



Shu-Te University  
College of Informatics  
Graduate School of Information Management

Thesis

A Study on the Factors Affecting Administrator' Adoption of  
McExam in Ministry of Education and Training, Vietnam

Student: Pham Van Luong  
Advisor: Dr. Shing-Hwang Doong  
Co-advisor: Dr. Nguyen Chi Thanh

October,2012

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McExam in Ministry of Education and Training, Vietnam

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2013 / Year 2 / Month 2 / Day

Graduate School of Information Management  
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Shu-Te University

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## ABSTRACT

Since 2006, MOET of Vietnam has used multiple-choice format testing for high school graduation, and college and university examinations. In accordance with Government's regulations, answer sheets must be marked by machine (scanner and computer) and specialized software. McExam used for marking every answer sheet.

This research will focus on every factor which can effect the acceptance of McExam's user, measurement of user acceptance and more factors. This research and an investigation of more than 220 person have led to an assumption that:

- The Perceived Ease of Using McExam has a positive effect to The Perceived Usefulness of Using McExam.

- The Perceived Usefulness of Using McExam has a positive effect to The Behavioral Intention to Use McExam.

- The Perceived Ease of Using McExam has a positive effect to The Behavioral Intention to Use McExam.

- The Behavioral Intention to Use McExam has a positive effect to The Actual System Use of McExam System.

Through this research, we hope to get the feedback from user about acceptance with McExam and promote new ideas for improve performance of software. Upon this

idea, MOET and the department of General Department of Education Testing and Accreditation have decided how the software should be used.

Key words: User acceptance, McExam software, TAM, Ministry of Education and Training Vietnam, General Department of Education Testing and Accreditation.

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I would like to thank to my employer: General Department of Education Testing and Accreditation, Ministry of education and Training for their help.

My love goes to my parents, my family because they have always supported me to complete this study.

Last but not least I want to send a special thanks to my Advisor Dr. Shing-Hwang Doong of Shu-te University and Dr. Nguyen Chi Thanh of the Education Department of Vietnam National University for their encouragements and support.

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# Chapter 1. Introduction

This introduction consists of five parts: Research background, Research motive, Research purpose, Research question and Research procedures.

## 1.1 Research Background

Ministry of Education and Training of Vietnam is a body of the Vietnamese Government which is responsible for the state management in education that covers (i) kindergarten education, (ii) highschool education, (iii) university and college education, and post-graduate education, ... It is also assigned with the management administering national exams, preparing candidates for international and regional examination.

Educational agencies in Vietnam are showed by following diagram:

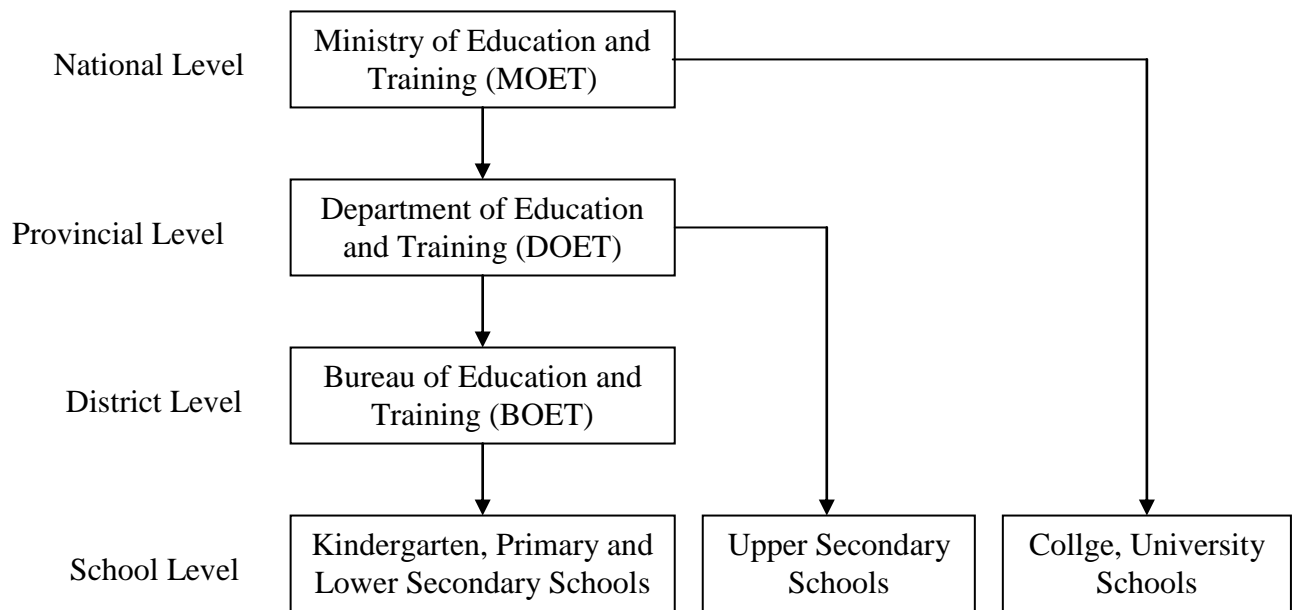


Figure 1 Educational agencies in Vietnam

The structure and scale of education system in Vietnam is described by the following table:

Table 1 The structure and scale of education system in Vietnam

#	Level of Education	Age	No. of schools	No. of pupils	No. of teachers
1	Kindergarten	Age 3 to 5	12,869	3,070,794	158,981

#	Level of Education	Age	No. of schools	No. of pupils	No. of teachers
2	Primary: Grades 1 to 5	Age 6 to 11	15,843	7,048,493	359,039
3	Lower Secondary: Grades 6 to 9	Age 12 to 15	10,462	4,968,302	312,710
4	Upper Secondary: Grades 10 to 12	Age 16 to 18	2,288	2,835,025	146,789
5	Colleges	Age 19 to 22	223	726,219	23,622
6	University	Age 19 to 24	163	1,435,887	50,951
	<b>Grand total:</b>		41,848	20,084,720	1,052,092

Source: MOET, 2011

By 2011, VietNam has 386 universities and colleges, with 2,162,106 students and 74,573 teachers (Education Statistic 2011, MOET). The state management function of ministry department Testing and control Quality education is enrolment and testing in university and college (MOET1, 2010). This department must collaborates with every university and college to accomplish the tasks.

Before 2002, every university and college administered their own entrance exams with most of the tests being in written form. Since 2002, MOET administered the same tests to every university and college in July. This examination is known in Vietnam as “three-sameness exam” (same time, same subjects, same use of results for admission). In 2011, college and university enrolment examinations involved 217 universities and 130 colleges, with the number of registered candidates being 2,183,630, and actual candidates competing being 1,749,767 (80.1%) (MOET2, 2012 ).

Roadmap for renew the final graduation in high school and enrolment in university and college of MOET.

In 2006 (MOET3, 2005), Vietnam began using optical scanner for marking examination papers of Physics, Chemistry, Biology, and foreign languages in final graduation and college entrance examinations. Candidates must provide their answers

on the answer sheet, specially designed for the purpose. Test items are multiple-choice questions.


Earlier, without technology and hi-tech equipment, exam papers were marked manually or by means of punched cards... This solution has a lot of limitations as it is time-consuming, erroneous, and only suitable for quick tests.... For a nationwide-scale examination that has millions of test papers to mark, this option can't meet the demand. Candidates' completed answers are fed into a computer linked to a scanner with optical mark recognition software.

Marking test papers in a large examination is a huge task and it must ensure accuracy, fairness, security and must be finished in a short time. MOET has decided to use special machine and software for marking test (MOET4, 2005).

Currently, MOET has used a lot of software to mark objective multiple-choice questions, one being the TestPro Engine, Mr Test, and the most notable is McExam software for university, college entrance exams, and high school graduation exams since 2006.

According to Anh Quan Corp 2011, McExam software was developed in 2004, and has become number-one software in marking test papers in Vietnam. McExam uses IT automatically for every step of operation cycle, recognitions test, handling test, and scoring; it enables end-users to easily handle things as they desire. The special features of this software is standardized, and written in Vietnamese. In accordance with the provisions of MOET in scoring examination papers. McExam allows for transferring data with another software which can provide statistics for MOET. McExam is a software which can meet every requirement of scoring examination for any partners of MOET.

At present, McExam software is used in many MOET educational and training institutions including Hanoi Department of Education and Training, Ho Chi Minh City Department of Education and Training, Hai Phong Department of Education and Training, etc. Furthermore, it also applied in other high schools, universities and colleges such as Ho Chi Minh City University of Technology, Ho Chi Minh City University Of Food Industry, Hoa Sen University – Ho Chi Minh City, Ho Chi Minh



City University of Transport, University of Economics Ho Chi Minh City, Ho Chi Minh City University of Technology, Banking University of Ho Chi Minh City, Ho Chi Minh University of Agriculture and Forestry, Vietnam National University - Ho Chi Minh City, Ho Chi Minh City International University - Vietnam National University, RMIT International University, University of Technical Education Ho Chi Minh City, Ho Chi Minh city National Education university, National Economics University, University of Agriculture 1, University of Civil Engineering, Electric Power University, Hanoi National University of Education, Hanoi Medical University, Military Technical Academy, Institute of Cipher Technics, two centers of General Department of Education Testing and Accreditation, etc. From 2010, Ministry of Education and Sports of Laos has also used McExam software for 30,000 tests in university, college entrance exams, (GDETA, 2011).

According to MOET4, 2011, during 6 years ago, McExam has marked 15,000,000 (fifteen millions) tests without any significant mistake. It fits well with the process and schedule, is easy and friendly to end-users. This explains the origin of success and necessity of McExam in scoring examination papers.

But so far there has been no study on the factors affecting adoption of McExam at the Ministry of Education and Training of Vietnam. Therefore, the study of factors affecting the adoption of the end user software McExam is very necessary.

## **1.2 Research motive**

Though McExam has been used in Vietnam for the past several years, there is still no study to explain factors that affect users' adoption of this technology. Thus, we set up our research motives as follows:

- To obtain feedback from users McExam.
- To recommend feasible solutions to the MOET, universities, colleges, General Department of Education Testing and Accreditation for making correct decision on using McExam to mark objective multiple-choice questions.

## **1.3 Research purposes**

The main purpose of research is to Study factors affecting users' adoption of McExam in Ministry of Education and Training, Vietnam", with the following four specific objectives:

- To study the factors affecting user adoption of objective multiple-choice questions marking McExam.
- To receive feedback from the software users.
- To propose method to raise the efficiency of McExam.
- To provide MOET, universities, colleges, General Department of Education Testing and Accreditation with a reference for decision to a synchronized use of McExam.

