

**Nanyang Polytechnic**

**School of Information Technology**

# **Final Project Report**

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| **Module Group:** | ITB911-02 |
| **Project Team Number** | 03 |
| **WIU Name:** | Visual Analytics Project |
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| **Due Date:** | 20th February 2022 (Sunday) |
| **Class:** | BA2102 |
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| **Executive Summary**  **Documented by: Vickneswaran, Bo Yu, Sam and Tristan**  A project that was initiated to find the answer to the question, “**Is Singapore a good place to live/work in**?” Various Primary and Secondary research was done with our target audience in mind (**Singaporean Locals & Immigrants**) and 4 chosen features (**Healthcare, Education, Housing and Expenditure**). With the help of our Microsoft Power Bi Desktop, we were able to find relevant datasets to give them life and see our findings play a vital role. Further proving that despite the steep cost, Singapore is a good place to live/work due to its efficiency.(quality) and adaptability. |

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| **Project Plan**  **Documented by: Vickneswaran**    **Project Organisation (Team)**  This is the **hierarchical display** of the project team organisation. From the supervisor (stakeholder) to the project leader to the project members.  **Project scheduling and task allocation (Software tool)**  For project scheduling and task allocation, the group leader used the **ASANA** software tool for efficiency. Able to track members and their weekly work status.    **Timeline (Gantt chart)**  It's an easier visual aid for members and leader to track the work and keep up with the schedule set.  **Link to asana tool used:**  [**https://app.asana.com/0/1201836406828003/board**](https://app.asana.com/0/1201836406828003/board)    Another tool we used was **WhatsApp** to convey messages to each other in a more informal manner. To make communication way faster and more efficient, instead of emailing each other. This helped the spread of information and response gotten much easier.      **Project Charter:**  The **Project Charter** was constructed by the Project Team Leader to illustrate and help the team understand the objectives and overview of the Project. This to keep everyone in the loop.  **Link to Project Charter:**  [Project Charter](https://docs.google.com/document/d/1mSYuZzKQnrh_iWZK3yMZqsrKSQUjhGQYl6_7wfJ7atk/edit) |

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| **Data Understanding, Visualisations and Modelling**  **Documented by: Vickneswaran, Bo Yu, Sam and Tristan**   1. **Healthcare (Vickneswaran)**   For healthcare, my main focuses were **COST** & **EFFICIENCY (Quality)**  **Datasets chosen and Visual charts used:**   1. **Healthcare-Cost**  * [**Average gross medical cost increase rates in the Asia Pacific from 2016 to 2018**](https://www.statista.com.nyp.remotexs.co/statistics/1013920/apac-gross-medical-cost-increase-rates/)   Name: (Healthcare) Average Gross Medical Cost **(Clustered Column chart)**  **Singapore too is in the Asia Pacific region**, was expected to reach 9.2 per cent in terms of the medical cost. It is Among the top 5 countries in terms of cost.   * [**Healthcare Consumer Price Index (1990-2020)**](https://www.statista.com.nyp.remotexs.co/statistics/932798/singapore-cpi-health-care/)     Name: (Healthcare) Consumer Price Index **(Table)**  **CPI for Healthcare in Singapore**  Consumer Price Index (CPI). Basically, is **the change in the prices/ inflation**. A simple matrix visualisation is used to show both the years and CPI side by side to show the total and help the users to visualise the increment yearly. Proving **that the price increase does also affect the health sector and it is getting more costly**.   * [**Ranking of the current healthcare spending in Asia by country 2020**](https://www.statista.com.nyp.remotexs.co/forecasts/1167591/healthcare-spending-in-asia-by-country)   Name: (Healthcare) Healthcare Spending in Asia **(Map)**  **Healthcare Spending in Asia**  The spending refers to the **current spending of both governments and consumers**.   * [**Government expenditure on health in Singapore from financial years 2009 to 2018**](https://www.statista.com.nyp.remotexs.co/statistics/1230924/singapore-government-expenditure-on-health/)     Name: (Healthcare) Government Expenditure **(Area Chart)**  **Singapore Government Expenditures**  From the years 2009 all the way to 2018. In 2018, Singapore spends **10.12 billion Singapore dollars on the health sector**.   * [**Cost of Heart Bypass Surgery in Various Countries**](https://www.statista.com.nyp.remotexs.co/statistics/189966/cost-of-a-heart-bypass-in-various-countries/)     Name: (Healthcare) Cost of Heart Bypass in Various Countries **(Clustered Bar Chart)**  **Cost of Heart Bypass Surgery in some countries**  Heart bypass is one of the most critical surgeries, it is known to be costly. When compared to other countries, **Singapore is in the middle more or less with $17 200 USD**.   * [**Per capita government health expenditure in Singapore from 2009 to 2018**](https://www.statista.com.nyp.remotexs.co/statistics/891506/singapore-government-health-expenditure-per-capita/)   Name: (Healthcare) Per Capita Expenditure in Singapore **(Line chart)**  **Per capita Government Health Expenditure**  Line chart was used to see the **flow of per capita expenditure over the years in Singapore**. Per capita as in, the amount of **money the government spend on an individual for healthcare in this case. An exponential increase over the years can be observed**.   1. **Healthcare-Efficiency**  * [**Leading 20 healthiest countries as of 2019, by health grade**](https://www.statista.com.nyp.remotexs.co/statistics/979667/20-healthiest-countries/)   Name: (Healthcare) 20 Healthiest Countries **(Area Chart)**  **20 Healthiest Countries in 2019**  20 different nations which got ranking for **20 healthiest countries**, referring to the people living at each nation. Singapore can be observed in the upper percentile which refers to its great quality of healthcare that **maintains people health and securing a spot in the 20 healthiest countries list**. Users can click points of the area chart to view the health grade of the countries.   * [**The number of medical staff in Singapore in 2019**](https://www.statista.com.nyp.remotexs.co/statistics/604865/number-of-medical-staff-in-singapore-by-type/)     Name:(Healthcare) Medical Staffs in Singapore **(Table)**  **Medical Staff in Singapore in 2019**  The manpower of the healthcare sector. Table visualisation is used to show the medical staff types of side by side to the number of that participle medical staff. **Manpower coincides with efficiency to a certain extent**. **Thus, accommodating to various roles in healthcare**   * [**Percentage of persons with trust in healthcare in 2021**](https://www.statista.com.nyp.remotexs.co/statistics/1071027/trust-levels-towards-healthcare-in-select-countries/)   Name: (Healthcare) Trust Level Towards Healthcare **(Map)**  **Trust level towards Healthcare in some countries in 2021**  **Singapore is one of the upper percentiles with 75 per cent of people having trust in healthcare**. Proving its efficiency able to make that many people trust the healthcare despite the many comments on costly healthcare in Singapore. This **could prove that the efficiency overrules healthcare to some**.   * [**The life expectancy of residents at birth in Singapore from 2011 to 2020**](https://www.statista.com.nyp.remotexs.co/statistics/1088680/life-expectancy-of-residents-at-birth-singapore/)     Name: (Healthcare) Life Expectancy at Birth in Singapore **(Line Chart)**  **Life expectancy at birth in Singapore from 2011 to 2020**  Life expectancy as **in the life span average is shown**. Relating to how the efficiency of the healthcare has been keeping the **Singapore people’s health up to standard and even improving it**.   * [**Waiting time for registration in polyclinics in Singapore**](https://www.statista.com.nyp.remotexs.co/statistics/874581/waiting-time-for-registration-in-polyclinics-in-singapore/)     Name: (Healthcare)Polyclinics Registration Waiting Time **(Clustered Bar Chart)**  **Polyclinic Registration Wating Time in 2021**  This internal comparison of Singapore is for time efficiency. The **registration time of various polyclinics all over Singapore varies due to crowding/manpower etc.**   * [**Number of Claims Made under MediShield Life Fund, Annual**](https://data.gov.sg/dataset/amount-of-claims-made-under-medishield-medishield-life-annual?view_id=fd87a124-1124-43dd-85d6-6ef0db4fc121&resource_id=35090ddf-276a-48b1-8a96-6525ac5bcb43)     Name: (Healthcare) Number of Medishield Claims **(Funnel)**  **The number of Medishield Claims made**  From 2006 to 2020, There is a very evident increase in the number of claims. Meaning that people are getting the policies more which is made by the Government. Efficiently **helping people with their spending in healthcare**. Singapore even was known to promote Medshield by educating people about it. This means, the main focus was not the cost or expenditure for the government, it was the wellbeing of the general public.   * [**Top 20 destinations worldwide based on the total medical tourism index in 2020**](https://www.statista.com.nyp.remotexs.co/statistics/889983/top-medical-tourism-countries-of-destination-by-total-index-rating/)     Name: (Healthcare) Top Medical Tourism Countries in 2020 **(Line Chart)**  **20 Top Medical Tourism Countries**  Shows that **Singapore is the second top country**, people international recognise Singapore’s healthcare. Further concluding that Singapore is preferred by many. People of various nations travel all the way to Singapore just to get medical treatment/care. This shows their **trust and belief in the Singapore healthcare system despite the cost**.  **Last Visual, (Statistical Modelling)**  **Dataset was provided by Ms Joanne in Blackboard. Healthcare facilities in SG.**  Name: (Healthcare) Healthcare facilities from 2009 to 2020 **(Decomposition Tree)**  By using **Decomposition Tree Visualisation** in my report, I can know the way the institution type, facility type, number of beds and years are branched out by explaining the number of facilities. Gives a better idea of Segregation over the years as well as of different facility and institution types.  **Screenshots of Dashboards**   1. **Healthcare-Cost (Report Page)**   Page consists of 6 charts relating to **Healthcare-Cost**. There is a **menu icon (Interactive), which will open a sidebar with slicers (Year/Country) and More Visualisations.**         1. **Healthcare-Efficiency (Report Page)**     Page consists of 8 charts relating to **Healthcare-Efficiency (Quality)**. There is a **menu icon (Interactive), which will open a sidebar with slicers (Year/Country) and More Visualisations.**    My report pages were kept to 2, for concise and specific reasons. Cost, talk about findings regarding if the price of healthcare is on the **steeper or cheaper side**, concluding that it's on the steeper side) While, efficiency, talks about the findings of the **healthcare quality and what are the factors that come with it (Time, manpower, facilities)**.  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   1. **Education (Bo Yu)**   For healthcare, my main focuses were **enrolment, salary and percentage of cohort and employment rate.**  **Datasets chosen and visual charts used**:  **Visual Charts (Teachers):**   * [**Students and Teachers under MOE**](https://data.gov.sg/dataset/students-and-teachers-in-schools?view_id=f1cd1180-d064-43ce-a10a-67c9beac7900&resource_id=22600569-848a-40af-af4c-b6f60c35c711)   Name:(Education) Primary\_Students\_and\_Teachers  (**Table Visualisation** was used to show the Year, School type and teacher side by side to have a **comparison** as the year **increases** and compare detailed data and exact values instead of **visual representations.**)   * [**Students and Teachers under MOE**](https://data.gov.sg/dataset/students-and-teachers-in-schools?view_id=f1cd1180-d064-43ce-a10a-67c9beac7900&resource_id=22600569-848a-40af-af4c-b6f60c35c711)   Name:(Education) Secondary\_Students\_and\_Teacher  (**Table Visualisation** was used to show the Year, School type and teacher side by side to have a **comparison** as the year **increases** and compare detailed data and exact values instead of **visual representations.**)  **Visual Charts (N/O Cohort):**   * [**N-Level Cohort Progress to Post Secondary Education**](https://data.gov.sg/dataset/percentage-of-n-level-cohort-that-progressed-to-post-secondary-education)   Name:(Education) Percentage\_of\_N-level\_Cohort  (**Line Chart** was used to show information that changes over time from 2015 to 2019 for N-Level Cohort and most of the races **increase** from 2016 to 2019.)   * [**Percentage of O-Level Cohort that Progressed to Post-Secondary Education-Data.gov.sg**](https://data.gov.sg/dataset/percentage-of-o-level-cohort-that-progressed-to-post-secondary-education)     Name:(Education) Percentage\_of\_O-level\_Cohort  (**Line Chart** was used to show information that changes over time from 2016 to 2020 for O-Level Cohort and some of the races has **decreased** from 2019 to 2020)  **Visual Charts (Enrolment):**   * [**Enrolment for Kindergartens**](https://data.gov.sg/dataset/enrolment-moe-kindergartens?view_id=7cddea4b-df86-40bf-a685-a7d9c5573d5f&resource_id=4ad866a7-c43a-4645-87fd-fc961c9de78a)   Name:(Education) Enrolment\_moe\_kindergartens  (**Area Chart** was used toshow the **rise and fal**l of various data series over time for Kindergarten Enrolment from 2018 to 2022. As the year increases the enrolment also **increases** as shown on the charts.)   * [**Enrolment for Primary School**](https://data.gov.sg/dataset/enrolment-primary-by-level?view_id=8995c187-610a-4493-af8c-f7afad9158bb&resource_id=b4b01dcd-9262-44e6-bf60-6d0126b7b2bb)   Name:(Education) Enrolment\_primary  (**Pie Chart** was used to show **percentages** for primary school enrolment from 2016 to 2020. From 2019 to 2020 there is a **decrease** in enrolment as shown on the chart.)   * [**Enrolment for Secondary School**](https://data.gov.sg/dataset/enrolment-secondary-by-level?view_id=9fc5a148-53cd-4cf6-8eee-add13338e1d6&resource_id=e30f699f-a246-4016-8bba-d83366da46c6)   Name: (Education) Enrolment\_secondary\_by\_level \_and\_ course  (**Clustered Column Chart** was used to display more than one data series in clustered vertical columns for Secondary Enrolment from 2016 to 2020. For Express and Normal (Tech), the enrolment **increases** from 2019 to 2020 but for Normal (Acad) it **decreases**.)   * [**Intake, Enrolment and Graduates by Institutions**](https://data.gov.sg/dataset/intake-enrolment-and-graduates-by-institutions)   Name:(Education) Enrolment\_by\_institutions  (**Donut Chart** was used to show the proportions of categorical data for ITE Enrolment from 2016 to 2020. From 2019 to 2020, the enrolment **decreases** as shown on the chart.)   * [**Polytechnic Information**](https://data.gov.sg/dataset/polytechnics-intake-enrolment-and-graduates-by-course)   Name:(Education) Polytechnics\_information  (**Card was used to display numbers for Graduates and Intakes and Clustered Column**  **The chart** was used to display more than one data series for Polytechnic from 2016 to  2020.Most of the courses **decrease** in terms of **enrolment** except for a few courses. )     * [**Enrolment for Pre-University**](https://data.gov.sg/dataset/enrolment-pre-university-by-level)   Name:(Education) Enrolment\_pre-university  (**Clustered Column Chart** was used to display more than one data series for Pre-University Enrolment from 2016 to 2020. There has been a **decrease** in enrolment for Junior College and Pre-University from 2019 to 2020. )   * [**Universities - Intake, Enrolment and Graduates by Course-Data.gov.sg**](https://data.gov.sg/dataset/universities-intake-enrolment-and-graduates-by-course)   Name:(Education) Universities-enrolment  (**Clustered Column Chart** was used to display more than one data series in clustered vertical columns for University Enrolment from 2016 to 2020. Most of the courses **increase** in enrolment except for some of the courses from 2019 to 2020.)    **Visual Charts (Survey and other information):**   * [**Graduate Employment Survey for Polytechnic Student**](https://www.todayonline.com/singapore/over-90-polytechnic-graduates-seeking-work-got-jobs-within-6-months-graduating-2021-survey-1789956)   Name:(Education) Polytechnic\_graduate\_survey  (**Matrix** was used to aggregate the data and enables you to **drill down** for Polytechnic Student Monthly Salary from 2019 to 2021. There has been a **rise** in salary for all the types mentioned on the chart from 2020 to 2021.)   * [**Highest Education Attained in 2020**](https://www.statista.com.nyp.remotexs.co/statistics/1007834/adult-residents-highest-education-qualification-singapore/)   Name:(Education) Highest\_education\_qualification\_attained  **(Clustered Bar Chart** was used to display a measure against a single dimension for  Highest Education Attained for 2020 for age 25 and above. This chart shows the  **the overall number** of students studying in Singapore, and how they are **performing** in  terms of education.**)**   * [**Graduate Employment Survey for University Student**](https://data.gov.sg/dataset/graduate-employment-survey-ntu-nus-sit-smu-suss-sutd)   Name: (Education) Graduate\_employment\_survey\_ntu-nus-sit-smu-suss-sutd  **(Decomposition Tree** was used to **visualise data** across multiple dimensions for  University Monthly Salary and Percentage. Users can view all the **courses and**  **universities** to see the monthly salary and employment rate based on their preference.**)**  **Statistical Modelling**  By using **Decomposition Tree Visualisation** in my report, I can know if the education in Singapore is good by looking at the monthly salary and employment rate for the specific year. I can know if studying in the course will give me a **higher employment rate and earnings** in Singapore.  **Screenshots of Dashboards**   1. **Enrolment Information (Report Page)**       This tab called **Enrolment Information** displays the enrolment number from Kindergarten to ITE based on the year slicers. If you click on the **Menu Bar** **button** it will display the year slicers for you to filter based on the user requirements and if you click on the **Back Arrow button** it will bring you back to the Home Page.   1. **Enrolment Information for Post-Secondary (Report Page)**     This tab called **Enrolment Information for Post Secondary** displays the enrolment number from Polytechnic to University based on the year filter.   