UNIVERSITI SAINS MALAYSIA

Second Semester Examination
2015/2016 Academic Session

June 2016

CIT553 – Business Intelligence and Data Mining
[Kecerdasan Perniagaan dan Perlombongan Data]

Duration : 2 hours
[Masa : 2 jam]

INSTRUCTIONS TO CANDIDATE:
[ARAHAN KEPADA CALON:]

- Please ensure that this examination paper contains **TWO** questions in **NINE** printed pages before you begin the examination.

  *[Sila pastikan bahawa kertas peperiksaan ini mengandungi **DUA** soalan di dalam **SEMBILAN** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.]*

- Answer **ALL** questions.

  *[Jawab **SEMUA** soalan.]*

- You may answer the questions either in English or in Bahasa Malaysia.

  [Anda dibenarkan menjawab soalan sama ada dalam bahasa Inggeris atau bahasa Malaysia.]

- In the event of any discrepancies, the English version shall be used.

  [Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi bahasa Inggeris hendaklah diguna pakai.]

1. (a) List and briefly describe the structure and relations of the business intelligence components.

Senarai dan terangkan secara ringkas struktur, dan hubungan komponen kecerdasan perniagaan.

(25/100)

(b) Read the following case study and answer **ALL** questions.

*Baca kajian kes berikut dan jawab **SEMUA** soalan.*

"The Malaysia Government has invested heavily in Public Organizations in Information and Communication Technology. Despite the heavy investment, many application systems had failed after implementation. Thus a study was conducted by Dr. Suhaimi to investigate what are the factors that have impact on the success of computer application systems (CAS) implementation (CASIS) in the Public Sector. After conducting, a concise literature review, he finally proposed the research model (Figure 1).

Referring to Figure 1, Successful CAS Implementation is an Information System which can provide accurate, reliable information and function as intended and is widely used [1]. The system achieve the organization business goals, operate at acceptable cost, meet defined performance standards, flexible and easy to learn and use [2]. Users' Involvement And Participation (UIP) is a process when users participate actively in the design and development processes. Users' Education and Training (UET) is when users is trained in order to be able to use the newly implemented CAS. This includes the training of data-entry, updating records and printing reports. Management Support (MS) is the expectations of activities that managers should perform in an organization [3]. Computer Department Staffs' Competence And Experience With Technology (CDC) is the degree of experience and know-how the MIS staff issues in handling with the programming language used, the type of relational database management system (RDBMS) used, the type of operating system used and the type of machines and cabling used in the development of the application system. If the developer has a limited experience and know-how concerning the CAS implement, then the development of the CAS meets users requirement is utmost difficult.

There are 5 items for user's Involvement and participation (Table 1), 4 items for UET (Table 2), 9 items for MS (Table 3), and 5 items for CDC (Table 4). Each of these items is measured on a scale of 1 (very low) to 5 (very high).

Questionnaires were sent to public organizations by using random sampling. A total of 138 questionnaires were returned to the researcher. Table 5 provides the outputs from descriptive statistics for the study variables. Table 6 provides the output for correlation analysis. Table 7 shows the output from the multiple regression analysis (MRA) retrieved by using SPSS software."

"Kerajaan Malaysia telah membuat pelaburan yang besar terhadap teknologi maklumat dan komunikasi dalam Organisasi Awam. Walaupun dengan pelaburan yang besar, banyak sistem aplikasi gagal selepas pelaksanaan. Oleh itu satu kajian telah dijalankan oleh Dr Suhaimi untuk menyiasat apakah faktor-faktor yang memberi kesan kepada kejayaan pelaksanaan sistem aplikasi dalam Sektor Awam. Selepas menjalankan, kajian literatur, penyelidik akhirnya mencadangkan model penyelidikan (Figure 1).