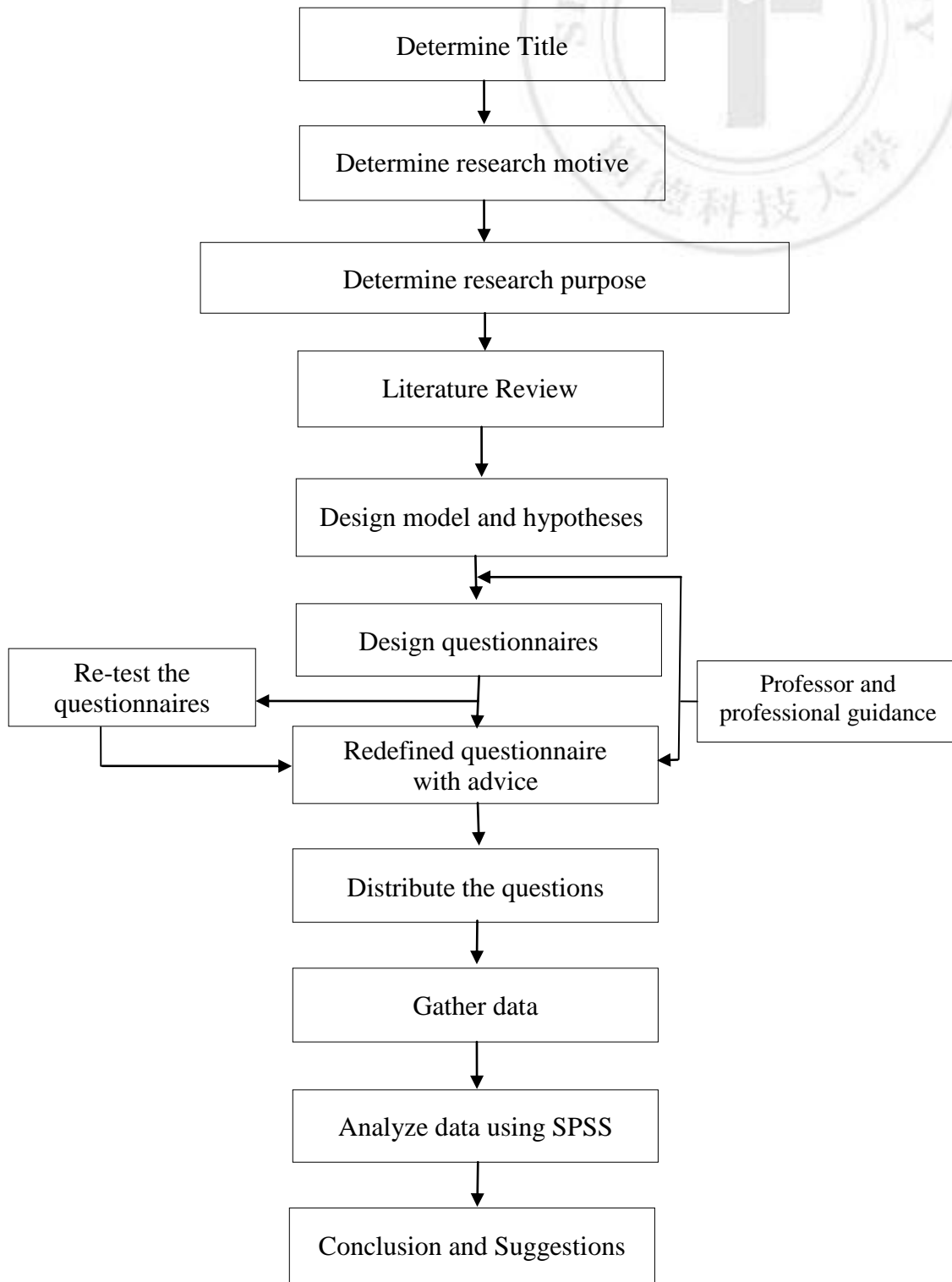
#### **1.4 Research questions**

This research aims to explore the factors affecting users' adoption of McExam in Ministry of Education and Training, Vietnam. Therefore, the purpose of this research is to find out and answer the following three research questions:

- What is research model on the factors affecting the user's adoption for software to mark objective multiple-choice questions, McExam at MOET Vietnam?
- What are important factors of this model affect to the use of software to mark objective multiple-choice questions, McExam at MOET Vietnam?
- What are the results from using Software to mark objective multiple-choice questions, McExam?

#### **1.5 Research procedures**

Table 2 Research procedure





## Chapter 2. Literature Review

This chapter will focus on review and explore the topic of software testing examiner. They include: Overview of the marking test in Vietnam, marking software test McExam; technology adoption model; The user accepts McExam system.

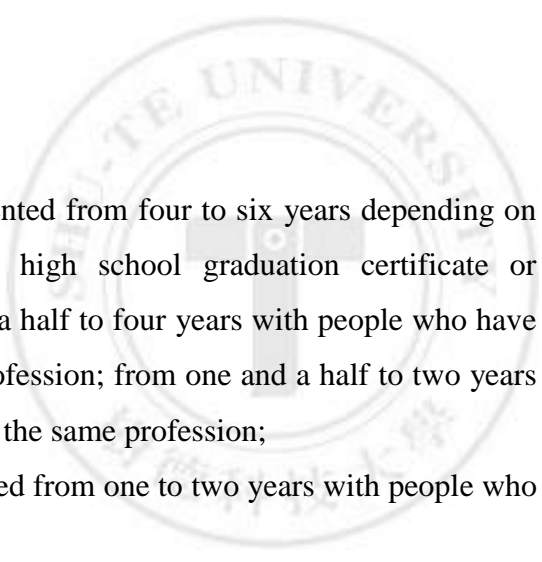
### **2.1 Overview of the use of objective multiple-choice questions in Vietnam**

The purpose of Vietnam undergraduate education is to train students to become people who with sound political awareness, well-behavior good knowledge and capabilities of professional practice; good health to serve the people and meet requirements of building and defending the country. College education helps students get specialized knowledge and proficient practice skills; capabilities of working independently, creatively and resolving problems in trained their speciality. Undergraduate education enables students to grasp specialized knowledge and proficient practice skills, independent work, creativeness and resolving normal problems in trained speciality. Master's degree education helps trainees have a thorough grasp of theory, practical high qualification, capabilities of independent working, creativeness and discovering, resolving problems in trained speciality. Doctorate education helps researchers have high qualification of theory and practice, capabilities of independent studying, creativeness, discovering and resolving new problems of technology, science, instructing scientific research and professional activities.

Under Vietnam law, undergraduate education institutions include: (i) College to train college qualification; (ii) University to train college qualification, undergraduate qualification; to train master's qualification, doctorate qualification as assigned by Prime Minister.

Undergraduate education includes:

Training junior college diploma is implemented from two to three years depending on training profession with people who have high school graduation certificate or vocational graduation diploma; from one and a half to two years with people who have vocational graduation diploma in the same profession;



Training bachelor's degree is implemented from four to six years depending on training profession with people who have high school graduation certificate or vocational graduation diploma; from two and a half to four years with people who have vocational graduation diploma in the same profession; from one and a half to two years with people who have junior college degree in the same profession;

Training master's degree is implemented from one to two years with people who have bachelor degree;

Training doctorate degree is implemented in four years with people who have bachelor degree, from two to three years with people who have master's degree. In particular case, training time of doctorate degree can be prolonged according to regulation of Minister of Ministry of Education and Training.

According to MOET1, 2010, General Department of Education Testing and Accreditation was assigned to implement function of government management majored in examination and education quality assessment by Minister of MOET. The department assists the Minister in matters of university, college enrollment such as advising the Minister to approve, issue law normative document, project, document instructing about policies, enrollment, instructing materials and forms serving enrollment; managing universities, institutions of universities, college, localities in implementing examination preparation and monitoring examination. The Department holds compiled exam questions, answer, marking scheme; is responsible for printing exam questions, answer, marking scheme and marking exam papers for the college entrance exam.

Before 2002, universities, colleges developed entrance exam questions by themselves, which took the form of subjective testing. Self-compiled exam questions had created some shortcomings, such as heterogeneous in difficulty level, exam questions had many errors. They were costly, wasteful and encouraged cramming for exam...

Since 2002, MOET has agreed to administer university, college entrance exam in July annually. MOET has been responsible for compiling general exam questions for all schools, this examination has been known as examination with "3 sameness" (same exam time, same exam questions and same result for admission). Exam form was firstly

subjective testing for all exam subjects. However, because exam questions were completely subjective, marking exam papers took much time and involved many people; schools had to mobilize hundreds of teachers, lecturers to mark exam papers for months. On the other hand, marking exam papers depended totally on human, therefore, it was not objective and fair.

Aiming at improving enrollment into universities and colleges in July 1996, MOET selected University of Dalat to implement a pilot program using objective multiple-choice questions applying many new technologies in compiling exam questions, standardizing exam questions and exam papers remarking. After implementing the pilot program in Dalat, Hanoi University of Business and Technology started objective multiple-choice method in December 1996.

Since 2006, MOET has implemented exam with objective multiple-choice method applied for subjects: Physics, Chemistry, Biology and Foreign languages in university, college entrance and high school graduation exams. Marking was aided efficiently by machine and software, therefore, marking progress has been very fast while ensuring fairness, accuracy and objectivity. Schools only had to mobilize from 10 -15 people to work for 7 – 10 days to fulfill the job. With multiple-choice questions, marking is totally objective, exact; it does not depend on examiners, especially when exam papers are marked by machine. This a big advantage of multiple-choice questions. That is why it is named objective multiple-choice testing method here.

University, college entrance exam happens in July annually, with 3 spells. The 1st spell, group A for Maths, Physics, Chemistry; the 2nd spell, group B for Maths, Chemistry, Biology; group C for Literature, History, Geography; group D for Maths, Literature, Foreign language (English, Russian, French, Chinese, German and Japanese). The 3rd spell is to test all spells A, B, C, D to enroll candidates into junior colleges. Subjects as Physics, Chemistry, Biology, Foreign language are tested with multiple-choice method; the others are tested with subjective method (MOET5, 2010).

Testing time for each subjective test for each subject is 180 minutes while 90 minutes for multiple-choice format subject. Exam questions in university, college entrance exam are compiled by MOET. A test includes from 50 to 60 items for Physics,

Chemistry, Biology and 80 questions for Foreign languages; testing time is 90 minutes. Exam questions are divided into 2 parts: general part for all candidates compiled according to a regular syllabus, a separate part compiled according to an advanced syllabus (There is no separate part in the foreign language tests). Candidates can choose to answer one suitable specific part. Anyone who answers both parts (regardless of the answers being finished or unfinished, being right or wrong), the exam paper is considered as violating rules, and only general part is marked, the separate part is not marked.

Multiple-choice questions in the examination have 4 choices: A, B, C, D. The same exam questions are mixed and permuted to produce many different versions (each version has a separate code). The order of questions as well as the options A, B, C, D are mixed and permuted automatically by computer. The code of each version is a secret content until the test is finished.

The same regulations are applied for both objective exam and subjective exam.

