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**CCT College Dublin Continuous Assessment**

| **Programme Title:** | Higher Diploma in Data Analytics for Business / Higher Diploma in AI Apps | | |
| --- | --- | --- | --- |
| **Delivery Mode:** | Online | | |
| **Cohort Details:** | Higher Diploma Data Analytics Sep2024 PT Semester 1  Higher Diploma AI Sep2024 PT Semester 1 | | |
| **Module Title(s)**: | Strategic Thinking | | |
| **Assignment Type:** | Individual | **Weighting(s):** | 20 % |
| **Assignment Title:** | CA 1 – Capstone Project Proposal | | |
| **Lecturer(s)**: | James Garza ([james@cct.ie](mailto:james@cct.ie)) | | |
| **Issue Date:** |  | | |
| **Submission Deadline Date:** | Sunday, 27th October 2024 23:59 | | |
| **Late Submission Penalty:** | Late submissions will be accepted up to **5** calendar days after the deadline. All late submissions are subject to a penalty of **10%** of the mark awarded.  Submissions received more than 5 calendar days after the deadline above **will not** be accepted and a mark of 0% will be awarded. | | |
| **Method of Submission:** | **This assignment is submitted via Moodle.** | | |
| **Instructions for Submission:** | Your work must be uploaded to Moodle.  • Capstone Project Proposal in Word format ONLY. The word count is 1,000.  • Ethics form signed by all students and submitted as PDF.  • ZIP or RAR files will not be accepted. Files must be submitted separately. | | |
| **Feedback Method:** | **Results posted in Moodle gradebook** | | |
| **Feedback Date:** |  | | |

**Vehicle life cycle cost prediction tool**

When considering buying a new vehicle, whether it will be a new or second-hand one, the cost of owning it goes beyond the purchase price.

Some key factors like insurance costs, depreciation value, maintenance, fuel consumption and others, have a direct influence in determining whether a new vehicle would be suitable or not for a given monthly budget.

When navigating a website to buy second-hand cars for example, it’s very hard to visualise how much a vehicle would cost per month or year and if the choice is compatible with the user's monthly or yearly budget.

While buying a new vehicle is the second biggest acquisition after a house, it is hard to predict and visualise **ownership costs** when using existing online tools or marketplaces.

There is a need for tools that provide a comprehensive cost analysis.

Research \*\*\*

To solve the above issue, a proposal to deliver an app that analyzes and considers those factors will provide a helper tool to the final consumer, helping with financial decisions by providing total cost of ownership (TCO) per month or per year.

By using real-time data and a trained advanced LLM model, the app offers a great tool that can help not only end buying customers but dealership’s online marketplace attraction.

**Objectives**

* **Improve customer financial decisions**

Deliver a web tool that can be easily accessed by any end user using a browser, that calculates and predicts the TCO (total cost of ownership), providing a solid dashboard and helping customers with the long-term financial responsibility of their decisions.

* I**ncrease online lead conversion**

When integrating this project on a website, it would improve user interaction metrics and engagement, which can increase leads conversion.

**Increase Online Vehicle Sales**

The tool would offer a detailed cost breakdown and a long-term visibility on the ownership price of a vehicle which can lead towards encouraging buying decisions.

* **Lead to market competitiveness**

Empower dealerships with a competitive tool that highlights their inventory providing transparent pricing and cost analysis and prediction.

* **Business value validation**
* By collecting user feedback and metrics, evaluate the tool’s usage and effectiveness in improving user experience and sales increase. This can provide its value proposition to stakeholders.

**Unpredictable visualization of total vehicle ownership costs**

When tempted to buy a new vehicle, some questions might come up as the following:

**New vehicles vs Second-hand:**

Should I buy a new vehicle or a second hand one ?

**Which fuel type to choose:**

Considering fuel costs, would it be better to buy an electric or petrol?

**Long-term costs:**

How much would it cost me in the long term to choose a petrol over an electric?

**Infrastructure:**

Is my country or the city I live in prepared for electric vehicles?

