Identifying New Business Opportunities In South Dublin City, Ireland

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1. Introduction

1.1 Background

The European country of Ireland has been experiencing an economic boom for the past few decades. Whereas once the nation served as as source of poor immigrants, escaping poverty or even famine, today Ireland ranks sixth in global GDP-per-Capita rankings (at $76,745 per person), behind only Brunei, Singapore, Luxembourg, Macao, and Qatar ($79,003pp, $94,105pp, $107,641pp, $115,367pp, and $128,647pp respectively).

Ireland's economy has been growing steadily since the 2008 Economic Crisis, with the latest figures showing that GDP grew by 8.2% during the 2018-2019 Fiscal Year, to $382.5 billion.

Dublin City, the capital of Ireland, contains much of this wealth: 28% of the Irish population, and $115 billion GDP. With a GDP-per-Capita of $86,649 per person, Dublin is amongst the wealthiest cities in the world. As Dublin's GDP increases (1.1% growth during 2018-2019 Fiscal Year), and the city's population increases (1.3% growth during 2018 calendar year), the economic opportunity of the city is set to steadily increase.

As the city sprawls outwards, beyond its traditional bounds, the surrounding regions are experiencing rapid development, in the forms of residential, commercial, and light industrial infrastructure. One such region which has undergone massive changes over the past twenty years, is Dún Laoghaire–Rathdown (pronounced *done-leery-rath-down*).

During each passing year, acres and acres of farmland are converted into housing estates, shopping malls, apartment blocks, and high-rise offices. Enormous potential exists for new businesses and services to set up shop amongst this rapid expansion. Since Ireland is a European Union member state, these opportunities extend to potential business-owners across the entire continent, who have full rights to migrate to, and create businesses, in Dublin.

2.2 Business Problem

The aim of this project is to analyse the county of Dún Laoghaire–Rathdown, and identify opportunities for new businesses and services, in a range of sectors. Specific areas within the Dún Laoghaire–Rathdown region, which have experienced growth in recent years, will be highlighted, as well as specific businesses and services which show potential in these areas.

2.3 Value of Project

This report will identify business opportunities that demonstrate a high-level of economic promise, in precise regions of a major European Union city, that are undergoing monetary and population growth. As such, the findings will prove valuable to potential investors and entrepreneurs from Dublin, from Ireland, or from anywhere within the EU.

2. Data Description

2.1 Data Sources

Previous population growth within the Dún Laoghaire–Rathdown region will be used as an indicator of both future population growth, and future economic growth potential. Ireland holds a census every five years. As of the time of writing, the most recent censuses were held in 2011, and 2016. The findings of the census are published online by the Central Statistics Office (CSO), and can be found at: ***www.cso.ie***.

As part of the office's analysis into the 2016 census, the CSO compared the populations of every Electoral District within the Dún Laoghaire–Rathdown region, to their 2011 values. A table showing the 2011 and 2016 populations for each District is available at: ***www.cso.ie/en/media/csoie/census/documents/census2016/Table_5.pdf***.

As well as predicting the future economic and population growth in each Dún Laoghaire–Rathdown Electoral District, this report also analyses the business potential of a range of services and sectors in each, by reviewing the existing businesses in each District.

To find existing businesses, the coordinates for each Electoral District is passed into Foursquare, a social networking service that can provide real-time data on shops, restaurants, gyms, and more. The data was gathered through a series of requests through Fouresquare's Developer application program interface, found at: ***www.developer.foursquare.com***.

2.2 Data Wrangling

Due to the accurate recording and publishing of population data by the CSO, very little wrangling was required. For each Electoral District within the Dún Laoghaire–Rathdown region, the following was recorded into a DataFrame: Name, 2011 Population, 2016 Population (total), 2016 Population (male), 2016 Population (female), 2011-2016 Percentage Population Change.

To find the latitude and longitude coordinates of each Electoral District, the Names of the Districts had to be transformed into formats readable by the Python geocoding client, called Geopy. This was achieved by identifying the Names containing hyphens, rearranging the string sections around the hyphens (as well as the hyphens and spaces), and appending the strings with ", Dublin, Ireland".

The average population density of Dún Laoghaire–Rathdown is 1,700 persons/km^2. Using the population data from the CSO, a square-kilometer estimate was therefore able to be made for each Electoral District. The Districts were each modelled as circles, with centre points as defined by Geopy, and radii as calculated from their square-kilometer estimates.