Candidates write their answers on the answer sheets printed under regulation of MOET, to be marked by automatic system (including scanner and computer specialized software).

Universities, colleges organize to invigilate the exam. Candidates' exam papers after examination are transferred to Board of examiners or General Department of Education Testing and Accreditation for marking, the Board of examiners will organize the marking of subjective exam papers and build a team of objective test papers examiners to support the marking multiple-choice exam papers under regulation of Ministry of Education and Training (MOET6, 2010).

## **2.2 Introduction of McExam software**

According to Vo Tan Quan (2006), User's McExam is for administrators, managers, technical experts and staff but administrators who are good at McExam have the most powerfulness in setting parameters for system, decentralizing, making security, copying, handling with problems which arise from using process and observing the whole of performance process of software.

Today, to read an exam paper quickly and enter it into computer, people use scanner to recognize Optical Mark Recognition.

There are two technical solutions:

Solution 1: Recognize exam paper in a standard designed form with Optical Mark Reader;

Solution 2: Recognize exam paper in a normal designed form with Image/Document Scanner enclosed point recognition software.

McExam software is designed to recognize exam paper according to solution 2.

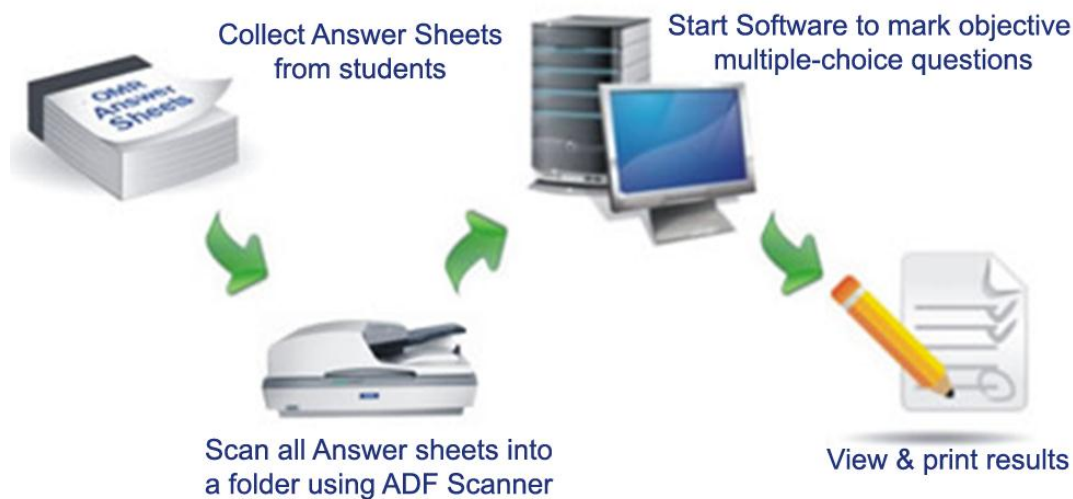


Figure 2 McExam software structure

Software to mark objective multiple-choice questions McExam was built by Anh Quan Company (<http://www.edusoft.net.vn>) in 2004 and ordered by MOET (General Department of Education Testing and Accreditation), used to mark multiple-choice exam papers by the General Department, and it also recommended to institutions. Nowadays, there are about 200 units, such as education and training department, university, college, high school... using this to mark the exam papers. The software has enough functions of multiple-choice question marking software in general, while ensuring requirements of current exam regulation. McExam software is designed by Microsoft Visual Foxpro; installation is easy, friendly, using Vietnamese, full and detail instruction documents, convenient to use, it has options helping users with many

choices and establishing reporting parameter, easy to import/export data from/to other software. Information is exported in many different forms, such as: Fox, Word, Excel, Acrobat... used stably and updated regularly, therefore, until now it has not caused any errors, the software can run on LAN network, and many users can use at the same time.

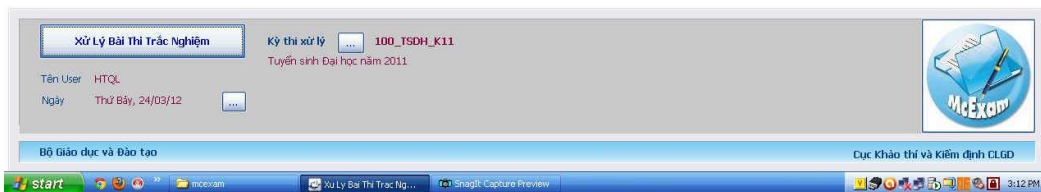
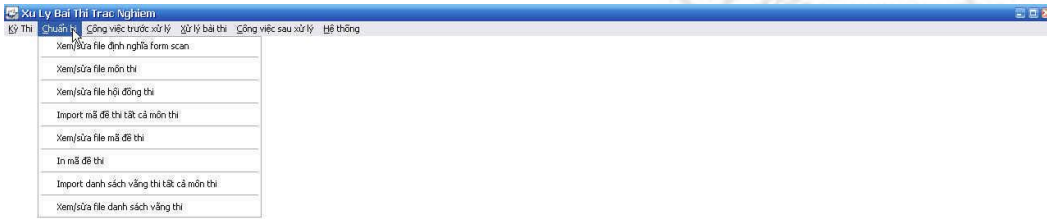


Figure 3 Main monitor of McExam software

### 2.2.1 Functions of McExam software

The McExam software suits the data standard of Ministry of Education and Training. It has been used to mark over 15 million exam papers in national examinations.

The main method of the software is based on Optical Mark Recognition (OMR). The software can recognize signals marked by users in available designed forms and saved into image files that scanned by ordinary scanners or special scanners. Moreover, it can recognize various popular image formats such as bmp, jpeg, tiff, pcx and png of

multiple-choice exam papers. Furthermore, it can be used to collect data of paper-based survey/questionnaire research. Regarding speed, it can process from 3000 to 6000 papers per hour depending on the computer's performance, scanners' speed and images' format.

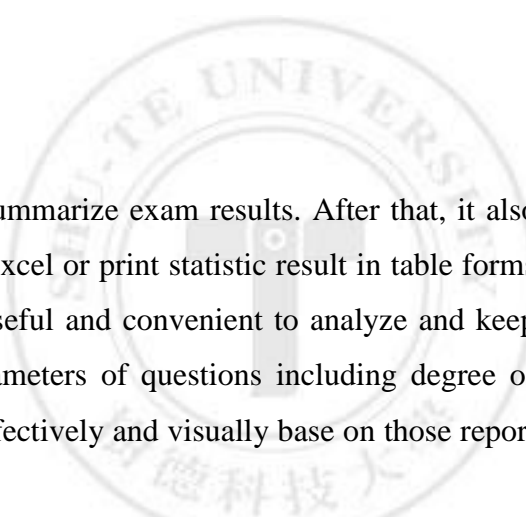
The software has many advantages. Firstly, the diversity of application can be used by the software due to the advantage of self-study of all different formats. Additionally, it supports the application in many pages (application with too much information that cannot design in one page). It has a function to decrease the deviation (incorrect by vertical, horizontal and incline) in case of incorrect cloning. Hence, it is absolutely 100% accuracy if the paper samples are printed exactly and the user marked technique is right. Moreover, it allows users to adjust recognition parameters to achieve the maximum results.

Another effective function of the software is automatic and intelligent checking and processing faults. It hastens handling process as well as detects and prevents errors when processing because of facilitating to correct faults fast, effectively and reliably. In addition, the initial scanning data files of exam papers are kept originally to support for handling process. It also allows users to correct mistakes of exam paper data.

Printing document of exam paper is very important to support the checking process effectively and efficiently. The exam papers can be displayed by the software that is another advantageous function to avoid finding or searching exam papers. Reports such as list tables or statistic table and data can update or adjust conveniently.

Furthermore, incorrect data such as registration numbers or question codes can be analysed effectively by the software. Then, it can generalize information about exam papers which has edited correctly in order to report to higher organization.

Importing automatically data into the system is vital function of the software. For example, files contain information about question codes, answers, permuting questions, distributing question point and marking formula forms that are imported easily to the system. It is designed to support for various format forms including format forms of Ministry of Education and Training.



The software is able to analyze and summarize exam results. After that, it also supports the function to export to Microsoft Excel or print statistic result in table forms and graphs or charts. This function is very useful and convenient to analyze and keep track of exam results. For instance, the parameters of questions including degree of difficulty or differentiation can be assessed effectively and visually base on those report forms.

The software is designed compatibly to mark and transfer points to other software. Additionally, it can handle data suitably and send general reports to higher units as well as distribute data to lower units. Moreover, the interface is designed logically and friendly to facilitate users with ease to use, especially Vietnamese language is very convenient for Vietnamese users.

The software is consulted freely in unlimited times and warranted within 1 year. In addition, it can be upgraded freely with a new version that is launched within 1 year since the date of purchasing product. When the warranty time is expired, it can be counted preferential price for new upgraded version.

### **2.2.2 Modules of McExam software**

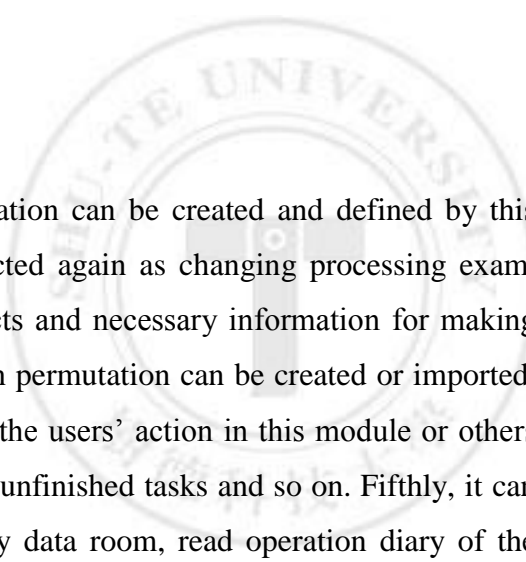
The McExam software has five main modules:

- Management and establishment system's parameters;
- Exam paper recognition;
- Exam paper processing;
- Marking exam;
- Statistics and report.

#### **2.2.2.1 System parameter establishment, management module**

Management module can establish the operation of the other modules. It is a crucial module of the software. It is managed and controlled by the highest administrator. The first capability of this module is that it can create, edit and manage accounts to access into other modules. The accounts are assigned with one or more specific permissions. Secondly, it can install working parameter for the whole system.





Thirdly, a new exam for each exam organization can be created and defined by this module. Moreover, these exams can be selected again as changing processing exam. Additionally, the list of exam's board, subjects and necessary information for making task (such as answer, question codes, question permutation can be created or imported. Fourthly, it can provide reports and statistics the users' action in this module or others including login time, the numbers finished or unfinished tasks and so on. Fifthly, it can implement and maintain system such as copy data room, read operation diary of the whole program. Therefore, administrators' manipulation in this management module can influence directly the other modules.