1. **Education Information (Report Page)**       This tab called **Education Information** displays the percentage of N and O Level Cohort, Graduate Polytechnic Monthly Salary and Graduate University Monthly Salary and Percentage. If you click on the **Menu Bar Button** it will display additional two charts for the Number of Primary and Secondary School Teachers and the Highest Education Attained in 2020.  **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**   1. **Housing (Sam)**   **Data sets and Visual charts used:**   * [**Average of Resale HDB Flat Cost per Area ($/sqm)**](https://data.gov.sg/dataset/resale-flat-prices) **(Singapore)**   *Name: (Housing) Average of Resale Cost per Area ($/sqm)* ***(Line chart)***  Most Flat Types have an increment of **Resale cost per area** throughout the years except for **1-room** and **multi-generation flats** with a decrement or no change of value from **2017** to **2022**.   * [**Median Rent of HDBs (Singapore)**](https://data.gov.sg/dataset/median-rent-by-town-and-flat-type)   *Name: (Housing) Average of Median Rent* ***(Scatter Chart)***  The range or trend of median rent can be seen moving more from the left area to the right area showing that **Median Rent** has **increased** for  Singapore from **2017** to **2021**.   * [**Monthly Household Expenditure (Singapore**](https://tablebuilder.singstat.gov.sg/table/TS/M212981#!)   *Name: (Housing) Monthly Household Income* ***(Donut Chart)***  **Housing and Related Expenditures** composite **22.36%** of Total Monthly Household Income from **1993** to **2018**. The Top 2nd of the categories of goods and services used for household income shows that it's an important expenditure spend for citizens   * [**Price of Private Permanent Housing (Hong Kong**](https://www.statista.com.nyp.remotexs.co/statistics/630699/hong-kong-private-permanent-housing-price-by-district/)**)**     *Name: (Housing) Price of Housing Flats per Area* ***(Line Chart, Matrix)***  A-Line Chart is used to show the **flow of the price of housing flats per square metre** over the years in **Hong Kong**. A **steep increase** of the high gradient can be observed in the graph. The gradient of the different districts can be observed to have a **similar ‘shape’**. The Matrix is used to observe its individual values over the years.   * [**Rent of Permanent Housing (Hong Kong)**](https://www.statista.com.nyp.remotexs.co/statistics/630606/hong-kong-average-rent-of-permanent-housing-by-district/)   *Name: (Housing) Rent of Housing Flats per Area* ***(Line Chart, Matrix)***  A-Line Chart is used to show the **flow of the rent of housing flats per square metre** over the years in **Hong Kong**. There is increment, decrement and no change of rent observed in the graph. This is inferred that the monthly rent of Hong Kong is unpredictable the gradient of the different districts can be observed to have a **similar ‘shape’**. The Matrix is used to observe its individual values over the years.   * [**Most Expensive Residential Property Markets (2020)**](https://www.statista.com.nyp.remotexs.co/statistics/1040698/most-expensive-property-markets-worldwide/)   *Name: (Housing) Worldwide Housing Markets, 2020* ***(Stacked Column Chart)***  As seen in the chart, Singapore is in the top 3 most expensive residential property markets worldwide with reaching an average of 0.92 million US dollars in residential prices.  **Statistical Models(Decomposition Tree)**   * [**Resale HDB Flat Cost ($)**](https://data.gov.sg/dataset/resale-flat-prices) **(Singapore)**     *Name: (Housing) Resale Housing Blocks from 2017 to 2022* **(Decomposition Tree)**  By using **Decomposition Tree Visualisation** in my report, I am able to see how the flat type, remaining lease, resale price($) and floor area are branched out by explaining the number of blocks. Gives a better idea of the distribution of blocks over the years as well as of different flat types.  **Screenshot of Dashboards**  This page consists of 2 cards and 2 charts relating to the Overview of Housing and it shows the summary of Singapore’s and Global Housing Market. There is a **menu icon (Interactive), which will open a sidebar**    This page consists of 2 cards and 2 charts about **HDB Prices (SG)** and shows the Rent and Resale Cost per Area of HDB Flats in Singapore. There is a **menu icon (Interactive), which will open a sidebar with slicer(s).