When calling on the Foursquare API to provide business data for each Electoral District, the centre points (X) and radii (Y) of each model were used to find all venues with X metres, from point Y.

2.3 Relevant Features

After the data was collected from various sources, and wrangled into usable formats, the following features were used for analysis:

- Name of Electoral District
- 2016 Population of Electoral District
- 2011 to 2016 Population Growth of Electoral District
- Number of venues in Electoral District in each business category
- Percentage of total venues claimed by each category

3. Methodology

The following twelve steps were carried out to compile the data sources, and wrangle them into presentable results.

Step 1 - Import Dublin Populations File as DataFrame

The raw data from the CSO website was read into a dataframe, with appropriate names being assigned to each of the CSO data columns.

Step 2 - Wrangle Data into more Usable Format

Unnecessary columns (such as the Reference Number of each Electoral District, and the male/female gender populations), were dropped from the dataframe. The values of all number columns (eg, Population sizes, and Percentage Population Growths) had their data types changed from ‘String’ to ‘Integer’ or ‘Float’ where appropriate.

To format the District Names into usable strings, the following steps were performed:

1. Any asterisks present in the data were removed, as they were not relevant to this study
2. All underscores were converted to spaces
3. Any strings containing hyphens were identified, and split into two along the hyphen. The two parts were rearranged, a string of “, “ was added, and all three parts were recombined. (eg, 'South City-Parkland' became 'Parkland, South City')
4. All Irish-language letters were converted into their closest anglicised counterparts: á became a, é became e, í became i, ó became o, and ú became u.

Step 3 - Get Coordinates for each Electoral District

Using the Geopy client, the latitude and longitude data for each formatted District Name were requested, and added to the dataframe.

Step 4 - Create Map of DLR Region

Using the District Names, and their corresponding Latitude and Longitude data, a map of the entire DLR Region was compiled.

Step 5 - Define Foursquare Data and Radius of Each ELectoral District

Assuming that the average DLR population density of 1,700 persons/km^2 is true for each District within the DLR region, a square-kilometer area estimate of each District was made. Each district was modelled as a circle, with the radius calculated using the square-kilometer area estimate.

Step 6 - Create Function to Get Foursquare Data for each District

A function was defined to find all Venues within a region, given the latitude and longitude coordinates, the search radius, and the limit to the number of Venues being requested.

Step 7 - Use Function for each District

Using the latitude and longitude coordinates for each District, as well as the District's modelled radius, the Foursquare Function was called for each District. A Venue limit of 20 was used. All results were read into a new dataframe.

Step 8 - Get Frequency of Venue Categories

Using 'One Hot Encoding', the Frequency of each Category of Venue was calculated for each District, and the results were compiled into a new dataframe.

Step 9 - Sort Venues in Descending Order for Districts

For each Electoral District, the 1st to 5th most common Categories of Venue were calculated, ranked, and displayed in a dataframe.

Step 10 - Add Population Data and Rank by Growth

The Population Size and Population Growths were added to each District in the dataframe of most common venues.

Step 11 - Display Districts with Maximum Population Growth and Venue Types

The dataframe was rearranged, to highlight the Electoral Districts with the greatest population growth.

Step 12 - Remake Map with Top 10 Districts for Population Growth

The ten Districts with the the greatest population growth were selected, and a map of Dublin was created to show these districts only.

4. Results

4.1 Reviewing the Geographical Area of Dún Laoghaire–Rathdown

As Can be seen from the below figure (Figure 1), the 69 Electoral Districts of Dún Laoghaire–Rathdown are condensed along the Dublin coastline, with fewer and larger Districts spread south and west into the mountains. Some major highways run along the southwest edges of the DLR region, with smaller roads connecting the coastal Districts.