Merujuk kepada Figure 1, Implementasi Sistem Aplikasi Komputer (CAS) yang berjaya (CASIS) adalah satu sistem maklumat yang boleh memberikan maklumat yang tepat, maklumat dipercayai dan berfungsi yang sepatutnya dan digunakan secara meluas [1]. Sistem mencapai matlamat perniagaan organisasi, beroperasi pada kos yang boleh diterima, memenuhi standard prestasi yang ditetapkan, fleksibel dan mudah untuk belajar dan digunakan [2]. Penglibatan Dan Penyertaan Pengguna (UIP) adalah proses apabila pengguna terlibat secara aktif dalam reka bentuk dan pembangunan proses. Pendidikan dan Latihan Pengguna (UET) adalah apabila pengguna dilatih supaya dapat menggunakan CAS yang baru dilaksanakan. Ini termasuk latihan kemasukan data, mengemas kini rekod dan laporan percetakan. Sokongan Pengurusan (MS) adalah jangkaan aktiviti yang pengurus perlu melaksanakan dalam organisasi [3]. Kecekapan Dan Pengalaman Staf Jabatan Komputer dengan teknologi (CDC) adalah tahap pengalaman dan pengetahuan kakitangan MIS dalam isu-isu penggunaan bahasa pengaturcaraan yang digunakan, jenis sistem pengurusan pangkalan data hubungan (RDBMS) yang digunakan, jenis sistem operasi yang digunakan dan jenis mesin dan kabel yang digunakan dalam pembangunan sistem aplikasi CAS. Jika pembangun system mempunyai pengalaman terhad dan pengetahuan mengenai perlaksanaan CAS, maka pembangunan CAS sukar memenuhi keperluan pengguna.

Terdapat 5 item untuk penglibatan dan penyertaan pengguna (UIP) (Table 1), 4 item untuk pendidikan dan latihan pengguna (UET) (Table 2), 9 item untuk sokongan pengurusan (MS) (Table 3), dan 5 item untuk kecekapan dan pengalaman staf jabatan komputer dengan teknologi (CDC) (Table 4). Setiap barangan diukur pada skala 1 (sangat rendah) hingga 5 (sangat tinggi).

Borang soal selidik telah dihantar kepada organisasi awam secara rawak. Sebanyak 138 soal selidik telah dikembalikan kepada penyelidik. Table 5 menyediakan output dari statistik deskriptif bagi pemboleh ubah kajian. Table 6 menyediakan output untuk analisis korelasi. Table 7 menyediakan output daripada analisis regresi (MRA) yang didapati dengan menggunakan perisian SPSS."

Source / *Sumber*

[1] Leong May Fung (1997). Behavioral Management Strategies in Successful Information System Implementation in Manufacturing Companies. Unpublished MBA Thesis: USM.

[2] Debrander, B.; Thiers, G., (1984). Successful Information System Development in Relation to Situational Factors Which Affect Effective Communication Between MIS-Users and EDP-Specialists. Management Science, 30(2): 137-155.

[3] Laudon , J.; Laudon, K. C., (2016). Essentials of MIS, Global Edition, 12/E. Pearson.

