

POLITEKNIK UNGKU OMAR

**PROPOSAL A NEW ROADMAPS INSIDE
POLYTECHNIC UNGKU OMAR**

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CIVIL ENGINEERING DEPARTMENT

FEB 2023

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**this report is submitted to the civil engineering department as a
condition for awarding the civil engineering diploma**

CIVIL ENGINEERING DEPARTMENT

FEB 2023

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PROPOSAL A NEW ROADMAPS INSIDE POLYTECHNIC UNGKU OMAR

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In front of me, En. Kamarudin bin Yunus as Project Supervisor on June 2023

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We started on this page to thank you to individuals who helped us doing this project. To the final semester coordinate. We also wish to thank our group supervisor Encik Kamarudin Bin Yunus who understand and high motivated to us for this project.

In this opportunity, we would like to express appreciation to the parents as ready to understand and inspire us to accomplish this project. Words of encouragement and wisdom of these we will embed in our hearts. Accept our offering as a symbolic to show our appreciation to individuals who helped. A special thanks to our group member that very determined to complete this project innovation for Civil Engineering Project this semester.

ABSTRACT

Efficient transportation within educational campuses plays a crucial role in ensuring smooth daily operations and enhancing the overall experience of students, faculty, and staff. This abstract explores the benefits of adding road infrastructure to campus environments, highlighting their positive impact on mobility, safety, and sustainability. In recent years, educational institutions have experienced significant growth in student enrolment and campus expansions, resulting in increased vehicular traffic. Traditional linear road networks often struggle to handle this surge, leading to congestion, delays, and safety concerns. By integrating road infrastructure and roundabouts strategically within campus layouts, several advantages can be achieved. Firstly, the addition of well-designed roads facilitates better traffic flow, allowing for improved accessibility and reduced congestion. Efficient road networks distribute vehicles across campus areas, minimizing bottlenecks and optimizing travel times. Roundabouts, compared to traditional traffic signal intersections, enhance safety by minimizing collision risks and reducing the severity of accidents. Their circular design encourages slower speeds, promotes better driver awareness, and provides continuous traffic flow without the need for stoplights or stop signs. Moreover, roundabouts contribute to sustainability efforts by reducing vehicle idling times and emissions, further aligning with environmentally conscious campus initiatives. Furthermore, the integration of road infrastructure and roundabouts within campuses promotes multi-modal transportation. By incorporating dedicated lanes for bicycles, pedestrians, and public transportation, campuses become more accessible and encourage alternative means of commuting. This inclusive approach fosters a sense of community, reduces dependence on single-occupancy vehicles, and supports environmental stewardship. In conclusion, the addition of road infrastructure and roundabouts to campuses offers a multitude of advantages. These improvements enhance mobility, reduce congestion, increase safety, and contribute to sustainable transportation practices. Educational institutions stand to benefit greatly from carefully planned road systems and roundabouts, ensuring a conducive and efficient campus environment that supports the needs of its diverse community.

ABSTRAK

Transportasi yang efisien di dalam kampus pendidikan memainkan peranan penting dalam memastikan operasi harian yang lancar dan meningkatkan pengalaman keseluruhan pelajar, fakulti, dan kakitangan. Abstrak ini meneroka manfaat menambah infrastruktur jalan raya ke dalam persekitaran kampus, menekankan impak positif mereka terhadap mobiliti, keselamatan, dan kelestarian. Dalam beberapa tahun terakhir, institusi pendidikan telah mengalami pertumbuhan yang signifikan dalam pendaftaran pelajar dan pengendalian kampus, yang mengakibatkan peningkatan trafik kenderaan. Rangkaian jalan raya linear tradisional sering menghadapi masalah menangani lonjakan ini, menyebabkan kesesakan, kelewatan, dan ketidakseimbangan keselamatan. Dengan mengintegrasikan infrastruktur jalan raya dan bulatan ke dalam susunan kampus secara strategik, beberapa kelebihan boleh dicapai. Pertama, penambahan jalan yang direka dengan baik memudahkan aliran trafik yang lebih baik, membolehkan aksesibiliti yang lebih baik dan mengurangkan kesesakan. Rangkaian jalan raya yang efisien mengagihkannya kenderaan di seluruh kawasan kampus, mengurangkan sempadan dan mengoptimumkan masa perjalanan. Bulatan, berbanding dengan persimpangan lampu isyarat trafik tradisional, meningkatkan keselamatan dengan mengurangkan risiko kemalangan dan mengurangkan keterukan kemalangan. Reka bentuk bulatannya menggalakkan kelajuan yang lebih perlahan, meningkatkan kesedaran pemandu, dan menyediakan aliran trafik yang berterusan tanpa perlu lampu isyarat atau tanda berhenti. Selain itu, bulatan menyumbang kepada usaha kelestarian dengan mengurangkan masa ralat kenderaan dan emisi, sejajar dengan inisiatif kampus yang peka alam. Kesimpulannya, penambahan infrastruktur jalan raya dan bulatan ke dalam kampus menawarkan pelbagai kelebihan. Penambahbaikan ini meningkatkan mobiliti, mengurangkan kesesakan, meningkatkan keselamatan, dan menyokong amalan pengangkutan yang mampan. Institusi pendidikan mendapat manfaat yang besar dari sistem jalan yang dirancang dengan teliti dan bulatan, memastikan persekitaran kampus yang kondusif dan efisien yang menyokong keperluan komunitinya yang pelbagai.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

Nowadays, there are several information about roadways issues in polytechnic. Polytechnic is a public institution that was developed by KPTM across the country to produce energy semi-professionals in various fields of technical and vocational education to meet the demands of the Malaysia workforce. Polytechnic offers a variety of courses at certificate and diploma to recognize and work eligibility to students.

Polytechnic education was introduced in Malaysia through the establishment of Polytechnic. Firstly, the Polytechnic Ungku Omar in Ipoh under the United Nations Development Plan in 1969. Certificate of education is reinforced by the cabinet committee on education in 1979 and the first National Industrial Master Plan (1985 – 1995). Polytechnic Ungku Omar (PUO) have a large number of students, faculty and staff coming a peak time, leading to traffic congestion and delays. Roadways within PUO require ongoing maintenance and repairs to ensure they remain safe and functional. This can include regular and road surfacing and drainage maintenance. Polytechnic must ensure that their roadways are accessible to all users.

One of the primary considerations in road design is the traffic volume and speed. Roads are typically classified based on the number of lanes, width of the lanes, and the type of vehicles that are expected to use them. The design also takes into account factors such as terrain, weather conditions, and the intended use of the road. Road construction involves the use of various materials such as asphalt, concrete, and gravel. The construction process includes earthworks, sub-base, base course, and surface course. Roads must be built to withstand traffic loads, resist wear and tear, and provide a smooth driving surface. Maintenance of roads is essential to ensure their longevity and safety. Maintenance includes activities such as filling potholes,

repairing cracks, and resurfacing the road. Proper maintenance can also improve the safety of the road and reduce the risk of accidents.