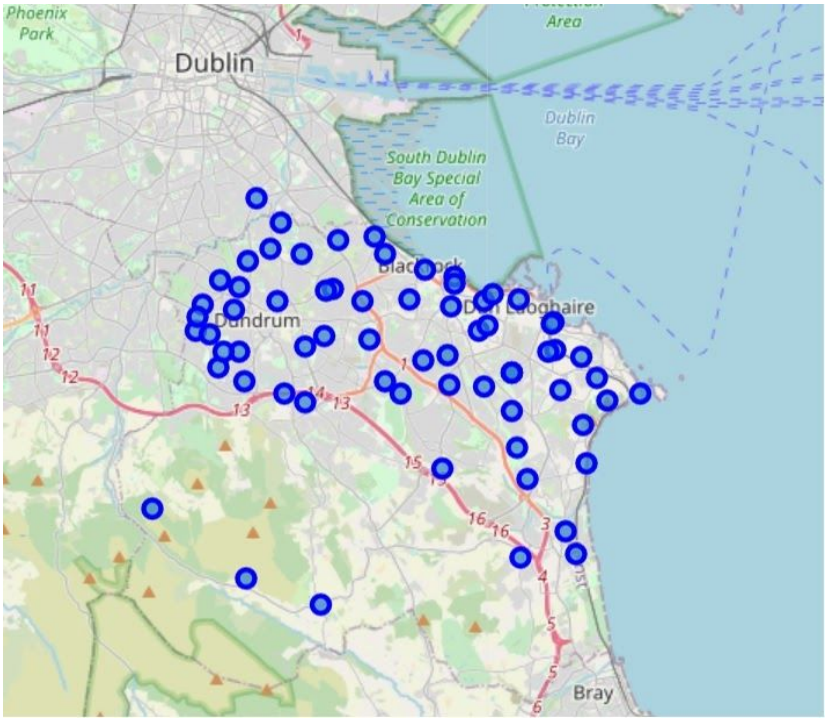

Figure 1

4.2 Examining the Most Common Businesses

As can be seen from Figure 2 below, the most common businesses (according to this sample size of ten, at least), appear to be in the retail, hospitality, and entertainment sectors.

District	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
Adelaide, Dun Laoghaire	Trail	Park	Basketball Court	Wine Shop	Furniture / Home Store
Balally, Dundrum	Hotel	Gym	Park	Wine Shop	Furniture / Home Store
Beech Park, Foxrock	Bus Stop	Garden Center	Café	Electronics Store	Entertainment Service
Belfield, Clonskeagh	Pub	Café	Soccer Field	Restaurant	Business Service
Booterstown, Blackrock	Pub	Train Station	Bar	Park	Furniture / Home Store
Broadford, Ballinteer	Supermarket	Pub	Indian Restaurant	Convenience Store	Sports Club
Bullock, Dalkey	Gym Pool	Trail	Scenic Lookout	Sports Club	Wine Shop
Carrickmines, Foxrock	Drive-in Theater	Tennis Court	Light Rail Station	Wine Shop	Furniture / Home Store
Carysfort, Blackrock	Playground	Park	Shoe Store	Café	Discount Store
Central, Blackrock	Pub	Coffee Shop	Café	Burger Joint	Flea Market

Figure 2

4.3 Sorting Districts by Population Growth

When the business sectors of the Districts with the fastest-growing populations are reviewed (Figure 3), the potential of the retail, hospitality, and entertainment sectors are again highlighted.

	District	Growth	Population	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue
1	Balally, Dundrum	44.0	7049	Hotel	Gym	Park	Wine Shop	Furniture / Home Store
2	Rathmichael, Shankill	28.8	3395	Park	Wine Shop	Discount Store	Electronics Store	Entertainment Service
3	Glencullen	26.7	16479	Golf Course	Pub	Wine Shop	Furniture / Home Store	Drive-in Theater
4	Roebuck, Clonskeagh	25.5	2556	Café	Bar	Coffee Shop	Tennis Court	Lake
5	Adelaide, Dun Laoghaire	20.4	2234	Trail	Park	Basketball Court	Wine Shop	Furniture / Home Store
6	Sandyford, Dundrum	19.0	6952	Pub	Café	Gym / Fitness Center	Chinese Restaurant	Lounge
7	Leopardstown, Stillorgan	17.5	2429	Bus Stop	Coffee Shop	Garden Center	Electronics Store	Entertainment Service
8	Woodpark, Ballinteer	15.7	5292	Pub	Supermarket	Burger Joint	Furniture / Home Store	Discount Store
9	Belfield, Clonskeagh	12.2	2740	Pub	Café	Soccer Field	Restaurant	Business Service
10	Booterstown, Blackrock	11.9	3328	Pub	Train Station	Bar	Park	Furniture / Home Store

Figure 3

4.4 Reviewing Geographical Areas of Fastest-Growing Districts

The map below (Figure 4) shows the location of the top ten fastest-growing Districts, as displayed above in Figure 5. It is interesting to note that five of the ten are concentrated far from the urban centre, and closer to the major highways. Also, one of the ten (Glencullen, the 3rd fastest-growing District), is located in the mountains.