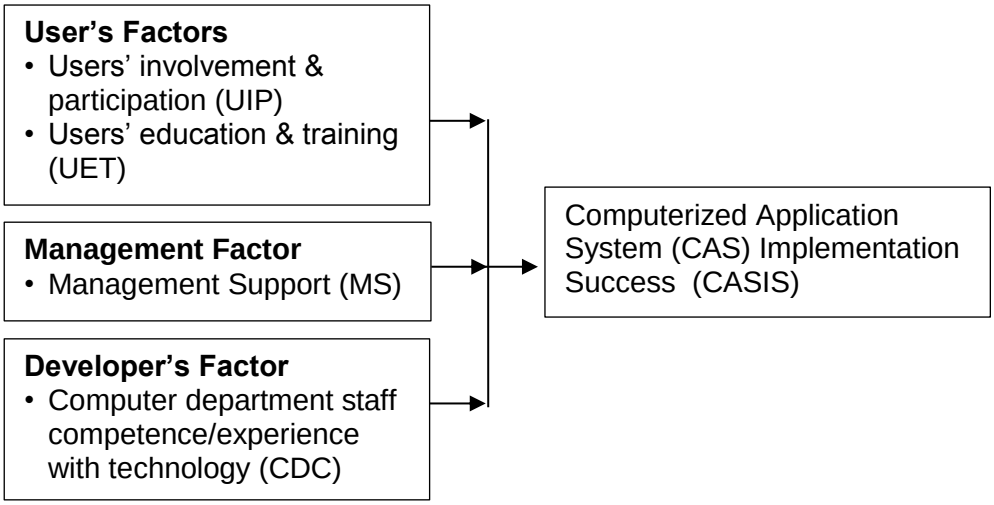

Figure 1: The Schematic Diagram of The Theoretical Framework

Table 1: User Involvement and Participation

1	User has put sufficient effort to enable the project team develop a realistic expectation of the CAS in my organization.
2	User has continuously involve and cooperate during the process of the CAS implementation in my organization.
3	User has put sufficient effort to activate the implementation of the CAS prototype in my organization.
4	User has a positive attitudes towards the CAS implementation in my organization.
5	User has involved and participated actively during the CAS design phase in my organization.

Table 2: User Education and Training

1	In my organization, the developer has made sufficient effort to activate the training process for users.
2	In my organization, the developer has made sufficient effort to encourage user's learning process of CAS use.
3	In my organization, the developer has taken sufficient effort to train user on how to key-in data, update data and print report.
4	In my organization, the developer has taken sufficient effort to train user on how to deal with errors when operating the CAS.

Table 3: Management Support

1	The top management has made sufficient effort to encourage user department to use the CAS in my organization.
2	The top management is concern with the CAS performance evaluation in my organization.
3	The top management has provide sufficient funding and resources for the CAS development and operation in my organization.
4	The top management has taken an active role in deciding the priority of the CAS implementation project in my organization.
5	The top man management emphasis in effective management and control for the CAS development and operation in my organization.
6	The top management is concerned with the CAS usage rate in my organization.
7	The top management participation actively in the planning process of the CAS development and operation in my organization.
8	The top management has taken sufficient effort to develop reward system to encourage the CAS use in my organization.
9	The top management is concern not to relocate/ transfer any staff involved directly with the CAS development while the it is still in the middle of development stage implementation in my organization.

Table 4: Computer Department Competence and Experience with Technology

1	The MIS Officer is a qualified person in terms of qualifications (at least having a Bachelor's Degree in Computer Sciences/IT/IS).
2	The MIS Officer (developer) has more than three (3) years of experience working with the types of hardware and software used to develop the CAS.
3	The MIS Officer (developer) has already developed a few applications using the same types of hardware and software before developing the CAS.
4	The MIS Officer has a proper training plan to encourage continuous learning process of the computer department staff to update and improve skill and knowledge with regards to CAS development in my organization.

Table 5: Mean and Standard Deviation for Major Variables

	Variables	Mean	Standard deviation
1	Dependent Variable		
	1.1 Application System (CAS) Implementation Success (CASIS)	3.71	0.56
	Independent Variables		
	2.1 Users' involvement and participation (UIP)	3.73	0.70
	2.2 Users' education and training (UET)	3.67	0.63
	2.3 Management' support (MS)	3.66	0.78
	2.4 Computer department staff competence and experience with technology (CDC)	3.38	0.89

Table 6: Results of Pearson's Correlation Matrix

	1.	2.	4.	5.	6.
1. Success (CASIS)	1.0000				
2. Users' Involvement (UIP)	* .5297	1.0000			
3. Management Support (MS)	* .6091	* .4959	1.0000		
4. Computer Staff Experience (CDC)	*** .2185	* .3601	* .2456	1.0000	
5. Users' Education & Training (UET)	* .4135	* .4311	** .1872	* .2285	1.0000

* $p < 0.01$; ** $p < 0.05$; *** $p < 0.10$

Table 7: Multiple Regression Analyses Using Enter Method With Independent Variables

	Independent Variables	Beta Coef.	Std Error Beta	T	Sig. T
1	Users' Involvement and Participation (UIP)	0.224	0.088	2.538	0.013
2	Management Support (MS)	0.315	0.066	4.790	0.000
3	Computer Department Staffs' Competence and Experience with Technology (CDC)	0.052	0.049	1.062	0.291
4	Users' Education and Training (UET)	0.071	-0.174	0.575	0.567

(i) What are the factors that have significant effect on CAS implementation success?