In a nutshell, Polytechnic Ungku Omar (PUO) face a number challenges related the road design in campus PUO is not consider in road design traffic road.

This is particularly problematic on narrow pathways and roads, which can impede the flow of traffic and make it difficult. These has led to improvements in terms of traffic management. It's important to involve the community in the planning process for new road additions. This can help to ensure that the needs and concerns of all stakeholders are taken into account and can help to build support for the project among students, faculty and local residents.

There are some new values for proposed roads in this study. The first new value was improved accessibility. New roads can make it easier for people to navigate around polytechnic, especially for those with mobility issues. This can help to improve overall accessibility and inclusivity. Next, new value create through this project is an increased convenience. New roads can make it quicker and more convenient for people to get their destinations within the polytechnic. This can help to reduce travel times and improve the overall user experience. Finally, the important new value create was enhanced safety. Adding new roads can help to reduce the risk of accidents and collisions by providing additional space for vehicles, pedestrians and cyclist. This can also help to improve the overall safety of the polytechnics.

Overall, the study of roads is a multidisciplinary field that encompasses various aspects of transportation infrastructure, engineering, safety, and environmental impact.

1.2 PROBLEM STATEMENT.

The Polytechnic Ungku Omar sees bad traffic flow at peak hours. Students, lectures, and staff experience delays and frustration as a result of the traffic congestion

on and around the campus, which has an impact on their everyday activities. To maintain the comfort and safety of the campus community.

- i. The amount of traffic during peak hours is too much for the PUO traffic control system to handle. Traffic congestion eventually has an impact on the campus's ability to run smoothly due to the few access and departure points and small roads.
- ii. The PUO has several small roads that connect different buildings and areas within the premises. However, these small roads are facing several issues that need to be addressed for the efficient movement of users and any size of vehicles inside the campus. The current condition of the small roads is causing inconvenience and safety hazards for the PUO community. The problem statement aims to identify and resolve these issues to ensure a smooth and safe transportation experience within the campus

Based on the online survey, 86.1% agree about our renewal roadmaps inside PUO. It is because people can get advantages from it such as ability to run smoothly due to the few access and departure points and small roads. Therefore, it should be highlighted that the Polytechnic Ungku Omar traffic management concerns are a severe issue that need to be addressed right away. A thorough approach to traffic management could improve students and staff comfort, safety and productivity on campus while also generating a better learning environment.

1.3 RESEARCH FRAMEWORK.

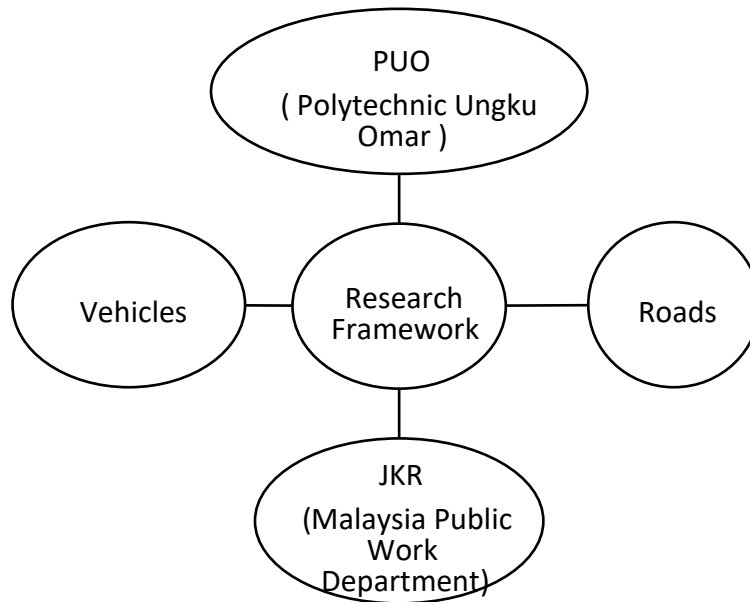


Figure 1.1: Research Framework

1.4 OBJECTIVE.

The objective of in this project is to improve accessibility and connectivity within the campus. Adding a new road can provide a direct route between different areas of the campus, reduce congestion on existing roadways and improve access to buildings, facilities and parking. The specific objectives of this project are as follows :

- i. To design a renewal roadmaps inside Polytechnic Ungku Omar.
- ii. To develop animation a renewal roadmaps inside Polytechnic Ungku Omar.
- iii. To test the design flow.

Overall, this project is to improve campus accessibility, safety and efficiency and support the growth and development of the institution.

1.5 IMPORTANCE ACTIVITY.

There are several important activities that need to be considered when adding roadmaps in a polytechnic. These may include:

- i. Conducting a feasibility study: A feasibility study is a preliminary assessment of the proposed project, which aims to identify potential risks, costs, benefits, and impacts of the project. It will help to determine whether the project is technically feasible, financially viable, and socially acceptable.
- ii. Planning and design: This activity involves the detailed planning and design of the new roadway or roadways, including the layout, alignment, width, and drainage. It is important to ensure that the new roadway or roadways are designed to meet the specific needs of the polytechnic, while also taking into account safety considerations and local regulations.
- iii. Obtaining necessary permits and approvals: The construction of new roadways may require permits and approvals from various government agencies, including local, state, and federal authorities. It is important to obtain all necessary permits and approvals before beginning construction to avoid any potential legal or financial issues.
- iv. Construction: This activity involves the actual construction of the new roadway or roadways. It is important to ensure that the construction is carried out according to the approved plans and specifications, and that safety measures are in place to protect workers, students, faculty, staff, and visitors.
- v. Post-construction evaluation: After the construction of the new roadway or roadways is complete, it is important to evaluate its performance and effectiveness. This evaluation should include an assessment of traffic flow, safety, and user satisfaction, among other factors.

Overall, adding roadmaps in a polytechnic requires careful planning, design, and construction, as well as ongoing evaluation and maintenance to ensure the safety and effectiveness of the transportation infrastructure.

1.6 SCOPE OF STUDIES.

The scope of studying the addition of roadmaps in a polytechnic would depend on the specific goals. However, some potential areas of focus could include:

- i. Road design analysis: The study could analyze the current road traffic in the polytechnic and the impact that the addition of new roadways could have on traffic flow. This could involve modeling traffic using animation software, such as ADOBE, and conducting simulations to determine the optimal layout for the proposal new roadmaps in PUO.
- ii. Environmental impact assessment: The addition of new roadmaps could have an impact on the surrounding environment. The study could assess the potential environmental impacts of the new roadmaps, including old building, old sewerage system, septic tank, old pipe line, air pollution, noise pollution, and effects on local wildlife.
- iii. Cost-benefit analysis: The study could evaluate the costs and benefits of adding new roadmaps to the polytechnic. This would involve estimating the costs of construction and maintenance of the new roadmaps, as well as the benefits in terms of improved road design and reduced congestion.
- iv. Safety assessment: The study could assess the safety implications of adding new roadways. This would involve analyzing accident data for the polytechnic and identifying potential safety hazards that could arise from the new roadways.
- v. Community engagement: The study could involve engaging with the local community to gather feedback and opinions on the addition of new roadways. This could help to ensure that the new roadways are designed in a way that meets the needs of the community and minimizes any negative impacts.

