

**Nanyang Polytechnic**

**School of Information Technology**

# **Project Proposal**

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| **Module Group:** | ITBW21-02 |
| **Module:** | Visual Analytics Project (WIU) |
| **Team Members:**  **(\*denotes the Team Leader)** | **1. Darren Wong (224627G)**  **2. Gangula Karthik (223715Y)**  **3. Gabriel Loh (220611N)**  **4. Victor Hoan (221225F)** |
| **Due Date:** | 15th January 2023 (Sunday) |
| **Class:** | BA2202 |
| **To:** | Ms Wang Mei Fen |

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**Project Research & Proposed Work Plan**

## **User Requirements**

Various methods were used to gather the requirements of the target users (recent university graduates). Then, these requirements were analysed to determine the tasks necessary to create the dashboards.

### **Survey Form:** <https://forms.gle/7G3CzdiVziQz8vnWA>

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| **List of Interview Questions** | | | |
| **S/N** | **Questions** | **Users** | **Type of Questions** |
| **1** | Could you describe your experiences with living and working in Singapore? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **2** | What do you think are the basic necessities required to live in Singapore and what is the monthly expenditure for them? | Recent Graduates *(Locals and immigrants)* | Close Ended |
| **3** | How does the cost of living in Singapore compare to other countries? | Recent Graduates *(Immigrants)* | Open Ended |
| **4** | Do you think it is possible to earn a sufficient income in Singapore to support oneself or a family? | Recent Graduates *(Locals and immigrants)* | Close Ended |
| **5** | Could you elaborate your thoughts regarding the housing situation and factors that impact your satisfaction with it? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **6** | What difficulties did you or your family encounter while searching for housing and how were they addressed? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **7** | What suggestions do you have for the Singaporean government to address and improve the housing situation? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **8** | What are the top priorities to consider when selecting housing options? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **9** | In your opinion, what are the key characteristics that make up good neighbourhoods in Singapore? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **10** | Have you encountered difficulties with public services and transportation in Singapore, if so, how were they addressed? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **11** | In your opinion, what is the most pressing issue facing public services and transport that is affecting citizens? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **12** | What recommendations do you have for improving public services and transportation in Singapore? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **13** | How effective has Singapore's education system been in preparing you for employment? | Recent Graduates *(Locals and immigrants)* | Open Ended |
| **14** | How does the accessibility of schools and education in Singapore compare to other countries? | Recent Graduates *(Locals and immigrants)* | Close Ended |
| **15** | What aspects of Singapore's education system have attracted you to consider studying in Singapore? | Recent Graduates *(Immigrants)* | Open Ended |

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| **Product Backlog** | | |
| **S/N** | **Use Case** | **Use Story** |
| **1** | BTO Waitlist Tracker | **As a recent college graduate**,  **I want to** be able to view the current waiting time for BTOs  **so that I can** make a more informed decision about which one to purchase, rather than relying on luck or speculation. |
| **2** | Resale Housing Price Comparison | **As a recent college graduate,**  **I want to** have access to information about the resale prices of housing in different regions  **so that I can** compare them and make an informed decision about where to purchase my housing that fits my budget and needs. |
| **3** | Demographic Analysis | **As a recent college graduate,**  **I want to** be able to find a neighbourhood with a higher proportion of young people,  **so that I** **can** make a choice that better suits my lifestyle |
| **4** | Filtering by Transport access and amenities | **As a recent college graduate,**  **I want to** be able to filter my property search results by availability of public transportation and amenities,  **so that I can** easily find a home that is conveniently located and meets my lifestyle needs. |
| **5** | Traffic Condition Prediction | **As a recent college graduate,**  **I want to** be able to predict traffic conditions that may cause unpredictability in my trip,  **so that I can** plan my trip more efficiently and avoid congested areas. |
| **6** | Plan Transportation Costs | **As a recent college graduate**,  **I want to** alleviate financial concerns related to transportation costs, **so that I can** attend classes, internships, and other activities without financial constraints. |
| **7** | Accurate bus schedule | **As a recent college graduate,**  **I want to be** able to catch my bus on schedule despite infrequent service or delays,  **so that I can** arrive at my destination on time. |
| **8** | Optimizing Commute Efficiency | **As a recent college graduate,**  **I want to** be able to plan for unexpected MRT breakdowns and high crowding during rush hours on trains and buses  **so that I can** minimize delays and frustration while commuting to work. |
| **9** | Budget planning for utilities and necessities | **As a recent college graduate,**  **I want to** be able to easily find out the cost of utilities and necessities  **so that I can** easily plan my finances for the month |
| **10** | Earning Beyond Necessities | **As a recent college graduate,**  **I want to** be able to earn additional income for services beyond the scope of basic necessities for survival  **so that I can** do things that I enjoy such as entertainment. |
| **11** | Family Planning for Cost Analysis | **As a recent college graduate,**  **I want to** know the average income required to afford the costs of starting a family or having a baby  **so that I** **can** make informed decisions about my career and financial goals. |
| **12** | Navigating the Insurance Market | **As a recent college graduate,**  **I want to** be able to compare the costs of different health/life insurance options,  **so that I** **can** make an informed decision about which insurance options to invest in to best protect myself and my family. |