Faktor-faktor yang manakah mempunyai kesan ketara ke atas kejayaan implementasi CAS?

(2/100)

(ii) Which factor is the strongest precursor? Justify your answer.

Faktor yang manakah yang paling kuat? Jelaskan jawapan anda.

(3/100)

(iii) Based on the results from the MRA, what suggestions (solutions) could you provide to the management and developers to ensure that CAS implementation in Public Organizations is a successful?

Berdasarkan keputusan dari MRA, apa cadangan (penyelesaian) anda boleh memberikan kepada pengurusan dan pembangun sistem pengguna untuk memastikan bahawa pelaksanaan CAS dalam Organisasi Awam boleh berjaya?

(10/100)

(iv) Please specify which data mining technique is suitable in predicting the success of CAS implementation?

Sila nyatakan teknik perlombongan data yang manakah yang sesuai untuk meramal kejayaan implementasi CAS?

(2/100)

(v) Explain how does the technique proposed in 1(b)(iv) could be applied to predict the success of CAS implementation?

Terangkan bagaimana teknik yang dicadangkan dalam 1(b)(iv) boleh diaplikasikan untuk meramal kejayaan implementasi CAS.

(4/100)

(vi) Explain how does the results obtained from Dr. Suhaimi research provides an advantage in determining the input parameters in predicting the success of CAS implementation?

Terangkan bagaimana hasil keputusan penyelidikan Dr. Suhaimi dapat memberi kelebihan dalam menentukan parameter input untuk membuat ramalan kejayaan implementasi CAS.

(4/100)

2. (a) (i) What are the **two** (**2**) main categories of learning in artificial neural networks? Explain the principle of each category.

*Apakah **dua** (**2**) kategori pembelajaran rangkaian neural buatan? Jelaskan prinsip setiap kategori.*

(ii) Draw a diagram to show the structure of a simple artificial neuron. Given a scalar input signal, x, describe the processing steps taken by the simple artificial neuron to produce a scalar output signal, y.

Lakarkan gambar rajah untuk menunjukkan struktur suatu neuron buatan yang ringkas. Diberikan suatu isyarat masukan skala, x, terangkan langkah pemprosesan yang diambil oleh neuron buatan ringkas tersebut untuk menghasilkan suatu isyarat skala keluaran, y.

(iii) With respect to unsupervised data clustering problems, discuss **one** (**1**) advantage and **one** (**1**) disadvantage of the Self-Organizing Map network.

*Berdasarkan masalah pengelompokan data tanpa pengawasan, bincangkan **satu** (**1**) kelebihan dan **satu** (**1**) kekurangan rangkaian peta penganjuran-diri.*

(16/100)

(b) (i) By using a suitable diagram, explain the overall process of a genetic algorithm.

Dengan menggunakan suatu gambar rajah yang sesuai, jelaskan proses keseluruhan suatu algoritma genetik.

(ii) Explain **two** (*2*) main differences in terms of the principle between a genetic algorithm and a traditional search and optimization method.

*Jelaskan **dua** (**2**) pembezaan berkenaan prinsip suatu algoritma genetik dengan suatu kaedah pencarian dan pengoptimuman tradisional.*

(iii) Describe the main steps involved in the procedure of the genetic algorithm.

Terangkan langkah utama yang terlibat dalam prosedur suatu algoritma genetik.

(17/100)

(c) (i) Discuss **four** (**4**) advantages of using fuzzy logic in solving real-world problems.

*Bincangkan **empat** (**4**) kelebihan menggunakan logik kabur untuk menyelesaikan masalah dalam dunia sebenar.*

(ii) Discuss the characteristics of a fuzzy set and its membership function. Give **two** (**2**) examples of fuzzy membership functions and draw their corresponding structures.

*Bincangkan ciri suatu set kabur dan fungsi keahliannya. Berikan **dua** (2) contoh bagi fungsi keahlian kabur dan lakarkan struktur berkenaan.*

(iii) Describe the procedure involved in establishing a fuzzy inference system.

Terangkan prosedur yang terlibat dalam mewujudkan suatu sistem kesimpulan kabur.

(17/100)

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