In summary, the scope of a renewal roadmaps inside Polytechnic Ungku Omar is broad, encompassing a range of activities related to traffic flow analysis, parking management, transportation planning, pedestrian safety, sustainable transportation, environmentally friendly transportation system that satisfies everyone's needs is possible with the aid of effective traffic management.

1.7 DEFINITION.

In definition, adding this project in a polytechnic refers to the process of designing and constructing new roads within the boundaries of a polytechnic institution. This may involve the creation of entirely new road networks or the expansion of existing roads to accommodate increased traffic or changes in the layout of the polytechnic campus. The objective of renewal roadmaps in a polytechnic is typically to improve accessibility and mobility within the campus, enhance safety, and reduce congestion. The process of adding roadways in a polytechnic typically involves various stakeholders, including engineers, architects, environmental experts, and community representatives, who work together to design and implement the new roadways in a way that meets the needs of the institution and its users. Traffic design inside Polytechnic Ungku Omar entails the implementation of numerous strategies and tactics to guarantee secure, effective, and environmentally friendly transportation throughout the campus. by controlling traffic flow, parking, pedestrians safety and rule compliance, it seeks to improve the entire transportation system.

CHAPTER 2

LITERATURE REVIEW

A literature review is a critical analysis and synthesis of published research and scholarly articles on a specific topic or research question. It involves systematically searching, evaluating, and synthesizing the existing literature to identify gaps in knowledge and highlight significant findings.

The purpose of a literature review is to provide an overview of the current state of knowledge on a particular topic, to identify research gaps or inconsistencies in findings, and to highlight areas where further research is needed. It is a critical component of academic research, and is used to establish the theoretical framework and research methodology for a study, as well as to provide context and justification for the research question.

A literature review typically involves identifying and selecting relevant sources of information, summarizing and synthesizing the findings from these sources, and analyzing and interpreting the implications of these findings for the research question at hand. The review may also identify methodological or theoretical limitations of existing research and suggest potential areas for future research.

2.1 INTRODUCTION

In a similar vein, a study examined the development of a road maps for research and innovation in higher education. The authors found that a successful roadmap should be based on a shared vision, involve input from a wide range of stakeholders, and be regularly reviewed and updated to ensure its continued relevance. Polytechnic campuses play an important role in providing technical education and training to students. As these campuses continue to grow, there is a need to ensure that they are safe, accessible, and efficient for students, faculty, and staff. One way to achieve this is by adding road maps to the campus. The addition of roadmaps can improve accessibility, safety, and

efficiency by providing easy and efficient transportation for everyone. However, adding roadways can also present challenges such as cost, environmental impact, and disruption to campus operations. This literature review will explore the benefits of adding roadmaps to a polytechnic campus, the challenges associated with such an addition, and best practices for designing and implementing roadways to ensure that they are safe, sustainable, and accessible for all members of the campus community.

A road map, route map, or street map is a map that primarily displays roads and transport links rather than natural geographical information. It is a type of navigational map that commonly includes political boundaries and labels, making it also a type of political map. In addition to roads and boundaries, road maps often include points of interest, such as prominent businesses or buildings, tourism sites, parks and recreational facilities, hotels and restaurants, as well as airports and train stations. A road map may also document non-automotive transit routes, although often these are found only on transit maps.

2.2 ISSUES

Roadmaps in Polytechnic Ungku Omar can pose various issues, including safety hazards, congestion, and environmental concerns. One of the main safety hazards is the potential for accidents between vehicles and pedestrians or cyclists. Campuses often have a high concentration of people walking or biking, and if the roadways are not properly designed and managed, it can lead to accidents. Congestion can also be a problem, particularly during peak times such as class changes or events. If the campus roadways are not designed to handle the volume of traffic, it can lead to traffic jams and delays, which can negatively impact the experience of students, staff, and visitors. Finally, roadways can contribute to environmental concerns, such as air pollution and carbon emissions. If the campus relies heavily on cars, it can contribute to increased air pollution and greenhouse gas emissions, which can have negative impacts on both the local and global environment.

2.2.1 SAFETY HAZARDS

These are the most common and will be present in most workplaces at one time or another. They include unsafe conditions that can cause injury, illness and death.

Safety hazards include:

- i. Spills on floors or tripping hazards, such as blocked aisles or cords running across the floor
- ii. Working from heights, including ladders, scaffolds, roofs, or any raised work area
- iii. Unguarded machinery and moving machinery parts; guards removed or moving parts that a worker can accidentally touch
- iv. Electrical hazards like frayed cords, missing ground pins, improper wiring
- v. Confined spaces
- vi. Machinery-related hazards (lockout/tagout, boiler safety, forklifts, etc)

Biological Hazards. Associated with working with animals, people, or infectious plant materials. Work in schools, day care facilities, colleges and universities, hospitals, laboratories, emergency response, nursing homes, outdoor occupations, etc. may expose you to biological hazards. These are types of thing you may be exposed to include:

- i. Blood and other body fluids
- ii. Fungi/mold
- iii. Bacteria and viruses
- iv. Insect bites
- v. Plants
- vi. Animal and bird droppings

Physical Hazards. Are factors within the environment that can harm the body without necessarily touching it. Physical hazards include:

- i. Radiation: including ionizing, non-ionizing (EMF's, microwaves, radio waves, etc.)
- ii. High exposure to sunlight/ultraviolet rays
- iii. Temperature extremes – hot and cold constant loud noise

Ergonomic Hazards: Occur when the type of work, body positions and working conditions put strain on your body. They are the hardest to spot since you don't always immediately notice the strain on your body or the harm that these hazards pose. Short-term exposure may result in "sore muscles" the next day or in the days following exposure, but long-term exposure can result in serious long-term illnesses. Ergonomic hazards include:

- i. Improperly adjusted workstations and chairs
- ii. Frequent lifting
- iii. Poor posture
- iv. Awkward movements, especially if they are repetitive
- v. Repeating the same movements over and over
- vi. Having to use too much force, especially if you have to do it frequently
- vii. Vibration

Chemical Hazards. Are present when a worker is exposed to any chemical preparation in the workplace in any form (solid, liquid or gas). Some are safer than others, but to some workers who are more sensitive to chemicals, even common solutions can cause illness, skin irritation, or breathing problems. Beware of:

- i. Liquids like cleaning products, paints, acids, solvents – especially if chemicals are in an unlabeled container
- ii. Vapors and fumes that come from welding or exposure to solvents
- iii. Gases like acetylene, propane, carbon monoxide and helium
- iv. Flammable materials like gasoline, solvents, and explosive chemicals
- v. Pesticides

Work Organization Hazards. Hazards or stressors that cause stress (short-term effects) and strain (long-term effects). These are the hazards associated with workplace issues such as workload, lack of control and/or respect etc. these are example of work organization hazards include:

- i. Workplace demands
- ii. Workplace violence
- iii. Intensity or pace
- iv. Respect (or lack of)
- v. Flexibility
- vi. Control or say about things
- vii. Social support/relations



Figure1.2: Safety hazards

2.2.2 CONGESTION

Congestion is a term used to describe a situation in which a road network, public transportation system, or other infrastructure is operating at or beyond its capacity. Congestion can occur in urban, suburban, and rural areas, and can have significant impacts on mobility, economic productivity, public health, and the environment. In this

essay, we will explore the causes and effects of congestion, as well as potential solutions to address this complex problem.

Congestion can be caused by a variety of factors, including population growth, urbanization, insufficient infrastructure, and inefficient transportation systems. As cities and towns grow, more people need to travel to work, school, and other destinations, and this increased demand can quickly overwhelm existing transportation systems. For example, in many cities, the number of cars on the road has increased much faster than the construction of new roads or highways, leading to gridlock and other problems.

Another cause of congestion is urbanization. As more people move into cities and urban areas, the demand for transportation services and infrastructure increases. Additionally, cities tend to have more complex transportation networks and higher population densities, which can exacerbate congestion problems.

Insufficient infrastructure is another major cause of congestion. In many areas, transportation systems have not kept pace with population growth, resulting in overcrowded roads, transit systems, and airports. Additionally, insufficient investment in maintenance and repair can lead to breakdowns, delays, and other problems that worsen congestion.

Finally, inefficient transportation systems can contribute to congestion. For example, many cities have transit systems that are slow, unreliable, or infrequent, which can discourage people from using public transportation and lead to more cars on the road. Similarly, poor traffic management, such as poorly timed traffic lights or inadequate signage, can exacerbate congestion by creating bottlenecks and slowing traffic flow.

Effects of Congestion:

Congestion can have a range of negative effects on individuals, communities, and the environment. Some of the most significant effects of congestion include:

- i. **Reduced mobility:** Congestion can make it more difficult for people to get to work, school, and other destinations on time. In some cases, it can also make it more difficult for emergency vehicles to reach their destinations quickly.

- ii. Increased travel time: Congestion can increase travel times significantly, leading to lost productivity, increased fuel consumption, and higher transportation costs.
- iii. Air pollution: Congestion can lead to increased air pollution, as cars and trucks idle in traffic and emit exhaust fumes. This can have serious health effects, particularly for people with respiratory problems or other pre-existing conditions.
- iv. Noise pollution: Congestion can also create significant noise pollution, particularly in urban areas. This can lead to sleep disturbances, stress, and other negative health effects.
- v. Economic impacts: Congestion can have significant economic impacts, particularly for businesses that rely on transportation networks to move goods and services. Delays and other disruptions can lead to lost productivity, increased costs, and reduced competitiveness.

Solutions to Congestion:

There is no single solution to congestion, and addressing this complex problem requires a multifaceted approach that includes investments in infrastructure, improvements to transportation systems, and changes in individual behaviour. Some potential solutions to congestion include:

- i. Investing in public transportation: Investing in public transportation can provide people with alternative transportation options, which can reduce the number of cars on the road. This can be done by expanding existing transit systems, introducing new modes of transportation such as bike-sharing programs, and creating more walkable communities.
- ii. Implementing congestion pricing: Congestion pricing is a system that charges drivers a fee to drive in congested areas during peak hours. This can reduce the number of cars on the road during peak hours and encourage people to use alternative modes of transportation.
- iii. Encouraging telecommuting: Telecommuting, or working from home, can help reduce the number of cars on the road during peak hours. This can be encouraged

by employers through flexible work arrangements and technology that enables remote work.

- iv. Building more bike lanes and pedestrian walkways: Building more bike lanes and pedestrian walkways can encourage people to walk or bike instead of driving. This can be done by local governments and transportation agencies, and can also be supported by private companies.
- v. Encouraging carpooling: Carpooling is when two or more people share a car to commute to work or other destinations. This can reduce the number of cars on the road and can also help reduce the cost of commuting for individuals.
- vi. Improving traffic management: Improving traffic management can help reduce congestion by optimizing the flow of traffic on roads and highways. This can be done by using intelligent transportation systems that use sensors and data to manage traffic flow.
- vii. Implementing flexible work hours: Flexible work hours can help reduce congestion by spreading out the number of people commuting during peak hours. This can be encouraged by employers through flexible scheduling and telecommuting options.

In conclusion, addressing congestion requires a multifaceted approach that includes investments in infrastructure, improvements to transportation systems, and changes in individual behaviour. By implementing a range of solutions, we can reduce congestion and create more sustainable transportation systems that benefit everyone.

2.2.3 ENVIRONMENTAL CONCERNS

Environmental concerns refer to a range of issues related to the degradation, depletion, and destruction of the natural world. These concerns are complex and multifaceted, and they pose a significant threat to the well-being of the planet and all its inhabitants. In this essay, we will explore some of the most pressing environmental concerns facing the world today, including climate change, deforestation, pollution, and loss of biodiversity.

Climate Change: Climate change is one of the most significant environmental concerns facing the world today. It refers to the long-term changes in the Earth's climate, including rising temperatures, more frequent and severe weather events, and melting ice caps. Climate change is primarily caused by human activities, including the burning of fossil fuels, deforestation, and agriculture.

The impacts of climate change are far-reaching and include rising sea levels, more intense and frequent heatwaves, droughts, floods, and more severe storms. These impacts have significant consequences for human health, ecosystems, and economies. For example, rising sea levels can lead to coastal flooding, which can damage infrastructure and displace communities. Heatwaves can increase the risk of heat-related illness and death, and droughts can lead to food and water shortages.

To address climate change, countries around the world are working to reduce greenhouse gas emissions. This includes transitioning to renewable energy sources, improving energy efficiency, and reducing deforestation. The United Nations Framework Convention on Climate Change (UNFCCC) has been working to address climate change since 1992, and the Paris Agreement of 2015 aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels.

Deforestation: Deforestation is another major environmental concern. It refers to the clearing of forests, typically for commercial purposes, such as agriculture or logging. Deforestation has significant impacts on the environment, including loss of biodiversity, soil erosion, and increased greenhouse gas emissions.

Forests play a critical role in the carbon cycle, absorbing carbon dioxide from the atmosphere and storing it in biomass and soil. When forests are cleared, this carbon is released into the atmosphere, contributing to climate change. Deforestation also destroys habitats for many plant and animal species, leading to the loss of biodiversity.