** There is a **play Axis** for the average of median rent by town, flat type, and year to better understand the trends of median rent throughout the years.  This page consists of 2 charts and 2 matrices about **Housing Prices (HK)** and shows the median rent and price per sqm for Hong Kong’s Housing Flat Price. There is a matrix to check for the specific values for median rent and price of housing flats. There is a **menu icon (Interactive), which will open a sidebar with slicer(s).**     1. **Expenditure (Tristan)**   **Datasets chosen and visual charts used**   * [**Distribution of Monthly Household Expenditur**](https://tablebuilder.singstat.gov.sg/table/CT/16465)**e**   *Name: (Expenditure) Breakdown of Expenditure across Income Deciles*  Information about how much **Households spend** on each category. Able to filter by decile.  Percentage of housing expenses gets **higher** for **lower-income families**, despite them already opting for cheaper houses.   * [**Household Income From Work**](https://tablebuilder.singstat.gov.sg/table/TS/M810361)   *Name: (Expenditure) Average income per capita, sorted by decile*  Information on the **Distribution of income**. Tells us how much of the population falls under a specific threshold.  In this case, **20-30%** of Singaporeans earn **income below the basic cost of living.**  [**Breakdown of Expenditure by Category in Japan**](https://www.statista.com.nyp.remotexs.co/statistics/1237097/japan-households-monthly-spending-category/)  *Name: (Expenditure) Breakdown of Expenditure of Japan and Singapore*  A breakdown of **Expenditures** between **Japan** and **Singapore**. Able to filter by category. **Expenses** in Singapore are **more expensive** in every aspect.  * [**Healthcare cost per capita (by country)**](https://en.wikipedia.org/wiki/List_of_countries_by_total_health_expenditure_per_capita)     *Name: (Expenditure) Healthcare spending per capita*  **Cost of healthcare per capita** in different countries.  From the chart, we can see that Singapore’s **healthcare costs** are **relatively low** when compared to the more successful countries.  **Screenshots of Dashboards**       1. **First dashboard**: a **clustered column chart** that details the breakdown of **Expenditures** (with filter for decile). **Funnel chart** to compare values of **Income** and **Cards** that reference the chart above. 2. **Second dashboard**: Clustered bar chart detailing the breakdown of **Expenditures** (with filter for the category), and another **Clustered bar chart** with info on **healthcare costs** for various countries. 3. **Menu button (top left)** contains a **dropdown slicer** that allows you to filter by certain columns. The menu also has a **back button**. **The back button (top right)** redirects you to the home page. |

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| **Problems Faced**  **Documented by: Vickneswaran, Bo Yu, Sam and Tristan**  When it comes to problems faced during this Project, **scheduling** was difficult. Due to each team member varying assignments, tests, and personal commitments, scheduling a meeting and task allocation couldn’t always be accomplished. The team had to then learn to prioritise and manage time better using tools like **ASANA** and completing work in small portions and checking each other's work for optimal efficiency.  Another problem faced would be **conflicts of ideas**. It is very normal to have differing ideas and opinions when it comes to a project, as everyone is thinking on behalf of what's best for the group and project. We overcame this problem by integrating ideas and combining them to satisfy all. If not, we pick based on **voting** and **logical plans**.  Lastly, it would be finding **relevant and credible datasets** for our individual features. To answer the main question of this project, “**Is Singapore a good place to live/work in**?”, we needed certain datasets of our choosing to further use Power Bi to make into visualisations. This whole process was stalled due to not all members being able to find relevant datasets that could help with the hypothesis. We solved this issue by helping each other find datasets to speed up the process. |

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| **Future Enhancements**  **Documented by: Vickneswaran, Bo Yu, Sam and Tristan**  For each member's time management, we overcome this problem by using **ASANA** created by the project leader to manage our time better so that we are able to complete the project in time and to be able to check each other's work again.  For each member's conflicts of ideas, we overcome this problem by **integrating ideas and combining them** to satisfy all our ideas. If we are unable to make a decision on whose idea to use, then we can pick based on voting to ensure fairness.  For finding relevant and credible datasets for individual features, we overcome this problem by **helping each other to find and check** whether it is credible and relevant datasets based on what we have learned in school. |