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| **13** | Job Market Insights | **As a recent college graduate,**  **I want to** have access to information about the job market,  **so that I** **can** make an informed decision about starting my career in a specific field or location. |
| **14** | Enhancing Work-Life Balance | **As a recent college graduate,**  **I want to** have a better understanding of working hours,  **so that I** **can** adjust to the lack of structure in the working world and avoid burnout. |
| **15** | Advancement in career goals | **As a recent college graduate,**  **I want to** access affordable, reputable training and resources  **so that I can** stay current with the­ latest technologies and applications in my field to effectively perform my role and contribute to the team and company’s success. |

## **Target Users**

Our target audience of recent college graduates between the ages of 21 to 34, with less than 3 years of working experience, is the ideal demographic for our research and analysis for several reasons:

* They are at a pivotal stage in their careers, transitioning from education to the workforce, making them a prime target audience for information about job opportunities in Singapore.
* They possess a unique perspective on the job market, having just completed their education, and can provide valuable insights into the current state of the job market, as well as the skills and qualifications that are most in demand.
* The lack of work experience may make finding suitable employment challenging, particularly in a competitive job market like Singapore, which is a global business and financial hub. However, this demographic is an ideal candidate for entry-level or entry-mid level job opportunities and understanding job opportunities in this city-state is essential for managing finances and achieving success in their career.
* They can provide insight into the housing and transportation situation in Singapore, and how it affects their daily lives, as well as the cost of living and the economic situation in Singapore.

Our project Gantt chart, created using Clickup, clearly outlines our project goals and milestones to ensure efficient completion

Graphical user interface

Description automatically generated

Our project was executed with a budget of zero dollars, as we employed the use of open-source software and complimentary tools throughout the development phase. This approach enabled us to access robust and advanced technologies without incurring any costs, thus enabling us to allocate our budget towards other critical aspects of the project. This cost-efficient method enabled us to successfully achieve our project objectives, while ensuring high-quality solutions for our clients. Below are some of the tools that we have used:

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| Icon  Description automatically generated | **Google Meet**, a video conferencing platform, was chosen for its ability to conduct **remote interviews** and was used as a **primary data source**. Thisstreamlined the **data collection process** and allowed for the creation of **detailed** and **accurate** **reports**. |
| Icon  Description automatically generated | **Google Forms**, a survey administration tool within the web-based Google Docs Editors suite, was utilized to solicit responses from participants and served as **a primary source of data.** |

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| ClickUp™ | One app to replace them all | We utilized **ClickUP**, a **cloud-based** project management tool, for tracking our progress on the report. Its **Gantt chart and Kanban** **board** features enabled us to **keep track of milestones** and **compare task progress** with team members, promoting **efficient** completion of tasks. Additionally, as a **free tool**, it served as an **easily accessible** and **cost-effective solution** for our project management needs. |
| Welcome To Colaboratory - Colaboratory | **Google Colab**, an online integrated development environment, was employed to generate bespoke visualizations utilizing Python and to conduct data scraping. The platform was selected for its ability to manage all necessary packages and libraries and its accessibility as a complimentary service, requiring only a Google account for utilization. |
| Icon  Description automatically generated | The utilization of **Python** in the creation of **custom visualizations** was chosen as it offers a **greater degree of flexibility** in the customization of charts, in comparison to Excel. Furthermore, it facilitates a more effortless method of exploratory data analysis. |
| Centralized Data sets | CloudxLab | We employed the use **of datasets and APIs** from Singaporean data sources, such as DataMall, openmaps, data.gov.sg, and singstats, as a **secondary data source** to augment the information gathered through primary means, providing a more comprehensive and nuanced understanding of the subject matter. The utilization of these datasets and APIs also allowed for **more efficient and precise data collection**, enabling us to focus our efforts on analysis and interpretation. |

## **Features:**

**Allocation of work**

**Economic Environment**: Darren

**Housing:** Karthik

**Transportation and public services:** Gabriel

**Schools and Education:** Victor

### **Economic Environment**

**Sub hypothesis:** Spending power of an individual directly impacts the quality of life

Recent college graduates in Singapore are able to support themselves for basic necessities, but are concerned about the rising costs of living such as inflation, GST increase, and family planning. This sentiment was confirmed through surveys and interviews. Despite the current economic environment being favourable, it is not enough to alleviate these concerns, particularly for those who live independently and have housing costs to consider.