To address deforestation, many countries have implemented policies to promote sustainable forest management and reduce illegal logging. Additionally, there is a

growing demand for sustainably produced commodities, such as palm oil and soy, which can help reduce the pressure to clear forests for agriculture.

Pollution: Pollution is a significant environmental concern that can take many forms, including air pollution, water pollution, and soil pollution. It refers to the release of harmful substances into the environment, typically by human activities, such as industry, transportation, and agriculture.

Air pollution can lead to respiratory and cardiovascular disease, while water pollution can cause illness and ecological damage. Soil pollution can reduce soil fertility and harm plant and animal life.

To address pollution, countries around the world have implemented regulations to reduce emissions from industry and transportation and to ensure that waste is disposed of safely. Additionally, there is a growing demand for sustainable products and production processes that minimize pollution.

Loss of Biodiversity: Biodiversity refers to the variety of life on Earth, including the variety of plant and animal species, as well as the genetic diversity within species. Loss of biodiversity is a significant environmental concern, as it can have significant impacts on ecosystems, economies, and human health.

Loss of biodiversity can result from habitat destruction, pollution, overfishing, and climate change. When species disappear, it can disrupt entire ecosystems, leading to declines in ecosystem services, such as pollination and water purification.

To address loss of biodiversity, many countries have implemented policies to protect endangered species and their habitats. Additionally, there is a growing recognition of the importance of ecosystem services and the need to protect and restore.

To address these issues, campuses can take a variety of steps, including:

- i. Designing roadmaps with safety in mind, such as providing separate bike lanes, crosswalks, and traffic calming measures
- ii. Encouraging alternative modes of transportation, such as biking, walking, or public transit
- iii. Implementing policies to reduce single-occupancy vehicle use, such as carpooling or charging for parking
- iv. Providing incentives for using alternative modes of transportation, such as bike parking or discounts on public transit passes
- v. Using sustainable transportation options, such as electric or hybrid vehicles, to reduce emissions.
- vi. By taking these steps, campuses can create safer, more sustainable, and more enjoyable environments for everyone who uses them.

There are several types of roads in Malaysia, as involve:

- i. Federal roads - These are roads that are maintained and managed by the federal government, which are usually the main arterial roads connecting major towns and cities in the country.
- ii. State roads - These are roads that are maintained and managed by the state governments, which serve as the primary connection between smaller towns and villages within each state.
- iii. Municipal roads - These are roads that are maintained and managed by the local government authorities, which are usually located within urban and suburban areas.
- iv. Expressways or highways - These are toll roads that are built to provide faster and more efficient travel between major cities and towns.
- v. Rural roads - These are unpaved or partially paved roads that are located in rural areas, connecting small villages and farms to the main road network

2.3 PREVIEW DATA

2.3.1 CAMPUS ROAD

- i. A total of RM24.5 million was allocated by the United Nation Development Programme (UNDP). UNESCO was assigned with the responsibility of planning and executing the polytechnic's construction on an area of 22.6 hectares. But the road distance is 2.2km from first gate to exit campus B.
- ii. The road was built in 1969.
- iii. Type of the road is rural road

2.3.2 ENTERANCE GATE

- i. Polytechnic Ungku Omar, which is located on Jalan Raja Musa Mahadi, has two entrance gates. The entrance to campus A is in front of Masjid Sultan Azlan Shah. Campus B's entrance is in front of Jabatan Penyiaran Malaysia Negeri Perak.
- ii. The entrance to campus A is in front of Masjid Sultan Azlan Shah which is houses of Department of Civil Engineering, Department of Mechanical Engineering, Department of Electrical Engineering, Department of Marine Engineering, Department of Information and Communication Technology
- iii. Polytechnic Ungku Omar took over the campus of Maktab Perguruan Kinta on September 1, 1999. The Department of Commerce, Department of General Studies, Co-Curriculum Unit, and Examination Unit are currently located on this campus, which is now known as Campus B. The entrance to campus B is in front of Jabatan Penyiaran Malaysia Negeri Perak.

2.3.3 HOW MANY CAR (VEHICLES) CAMPUS

- i. Cars: 550
- ii. Motorcycles: 700
- iii. Buses: 7
- iv. bicycle: 13

2.3.4 HOW MANY STUDENTS USED THE ROAD IN CAMPUS

There 5531 students used the road in campus, the number includes degree and diploma students. A few students used a motorcycle, car, and walk to go to their department in a day.

2.3.5 ROAD DESIGN AND FURNITURE

Road design furniture for road management inside Polytechnic Ungku Omar may include:

- i. Proper road signs with clear and visible instructions help in directing traffic flow, indicating speed limits, highlighting pedestrian crossings, and providing guidance on parking areas.
- ii. Traffic cones are often used to temporarily redirect or block off certain areas of the road during maintenance or construction activities
- iii. Clear and well-maintained road markings, including lane dividers, arrows, and pedestrian crossings, help in guiding drivers and ensuring orderly traffic flow.
- iv. These small reflective markers are embedded in the road surface and provide enhanced visibility during low-light conditions, aiding drivers in navigating the road safely.
- v. Guardrails are installed along curves or areas where there is a height difference to provide protection and prevent vehicles from leaving the road in case of accidents.

These are some examples of road design furniture that may be used for road management inside Polytechnic Ungku Omar or any similar institution. However, it's important to note that specific road design and management practices may vary, and for accurate and detailed information, it is best to refer to the institution's official resources or contact them directly.

CHAPTER 3

METHODOLOGY

In this chapter, every of the components from each students has been researched and reviewed. Each students has focused on their own scope and had combine together all the data and research for this project. The project implementation methods will be explained starting from planning until this reference system of modular coordination is completed. For explain the implementation method of this project more clearly, diagrams, tables, gantt charts and drawing will be shown. This chapter also shows the initial process of analysis implemented including costs, materials and other costs that are directly related in project implementation. In this chapter the aspects related to the implementation method. And also each of steps has certain regulations and analysis requirements that have to be fulfilled.

3.1 INTRODUCTION

Methodology refers to the systematic and theoretical analysis of methods, practices, procedures, or rules used in a particular field of study or in solving a specific problem. It involves the principles, approaches, and techniques employed to conduct research, gather data, analyze information, and make conclusions or recommendations.

3.2 DEVELOPMET OF STUDY.

Study or project design refers to the overall plan or blueprint that outlines the objectives, methods, procedures, and resources required to conduct a research study or implement a project successfully. It encompasses the strategic decision-making process that shapes the direction and structure of the study or project. The cause and effect method is used in the research design, and it is determined whether quantitative data is collected.

Example 3.1 (Research Design):

This study was conducted using a cause and effect method. Inside PUO, we have identified the issue and the roadmap for the solution. We concluded from the survey that PUO's roadmap is bad. The issue is heavily congested traffic on some roads, like the entrance gate to enter and exit in PUO, which is inappropriate for heavy vehicle.

