FACULTY OF MANAGEMENT

November 2014 Examination

DEPARTMENT	**Department of Applied Information Systems**
MODULE	STRATEGIC INFORMATION TECHNOLOGY MANAGEMENT
CODE	ITM 03X7 / ITM 8X08
DATE	1ST NOVEMBER 2014 EXAMINATION
DURATION	3 HOURS
TIME	08:30 - 11:30
TOTAL MARKS	100

EXAMINER	DR K NJENGA
EXTERNAL MODERATOR	DR BILLY KALEMA
NUMBER OF PAGES	5 PAGES

INSTRUCTIONS TO CANDIDATES:

- Please answer all questions from **Section A** and all questions from **Section B**.
- Question papers must be handed in.
- This is a closed book assessment.
- Read the questions carefully and answer only what is asked.
- Number your answers clearly.
- Write neatly and legibly.
- Structure your answers by using appropriate headings and sub-headings.
- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.

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CASE STUDY : Electronic Road Pricing (ERP) - Singapore

ROAD pricing in Singapore has been effective in managing congestion on roads in the Central Business District (CBD) since its inception in 1975, and in recent years on expressways and other major roads outside the CBD. Changes have been made to the road pricing scheme from a paper-based manual scheme on permits and applicable during the morning peak period to an electronic version.

Technologies have assisted in making the expansion of the original road pricing scheme possible. The authorities are still keeping tab on new developments in road pricing technology to further enhance the world's first **Electronic Road Pricing (ERP)** system that was dependent on gantries (similar to current e-toll system in South Africa).

A new charging scheme for the next phase of **ERP system** based on Global Positioning System (GPS) and Geographic Information System (GIS) is presented. The new scheme charging will be based on distance vehicle travelled in different areas determined by integrated GPS positioning and digital road network database in GIS.

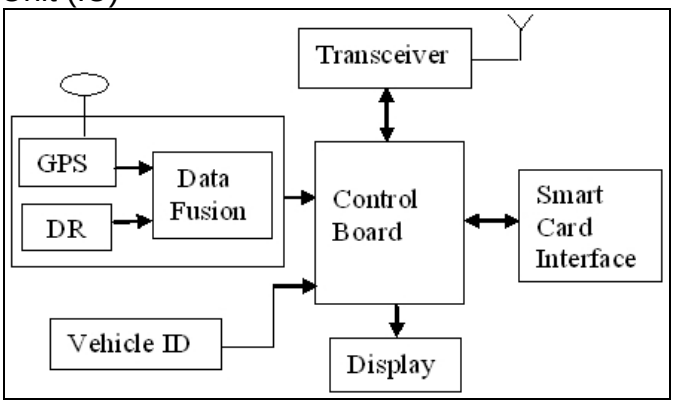
This makes the new system not only more consistent with road pricing principles and objectives of reducing traffic congestion and air pollution, but also more flexible for the integration of ERP system with other Intelligent Transportation Systems (ITS) such as emergency assistant and dynamic traffic assignment. At the same time, it has lower capital investment and operating costs, and is relatively simple to implement and modifying with the expansion of CBD and changes of traffic conditions because it is not dependent on gantries.

Regarding the system design in order to meet the requirements of an effective and fair road pricing system, the characteristics of the proposed new **ERP system** should be reflected from different perspectives. The users always hope the system is easy to understand, convenient (i.e. does not require vehicles to stop at toll booths), different options (alternative modes, travel times, routes, destinations), payment options (cash, prepaid card, credit card, etc), transparent, and anonymous. The traffic authority wants the system to have less traffic flow impacts, efficient and equitable, flexible, reliable, secure and enforceable, cost effective, minimum disruption during development phase and can be expanded as needed.

From the society's perspective, it is should have positive net benefits when all impacts are considered, politically acceptable, positive environmental impacts, and easy integration with the same charging system such as parking, public transit, etc. The proposed GPS/GIS-based ERP system is the best method to balance the requirements from different perspectives. The new GPS/GIS-based ERP system consists of In-vehicle Units (IU) and the Control Centre System (CCS). The block charts of IU and CCS are shown in figure 1 and figure 2 respectively.