#### **2.2.2.2 Exam paper recognition module**

Exam paper recognition module can call the first module of the marking processing. Firstly, the exam papers can be scan by scanner. This module, then, recognizes the image files and imports to text files.

The image file BT0001.JPG (path from: D:\mcScanner\INPUT\BT0001.JPG) as the figure 4 below is an example for the input file.

Sở Giáo dục & Đào tạo TP.HCM  
Trường PTTH Dân Lập Việt Thanh

**Phiếu trả lời trắc nghiệm**

Ngày thi: 24/2/06  
Môn thi: Anh

Họ tên & chữ ký giám thị 1: \_\_\_\_\_  
Họ tên & chữ ký giám thị 2: \_\_\_\_\_

**Hướng dẫn**

- Giữ cho phiếu phẳng, không bôi bẩn, làm rách.
- Thí sinh dùng **bút chì mềm** tô kín các ô cần thiết cho: **số báo danh, mã đề thi và các câu trả lời.**
- Số thứ tự câu trả lời dưới đây ứng với số thứ tự câu hỏi trong đề thi.
- Mỗi câu hỏi thí sinh chọn và tô kín 1 ô tròn tương ứng với phương án trả lời đúng nhất.

**Số báo danh**      **Mã đề thi**

8 9 3 2 0 3      0 0 7

**Thông tin thí sinh**

Họ và tên: Lê Hải Ngân  
Lớp: 7  
Chữ ký: [Signature]

**Phần trả lời**

1	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	14	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	27	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	40	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
2	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	28	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	41	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
3	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	16	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	29	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	42	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
4	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	17	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	30	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	43	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	31	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	44	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
6	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	19	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	32	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	45	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
7	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	20	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	33	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	46	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	34	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	47	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	22	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	35	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	48	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
10	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	23	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	36	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	49	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
11	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	24	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	37	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	50	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
12	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	25	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	38	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>					
13	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	26	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	39	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>					

Figure 4 Multiple- choice testing sheet

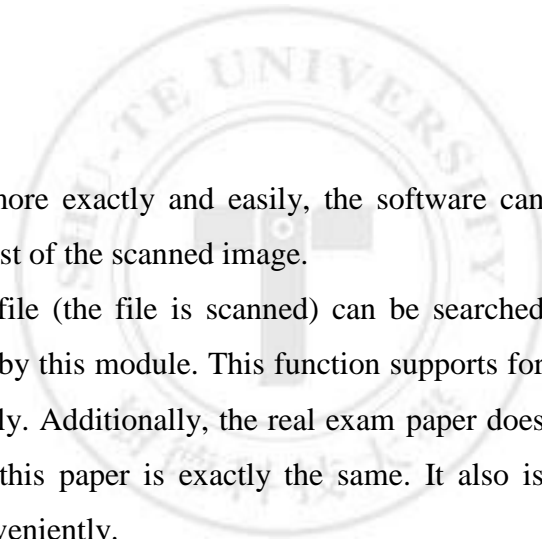
After processing by this module, the output file (txt format) is exemplated as below.

Name of file: D:\mcScanner\OUTPUT\01\_01\_ANH3N\_01.TXT (Extract only 1 line corresponding to above exam paper)

893203 001 BBDCAAABBBDddd-----

DBBCDADACDADDADCABBCCACDABCDC

Creating sample file in the module is a vital part of the marking processing. Sample file is unique which defined field to take data. Initially, that exam paper (as figure 4) is fully filled answering all questions, registration number and question code of candidate as well. After that, the paper is scanned to recognize the information.



Furthermore, in order to recognize more exactly and easily, the software can support to adjust the brightness and the contrast of the scanned image.

Moreover, the result file and image file (the file is scanned) can be searched easily and displayed on the screen or printed by this module. This function supports for faults recognition more quickly and effectively. Additionally, the real exam paper does not need to find because the image file of this paper is exactly the same. It also is showed on the screen to check easily and conveniently.

### 2.2.2.3 Test processing module

Input file is text file to save the test information which may has some errors (because of various methods). Output file is data file (for example DBF – file type of Foxpro software) to save the test information which is adjusted and completed (mistake adjustment).

For example of input files:

File name: D:\McExam\THITHU\01\_13\_ANH3N\_01.TXT

```

130001 212 ABCDBCDCBACBACBBADCCDCBDAABDDBBCAABBBBCBCBDBBAD
130002 DBBDABBABDBDCBCBBDBAACDACCABAAAADBAADBACBBDDACC
130*03 609 AADCCBBDBDABCDADADABDBDDCAAAADADABBABAABAADDCCDBA
130004 83* DDCDAACAACCBDDBCDBACBDADACBBABBACBBADABDDCBBBDADCBA
130005 212 AADCBCAABACDBABBDDCDDCCDABADDCCBDBBADBBBCBCBDBBAA
130006 4 8 DBCDABBABDBDCACBBDBAAADAACCAABAAAADCDACABCCABDDDCB
13--07 609 BCAACBBABBDBDDCCDDDBDDCBBAADDCCDBCAABACCCDCCABC
      835 DDC      ABCCD      BBDDCBDAE      CAA
  
```

For example output file:

File name: D:\McExam\THITHU\EXPORT\01\_ANH3N.DBF

	Sbdc	Donvi	Made	Mautin	Traloi	Truong	Malocham
▶	130001	01	212	1	ABDCDBCDCBACBACBBADCCDCBDAABDDBBCAABBBBCBCBDBBAD	13	01
	130002	01	428	2	DBBDABBABDBDCBCBBDBAACDACCABAAAADBAADBACBBDDACC	13	01
	130003	01	609	3	AADCCBBDBDABCDADADABDBDDCAAAADADABBABAABAADDCCDBA	13	01
	130004	01	835	4	DDCDAACAACCBDDBCDBACBDADACBBABBACBBADABDDCBBBDADCBA	13	01
	130005	01	212	5	AADCBCAABACDBABBDDCDDCCDABADDCCBDBBADBBBCBCBDBBAA	13	01
	130006	01	428	6	DBCDABBABDBDCACBBDBAAADAACCAABAAAADCDACABCCABDDDCB	13	01
	130007	01	609	7	BCAACBBABBDBDDCCDDDBDDCBBAADDCCDBCAABACCCDCCABC	13	01
	130008	01	835	8	DDCDAADDABCCDAADCDADDBDCBCEBDAABBAACABBDDCBDABCAA	13	01
	130009	01	212	9	ABACDCDADDCCCBBAECBCEBDCDAAAACDBBDBBBEDACAABADBAD	13	01
	130010	01	428	10	DCCDAABDBBBBCBBDAAADCACDACAABAAADCAADBACBDDAABC	13	01
	130011	01	609	11	DCAACBCABBBDDBCADABBBBCBBAADCCDDBACACADCCDDC	13	01
	130012	01	835	12	DBCBCDCBACCCDADDBAABDDBACBCEBAAAABBADCEBDBABBDDACC	13	01

Figure 6. Data of output file of McExam (etc)

After copying the test (text file) of exams into a regulated folder (each file of test contains data of series of tests), the series of test can be defined. The module can

support automatically for the definition. However, checking the accuracy of supporting is very necessary. After that, the mistakes of series of tests is checked and tested. Then, the data logic errors and other mistakes of series of tests are needed to correct. Next, the data errors of series of tests are tested. Additionally, the module can support the checking suitability absent student numbers in score-board and detecting with the list of absent students. Moreover, the probability search lists can be printed in the module. It also facilitates to search the probability to evaluate the accuracy of scanning processing. If data errors are occurred, it is necessary to detect more to eliminate all errors. This module can support to create summarized exam file of each subject (after checking to eliminate all logic errors).

#### 2.2.2.4 Marking exam module

Test marking means as follows:

Input file is a file of student test (no logical errors)

Output file is a file of marking result with scale of 10.

The figure 6 is an example of input file.

File name: D:\mcScore\THITHU\BAITHI.DBF

Baithi						
	Mamon	Donvi	Truong	Sbdc	Made	Traloi
▶	ANH3N	01	02	020001	212	ADACBECDDBACBECBACCCCCAAAADCCDACBACAABBACACBDBBAD
	ANH3N	01	02	020002	428	DABDABBAABDDADCBEBDBACDAABCAABDBCBCCDCABBADCACCBDC
	ANH3N	01	02	020003	609	CCAACBABBEBDDDCADBBEBDDCBACAADCDADABABECBCCDCCBDC
	ANH3N	01	02	020004	835	DDCDAACACBBDADDEACADBDDBCBBABBACBDBADDABDCBEBBADCFBA
	ANH3N	01	02	020005	212	ADACDBADDABCBCBEBDDCCDCBBAABDABBACAABDADACBDBBAD
	ANH3N	01	02	020006	428	DABDABBAABDABACBEBDBADCDABCCAAABABAADABCBEBCCBDBBBA
	ANH3N	01	02	020007	609	CCAACBEBDBEBDDCAABEBDDCBACAADCDADABDDCBADCCDAC
	ANH3N	01	02	020008	835	DDCDAADCAED-DABDBACADBDDBCAAABBACBEBDDDBDCBEBDADCAD
	ANH3N	01	02	020009	212	AAACCBBDABACB-CBEBDDCCCBADAAACDABBCAABDBCBEBDBBAD
	ANH3N	01	02	020010	428	DCDDABBAABDBDCBEBDBCBCCACBAACADABBABBCCBEBDACC
	ANH3N	01	02	020011	609	CBAACBEBDBEBDDCCBBDCAABCAADCCBEC-ADBCACDCCBDC
	ANH3N	01	02	020012	835	DDCDAACABDBDADDEACADBDDBCBBABBACBEBDDDBDCBEBDADCBEB
	ANH3N	01	02	020013	212	ADACBEBDDABCBCBEBDDCCDCAAABDBECBBAABBBBCBEBDBBAD
	ANH3N	01	02	020014	428	DBBDABBAABDDCABEBDBAAADCAACCAADABADBAABBDACDDBDCC
	ANH3N	01	02	020015	609	CCAACBEBEBDBEBDDCCDADBEEDCBACAADCDADABDBCACCCDCCBDC
	ANH3N	01	02	020016	835	DDCCAACCCDCBABBCCB-DCBDCCAABBACCDAAACBDBEBDBADCCD
	ANH3N	01	02	020017	212	ADACDBADDDBCBDBEBDDCCDDBAAABBDACADABEBBACBEBDBAD

Figure 5 Data of input file of McExam (etc)

Output file is also added with field DIEM (SCORE)

The module can support for preliminary marking to assess the test questions with the degree of difficulty and difference. The official test scale for each question is

established. And the official marking with scale of 10 is setup. Next, the scaled table from 100 to 10 is established. It is easy to print the score record of statistics and lists in each stage of marking.

The module also supports to print and export the results of tests.