**Links:**

1. **Cost of family planning:**
   1. **Data for monthly basic wage:** <https://data.gov.sg/dataset/median-monthly-basic-and-gross-wages-of-common-occupations-by-establishment-size-in-all-industries>
      1. This dataset contains information about the median monthly basic and gross wages of common occupations.
      2. This data allows us to perform calculations and aggregate how much a household is likely to earn in any given month and whether the amount would be sufficient to offset utility and food for the month.
      3. This dataset was last updated in 2022.
2. **Comparing insurance options:**
   1. **PDF document with insurance data:** <https://www-moh-gov-sg-admin.cwp.sg/docs/librariesprovider5/integrated-shield-plans-documents/sep-2022/v8-comparison-of-std-ips---sep-2022.pdf>
      1. This data was in the form of a pdf file, hence python was used to scrape the data and converted into a csv file for easier processing through Power BI.
      2. The dataset provides information on the premium costs and features of different Integrated Shield Plans (ISPs)
      3. Offered by insurance providers in Singapore as of September 2022.
      4. Allows the user to compare and select the best ISP based on their specific needs, budget and also the age of the insured person.
3. **Optimizing budget management:**
   1. **Data for consumer price index:** <https://data.gov.sg/dataset/consumer-price-index-cpi-monthly-seasonally-adjusted>
      1. This dataset contains information about the cost of common consumer goods purchases by households and their increase or decrease in price over the years.
      2. The dataset is able to aid us in forecasting the future cost of products and also allows us to estimate the expenditure of an average household on common consumer goods.
      3. This dataset was updated last on Oct 2022
   2. **Data for utilities (water, electricity, gas):** <https://www.singstat.gov.sg/find-data/search-by-theme/industry/energy-and-utilities/latest-data>
      1. This dataset contains information about the yearly and monthly (where available) for electricity, gas and water tariffs.
      2. This allows us to find out the average cost of utilities per month and helps a household estimate monthly utility bills.
      3. This dataset was updated last on 16th Aug 2021.
4. **Additional income for recreational purposes:** 
   1. **Data on household-expenditure:** <https://www.singstat.gov.sg/find-data/search-by-theme/households/household-expenditure/latest-data>
   2. **Data on household-income**: <https://www.singstat.gov.sg/find-data/search-by-theme/households/household-income/latest-data>
      1. These 2 datasets contain detailed information on household expenditures on goods and services and their monthly income. By analysing the expenditure on essential goods and services beyond basic necessities, we are able to provide an accurate estimate of additional expenditure to account for when planning a monthly budget.
      2. The initial analysis will utilize a dataset that provides information on income before and after Central Provident Fund (CPF) contributions, as well as the average household size. If a more in-depth analysis is necessary, supplementary datasets will be utilized to supplement the analysis.
      3. The household expenditure dataset was updated last on 8th Dec 2021 while the household income dataset was updated last on 15th Feb 2022.

### **Housing**

**Sub hypothesis:** Availability and Affordability of housing contributes to the happiness and wellbeing

Recent college graduates have voiced concerns about housing in Singapore, specifically regarding cost and location. Our research confirms these issues, and our user stories aim to empower recent college graduates to make informed decisions about housing in Singapore by providing them with the tools and information they need to make these decisions.