**Additional Investments:**

How much would it cost to invest in an electric home plug in addition to buying an electric vehicle?

While researching online, it was identified the lack of one prediction tool that could help to solve all the above questions at once integrated with a marketplace while buying a vehicle online.

**Impact**

**Buyers:**

Without the proper visualization of TCO, buyers would make uninformed decisions, which leads towards higher expenses over time and consequently dissatisfaction with their purchase.

**Environmental Goals:**

While not certain about the benefits and costs of EVs, users would take longer to consider its adoption. This directly impacts on the world goal to reduce carbon emissions and combat climate change.

**Sales:**

Business lacks chances to engage customers with a valuable decision tool that can lead to more sales conversions and user satisfaction.

**Social:**

In a world where informed decisions are crucial to continue reducing fossil fuels, the lack of prediction tools like this one directly impacts environmental sustainability.

**Project Scope**

By using advanced predictive modeling, real-time data and a web user interface, the project would fill the existing gap in the market for tools that provide cost of ownership analysis.

**Included in the Project**

**Data collection and analysis**

Project would gather data on the following fields:

Vehicle purchase prices, insurance rate, depreciation rate, Repair and maintenance costs, fuel type costs, infrastructure for electric vehicles, government incentives and tax implications, financing incentives on green vehicles.

**Predictive Models**

Project would develop machine learning models to help forecast the following:

Depreciation metrics, maintenance costs, fuel consumption costs, insurance costs over time.

By using algorithms such as linear regression, time-series forecasting and decision trees.

**Web Interface**

* Web-component that can be easily integrated on dealership websites
* Usage of modern web technologies such as Vue, Typescript and Tailwind to build a scalable SDK that can expose the web-component tool.

**Features**

* Comparison table: A table that compares one option over the other.
* Environmental Impact report: A report component that helps users to understand the impact of a given vehicle.
* Summary Dashboard: A metric dashboard component that displays TCO information over years.

Excluded from the Project

**Mobile Application Development**: This tool would initially be a web only tool, meaning it will not extend to native mobile app development.

**Real-time inventory integration:** This tool initially would not be connected with any dealership inventory. Placeholder data will be used to demonstrate its initial purpose and features.

**Required Data Sources**

Ideally to deliver the above functionality, at least 9 vehicle related data sources are required to achieve the full tool capability.

List of required data source, possible sources, usage permission:

**1 - Vehicle Pricing:**

New and second-hand vehicle price data.

Sources:

SIMI (<https://www.simi.ie/en/motorstats/recommended-price-guide>)

ECB:(https://data.ecb.europa.eu/data/concepts/second-hand-vehicles?tags\_array%5B0%5D=Second-hand%20vehicles&filterSequence=tags\_array)

**2 - Depreciation**

Vehicle depreciation rates data.

Sources:

Kaggle

<https://www.kaggle.com/code/alexandersylvester/used-cars-eda-with-depreciation-analysis>

https://www.kaggle.com/datasets/taeefnajib/used-car-price-prediction-dataset

**3 - Maintenance**

Maintenance costs data.

Read a bit more (<https://www.bankrate.com/loans/auto-loans/average-car-maintenance-costs/>)

https://www.theaa.ie/motoring-advice/cost-of-motoring/

Sources: AAA

**4 - Insurance**

Average insurance costs data.

Sources: Chill (<https://www.chill.ie/blog/car-insurance-pricing-index/>)

**5 - Financing**

Interest rates and financing terms data

Sources:Statista (<https://www.statista.com/statistics/290673/auto-loan-rates-usa/>)

Investopedia

(https://www.investopedia.com/articles/personal-finance/061615/how-interest-rates-work-car-loans.asp)

**6 - Fuel type cost**

Fuel prices and EV rates data.

Sources: https://www.gulfoilltd.com/exploring-ev-and-petrol-running-costs-across-nations

**7 - Electric Vehicle Infrastructure**

Locations of national EV stations

Sources: https://www.electromaps.com/en/charging-stations/ireland/county-dublin/dublin

**8 - Government Grants and Tax**

Information on tax relief and credits for EV vehicles.