#### **2.2.2.5 Statistics and reports module**

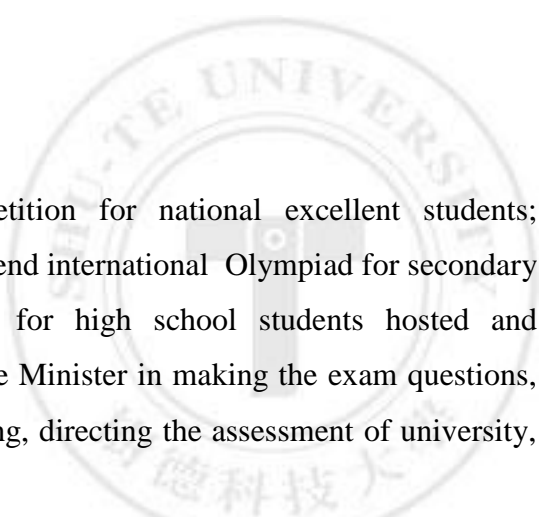
This module support to print the table of statistics, lists related to test processing and marking. Moreover, report files as required of Ministry of Education and Training can be exported easily.

### **2.3 The reasons for choosing Software to mark objective multiple-choice questions, McExam at Vietnam Ministry of Education and Training.**

Currently, most countries have applied information technology in the areas such as government management, education and training, culture, society and economic development, etc. In addition to be used to mark the exam, Software to mark objective multiple-choice questions have also been used for various purposes such as counting the votes in elections, investigating the sociological research, market research, etc. In Vietnam, the use of Software to mark objective multiple-choice questions for marking multiple-choice questions is extremely necessary. Moreover, MOET has regulated that it is compulsory to use it for high school graduation exam and enrollment at the colleges, universities.

In 2003, General Department of Education Testing and Accreditation was established by MOET with the aim of assisting the Minister in performing the government management on the National Education Testing and Accreditation; implementing public services in testing, accreditation of education and certification of diplomas. For organizational structure, Department includes the following offices: Office, Office of Testing, office of accreditation of preschools, general schools and continuous trainings. Office of accreditation of university education and vocational schools; office of enrollment and diplomas certification.

From its establishment to now, the Department has presided and coordinated with other agencies to assist the Minister in directing and organizing the regional and international, national tests including: high school graduation exams (high school



education and continuous training), competition for national excellent students; competition for choosing national teams to attend international Olympiad for secondary education subjects; international Olympiad for high school students hosted and organized in Vietnam. Besides, this assists the Minister in making the exam questions, developing the answers and scales, and guiding, directing the assessment of university, college admission.

To meet the requirements of innovation on tests and recruitment, the Department has joined its hand on developing the projects and route of renovation, admissions. The focus of this issue is changing the form of traditional competition into objective multiple-choice questions applying for high school graduation exams. In addition, the Department has tested Software to mark objective multiple-choice questions, including McExam to choose, improve and put into use for marking the objective multiple-choice questions in accordance with the regulations.

As software to mark objective multiple-choice questions, McExam has been implemented at Da Lat University and the multiple-choice exams of MOET. This software ensures the requirements of the exams, so MOET has selected McExam software to deploy on a large scale and put into use in the educational and training institutions. Presently, this software has been used in more than 100 universities and colleges (GDETA, 2011).

These are the multi-disciplinary universities with many contestants; all test groups consisting of the exam with objective multiple-choice questions. Besides, since 2006, these universities have used the McExam software to mark the objective multiple-choice questions according to the policy of the Ministry of Education and Training. Until now, 15 million tests have been marked by this software without any technical errors. Therefore, it meets the requirements of the current competition regulations.

This shows that McExam is very necessary and important for the exams in general and test marking in particular. However, now, there is no research to find out the factors affecting the user's adoption for Software to mark objective multiple-choice questions, McExam at MOET Vietnam. Therefore, it is essential to conduct the research

on the factors affecting the user's adoption for Software to mark objective multiple-choice questions, McExam at MOET Vietnam.

#### 2.4 Technology Acceptance Model

Technology Acceptance Model (TAM) was initially developed by Davis to provide an explanation of the determinants of computer adoption. In general it is capable of explaining user behavior across a broad range of end-user computing technologies and user populations theoretically justified (Davis, 1989). The core concepts of TAM is based on (i) Perceived usefulness - which has been defined as a user's subjective perception of the ability of a computer to increase their job performance when completing a task, and (ii) Perceived ease-of-use - which is a person's subjective perception of the effortlessness of a computer system, which affects the perceived usefulness thus having an indirect effect on a user's technology adoption.

Since Davis proposed TAM, several approaches that focus on the degree of technological adoption have been based on the model (Adams, Nelson, & Todd, 1992; Igbaria, Guimaraes, & Davis, 1995; Mathieson, 1991). However, TAM only provides general information about whether a technology has been adopted by users. Further information is needed regarding its use in specific fields, so that the development of technology can be guided in the right direction (Mathieson, 1991).

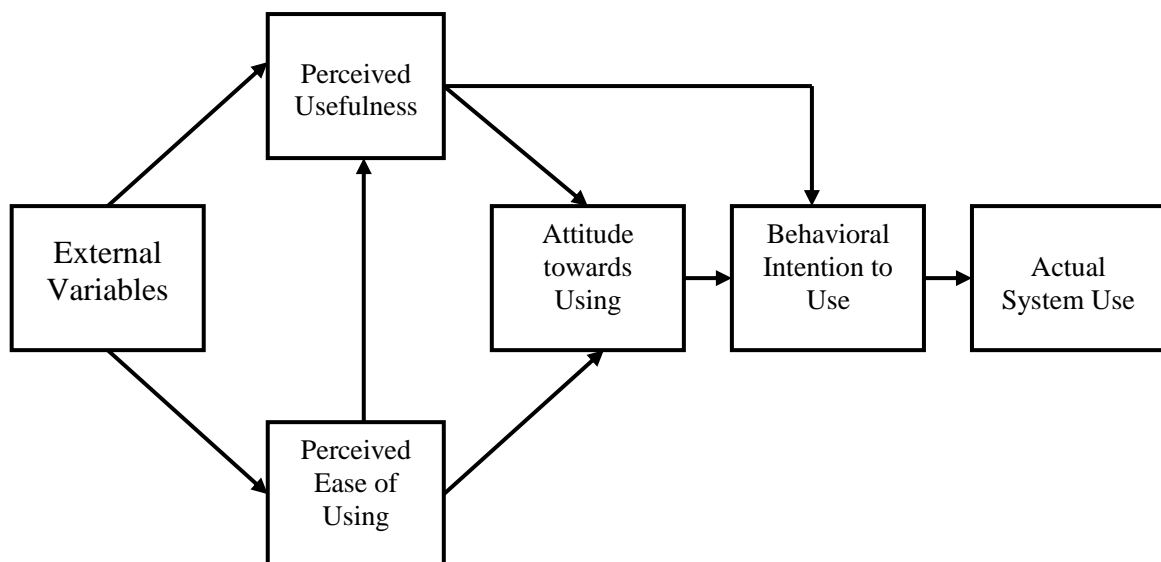


Figure 6 Technology Acceptance Model (Davis, 1989)

The TAM explains user acceptance of a technology is based on user perceptions (Davis, 1989; Davis et al., 1989). The mediating roles of perceived usefulness and perceived ease of use are examined in the relationship between external variables and the intention of system usage. While perceived usefulness is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance,” perceived ease of use is defined as “the degree to which using the technology will be free of effort” (Davis, 1986, 1989). Both perceived usefulness and perceived ease of use influence the individual’s attitude toward using an information system. Attitude and perceived usefulness, in turn, predict the individual’s behavioral intention to use it.

The TAM has been continuously studied and complete - The final version of TAM (Venkatesh & Davis, 1996)

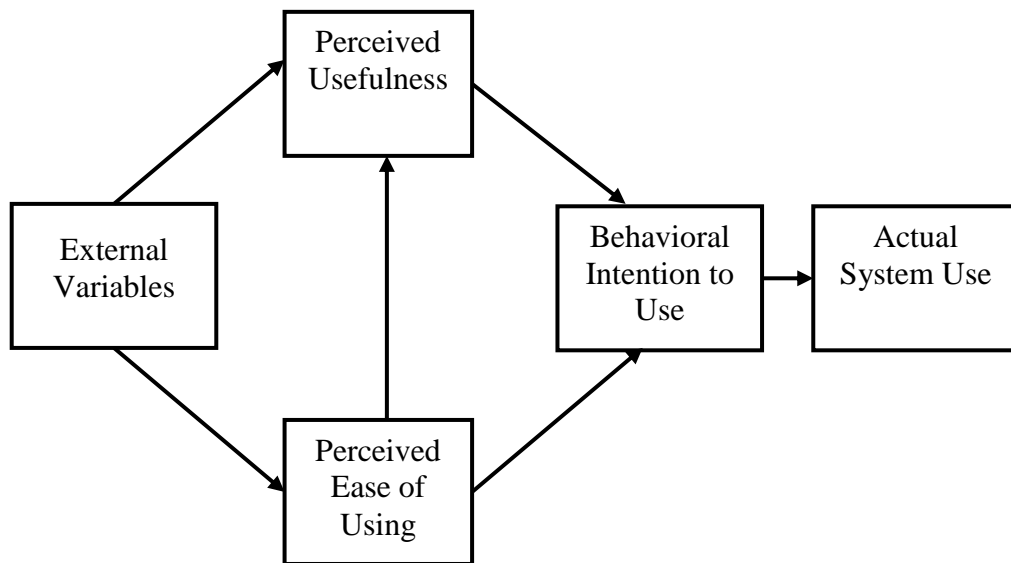


Figure 7 The final version of TAM (Venkatesh, V. & Davis, F.D. 1996, p.453)

## 2.5 User adoption of McExam in Vietnam

TAM has been used for explaining user acceptance of a technology based on user perceptions (Venkatesh & Davis, 1996), thus, in this research “A Study on the factors affecting Administrator’ adoption of McExam in Ministry of Education and Training, Vietnam”, author used TAM to exam user adoption of McExam system. In the



follow sessions will explain the relationship between standard factors of TAM with the research framework.

### **2.5.1 Perceived ease of use of McExam**

Perceived ease of use is an angle of human behavior which covers that, to what extent the new technology usage can provide ease at work or can give more relief on work. Perceived ease of use explains individuals self approach towards the new technology use (Davis, 1989). It is also noted that if the task is totally related to information technology (IT) then perceived ease of use influence the perceived useless for new technology adoption (David & Detmar, 2000).

In the other hands, perceived ease of use also defined as the degree to which an individual believes that using a particular system would be free of physical and mental effort. A considerable amount of prior studies supported the significant effect of perceived ease of use on behavioral intention, either directly or indirectly through perceived usefulness (Venkatesh & Davis, 1996; e.g., Agarwal & Prasad, 1999; Davis et al., 1989; Hu, Chau, Sheng, & Tam, 1999; Jackson et al., 1997; Venkatesh, 1999; Yi & Hwang, 2003).