**Links:**

* 1. **Data for property construction waiting time**
     1. **Public housing Data:** <https://www.btohq.com/bto-top-tracker/1>
        1. This data is not readily available through an open source or publicly exposed API, thus we will use a web scraping method using python to extract the data from a website such as BTOhq and convert it into a CSV file for further analysis.
        2. *Note: the python code and csv file has been uploaded*
     2. **Private housing Data:** <https://www.ura.gov.sg/maps/api/#private-residential-projects-in-the-pipeline>
        1. For private housing there is an API that allows us to request for the data of private housing that is currently in the development pipeline and gives us the TOP (Temporary Occupation Permit).
     3. The datasets will be used provide insights on construction waiting times for both public and private housing in Singapore.
  2. **Data for housing prices across Singapore**
     1. **Dataset:** <https://data.gov.sg/dataset/resale-flat-prices>
     2. The dataset contains information about resale transacted prices for housing in Singapore
     3. The data includes the month and year of the transaction, the town, flat type, block, street name, storey range, floor area in square meters, flat model, lease commence date and remaining lease, and the resale price in SGD.
     4. The data covers the period from January 1, 2017 to January 13, 2023
     5. The dataset is managed by the Housing and Development Board and is provided under the Singapore Open Data Licence.
     6. This data will allow us to analyse the housing prices across different towns in Singapore, and to see how they have changed over time. Additionally, it will allow us to compare prices across different types of flats, such as HDB or Condominium. Insights could also be drawn from the remaining lease and the floor area of the flat.
  3. **API for population age demographics**
     1. **API for data:** <https://www.onemap.gov.sg/docs/#age-data>
     2. The user must specify the year of data they wish to retrieve in the format of YYYY, for example, 2010.
     3. The API allows the user to retrieve data for a specific planning area, by providing the name of the planning area. A list of planning area names can be retrieved from the API documentation.
     4. The data returned includes the population breakdown by age group for the specified planning area and year, including the total population and the population for each age group starting from 0-4 years old and going up to 85 years and above
     5. The data returned is in JSON format which is commonly used for APIs.
     6. By providing the token, year and planning area, developer can retrieve data of population of selected year in selected planning area.
     7. The data is specific to a particular planning area in Singapore, and you can use this to understand the population distribution and demographics of the area.
  4. **API to get available transport options and nearby amenities**
     1. **API for data:** <https://www.onemap.gov.sg/docs/#planning-area>
     2. Utilize location data to determine the proximity of key amenities, such as MRT stations, bus stops, schools, and shopping centres, to the housing location being considered.
     3. Calculate and display the distance of the chosen HDB from these key amenities, allowing for easy comparison and evaluation of the housing location's accessibility.
     4. Please note that there is a limit of 250 calls per minute for this API.
     5. The location data can help users understand how accessible the location is in terms of transportation options and nearby amenities.

### **Transport and public services**

**Sub hypothesis:** The efficiency of the transportation and public services system affects the quality of life

  In Singapore, the transport system is widely recognized as efficient and well-developed with a comprehensive network of buses, trains and taxis that effectively connect various parts of the city-state. The majority of citizens consider the services provided to be satisfactory and reliable. However, as with any system, there are always areas for improvement and some individuals may have differing opinions on how transport services can be enhanced further. Despite this, the government is constantly working to improve the transport system to meet the needs of the growing population and enhance their overall satisfaction.

**Links:**

1. **Traffic Speed Bands**
2. **API for traffic speed:** <https://datamall.lta.gov.sg/content/datamall/en/dynamic-data.html>
3. The data provides current traffic speeds on expressways and arterial roads, expressed in speed bands.
4. The data is updated every 5 minutes.
5. Data includes road ID, name, category, speed bands, min and max speeds, and location coordinates.
6. By analysing the traffic data, the time taken to travel between two points can be predicted, which could be useful for commuters.
7. By analysing traffic data, one can identify when traffic is busiest on certain roads, which can be useful for businesses and operations that depend on traffic patterns.
8. **Fare cost:**
9. **Data for fare cost:** <https://github.com/hxchua/datadoubleconfirm/blob/master/datasets/mrtfaretime.csv>
10. The table in the link above shows the cost for commuters
11. Information is from 2018
12. The dataset will be used to provide insight on the cost structure of the fare, including any fixed or variable costs helping users to plan ahead better.
13. **Real time bus arrival information:**
14. **API for bus arrival times:** <https://datamall.lta.gov.sg/content/datamall/en/dynamic-data.html>
15. Information is real time
16. Data provides information on bus services including service number, operator, next oncoming buses, origin, and destination codes, estimated arrival time, location coordinates, occupancy level, wheelchair accessibility, and vehicle type.
17. Data includes attributes such as operator code, structural tags for next oncoming buses, reference codes for bus stops, estimated time of arrival, location coordinates, ordinal value of visit, crowding level, wheelchair accessibility and vehicle type.
18. Returns real-time Bus Arrival information for Bus Services at a queried Bus Stop, including Estimated Time of Arrival (ETA), Estimated Location, Load info (i.e. how crowded the bus is).
19. By analysing the data, one can gain insight into bus routes, schedules, crowdedness and busiest stops, which can be used to plan commutes and make more informed decisions on which bus to take, to avoid crowded buses and reach destinations on time. The service number, origin code and destination code attributes can assist in planning the correct bus route.
20. **Crowds:**
21. **API for Platform crowd density real time:** <https://datamall.lta.gov.sg/content/datamall/en/dynamic-data.html>
22. Update frequency is 10 minutes.
23. Returns real-time platform crowdedness level for the MRT/LRT stations of a particular train network line
24. Train lines supported: Circle Line, Circle Line Extension, Changi Extension, Downtown Line, East West Line, North East Line, North South Line, Bukit Panjang LRT, Sengkang LRT, Punggol LRT.
25. Data includes Trainline, Station, Start Time, End Time, and Crowd Level attributes.
26. The dataset will be used to provide insight on size, density and demographics of the crowd

