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**Data Analysis – Group Project**

**Group Members:**

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| **Group Member Name** | **Group Member X Number** |
| Jason O’Connor | X00191019 |
| Brandon Kelly | X00189349 |
| Nathan Kelly | X00182498 |
| Lee Clark | X00189621 |

**Project Overview:**

1. **Import Data:** Show and Use Python to Import the Dataset
2. **Data Cleaning:** Clean, Pre-Process Dataset with Python
3. **Data Manipulation:** Dataset for Analysis & Visualization
4. **Data Visualization:** Display Data using Plots & Graphs
5. **Hypothesis & Analysis:** Formulate based on Data and do Relevant Statistical Test, Making Interpretations
6. **Advanced Analysis:** Include Linear Regression, Multiple Regression, etc.

**Deliverables:**

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|  | **Deliverables (Submit Via Moodle)** |
| **1.** | Dataset Selection / Collection |
| **2.** | Technical Report: Python Notebook w/ Code |
| **3.** | Report: 2k – 3.5k Words |
| **4.** | Presentation |

**Report Overview:**

1. **Word Count:** Anywhere between 2000 - 3500 Words
2. **Brief Introduction:** Explain the Dataset, Where We Got It From
3. **Problem:** Explain the Problem We Attempt to Solve
4. **Results & Findings:** Explain Findings, Talk about Results w/ Referencing and Outcomes

**Brief Introduction**

The global onset of the COVID-19 pandemic in 2019 wrought unprecedented changes across the societal and economic fabric, prompting a critical re-evaluation of various sectors. This report centres on one such area of study – the fluctuation in public transport ridership in Ireland, spanning the years 2018 to 2022.

Ireland, as a dynamic European nation, boasts a comprehensive public transportation system that includes buses, trams, and trains. The investigation encapsulates both the pre-pandemic era, characterized by consistent commuter patterns and growing ridership, and the subsequent years marked by lockdowns, social distancing measures, and notable shifts in mobility behaviour.

This report aims to dissect the dynamics of Ireland’s transport systems, addressing essential questions such as: What is the correlation between the decline in passenger numbers and the economic impact on the country? How do the passenger numbers vary across different airports and airlines?

By scrutinizing data trends and exploring contextual factors, our group aims to provide a comprehensive understanding of the intricate relationship between a global health crisis and Ireland's public transport infrastructure. This exploration seeks to offer valuable insights for future national and regional planning and transportation strategies, emphasizing adaptability and resilience in the face of unforeseen challenges.

**Project Management**

Once we had been informed fully about the details of this group project, and we had agreed upon a team, the next logical step was planning and designating work for each member to complete whilst ensuring each member contributed equally and effectively towards the end result of a completed project.

Once the team agreed upon a strategy, the tasks were assigned, and we ensured each member knew what they should be working towards whilst ensuring everyone got the support and help should they need it.

**Group Activity:** Choosing the Dataset.

**Nathan Kelly:** It was Nathan’s duty to undertake the importing of the data, the cleaning of the data to ensure there were no empty entries, null values, or pointless unnecessary columns. Then, using Data Manipulation, he turned this into a new, formatted and error-free, dataset.

**Lee Clarke:** It was Lee’s duty to work on the Data Visualization side of the project. To effectively communicate our findings and work, we would need graphs to demonstrate our results, which Lee undertook.

**Jason O’Connor:** The tasks that Jason undertook were the exploration of the data through visualization whilst researching the topic and making interpretations. Jason also performed Hypothesis Testing, formulating these tests, and making clear interpretations based on the results, and Advanced Analysis of Multiple Regression.

**Brandon Kelly:** For his contribution to the project, Brandon undertook Statistical Analysis, formulating tests based on the data. With the findings, he made data-driven interpretations and explored the topic further, while also carrying out Linear Regression testing.

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| **Student Name:** Nathan Kelly | **Student Num:** X00182498 |

**Task:** Describing the Data Collection & Cleaning Process, Detailing Challenges & Methods to Counter and Overcome them.

\*\* Answer your shit here \*\*

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| **Student Name:** Lee Clarke | **Student Num:** X00189621 |

**Task:** Exploratory Look into the Dataset, Showcasing Data Visualizations & Initial Insights.

The unprecedented nature of the COVID-19 pandemic, which not only had numerous implications for the Irish economy, but the world’s economy, also had an adverse effect on the aviation sector as well, causing it to decline. This decline in the aviation sector also had a hand-in-hand effect on the Irish economy, which is what I will explore further.

The decline in passengers’ numbers in the aviation sector during the COVID-19 pandemic is likely to have caused a significant economic impact on Ireland, as it has on countries globally.

The impact of the pandemic was felt profoundly within the Irish tourism industry. As the virus began spreading globally, there were numerous travel restrictions, lockdowns, and safety concerns which led to a large reduction in both international and domestic tourism. Ireland, largely known for its beautiful landscapes, heritage, and vibrant cities, quickly realised the impact of COVID when there was a sharp decline in visitor numbers coming through the airports, such as Dublin Airport, shown below in the graph by Lee Clarke.