McExam is really useful for users who has task force in testing by multi-choices questions. Otherwise, McExam is understood as an information system, characterized technology, to use and exploit it effectively, users need to learn the skills to use it better. Therefore, the level of McExam user acceptance is affected the level of McExam effectiveness.

### **2.5.2 Perceived Usefulness of McExam**

Perceived usefulness is the degree to which a person believes that using a particular system could enhance his or her performance (Saade, et al., 2005). There are many extensive researches that provide evidence of the significant effect of perceived usefulness on adoption intention (Venkatesh & Davis, 1996; Agarwal & Prasad, 1999; Davis et al., 1989; Hu, Chau, Sheng, & Tam, 1999; Jackson, Chow, & Leitch, 1997; Venkatesh, 1999; Venkatesh & Davis, 2000). Empirical studies on the behavioral intention of technologies have found consistently positive relationships between usefulness and the user's intention of a variety of specific technologies, ranging from

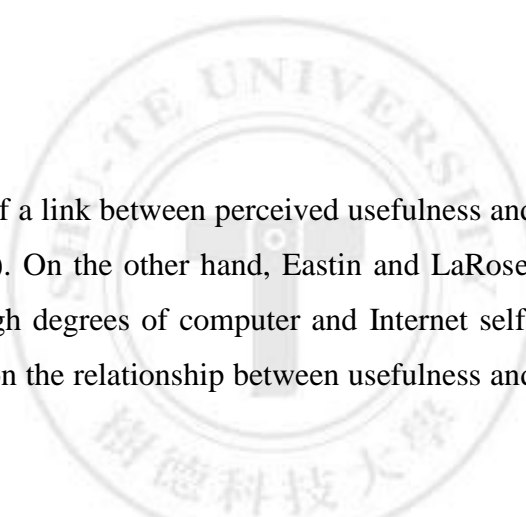
computer software to e-mail (Chau & Hu, 2001) and the TAM also supports this link (Davis et al., 1989).

According to research of TAM (Venkatesh & Davis, 1996), what causes people to accept or reject information technology among the many variables that may influence system use, previous research suggests two determinants that are especially important. First people tend to use or not use an application to extend; they believe it will help them to perform their job better. We refer about the first variable Perceived ease of use. Second, even potential users believe that a given application is useful, they may, at the same time, believe that the system is too hard to use and that performance benefits of usage are out weighted by the effort of using application. That is, in addition to usefulness, usage is theorized to be influenced by Perceived ease of use.

### **2.5.3 Behavioral Intention to Use of McExam**

The theory of planned behavior extends from TRA by incorporating an additional construct, namely perceived behavior control, to account for situations in which an individual lacks substantial control over the targeted behavior (Ajzen, 1991). According to TPB, an individual's behavior can be explained by his or her behavioral intention, which is jointly influenced by attitude, subjective norms and perceived behavioral control. Attitude refers to an individual's positive or negative evaluation of the performance effect of a particular behavior. Subjective norms refer to an individual's perceptions of other people's opinions on whether or not he or she should perform a particular behavior, while perceived behavioral control refers to an individual's perceptions of the presence or absence of the requisite resources or opportunities necessary for performing a behavior (Ajzen & Madden, 1986).

Ease of use is believed to be one of the fundamental factors in determining the behavioral intention and use of various corporate information technologies (Davis, 1989). According to TAM, behavioral intention to use is influenced by ease of use, because the easier a technology is to use, the more useful it can be (Venkatesh, 1999). Extensive research over the past decade provides evidence of the significant effect of perceived ease of use on usage intention, either directly or indirectly (Venkatesh, 1999).



There also exists pragmatic evidence of a link between perceived usefulness and behavioral intention to use (Venkatesh, 1999). On the other hand, Eastin and LaRose, (2000) recognized the link and stated that high degrees of computer and Internet self-efficacy proved to have an attenuating effect on the relationship between usefulness and attitude toward adopting the Internet.

#### **2.5.4 Actual System Use of McExam**

There are some models to examine factors influencing the technology adoption and actual system use. The most famous one is TAM (Venkatesh & Davis, 1996). Following their literature above, the customer adoption behavior is determined by the intention to use a particular system, which in turn is determined by the perceived usefulness and perceived ease of use of the system. However, factors affecting the adoption of a new information technology are likely to vary with the technology, target users, and context (Moon & Kim, 2001). As whispered by Sohail and Shanmugham (2003), customer adoption describes beliefs about having necessary resources and opportunities for an individual's intention to perform. These are facilitating conditions, which refer to the availability of resources, i.e. the technological resources and infrastructure needed to engage in the adoption (Triandis, 1979).

## Chapter 3 Research Method

The objective of this chapter is to describe the research model, research hypothesis, how to measure variables, data collection, research method and research process.

### 3.1 Research model

The focus of my research is on McExam. In this study, I have modified and updated Technology Acceptance Model-TAM by Venkatesh & Davis (Venkatesh & Davis, 1996) by considering it in the context of mark recognition software - McExam in accordance with the provisions of enrollment regulations and characteristics of Vietnam.

Based on the literature reviews as well as TAM's reviews in the Chapter 2, the research model is proposed as below:

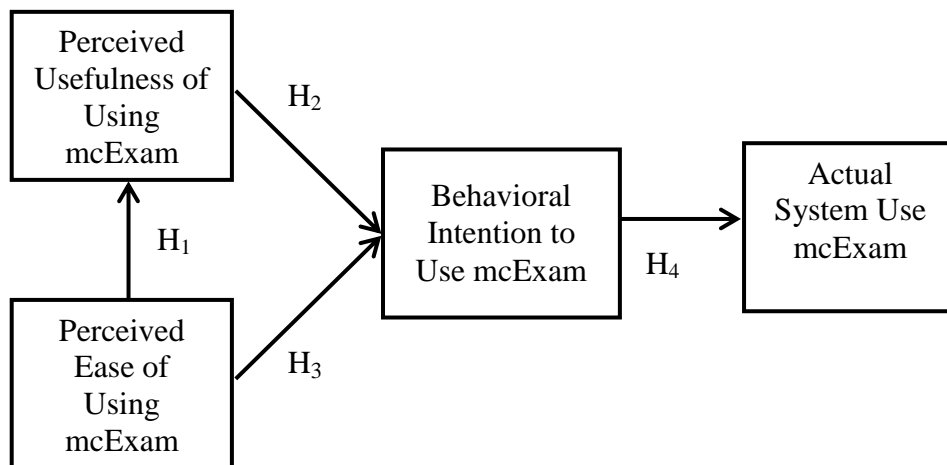


Figure 8 Research model is adapted from TAM

### 3.2 Research hypothesis

On the basis of chapter 2 and situation of using McExam in Ministry of Education and Training of Viet Nam, I would like to propose 4 hypotheses as follows:

H<sub>1</sub>: The Perceived Ease of Using McExam has a positive effect to The Perceived Usefulness of Using McExam.

H<sub>2</sub>: The Perceived Usefulness of Using McExam has a positive effect to The Behavioral Intention to Use McExam.

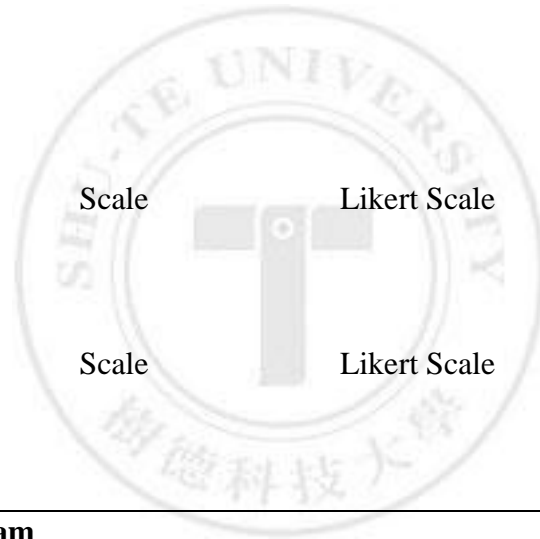
H<sub>3</sub>: The Perceived Ease of Using McExam has a positive effect to The Behavioral Intention to Use McExam.

H<sub>4</sub>: The Behavioral Intention to Use McExam has a positive effect to The Actual System Use of McExam System.

### 3.3 Measuring variables

Table 3 Variables and measurement categories.

Question	Level of Scale	Type of Scale
<b>Part I: Perceived Usefulness of Use McExam</b>		
- Using McExam enables me to accomplish my task quickly.	Scale	Likert Scale
- Using McExam would improve my performance in my work place.	Scale	Likert Scale
- Using McExam would help me increase my productivity.	Scale	Likert Scale
- Using McExam would enhance my effectiveness in the job.	Scale	Likert Scale
- Using McExam would make the job easier.	Scale	Likert Scale
<b>Part II: Perceived Ease of Use McExam</b>		
- I find it easy to get the McExam to do what I want.	Scale	Likert Scale
- My interaction with the McExam will be clear and understandable.	Scale	Likert Scale
- I find the McExam flexible to interact with.	Scale	Likert Scale
- I find the McExam easy to use.	Scale	Likert Scale
<b>Part III: Behavioral Intention to Use</b>		
- I will use the McExam rather than manual methods to complete the job.	Scale	Likert Scale



- My intention to use the McExam rather than manual methods in completing the job.
- In completing the job, I would rather use the McExam than use manual method alone.

Scale Likert Scale  
 Scale Likert Scale

---

**Part IV: The Actual System Use of McExam**

- I usually use McExam.
- I think the McExam should be upgraded yearly in order to suit the practice.
- I think the McExam need to be applied for extension.

Scale Likert Scale  
 Scale Likert Scale  
 Scale Likert Scale

---

Technology Acceptance Model by Venkatesh & Davis (Venkatesh & Davis, 1996) is as guiding road to prepare questions for experimental research. We also make reference documents which are used for measurement and parallel structure in our research model (it means The Perceived Usefulness of Using McExam, The Perceived Ease of Using McExam, The Behavioral Intention to Use McExam and Actual System Use of McExam) (Mark T. Dishaw, Diane M. Strong, 1998). Questions are tested by professional experts before one survey is conducted and are adjusted based on experimental results.

Questions are made based on 5-point Likert scale to collect data for structures of research model. To measure the acceptance level of users about the mark recognition software objectively, we ask one person to answer our report on his acceptance level to McExam. These answers are summarized in Table 2.

**3.4 Data collection**

**3.4.1 Measurement scale: 5-point Likert scale**

Categories which are used in conducting researches are taken from previous relevant researches.

Chosen categories are adjusted to be in accordance with the situation of this research as well as of Likert scale: 1 = Very disagree; 2 = Disagree; 3 = No idea; 4 = Agree and 5 = Very agree (Appendix A).