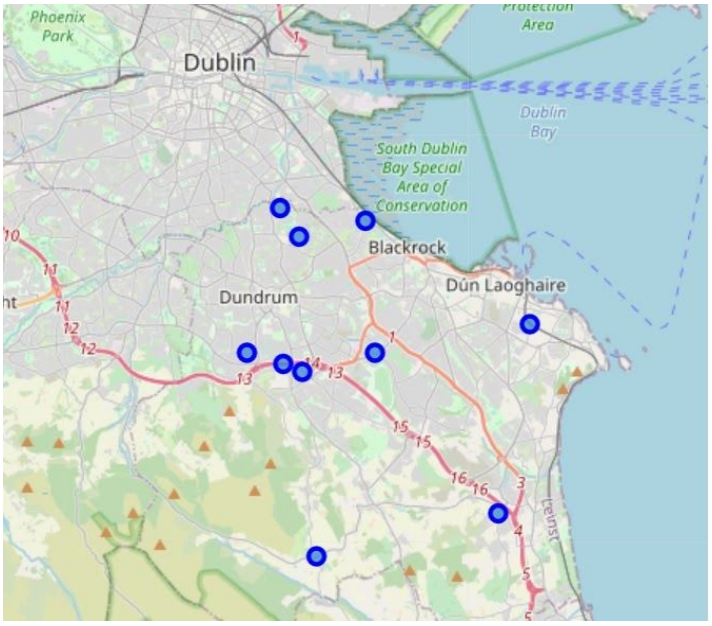

Figure 4

5. Discussion

5.1 Identifying Business Categories

Reviewing the most common Venue Categories for all 69 Electoral Districts (see the attached Python Workbook for full details), it is evident that the sectors which currently hold the most economic potential are those in retail, hospitality, and entertainment. Of the 345 categories identified (five for each of the sixty-nine Districts), 73% were calculated to fall into these three sectors, with the most common Venue Categories being: Food/Drink Shop or Supermarket (23% of total), Pub (14% of total), Restaurant (9% of total, counting all restaurant types), and Recreational Area (6% of total, counting all Parks, Gyms, Pools, Cinemas, Sports Arenas, and Hiking Trails).

From the above findings, the economic potential of businesses in the food and drink industry, be they bars, restaurants, or shops, becomes clear. As the population and wealth of Dublin City, and specifically the Dún Laoghaire–Rathdown region, continue to grow, the residents will continue to frequent these businesses regularly.

A potential investor or entrepreneur, interested in tapping into the economic potential of DLR, may take note of these findings, and conclude that the food and drink sector shows great promise.

5.2 Identifying Business Locations

This report assumes that the Population Growth of an Electoral District can be used as a reliable indicator for future economic potential. Reviewing the locations of the fastest growing Districts (Figures 3 and 4), some interesting findings can be made:

1. Five of the ten fastest-growing Districts (Balally, Dundrum; Sandyford, Dundrum; Woodpark, Balinteer; Leopardstown, Stillorgan; Rathmichael, Shakhill) are located out of the built-up urban area, along major highways.
2. Four of the Districts (Belfield, Clonskeagh; Roebuck, Clonskeagh; Booterstown, Blackrock; Adelaide, Dun Laoghaire) are located deeper into the built-up, urban area.
3. One of the Districts (Glencullen), is located far into the mountains.

The most common Categories of Venues differs slightly, for each of the three locations identified above (Light-Urban, Heavy-Urban, Mountains):

1. The availability of space in the mountainous region, has enabled Venues requiring large tracts of land to prosper (eg, Golf Course, Drive-In Cinema).
2. In the Heavy-Urban areas, residents appear to frequent many sport venues, possibly as an escape from their dense urban environment (eg, Soccer Field, Basketball Court).
3. In the Light-Urban areas, the popularity of Venues allowing for personal relaxation is notable (eg, Cafe, Lounge, Garden Centre).

6. Conclusion

After reviewing the population growth for each Electoral District in the DLR region, and the Categories of Venue most common in each area, some trends were drawn for potential future investors and entrepreneurs, to allow them to analyse future economic promise, and possible business opportunities.

It was found that the Food and Drink Sector, which can manifest in the form of bars, restaurants, and shops, showed huge potential in the fastest-growing Districts of the DLR region.

When the geographic locations of the fastest-growing Districts were classified, and divided into three categories (Heavy-Urban, Light-Urban, and Mountains), the types of businesses that seemed to prosper in each location were identified. It was found that: in Heavy-Urban areas, escapism from city life was popular; in Light-Urban areas, personal relaxation was sought after; and in the Mountains, the kind of venues that require lots of space were frequent.