A graph of blue lines

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The graph above, based on Monthly Passengers passing through Dublin Airport, shows clearly in 2020, in the month of March, when the lockdowns were imposed, just how quickly the decline in passengers took effect. Slowly, the numbers began growing again, however, it is clear to see that for the duration of the pandemic during 2020, the number of passengers never grew anywhere close to those of previous years statistically.

The closure of attractions, hotels, and hospitality services led Ireland to a significant financial period of loss for businesses and this caused widespread job disruptions within the tourism sector. The government quickly stepped in, as explained by the KPMG, putting measures into place to reduce the impact and fallout for businesses. For example, as shown by KPMG, just some of the measures included Direct and Indirect Tax Measures, such as deferrals and reductions, whilst also providing Employment-related measures such as state compensation and training schemes. (KPMG, 2020). With the government stepping in to ease the effects of the pandemic, the nature of the impact is clear to see, as it required such a response.

Dublin Airport was not the only airport that saw these declines, as the effect was felt across Knock, and Shannon, meaning Ireland was feeling the full effect of a pandemic, resulting in a massive loss for the tourism industry. Shown in the graph below, we can see that Shannon Airport not only saw a sharp reduction in passengers, but they also had to shutdown due to both lack of passengers and demand for the service during the pandemic.

A graph of a passenger

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The impact on the tourism industry was felt nationwide, with the website *‘PublicPolicy’* stating that the “Irish tourism and hospitality industry have been hit by COVID-19 restrictions, having lost about €17 million per day, according to the ITIC”. (Foley, 2022). The article continues to show us that the total losses almost amounted to €12.2 billion, leaving a severe dent in the tourism industry. Not only did the pandemic lead to the closure of airports and monetary losses, but also jobs too. The article states that, of the nearly 260’000 jobs across the tourism sector, over 180’000 were either lost or vulnerable.

As we can see, the closures of the airports, and the loss of international tourists making their way to our Emerald Isle, the impact was not only limited to businesses and their profit margins, but it was felt by the everyday resident of Ireland, with jobs at risk, or lost, due to the lack of visitors to our country. With many of these workers, who were highly skilled in their fields, being left jobless, this caused a massive increase in the recipients of the Pandemic Unemployment Payment, or PUP, leaving them searching for jobs outside their preferred sector, which is a big loss for the country as a whole, as you would wish for specialised workers sticking within their preferred sector.

As per the website, *PublicPolicy,* the following graph demonstrates the proportion of jobs depending on the tourism sector per county. Here, we can directly correlate between our graphs, provided by Lee Clarke, and the graph provided by PublicPolicy.

A map of ireland with different colored states

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As we can see in the above graph, a county that employees a large amount of tourism sector jobs is Kerry, with a massive 18%. Now, when talking about tourism in Kerry, the closest available airport for the average traveller to reach would be Shannon. However, during the pandemic, the following graph, as crafted by Lee Clarke, shows the impact of the pandemic on the Shannon Airport.

A graph of a passenger

Description automatically generated with medium confidence

As we can see, Shannon didn’t just slow down during the pandemic, it closed completely, which, when we see how many jobs depend on tourism, would have had a massive impact on Kerry, which heavily depends on tourism as a county, with attractions such as Muckross House, Ross Castle, and the Ring of Kerry heavily attracting tourists to the area.

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| **Student Name:** Brandon Kelly | **Student Num:** X00189349 |

**Task:** Statistical Analysis & Linear Regression

1. Carry out the Linear Regression
2. Describe the results of the test?
3. Do Mean, Median, Mode, Standard Deviation if possible?

**\*\* Screenshot for help towards getting this done \*\***

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| **Student Name:** Jason O’Connor | **Student Num:** X00191019 |

**Task:** Hypothesis Testing & Multiple Regression

**\*\* Two Screenshots for help towards getting this done \*\***

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**References:**

[1] Perumal, V., Curran, T. and Hunter, M. (2020). FIRST CASE OF COVID-19 IN IRELAND. *The Ulster medical journal*, [online] 89(2), p.128. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7576383/#:~:text=We%20present%20the%20first%20case>.

[2] Mangan, I. (2020). *When did lockdown in Ireland start? Timeline of coronavirus restrictions*. [online] irishmirror. Available at: https://www.irishmirror.ie/news/irish-news/coronavirus-ireland-lockdown-timeline-restrictions-21978302.

‌[3] Siobhán O’Donnell. (2021). daa Records €284m Loss Due To Impact Of COVID-19 On Travel. [online]daa. url: https://www.daa.ie/daa-records-e284m-loss-due-to-impact-of-covid-19-on-travel/

Foley, L. (2022, August 4). *The Pandemic Two Years On: The Impact on Travel*. Retrieved from PublicPolicy: https://publicpolicy.ie/covid/the-pandemic-two-years-on-the-impact-on-travel/

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