### **Schools and Education**

**Sub hypothesis:** Level of educational Qualification impacts the quality of life

Education in Singapore is highly accessible to students, making it one of the best in Asia. However, there are still challenges that need to be addressed, such as the lack of emphasis on teaching relevant skills for the workforce, and people management skills. This is especially evident as students' progress through the education system and enter the workforce, where they may find that their education did not fully prepare them for the demands of the job market. Considering this, our user stories are aimed at supporting recent college graduates as they navigate the job market and explore opportunities for upskilling to stay relevant in the workforce.

**Links:**

1. **Employment Rates of Graduates across different Local Universities across Singapore**
   * 1. **Data:** <https://stats.mom.gov.sg/Pages/Singapore-Yearbook-Of-Manpower-Statistics-2022-Training-and-Higher-Education.aspx>
     2. The table shows data on the proportion of graduates in the labour force who were employed, and in full-time permanent employment, as well as the mean and median basic and gross monthly salaries for various degrees. It also includes the 25th and 75th percentile for gross monthly salary.
     3. The data was released on 30 June 2022
     4. Having access to data on the average salary for a specific field or industry can give you a better understanding of the typical salary range for that field or industry which can be helpful when negotiating your salary, as it gives you a benchmark to use when discussing your salary with an employer.
   1. **Normal and overtime working hours across the different industries**
      1. **Data**: <https://stats.mom.gov.sg/Pages/HoursWorkedTimeSeries.aspx>
      2. The data shows the number of weekly hours worked by full and part-time employees in various industries, including whether the hours were paid or unpaid.
      3. Contains data from 1998 to 2021
      4. The average number of weekly working hours for full-time and part-time employees in different industries, and how they compare to each other allowing recent graduates to make a more informed career choice.
   2. **Skills future Singapore course information**
      1. **API link**: [https://developer.ssg-wsg.gov.sg/webapp/docs/product/6kYpfJEWVb7NyYVVHvUmHi#](https://developer.ssg-wsg.gov.sg/webapp/docs/product/6kYpfJEWVb7NyYVVHvUmHi)
      2. Utilizing the API's provided information on course categories, fees, training providers, and popularity (as indicated by "Course Likes")
      3. This data can be used to evaluate the cost and perceived value of the courses being considered.

## **Benefits**

**Allocation of work**

**Economic Environment**: Darren

**Housing:** Karthik

**Transportation and public services:** Gabriel

**Schools and Education:** Victor

### **Economic Environment**

* + 1. **Points to Analyse:** Likelihood of individuals being able to earn enough to afford basic necessities, Average cost for services beyond basic necessities, Cost of starting a family, Cost of raising a child
    2. **Solution:** The solution will aim to aid college graduates in helping to plan their finances so that they are able to feel secure knowing that they will be able to afford food, water and utilities with their earnings every month. The average cost for services beyond basic necessities is also necessary data to be analyzed as there are further requirements that would ease the lives of college graduates in their day to day lives. Examples of these would be having a mobile phone and plan for connections with colleagues or looking for job opportunities or having surplus income for an insurance plan and more. By analyzing the housing market and the government subsidy plans available, we aim to provide college graduates with a clear understanding of how much is required for them to move into a house of their own and how much that they would have to pay subsequently after using the government funding available. The cost of raising a child is also knowledge that would be useful to college graduates soon as family planning usually involves raising a child as well and given its complicated nature, there is a lot of costs to learn of and plan beforehand. All the analysis that has been done will be shown as a dashboard solution in Power BI, so that our target user will be able to easily filter through the data that is relevant to them and suits their needs.
    3. **Benefit the target users:** Our solution aims to help college graduates plan their finances by providing them with detailed information on the cost of basic necessities and services beyond them. By having this knowledge, college graduates will be able to set financial goals, such as saving for retirement or a down payment on a house, and achieve them with more ease. Furthermore, the solution uses a data-driven approach to analyze the cost of starting a family and raising a child, allowing graduates to identify potential cost savings and efficiencies. This information also enables accurate budgeting and forecasting, which helps to avoid unexpected expenses and enables graduates to make informed decisions in their preparations.