FIGURE 3.1: Research Design

Example 3.2 (Data Collection):

This study was carried out using quantitative methods. We do a survey using Google Forms. We ask students, faculty, and staff at Polytechnic Ungku Omar to answer the survey. The survey can gather information about their transportation preferences, commuting patterns, satisfaction with the road infrastructure, and any specific concerns or issues they face.

FIGURE 3.2: Data Collection

3.2.1 SAMPLING AND METHODS

In studying the roadmap inside Polytechnic Ungku Omar, it is essential to gather data that represents the various road segments and intersections within the campus. The aim of this study is to investigate various aspects of the road map, such as traffic patterns, road conditions, and safety considerations. To achieve this, employ a random sampling method that ensures that each road segment and intersection within the campus has an equal chance of being included in the sample. Proceed with simple random sampling. Randomly select a representative sample of road segments or intersections within Polytechnic Ungku Omar for data collection. This method ensures that each road segment or intersection has an equal chance of being included in the study, providing a fair representation of the entire road network.

- i. **Define the population of students inside Polytechnic Ungku Omar:** In this case, the population would be all the road segments or intersections within the Polytechnic Ungku Omar campus, which has 5531 students.
- ii. **Determine the Sample Size:** We determine the desired sample size based on the available resources, time constraints, and level of precision required for the study. For example, we consider the available resources, including time, budget, and manpower, when determining the sample size.
- iii. **Determine the sample required:** Review the estimated sample size and ensure it aligns with our research objectives, which are the renewal of the roadmap, statistical guidelines, and practical considerations.

The methods for this project is use by Google Forms as a platform to collect data using quantitative methods. From ask for the target population for our survey, such as students, faculty, staff, or visitors within Polytechnic Ungku Omar. The survey form is distributed to respondents using an online method. The data collection period lasted for a week. Among the topics of the survey are the appropriateness of road additions, roundabout additions, and traffic congestion.

Through this method, will find out the number of users who find it difficult. Also know that, there are many users who need a renewal of roadmap.

3.2.2 MATERIALS AND TOLLS

Figure 3.2 shows materials and tools are used throughout the construction process to excavate the area, prepare the ground, and safety measures, the specific materials and tools utilized may vary depending on the project's scope, site conditions and construction techniques employed.

MATERIAL/TOOLS	FUNCTIONS
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Cardboard 	To made some new roadmaps for our roadmaps. Cardboard is a generic term for heavy paper based products. The construction can range from a thick paper, and also the cardboard will be a building for this project.
Saw 	Saw are used for cutting cardboard. A large variety of saw and shears all exist for specialized purposes.
Colour Tape 	Colour tape is used for shows the old road ways and the new road ways. Red tape: old road ways Green tape: new road ways
Banner 	Banner is used for showing the real earth maps inside the Polytechnic Ungku Omar.

Table 3.2: Material for the project

3.2.3 ESTIMATE PROJECT COST

Estimating the project cost for infrastructure development, specifically adding a road and roundabout, requires detailed analysis and consideration of various factors. Without specific project details, it is challenging to provide an accurate estimate. However, A general breakdown of cost components typically involved in such projects

NO	ITEM	COST
1.	App Software	RM50
2.	Animation	RM100
3.	Model	RM60
4.	Print	RM70
5.	Saw	RM12
6.	Tape	RM5
	TOTAL	RM297.00

Table 3.3: Project cost

3.3 SUMMARY.

A comprehensive renewal roadmap has been devised to enhance the infrastructure and transportation systems within the polytechnic campus. The focus of this roadmap is to improve traffic flow, enhance accessibility, and create a safe and efficient environment for students, faculty, and visitors. One of the key components of the renewal roadmap is the addition of a new road within the polytechnic campus. This road is strategically designed to alleviate traffic congestion and facilitate smoother movement of vehicles. It will connect various sections of the campus, providing convenient access to different departments, facilities, and parking areas. The new road aims to streamline the flow of traffic, reduce travel time, and enhance overall campus connectivity.

Furthermore, a roundabout is planned as part of the renewal roadmap. The roundabout will serve as a traffic management solution, replacing a conventional intersection that often causes delays and congestion. By implementing a roundabout, the polytechnic aims to improve the overall traffic flow, minimize the number of stops, and enhance safety for pedestrians and cyclists. The roundabout will be designed with modern safety features, clear signage, and designated pedestrian crossings to ensure a smooth and secure experience for all users.

The renewal roadmap also incorporates sustainability principles in its design. Consideration is given to incorporating green spaces, landscaping, and environmentally friendly materials in the construction of the new road. These efforts aim to create an aesthetically pleasing campus environment while minimizing the ecological impact of the infrastructure development. To ensure the successful implementation of the renewal roadmap, a comprehensive plan has been developed, taking into account various factors such as feasibility, budget, and stakeholder input. Extensive consultations have been conducted with the polytechnic community, including students, faculty, and staff, to gather feedback and incorporate their needs and concerns into the plan.

In conclusion, the renewal roadmap for the polytechnic's infrastructure development envisions the addition of a new road and roundabout. These initiatives are aimed at improving traffic flow, enhancing accessibility, and creating a safe and efficient environment within the campus. Through careful planning, sustainable design, and stakeholder engagement, the polytechnic aims to create a modern and vibrant campus that meets the evolving needs of its community.

CHAPTER 4

RESULT AND DISCUSSION

4.1 INTRODUCTION

The renewal of way out and navigation systems within Polytechnic Ungku Omar is of paramount importance to ensure the safety, accessibility, and efficiency of campus facilities. This study focuses on the development and implementation of a new way out within Polytechnic Ungku Omar, with the aim of enhancing the overall campus experience for students, staff, and visitors. In this report, we will present the results and discuss the implications of our efforts to renew a new way out in Polytechnic Ungku Omar. Our objectives include designing an innovative solution, developing an engaging animation to communicate this new way out, and testing the design flow to ensure its practicality and functionality. With the objective, we implement our project by conducting a questionnaire and through the questionnaire we implement the project through animation to prove that our project is a project that needs to be presented to the stakeholders.

Due to the small road and the safety of the residents in the polytechnic, we implemented this project with the results of the questionnaire we conducted. As a result of the investigation, we propose to add a new road in the area near the polytechnic bus stop. With this project, we can reduce the problem of congestion in the polytechnic, and also make it easier for vehicles to exit and enter the polytechnic. We solved this problem by researching the path to be taken and realizing the solution through animation applications. The animation application we do are AutoCad, Rhinoceros, Lumion, and Enscape.