Sources

Revenue: : <https://www.revenue.ie/en/vrt/calculating-vrt/electric-hybrid-vehicles.aspx>

Windsor: https://www.windsor.ie/news/ev-tax-benefits-bik-aca/

Citizen Information: https://www.citizensinformation.ie/en/travel-and-recreation/motoring/buying-or-selling-a-vehicle/electric-vehicles/

**9 - Environmental Impact**

Carbon emissions and Co2 emission data

Possible sources:

TCE https://www.transportenvironment.org/articles/how-clean-are-electric-cars?gad\_source=1&gclid=CjwKCAjwx4O4BhAnEiwA42SbVEw1-qisvuTCyQbGoXXqrc8ZXXqIm16eGbJVyQgy4BdOXrhS-P-HKhoCsj8QAvD\_BwE

Evidence of usage.

// Need to research and check each one

**Ethical Considerations**

As the project intends to collect user data to provide a more personalised dashboard, it is important to comply with the current laws and collect only the necessary data avoiding as much as possible sensitive and private data collection.

It is crucial to present the user with terms and privacy consent that outlines the purpose of the data collection, time the data will be held, and the responsibilities around data protection .

Below are some key ethical considerations which should be carry over the project implementation:

**Societal Impact**

While considering environmental benefits by promotives electric vehicles, promote unbiased comparisons so customers can make informed and personal decisions on their own circustances.

Finally ensure the tool is compliant with the current lows, not crossing lines and boundaries when it comes to user rights and advertising.

**Bias in Predictive Modeling**

While training the models, the usage of diverse and representative datasets to minimize biases related to geography and demographics. Implement regular testing against any kind of discriminatory outcomes and adjust algorithms to have a fair result.

Further details of the assessment:

1. **A GitHub link will be provided on Moodle, and the report Word document must be put into a GitHub repo for version control. GitHub's activity tracking ensures transparency and original work. There should be at least 10 to 15 commits throughout the project. Put the GitHub link at the end of your report.**

**https://github.com/bragayuri/strategic-thinking-ca-1**

1. **Support your analysis with references and properly reference ALL sources that you have used. WARNING – If you do not support your work, you will not receive a high mark!**
2. WORD COUNT: 1,000 words. You may lose up to 10% of marks if your report is too short or long!

## Assessment Requirements

All assessment submissions must meet the following minimum requirements:

* Be submitted in the format outlined in the assignment summary table.
* Ethics form signed by all students and submitted as PDF.
* ZIP or RAR files will not be accepted. Files must be submitted separately.
* Capstone Project proposal report in Word ONLY format of about 1,000 words
* Be submitted by the deadline date specified or be subject to late submission penalties.
* Be submitted via Moodle upload.
* Use [Harvard Referencing](http://40.115.124.2/sp/subjects/guide.php?subject=harvardref) when citing third party material.
* Be the student’s own work.
* Include the CCT assessment cover page.

## Learning Outcomes:

This assessment addresses the following module learning outcomes for this module:

1. Critically evaluate the relationship between information technology infrastructure and organisational competitive advantage.

2. Critically analyse and select open source and proprietary software with a view to developing IT

solutions for business and business-related IT problems.

3. Utilise tools of strategic business analysis to evaluate the current macro and micro business environment with a view to formulating future action plans.

4. Research emerging technologies and critically evaluate their impact on business and business information systems in general.

5. Understand the relationship between data gathering/utilisation and business intelligence and its impact on industry policy.