### **3.4.2 Sampling method**

Presently, this software has been used in more than 100 universities and colleges (GDETA, 2011) including administrators, managers, technical experts and staffs. Administrators are good at McExam and have the most powerfulness in setting parameters for system, decentralizing, making security, copying, handling with problems which arise from using process and observing the whole of performance process of software,... In this study, administrators will mainly take part in answering question naire.

### **3.4.3 Experimental survey**

An experimental survey is conducted before an official survey is carried out. The objective of experimental survey is to test whether proposed model develop well and is suitable with McExam's acceptance analysis. It also tests question table which is designed for answerers.

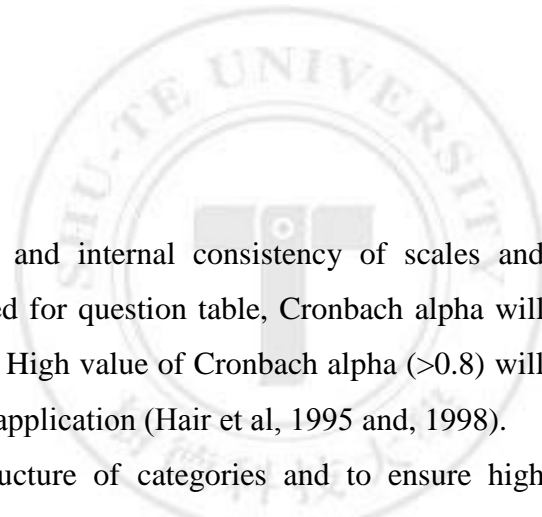
Question table is sent to individuals who are controlling this software and to organizations which are assigned to give marks to tests so that they can give feedback to administrators.

### **3.4.4 Final McExam Acceptance model**

Data Collection method.

This question table is directly sent to individuals who are controlling McExam and to testing centers (units are assigned to give marks to tests) of all universities and colleges using McExam and to two General Department of Education Testing and Accreditation. This question table is designed based on some previous researches and on asking for experts' advice as well as direct controllers of McExam at General Department of Education Testing and Accreditation. Carrying out first 35 questions and taking experience from it and asking for experts' advices as well as long time users of McExam. After all, official question table will be made.

### **3.5 Confidence Interval and reliability of variables**



### 3.5.1 Confidence Interval Estimation

To estimate the confidence interval and internal consistency of scales and structures in measurement categories designed for question table, Cronbach alpha will be considered for each group and for total scale. High value of Cronbach alpha ( $>0.8$ ) will be considered “Acceptable” in social science application (Hair et al, 1995 and, 1998).

To check confidence interval of structure of categories and to ensure high valuation for measurement, scale, designing of question table, it will be representatives of each variables and is used with Cronbach  $\alpha$ . I highly appreciate confidence interval of 4 components including The Perceived Usefulness of Using McExam, The Perceived Ease of Using McExam, The Behavioral Intention to Use McExam and Actual System Use. Cronbach  $\alpha < 0.7$  will be deleted.

Cronbach  $\alpha$  is used to check if methods are free from Errors. During experimental survey, we found that all Cronbach  $\alpha > 0.7$ , it means the structure of question table has high confidence interval. Results are shown in table 4.

Table 4 Confidence interval of each measurement.

Factors	Items	Cronbach $\alpha$
Perceived Usefulness of Use (PUU)	5	0.865
Perceived Ease of Use (PEU)	4	0.852
Behavioral Intention to Use (BIU)	3	0.883
Actual System Use (ASU)	3	0.859

Source: Survey data

### 3.5.2 Factor analysis

Factor analysis is used to check the appropriateness of the factors: Perceived Usefulness of use, Perceived Ease of use, Behavioral Intention to use and Actual use of mcExam. After uses SPSS software to analyze factors, the results are show on Table 5:

Table 5 Results of Factor analysis.

Categories	Factor - Loading			
	PUU	PEU	BIU	AUS





PUU1	Accomplish task quickly	0.839			
PUU2	Improve performance	0.701			
PUU3	Increase productivity	0.837			
PUU4	Enhance effectiveness	0.524			
PUU5	Easier to do the job	0.815			
PEU1	Find easy		0.808		
PEU2	Clear and understandable		0.761		
PEU3	Flexible to interact		0.821		
PEU4	Easy to use		0.711		
BIU1	Will use			0.977	
BIU2	Intention to use			0.851	
BIU3	Better than manual method alone			0.877	
AUS1	Usually use				0.964
AUS2	Upgraded				0.829
AUS5	Applied extension				0.854
Extraction % of Variance		56.464	12.122	81.593	78.165
Extraction Cumulative (%)		56.464	68.585	81.593	78.165

Extraction Method: Principal Component Analysis.

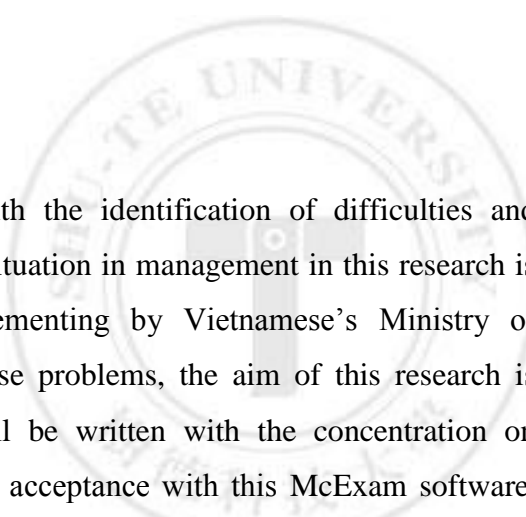
Rotation Method: Varimax with Kaiser Normalization.

A Rotation converged in 5 iterations. With values <0.5 suppressed are displayed.

Source: Survey data

On the Table 4, there are all of items have factor loading are greater than 0.5, thus, according Hair et al. all of items are significant.

### 3.6. Conducting an empirical research



Many research works often start with the identification of difficulties and problems in management. These difficulties situation in management in this research is the problems of McExam which is implementing by Vietnamese's Ministry of Education and Training. After analyzing these problems, the aim of this research is identified. Next, overview of document will be written with the concentration on definitions related to the influences of user's acceptance with this McExam software. Therefore, Technology Acceptance Mode (TAM) is a fundamental theory of this research.

The methodology will be used in this research is quantitative research with survey/questionnaire. Next, the questionnaire will be developed based on general researches and will be consulted by experts in this filed. It also will be examined and tested by users. After that, the questions in the questionnaire will be adjusted and improved in order to assess and measure the mean and confidence interval. Finally, after analyzing data, the research will provide the findings and recommendations.

## Chapter 4. Research results

These are results of research, discussion and analysis of data to identify the proposed model McExam Technology Acceptance at Ministry of Education and Training of Viet Nam, including sample description, descriptive statistical data of variables, linear regression analysis. To test hypothesis, SPSS 15.0 is used to help me analyze collected data.

### 4.1 Sample description

Research survey is implemented on objects: Administrators of McExam at universities and colleges and General Department of Education Testing and Accreditation.

Official survey is conducted with 210 question tables to administrators of McExam at universities and colleges and two at the General Department of Education Testing and Accreditation. After 2 weeks of survey, we collect 190 question tables, accounting for 90.05% of total issued question tables. In total collected 190 question tables, there are 10 question tables not answered fully, so they are omitted, accounting for 5.25% of collected question table. Remaining 180 question tables have full answers as regulated, accounting for 94.75% of collected question table.

Among the total of 180 question tables given within 2 weeks on April, 2012, question tables are tested once again and are recorded in one database of SPSS program. Implementing checking and turning this SPSS program into database can be used for all SPSS programs.

Survey information includes sex, age, field of study at university, experiences of using McExam.

Table 6 Features of samples.

<b>Categories</b>	<b>Number of peoples (persons)</b>	<b>Rate (%)</b>
Gender	Male	165 91.7



	Female	15	8.3
Age	Under 25	5	2.8
	From 25 to 45	135	75
	Over 45	40	22.2
Field of study	Information		
	Technology	155	86.1
	Economic	3	1.7
	Technical	17	9.4
	Other	5	2.8
Experiences of using McExam	Less than 3 year	33	18.3
	3 to 5 years	80	44.4
	More than 5 years	67	37.2

Source: Survey data

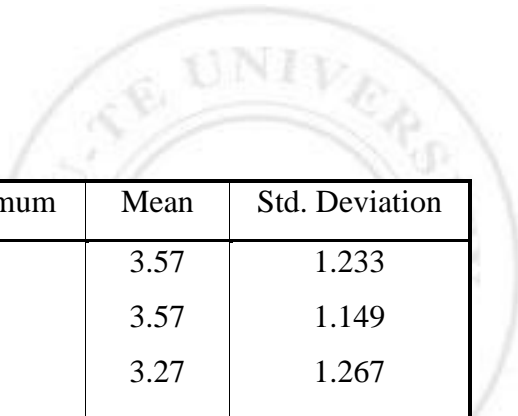
Total surveyed number of people is 180 people including 15 female customers, accounting for 8.3%, and 165 male customers, accounting for 91.7%. Most of the informants have age ranked from 25 to 45 years old (75%). Thus, most of surveyed people are in young ages. In term of the field of study, information technology accounts for large population using this software with 155 people (86.1%). We find that most of people who use this software are men (91.7%) and most of them are trained in the information technology branch. Detail data is shown in Table 5.

#### 4.2 Description of variables

Assessment categories on Perceived Usefulness of Using McExam through PUU1, PUU2, PUU3, PUU4, PUU5 have relatively high level with average marks ranging from 3.27 to 3.57 in which the maximum mark is 5 marks. This result is quite good generally.

Table 7 Categories of descriptive statistics.

	N	Minimum	Maximum	Mean	Std. Deviation
PUU1	180	1	5	3.40	1.203
PUU2	180	1	5	3.33	1.046



	N	Minimum	Maximum	Mean	Std. Deviation
PUU3	180	1	5	3.57	1.233
PUU4	180	1	5	3.57	1.149
PUU5	180	1	5	3.27	1.267
PEU1	180	1	5	3.30	1.162
PEU2	180	1	5	3.23	1.149
PEU3	180	1	5	3.43	1.260
PEU4	180	1	5	2.90	1.251
BIU1	180	1	5	3.13	1.364
BIU2	180	1	5	3.03	1.113
BIU3	180	1	5	3.30	1.422
ASU1	180	1	5	3.50	1.208
ASU2	180	1	5	3.30	1.133
ASU3	180	1	5	3.63	1.172
Valid N (list wise)	180				

Source: Survey data

Assessment categories on Perceived Ease of Use through PEU1, PEU2, PEU3, PEU4 have average level with average marks ranging from 2.90 to 3.43 in which the maximum mark is 5 marks. Therefore, this result is quite good generally.