### **Housing**

* + 1. **Points to Analyse:** Waiting times for both public and private housing, Housing prices across Singapore for different flat types, how likely house loan is to be approved for a specific property type and the distance of housing to the different amenities such as schools, MRT and bus stations, shopping centres, etc.
    2. **Solution:** Our solution aims to assist recent college graduates in finding the most optimal, economical housing that meets their location requirements by utilizing data on waiting times for public and private housing, housing prices, and the likelihood of obtaining a house loan for specific property types in Singapore. By providing a comprehensive understanding of the housing market, users will be able to discern the best options for affordable housing and areas where they have a higher chance of obtaining a house loan. Additionally, by analysing the proximity of housing to various amenities such as schools, public transportation, and shopping centres, we can help users identify areas with the best access to services they need. All this data will be presented in an easily understandable format through a Power BI dashboarding solution, allowing users to quickly and easily find the housing options that best suit their needs and budget.
    3. **Benefit the target users:** The acquisition of housing, a fundamental requirement for human survival, has become a problem of increasing magnitude. Our analysis of survey and interview data has revealed that cost and proximity to essential amenities are of paramount importance to individuals in their quest for housing. Our solution, utilizing a data-driven approach, will aid recent college graduates, with limited real-world experience, in making more informed decisions regarding their housing options, thereby saving both money and time by allowing them to quickly identify trends and patterns in the housing market as well as identifying areas or neighbourhoods with the highest potential for appreciation or rental income.

### **Transportation and public services**

* + 1. **Points to analyse:** Waiting time between busses or trains,cost of taking buses or trains, bus and train conditions, bus or train station crowds
    2. **Solution:** Our solution addresses the need for recent graduates to have access to information that allows them to make informed decisions about their transportation options. By providing cost-effective and efficient travel options, as well as information on the best times to take public transportation, recent graduates can plan their commutes more effectively and make the most of their time and resources. With real-time data, this solution also enables them to make decisions based on the most up-to-date and accurate information, allowing them to respond quickly and avoid last-minute inconveniences.
    3. **Benefit the target users:** Finding reliable and affordable transportation options has become a growing concern for many individuals. Our solution, utilizing a data-driven approach, aims to assist individuals, particularly recent graduates with limited real-world experience, in making more informed decisions regarding their transportation options. By providing real-time information about transportation options, costs, and conditions, we can help them save both money and time by quickly identifying the most efficient, cost-effective, and convenient options available. Additionally, we can provide information on the distance of transportation options to amenities such as schools, shopping centres, and workplace, further assisting them in planning their commutes more effectively, making the most of their time and resources and reducing stress and uncertainty associated with transportation.

### **Schools and Education**

* + 1. **Points to analyse:** employment rates for recent graduates in different Local Universities across Singapore, normal and overtime working hours across different industries and resources offered by Skills future Singapore
    2. **Solution:** Our solution addresses the challenge of recent graduates making informed decisions about their career aspirations. By referencing statistics on employment rates and industry demands, graduates will have a stronger understanding of their job prospects and what is required of them in their desired field. Additionally, by providing information on typical working hours, graduates will have a clearer understanding of the level of commitment expected in their chosen workplace. And for those who may lack certain qualifications, the solution offers the option of obtaining the necessary skills through SkillsFutureSingapore programs by helping them pick the right course based on their needs.
    3. **Benefit the target users:** The need for guidance and support during their post-graduation period is brought up as an issue by many graduates, as they find themselves missing certain skill requirements for the job on hand. Our solution is to provide graduates with a platform to upskill themselves by acquiring the skills needed for their job as well as additional skills they wish to gain after graduation. The data for employment rates and working hours provided to graduates enables them to make more informed decision on what jobs they wish to apply for based on the salary, work timings and demands for people from that industry. With the solutions stated, it will provide graduates with a better chance of obtaining a job, along with gaining the skills they want to add to their skillset that will better improve themselves in the long run.

## **Citations:**

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