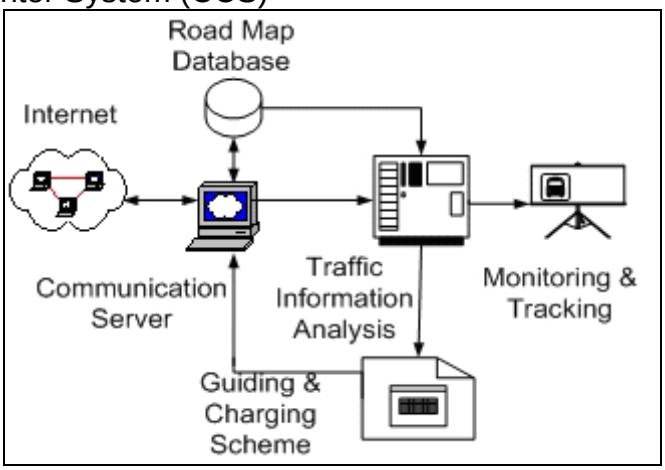
The IU provides continuous vehicular position determined by integrated GPS/Dead Reckoning (DR) positioning device and transmits it with vehicle ID to CCS. Data fusion is mainly for fusing all the sensors' data to get more accurate, robust positioning information. Display function shows related information to the driver, such as guidance, charging information or map interface.

Figure 1. In-Vehice Unit (IU)



Transceiver provides two-way data link via wireless network and IP based packet data transmission. The data would be broadcast into the Internet so that any authorized user can make full use of them to provide value-added services. Smart card interface is for charging via pre-paid smart card.

Figure 2. Control Center System (CCS)



CCS is functioned to track, monitor, charge, and provide guidance to all vehicles travelling on the road. Charging is based on the road links vehicle travelled matching with map database and determined charging standard. Charging standard is available on Internet for all drivers. It can also be checked through IU if it is functioned. Upon receiving the vehicle position, CCS matches vehicle trace with the road links through map matching and calculates the vehicle cost. Payment can be made through smart card in IU immediately afterward or later on monthly based.

Financial Estimates

The financial details of the proposed **ERP system** are as follows; Initial costs of computerising the system are expected to be R 138,000,000 (in the first year). The table below shows the estimated benefits of the **ERP system** to the Government of Singapore in **'000s** for the next 5 years. The project is also estimated to incur annual software maintenance costs of R 660,000 and hardware maintenance costs of R 10,000 from the first year.

	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
*Estimated Benefits In R '000s	42,000	38,000	33,000	21,000	14,000

The discounted rate of 17% is applicable.* ***Note:* *Discount Factor for Year 1 = 1.000*

SECTION A [CASE STUDY QUESTIONS] [70 Marks]

QUESTION 1

How has IT changed the *nature of work done* and *where the work is done* by the Government of Singapore in relation to Road Pricing?

[10 marks]

QUESTION 2

a) Calculate the Net Present Value of the proposed system **ERP system** for the Government of Singapore.

[10 marks]

b) Why is it necessary to build a business case for the new **ERP system**? What will you typically include in the business case? (Discuss 4 areas). Would the answer you obtain for a) above inform your business case? Why or why not?

[10 marks]

QUESTION 3

Which are the main security decisions that must be made for the **ERP system**? Give an example for each decision type.

[10 marks]

QUESTION 4

Do you think that government of Singapore must use a third party for the development of the **ERP system**? Motivate your answer.

[10 marks]

QUESTION 5

Illustrate the method for re-designing the business process for Road Pricing away from the traditional gantries into using Global Positioning System (GPS) and Geographic Information System (GIS).

[10 marks]

QUESTION6

Traffic Control may request access data in the **ERP systems** to monitor flows and address traffic congestion. Use the case study above to explain the knowledge management process.

[10 marks]

SECTION B [GENERAL QUESTIONS] [30 Marks]

QUESTION 7

Discuss in detail the four components essential for any project that are necessary to assure a high probability of project success.

[15 marks]

QUESTION 8

Why are most managers ill-equipped to handle ethical issues in organizations?

[15 marks]