## Statement of Acceptable Use of Artificial Intelligence

| **Acceptable and Unacceptable Use of AI** |
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| * The use of generative AI tools (e.g. ChatGPT, Dall-e, etc.) is permitted in this assignment for the following activities:   + Brainstorming and refining your ideas;   + Fine tuning your research questions;   + Finding information on your topic;   + Drafting an outline to organise your thoughts; and   + Checking grammar and style. * The use of generative AI tools is not permitted in this course for the following activities:   + Impersonating you in classroom context   + Completing group work that your group has assigned to you   + Generating code for your assignment   + Writing a draft of a writing assignment   + Writing entire sentences, paragraphs or papers to complete class assignments. * You are responsible for the information you submit based on an AI query. Your use of AI tools must be properly documented and cited. * Any assignment that is found to have used generative AI tools in an unauthorised way will be subject to college disciplinary procedures as outlined in the QA Manual. * When in doubt about permitted usage, please ask for clarification. |

## Grading Criteria

This grading rubric sets out the marking criteria for your assignment.

| **Criteria** | ***Project Proposal*** | ***Scope and Methodology*** | ***Data and Ethical Considerations*** |
| --- | --- | --- | --- |
| **Weighting per criteria** | **40%** | **40%** | **20%** |
| *Excellent (+70%)* | Clear, well-structured overview with clear, concise objectives and a well-explained problem definition. | Scope and methodology are very well-defined, with appropriate methods and detailed timelines for each stage. | Excellent identification and explanation of data sources. Ethical considerations are thoroughly addressed. |
| *Very Good (60 - 69%)* | Good overview with clearly stated objectives and mostly well-explained problem definition. | The scope and methodology are well-defined, but minor details are missing. The timeline effectively covers all main tasks. | Data sources are identified with some explanation; ethical considerations are adequately addressed. |
| *Good (50 - 59%)* | The overview and objectives are clear but lacking in detail. The problem definition may be vague. | Scope and methods are sufficiently defined but lack depth or detail. The timeline covers most tasks. | Data sources are listed with a basic explanation. Ethical concerns are briefly mentioned but not fully explored. |
| *Acceptable (40 - 49%)* | Objectives and problem definitions are present but underdeveloped and lack clarity. | Scope and methods are minimally addressed. The timeline is incomplete or lacks important details. | Data sources are vaguely mentioned. Ethical considerations are minimal and need more depth. |
| *Fail (< 39%)* | Little to no explanation of objectives or problem definition. | The scope and methodology are unclear or missing. No clear timeline. | Data sources and ethical considerations are either missing or not addressed at all. |

**The Irish Grading System**

The grading system in CCT is the QQI percentage grading system and is in common use in higher education institutions in Ireland. The pass mark and thresholds for different grade bands may be different from what you have experienced in the higher education system in other countries. CCT grades must be considered in the context of the grading system in Irish higher education and not assumed to represent the same standard the percentage grade reflects when awarded in an international context.

Please review the CCT Grade Descriptor available on the module Moodle page for a detailed description of the standard of work required for each grade band, and review the marking criteria outlined in this assignment brief for a breakdown of the marking criteria for this specific assignment.

**Additional Information**

* Lecturers are not required to review draft assessment submissions. This may be offered at the lecturer’s discretion.
* In accordance with CCT policy, feedback to learners may be provided in written, audio or video format and can be provided as individual learner feedback, small group feedback or whole class feedback.
* Results and feedback will only be issued when assessments have been marked and moderated / reviewed by a second examiner.
* Additional feedback may be provided as individual, small group or whole class feedback. Lecturers are not obliged to respond to email requests for additional feedback where this is not the specified process or to respond to further requests for feedback following the additional feedback.
* Following receipt of feedback, where a student believes there has been an error in the marks or feedback received, they should avail of the recheck and review process and should not attempt to get a revised mark / feedback by directly approaching the lecturer. Lecturers are not authorised to amend published marks outside of the recheck and review process or the Board of Examiners process.
* Students are advised that disagreement with an academic judgement is not grounds for review.
* For additional support with academic writing and referencing students are advised to contact the CCT Library Service.
* For additional support with subject matter content students are advised to contact the [CCT Student Mentoring Academy](https://moodle.cct.ie/course/view.php?id=827)
* For additional support with IT subject content, students are advised to access the [CCT Support Hub](https://moodle.cct.ie/course/view.php?id=1861).