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| **Conclusions**  **Documented by: Vickneswaran, Bo Yu, Sam and Tristan**  **Individual Conclusions**   1. **Healthcare**   Having chosen a vital pillar of living in Singapore, Healthcare there are 2 sides to this conclusion. Be its pros/cons, now I’ll be concluding my findings regards to our hypothesis.  In terms of **COST** being in the con’s standpoint, in this case**,** Singaporean does fall on the **steeper cost** side when compared to the third world/second work and even first world countries. Due to factors such as **population, inflation, and economic status**. Making it a little difficult for low financially abled families and individuals as further proved by the Expenditure feature.  However, when further analysing **EFFICIENCY (Quality)** being the pros standpoint, in this case, Singapore is known nationally and internationally for its quality be it time, service, manpower etc. Accommodating to the general public and even going further to provide policies to help decrease the steep price is remarkable. The Pro overall exceeding the Con proves that **Singapore is a good country to live/work in when it comes to healthcare**.   1. **Education**   Researching on **Education,** able me to find out more information about  government action towards Education for students studying in Singapore in terms  of **Enrolment, Salary Percentage of Cohort and Employment Rate.**  On **Enrolment,** we can see a rise in the enrolment number of students for  some of the Education Pathways in Singapore which is one of the good signs that  tell you that Education in Singapore is **good**.  On **Salary** and **Employment Rate** for Polytechnic and University students, it has  been **increasing** as the year increases due to Government is trying to ensure  students have the **relevant skills** needed in the workforce.  Lastly will be on the **Percentage N and O Level Cohort** where there has been **raise**  **of** people passing their respective exam from some of the races Increases.  **In conclusion**, there are more pros to cons based on my report agreeing that  Singapore is a good place to live in or work in for Education.   1. **Housing**   Using the analysis between the rent and price of housing flats between Hong Kong and Singapore, both countries have increased prices could be the fact of their constant economic growth as they are more developed countries. The gradient of the charts for Singapore is less steep compared to Hong Kong which is steeper at the same time range. Moreover, Singapore has a more consistent increase unlike the unstable changes for Hong Kong which makes residents such as immigrants and locals in Singapore more prepared for the change of economy to survive. To end off, Singapore is more affordable to the majority of people as a higher ratio of people could have a more affordable option and higher purchasing power of residential properties.   1. **Expenditure**   There are always pros and cons we have to weigh before we can make a conclusion, namely the housing, transport, and healthcare costs as a percentage of total expenditures between different income classes. Housing and transport are reasonable for upper-income families but makes up a large chunk of all expenses for low-income families, so this is an undesirable aspect of living in Singapore. Even if we are better than other countries in this aspect, having >20% of families earning below the minimum cost of living is always a problem.  The good side of it is that healthcare is significantly cheaper than in most other countries.  However, with housing and transport being key expenditure categories that are easily deciding factors for immigrants and even locals, I would say the bad outweighs the good expenditure-wise.  **Final Conclusion of Hypothesis**  After much research, findings of datasets, and collaborative deliberation with all members of the teams, we can conclude the hypothesis of “Is Singapore a good place to live/work in?” with yes, it is a good place to live/work in. Despite the steep cost for healthcare, housing and expenditure and stress level for education, it is accommodated by great quality and adaptability of national/international to the general public allowing Singapore to be a good place to live/work in. |