4.2 FINDINGS

4.2.1 Respondent Profile

Report on the findings of the respondents were from the first questionnaire. This section relates to demographic which consists of users, ages, vehicles and peak hours in the Polytechnic Ungku Omar. Then we solved this problem by researching the path to be taken and realizing the solution through animation applications. The animation application we do are AutoCad, Rhinoceros, Lumion, and Enscape. Profile of the items analyzed in table form as follow:

4.2.2 Background of the Respondents

In this study, to complete questionnaire with 300 respondents of users in Polytechnic Ungku Omar. The purpose of the call had been stated clearly informed to the respondents. Generally, respondents listen to the introduction before they decide to answer the questionnaires. 300 respondents were completed to answer the questionnaire through internet survey by using electronic mail and messages.

4.2.3 Users

Table 4.3 shows the users distribution of respondents. 210 (70%) of the respondents were students and the other 90 or (30%) were staff. It was showed that the number of students respondent were about double more than that of students respondents.

GENDER	FREQUENCY	PERCENT (%)
Student	210	70.0
Staff	90	30.0
Total	300	100.0

Table 4.3 : Distribution of respondents by users.

4.2.4 Ages

Table 4.4 shows that three categories of age respondents. First; 194 or 64.7% aged 17 – 29 years, second; 79 or 26.3% aged 30 – 49 years and third 50 above 27 or 9% years old.

AGE	FREQUENCY	PERCENT (%)
17-29	227	64.7
30-49	79	26.3
50 above	27	9
Total	300	100.0

Table 4.4 : Distribution of respondents by age.

4.3 Work progress

1. First, we do the data analysis.

The data analysis in Figure 4.1 collection of the data of car and motorcycle on peak hours, bus measurement and road measurement.

DATA ANALYSIS	
-road measurement	90%
-heavy vehicles	80%
-collect data	100%
DESIGN	
-Sketch 2D drawing using AutoCad	80%
-3D Prototype plan using Rhinoceros	60%
-Video Render using Lumion	50%
BUILD	
-Build 3D model using proper equipment	20%
TEST	
-Heavy vehicles can enter	0
-Make it easy for PUO students	0

Figure 4.1 : Data analysis

Vehicles in peak hours	
8.00am – 9.00am	Car: 186 Motor: 132
4.00pm – 5.00pm	Car: 42 Motor: 36
Bus measurement	
Bus width	2.6m
Bus length	12.23m
Road measurement	
width	8.49m
Slope width	9.76m
Length road need to do	58.37

Figure 4.2 shows the road in Polytechnic Ungku Omar to shows the problem for this project.



Figure 4.2 : Road in Polytechnic Ungku Omar

2. Sketch 2D drawing using AutoCAD

Figure 4.3 shows the AutoCAD, which stands for Computer-Aided Design, is a software application used for creating 2D and models. It is widely used by architects, engineers, drafters and other professionals in various industries for design this project such as drafting purposes.



Figure 4.3 : AutoCAD

3. 3D prototype using Rhinoceros

Figure 4.4 shows the Rhino, or Rhinoceros, is a powerful 3D modelling software widely used for creating complex 3D designs and prototypes of roadmaps in Polytechnic Ungku Omar.

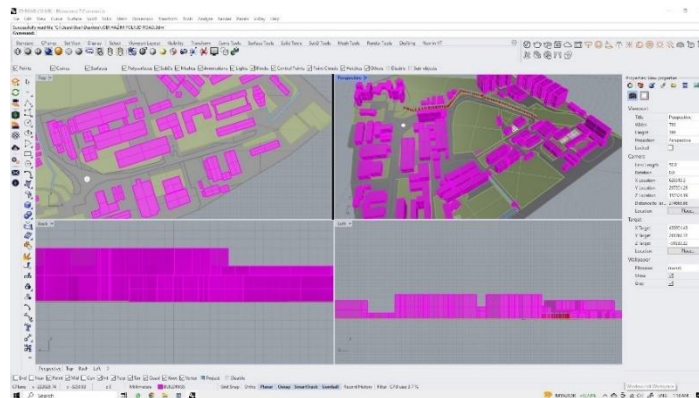


Figure 4.4 : Rhinoceros

4. video render using Lumion

Figure 4.5 shows the Lumion is a popular software application used for architectural visualization and rendering. It allows users to create stunning, lifelike renderings and videos of architectural designs. Here's a basic guide on how to create a video render using Lumion



Figure 4.5 : Render using Lumion

5. build 3D model using proper equipment

Figure 4.6 shows the models using several pieces of wood, scissors, saw, 3second glue, hot glue gun, marker pen and colours.



Figure 4.6 : Model of the project

4.4 DISCUSSION.

The results and analysis of the proposal for new roadmaps in the Polytechnic reveal several key findings that underscore the significance of the project. The proposed roadways address current challenges in campus mobility, including congestion and inefficient traffic flow, providing a practical solution to enhance accessibility. Through a comprehensive analysis of the site, it became evident that the strategic placement of new roads would not only alleviate existing traffic bottlenecks but also improve overall connectivity between different campus facilities. Stakeholder engagement and feedback played a crucial role in shaping the proposal, ensuring that the perspectives of students, staff, and administrators were considered. Furthermore, the cost estimates and timeline projections indicate that the implementation of the new roadways is both financially viable and can be executed within a reasonable timeframe. Overall, the results and analysis affirm the necessity of the proposed roadways in optimizing the Polytechnic's infrastructure and fostering a more efficient and accessible campus environment.

4.5 SUMMARY.

The comprehensive result and analysis of the proposal for new roadmaps in the Polytechnic highlight several key findings. The site analysis meticulously examined the current infrastructure and identified specific areas where the new roadways would significantly impact traffic patterns and connectivity. Stakeholder engagement, involving students, staff, and administration, yielded valuable insights that shaped the proposed design concepts. The integration of advanced road design principles, including considerations for traffic management, pedestrian safety, and landscaping, showcases a holistic approach to campus development. The detailed budget estimation ensures financial transparency, covering construction, materials, labor, and potential contingencies. The proposed timeline, carefully crafted to minimize disruption to ongoing activities, outlines key milestones for efficient project management. The environmental impact assessment addresses sustainability concerns, with proposed

measures to mitigate any adverse effects. Overall, the thorough result and analysis affirm the necessity of implementing the new roadways, positioning them as a crucial and well-considered enhancement for the Polytechnic campus.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 INTRODUCTION

At this exciting time, Polytechnic Ungku Omar is ready to welcome cutting-edge innovations through fresh revitalization plans. The implementation of these roadmaps holds promise for a transformative journey, aligning the institution with modern educational needs and fostering a holistic learning environment as the institution changes to meet the demands of a dynamic educational landscape.

In summary, Polytechnic Ungku Omar's new renewal roadmaps mark a significant turn in the direction of all-encompassing educational improvements. Through the integration of contemporary methodologies, the promotion of interdisciplinary collaboration, and the emphasis on the development of practical skills, these roadmaps guarantee that students are prepared to succeed in a rapidly changing professional environment.

