	31,946
Software Engineer	35,000
Software Development Manager	72,500
Customer Service Agent	21,800
Software Tester	24,490
Technical Consultant	38,000
Associate Project Manager	59,933
Project Manager	46,500
Business Analyst, Finance/ Banking	32,589
BI developer	32,000
Account Receivable Analyst	30,492

	Salary (EUR)
Average	42,604
Total Average	46,628
Irishtown-Ringsend: Average Salary Raw Data	
Profession Details	Salary (EUR)
Physician/ Doctor, General Practice Salary	48,834
Public Health Nurse	46,450
Average	47,642
Credit Controller	35,000
Loan Officer	24,712
Compliance Officer	37,500
Credit Union Manager	65,000
Chief Executive Officer	109,000
Business Development Officer	32,675
Financial Accountant	50,000
Average	50,555
Civil Engineer	54,201
Human Resources (HR) Manager	47,500
Administrative Officer	34,856
Average	45,519
Operations Manager	28,723
General/ Operations Manager	27,500
Duty Manager	23,750
Club General Manager	35,664
Gym Manager	26,600
Average	28,447
Total Average	43,041

Table 6: Calculations for Irishtown-Ringsend and Grand Canal Dock for Average Salary

Bibliography

[1] H. McDonald, 5th March 2015, '700 US companies now located in Ireland as direct investment soars', Retrieved 28th October 2017, https://www.theguardian.com/world/2015/mar/05/ireland-attracts-soaring-level-of-us-investment

[2] D. MacGuill, 30th August, 2016, 'FactCheck: Is Ireland actually the world's "most globalised" country? , Retrieved 28th October, 2017, http://www.thejournal.ie/ireland-worlds-most-globalised-country-fact-check-2954572-Aug2016/

[3] E. O'Connor, 23rd January 2017, 'The Evolution of Dublin's Silicon Docks', Retrieved 5th January 2018, https://www.rte.ie/events/dublin-tech-summit/2017/0119/846187-the-evolution-of-dublins-silicon-docks/

[4] Google Map Source
Screenshot of Grand Canal Dock Google Map (Far Left)
https://www.google.ie/maps/place/Grand+Canal+Dock+Train+Station/@53.3397904,-6.240292,17z/data=!3m1!4b1!4m5!3m4!1s0x48670eeb3c39a15b:0xc82d9caeb70c4d85!8m2!3d53.3397872!4d-6.238098?dcr=0
Screenshot Irishtown-Ringsend Google Map (Far Right)
https://www.google.ie/maps/place/Ringsend+Bridge/@53.3416551,-6.2312318,17z/data=!3m1!4b1!4m5!3m4!1s0x48670ee92b2714db:0xffa8dcbf89521eef!8m2!3d53.3416519!4d-6.2290378?dcr=0

[5] McCutcheon Halley Walsh, n.d., 'Dublin Docklands Social Infrastructure Audit 2015'., Retrieved October 29th, http://www.dublincity.ie/sites/default/files/content/Planning/OtherDevelopmentPlans/LocalAreaPlans/Documents/DraftDublinDocklandsSocialInfrastructureAudit24thApril2015.pdf

[6] 'City Prosperity Initiative', n.d Retrieved October 18th , 2017, http://cpi.unhabitat.org,

[7]

Irishtown-Ringsend
Irishtown & Ringsend Primary Care Centre, General Practitioner, Irishtown Road, Dublin https://www.payscale.com/research/IE/Job=Public_Health_Nurse/Salary https://www.payscale.com/research/IE/Job=General_Practitioner/Salary/d05e22e4/Dublin
Ringsend & District Credit Union, 5 Irishtown Road, Dublin https://www.payscale.com/research/IE/Industry=Credit_Union/Salary
Irishtown Stadium, 1 Kerlogue Road, Dublin 4 https://www.payscale.com/research/IE/Industry=Local_Government/Salary
Sports & Fitness Irishtown, Ringsend, Dublin https://www.payscale.com/research/IE/Industry=Fitness_Club/Salary

Grand Canal Dock
Google Building Gordon House, Grand Mill Quay, Barrow Street, Grand Canal Dock, Dublin https://www.payscale.com/research/IE/Employer=Google%2C_Inc./Salary
Milano – Grand Canal, Unit 1, Hanover Quay, Dublin 2 https://www.payscale.com/research/IE/Industry=Restaurant/Salary
The Marker Hotel, Grand Canal Square, Docklands, Dublin 2 https://www.payscale.com/research/IE/Industry=Hotel/Salary
Accenture The Dock, 7 Hanover Quay, Dublin https://www.payscale.com/research/IE/Employer=Accenture/Salary

Table 7: Randomly selected services for Average Salary Calculations and payscale URL for the average wage salary's extracted for the professions within each service for Grand Canal Dock and Irishtown-Ringsend.

[8] 'Fieldwork', Retrieved 28th October 2017, https://www.geography-fieldwork.org/gcse/urban/inner-cities/fieldwork/

[9] Retrieved 10th February, 2018
https://www.google.ie/maps/dir/Irishtown+Stadium,+1+Kerlogue+Rd,+Dublin+4,+D04+NH74/Bord+Gáis+Energy+Theatre,+Grand+Canal+Square,+Docklands,+Dubl%C3%ADn+2/data=!4m8!4m7!1m2!1m1!1s0x48670ee6cf1e282f:0x21e7885bb135bd30!1m2!1m1!1s0x48670eed2c9d96a9:0x8d0ab50e181ea3a1!3e2

[10] 'Census Mapping Module: Dublin City', Retrieved 5th January, 2018
http://airo.maynoothuniversity.ie/external-content/dublin-city ,

[11] Wisconsin Department of Health Services, 30th of October 2015, 'Age Dependency Ratios', Retrieved 6th of January 2018, https://www.dhs.wisconsin.gov/wish/population/ratio.htm

[12] Dublin City Council, 'North Lotts & Grand Canal Dock Planning Scheme', 5th November 2013, Retrieved January 4th 2018, http://www.dublindocklands.ie/sites/default/files/Planning/Planning%20Scheme.pdf

[13] 'Milano Winter Menu', Retrieved January 19th 2018, http://www.milano.ie/Content/files/milano-menu.pdf

[14] 'Basil Menu', Retrieved January 19th 2018, https://www.zomato.com/dublin/basil-ringsend/menu#tabtop

[15] 'Growing pains of Dublin's Silicon Docks', Retrieved January 19th 2018,
https://www.independent.ie/business/technology/growing-pains-of-dublins-silicon-docks-30275228.html

[16] A. Gallagher, June 13th 2017, 'Smart Irishtown renovations could have Google appeal', Retrieved February 10th 2018, https://www.irishtimes.com/life-and-style/homes-and-property/new-to-market/smart-irishtown-renovations-could-have-google-appeal-1.3117995 ,

[17] 'Spearman Rank Correlation Coefficient', Retrieved February 8th, 2018, http://www.field-studies-council.org/media/2594645/spearmans-wksheet.pdf