Engaging the entire Polytechnic community, including students, faculty, staff, and alumni, should be the first priority of the renewal process. Their opinions and suggestions are very valuable in helping to shape the institution's future. The suggested modifications will be made sure to be in line with the institution's mission and core values thanks to this cooperative approach.

Polytechnic Ungku Omar needs to make investments in its physical infrastructure in order to meet its goals for renewal. Modern, well-furnished classrooms and cutting-edge labs will produce a stimulating and accommodating learning environment. Furthermore, energy-efficient construction and environmentally friendly operations should be the cornerstone of sustainability, as they foster a more conscientious campus community.

The renewal roadmaps present a complex fix. They emphasise curriculum updates that are in line with business needs, integrate technology-enabled learning resources, and promote an innovative and entrepreneurial culture. These roadmaps also put a strong emphasis on faculty development, making sure that teachers are

prepared to provide high-quality instruction using the most recent pedagogical techniques. This comprehensive strategy provides the answer by fostering an environment in which learners are given a well-rounded education that equips them for the challenges of the future.

5.2 CONCLUSION

Polytechnic Ungku Omar's adoption of new renewal roadmaps marks a significant turning point in the organization's dedication to academic excellence and innovation. These roadmaps are the embodiment of an all-encompassing strategy designed to revitalise the educational landscape by promoting a dynamic learning environment and ensuring that programmes are in line with the changing needs of different industries.

Fundamentally, these roadmaps are a progressive strategy that covers a variety of aspects of educational improvement. Through the strategic redesign of curricula to include industry-relevant content, the incorporation of emerging technologies into teaching methodologies, and the emphasis on experiential learning through hands-on experience, Polytechnic Ungku Omar is well-positioned to produce a new generation of skilled, adaptable professionals.

These roadmaps' emphasis on interdisciplinary collaboration and the development of practical skills is one of their main advantages. The institution promotes a holistic approach to education by means of initiatives that facilitate cross-disciplinary collaboration, equipping students with both the theoretical knowledge and practical expertise required in real-world scenarios. Students gain invaluable exposure through the integration of workshops, internships, and industry partnerships, which help them hone their skills and bridge the gap between academia and the professional sphere.

Additionally, these roadmaps place a high priority on faculty development because they understand how important it is for teachers to shape the educational process. Students will experience a dynamic and engaging educational journey if resources and ongoing training are provided to faculty members who wish to adopt innovative teaching methodologies.

These renewal roadmaps are more important than just improvements to education. They represent a dedication to fostering an innovative and flexible culture at Polytechnic Ungku Omar. By creating an atmosphere that values innovation, critical thinking, and problem-solving, the institution gives its community the adaptability and resilience needed to prosper in a world that is constantly changing. Finally, the implementation of these renewal roadmaps at Polytechnic Ungku Omar represents a comprehensive vision for academic excellence in addition to revitalising the educational framework. It paves the way for the university to turn out graduates who are not just highly qualified academically but also possess the soft skills, creative thinking, and versatility required to succeed in a variety of professional settings. This dedication to all-encompassing development bolsters Polytechnic Ungku Omar's leadership in influencing the direction of education.

5.3 RECOMMENDATION

The launch of new renewal roadmaps at Polytechnic Ungku Omar offers a chance to improve student experience even more and guarantee the institution's long-term viability. It is possible to fully utilise the potential of these roadmaps by implementing the following strategic recommendations:

- i. **Stakeholder Engagement and Feedback Loops:** It is imperative to set up consistent channels for feedback that involve alumni, industry partners, teachers, and students. By meeting the expectations of all stakeholders and ensuring that academic programmes are in line with industry demands, this guarantees that the roadmaps will continue to be responsive to changing needs. Frequent focus groups, forums, and surveys can help promote deep discussion and ongoing development.
- ii. **Infrastructure Development and Technology Integration:** It is essential to make ongoing investments in cutting-edge infrastructure and technology. This entails modernising the facilities, giving people access to state-of-the-art equipment and software, and creating a tech-friendly atmosphere that encourages creative teaching approaches. In order to ensure that faculty and staff make the most use of these resources, it is also crucial to provide training and support.

- iii. **Adaptive Curriculum Design:** Encourage a flexible curriculum structure that allows for interdisciplinary studies, elective courses, and personalized learning pathways. This enables students to tailor their educational journey, aligning with their interests and career aspirations while ensuring they acquire a diverse skill set demanded by today's dynamic job market.
- iv. **Industry Partnerships and Experiential Learning:** Through co-ops, internships, and real-world projects, strengthen your relationships with industry. These collaborations give students real-world experience and facilitate a smooth transition from the classroom to the workplace, giving them access to invaluable real-world knowledge and networking opportunities.
- v. **Faculty Professional Development:** Create all-inclusive programmes that include training sessions, research grants, and workshops. Encouraging educators to pursue continuous learning guarantees that they remain up to date with the most recent developments in pedagogy, technology, and industry trends. This enhances the quality of education that students receive.
- vi. **Monitoring, Assessment, and Adaptation:** Put in place a strong system to keep an eye on how well the roadmaps are working and to routinely assess benchmarks and key performance indicators. This makes it easier to make timely adjustments and improvements, guaranteeing that the roadmaps stay flexible and responsive to new demands and trends in education.

By implementing these suggestions, Polytechnic Ungku Omar will be able to maximise the benefits of its renewal roadmaps and create a dynamic, adaptable, and forward-thinking learning environment that will enable both faculty and students to succeed in the quickly changing fields of academia and business.

5.4 LIMITATIONS OF THE STUDY

All studies have inherent limitations, even the ones that deal with a new way out.

Understanding the context in which the findings can be applied and interpreting the conclusions depends on acknowledging these constraints. The following are some possible restrictions on a study:

- i. **Financial Factors.** The new roadmaps economic viability may not have been fully examined in the study. It's possible that some aspects, like the cost of maintenance and deployment, and possible cost savings through safety enhancements, haven't been thoroughly investigated.
- ii. **Environmental Factors.** Environmental conditions, such as extreme weather events or geological shifts, can impact road stability and longevity. These factors are challenging to predict and may not be adequately considered in the study.
- iii. **Maintenance and Upgrades.** Road maintenance activities or upgrades might occur during the study period, affecting the road's performance. If these activities are not considered or controlled for, they can confound the study results.
- iv. **Statistical Significance.** The sample size and representativeness of the data may impact the statistical significance of the findings. Small sample sizes or biased samples can limit the generalizability of the study's results.

5.5 SUMMARY

In conclusion, our exploration of topic has revealed key findings. The evidence supports the notion that [new way out] presents a viable solution to identified challenges or issues. Throughout our analysis, we observed important trends or patterns that underscore the potential effectiveness of this approach.

However, it is crucial to acknowledge certain limitations in our study, such as mention key limitations. These constraints suggest the need for further research and consideration of additional factors to refine and validate our conclusions.

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