Assessment categories on Behavioral Intention to Use through BIU1, BIU2, BIU3 have above-average marks, the lowest being 3.03 in which the maximum mark is 5 marks. This is quite good.

Assessment categories on Actual System Use through ASU1, ASU2, ASU3 have average marks ranging from 3.30 to 3.63 in which the maximum mark is 5 marks. This is quite good. Statistic data is listed in table 6.

#### **4.3. Linear regression analysis**

In this study, to assess Perceived Usefulness of Use, we use five measurement categories PUU1, PUU2, PUU3, PUU4, PUU5. To assess Perceived Ease of Use, we

use four categories PEU1, PEU2, PEU3, PEU4. To assess Behavioral Intention to Use, we use 3 categories BIU1, BIU2, BIU3. To assess Actual System Use, we use 3 categories ASU1, ASU2, ASU3. Four factors (PUU, PEU, BIU, ASU) and 15 categories (PUU1, PUU2, PUU3, PUU4, PUU5, PEU1, PEU2, PEU3, PEU4, BIU1, BIU2, BIU3, ASU1, ASU2, ASU3) has high confidence interval and reliability (see Table 3 and Table 4).

In this study, we use linear regression analysis to check the correlation among independent variables and dependent variables in order to check our research hypothesis.

To make full and comprehensive assessment on Perceived Usefulness of Use of McExam, Perceived Ease of Use of McExam, Behavioral Intention to Use and Actual System Use of users, independent variables and dependent variables are measured and have results as follows.

$$PUU = \text{MEAN}(PUU1, PUU2, PUU3, PUU4, PUU5);$$

$$PEU = \text{MEAN}(PEU1, PEU2, PEU3, PEU4);$$

$$BIU = \text{MEAN}(BIU1, BIU2, BIU3);$$

$$ASU = \text{MEAN}(ASU1, ASU2, ASU3).$$

#### **4.3.1. Linear regression analysis to test Hypothesis H<sub>1</sub>**

To test positive impacts of Perceived Ease of Use (PEU) on Perceived Usefulness of Use (PUU) of users, we use the hypothesis H<sub>1</sub> as one objective of our study.

H<sub>1</sub>: The Perceived Ease of Using McExam has a positive effect on The Perceived Usefulness of Using McExam.

In Linear regression analysis, to test Hypothesis H<sub>1</sub>, PUU is dependent variable, PEU is independent variable.

$$\text{This model can be written: } PUU = b_0 + b_1 * PEU$$

In which:

PUU: Perceived Usefulness of Use

PEU: Perceived Ease of Use

The results are shown in Table 8.

Table 8 Results of Linear regression analysis to test hypothesis H<sub>1</sub>

Construct	Unstandardized coefficients $\beta$	Standardized Coefficients $\beta$	t value	Sig.	R <sup>2</sup>	Adjust R <sup>2</sup>	F value
PEU	0.626***	0.659***	11.699	.000	.435	.431	136.856***

Dependent variable: Perceived Usefulness of Use

\*\*\* P <0,001, \*\* p <0.01, \* p <0.05, + p <0.1

Source: Survey data

We can see that in table 8, R<sup>2</sup> = .435, Adjust R<sup>2</sup> = .431, F = 136.856\*\*\* show the high correlation between variables Perceived Ease of Use (PEU) and Perceived Usefulness of Use (PUU).

Since the relation between PEU and PUU has t = 11.699, Sig=0.000, beta = 0.659\*\*, thus, H<sub>1</sub> is supported.

#### 4.3.2. Multi-variables Linear regression analysis to test Hypothesis H<sub>2</sub>. H<sub>3</sub>

To test impacts of Perceived Usefulness of Use (PUU) on Behavioral Intention to Use (BIU), we use Hypothesis H<sub>2</sub> as one research objective.

H<sub>2</sub>: The Perceived Usefulness of Using McExam has a positive effect to The Behavioral Intention to Use McExam.

To test impacts of Perceived Ease of Use (PEU) on Behavioral Intention to Use (BIU), we use Hypothesis H<sub>3</sub> as one research objective.

H<sub>3</sub>: The Perceived Ease of Using McExam has a positive effect to The Behavioral Intention to Use McExam.

In Multi-variables Linear regression analysis, to test two hypotheses H<sub>2</sub> and H<sub>3</sub>, BIU will be dependent variable; PUU and PEU are independent variables.

This model can be written:  $BIU = b_0 + b_1 * PUU + b_2 * PEU$

In which:

BIU: Behavioral Intention to Use;

PUU: Perceived Usefulness of Use;

PEU: Perceived Ease of Use;

Results are shown in Table 9.

Table 9 Results of Linear regression analysis to test Hypothesis H<sub>2</sub>, H<sub>3</sub>

Construct	Unstandardized coefficients $\beta$	Standardized Coefficients $\beta$	t value	Sig	R <sup>2</sup>	Adjust R <sup>2</sup>	F value
PUU	-.070	-.057	-1.092	.276	.730	.727	239.212
PEU	1.043	0.891***	17.115	.000			

Dependent variable: Behavioral Intention to Use

\*\*\* P <0,001, \*\* p <0. 01, \* p <0.05, + p <0,1

We can see that in table 8, R<sup>2</sup> = .730, Adjust R<sup>2</sup> = .727, F = 239.212\*\*\* show the high correlation between variables PEU, PUU and BIU.

Since the relation between PUU and BIU has Sig = 0.276 > 0.1, thus, H<sub>2</sub> is not supported.

Since the relation between PEU and BIU has t = 17.145, Sig = 0.000, beta = 0.891\*\*\*, thus, H<sub>3</sub> is supported.

#### 4.3.3. Linear regression analysis to test Hypothesis H<sub>4</sub>

To test impacts of Behavioral Intention to Use (BIU) on Actual System Use (ASU), we use Hypothesis H<sub>4</sub> as one of our research objective.

H<sub>4</sub>: The Behavioral Intention to Use McExam has a positive effect to The Actual System Use of McExam System.

In linear regression analysis to test Hypothesis H<sub>4</sub>, ASU is dependent variable, BIU is independent variable.

The model can be written as:  $ASU = b_0 + b_1 * BIU$

In which:

ASU: Actual System Use;

BIU: Behavioral Intention to Use;

Results are shown in table 10

Table 10 Results of linear regression analysis to test Hypothesis H<sub>4</sub>

Construct	Unstandardized coefficients $\beta$	Standardized Coefficients $\beta$	t value	Sig.	R <sup>2</sup>	Adjust R <sup>2</sup>	F value
-----------	-------------------------------------	-----------------------------------	---------	------	----------------	-----------------------	---------



BIU	0.657***	0.747***	14.973	.000	0.557	0.555	224.191***
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Dependent variable: Actual System Use

\*\*\* P <0,001; \*\* p <0,01; \* p <0.05, + p <0.1

Source; Survey data

We can see that in table 9,  $R^2 = .557$ , Adjust  $R^2 = .555$ ,  $F = 224.191***$  show the high correlation between variables BIU and ASU.

Since the relation between BIU and ASU has  $t = 14.973$ ,  $Sig = 0.000$ ,  $\beta = 0.747***$ , thus,  $H_4$  is supported.

We can see coefficient of research model in Figure 11.

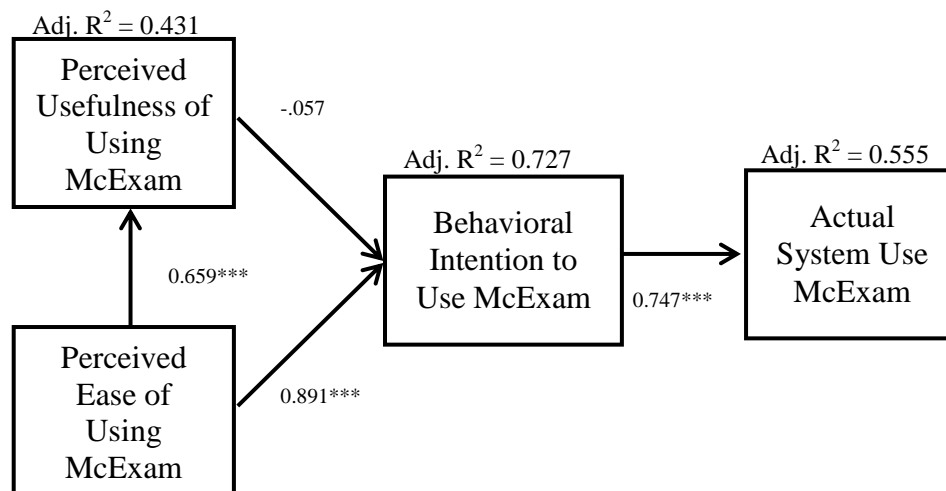


Figure 9 Path Coefficients for Research Model

(\*\*\* P <0,001; \*\* p <0,01; \* p <0.05, + p <0.1)

Source: Survey data

#### 4.4 Discussion

The objective of this research is to study the factors affecting users' adoption of McExam in Ministry of Education and Training, Vietnam. To assess the acceptance of users, researcher has surveyed and developed research models from Technology Acceptance Model by Venkatesh & Davis (Venkatesh & Davis, 1996) with factors such as The Perceived Usefulness of Using McExam, The Perceived Ease of Using McExam, The Behavioral Intention to Use McExam and Actual System Use. After designing

research model, research model includes 15 questions of above four factors and many surveys are implemented through administrators of McExam. The researcher has collected results and used SPSS 15.0 to make statistics, analyze the data, identify the confidence interval and correctness for success of research model. All hypotheses are tested by survey data taken from the fact and the contents above are analyzed fully. Results of hypotheses are shown in Table 11.

Table 11 Results of testing hypothesis.

Testing hypothesis	Result
H <sub>1</sub> : The Perceived Ease of Using McExam has a positive effect on The Perceived Usefulness of Using McExam.	Supported
H <sub>2</sub> : The Perceived Usefulness of Using McExam has a positive effect on The Behavioral Intention to Use McExam.	Not Supported
H <sub>3</sub> : The Perceived Ease of Using McExam has a positive effect on The Behavioral Intention to Use McExam.	Supported
H <sub>4</sub> : The Behavioral Intention to Use McExam has a positive effect on The Actual System Use of McExam System.	Supported

Source: Survey data

All hypotheses are tested through correlations among factors and assessed through detail data (as in Chapter 4, section 4.3 linear regression analysis).

Factors used in research model, in my viewpoint are as follows: Perceived Usefulness of Use: Quickly, improve performance, increase productivity, enhance effectiveness, easier to do the job; Perceived Ease of Use: clear and understandable, flexible to interact, easy to use,...; Behavioral Intention to Use: will use, intention to use, than use manual method alone,...; acceptance of users is attitude of users to McExam.

I hope that this study will contribute remarkably to implementing McExam in universities and colleges, especially in the General Department of Education Testing and Accreditation where the author is working.

## Chapter 5 Conclusion

This chapter includes four sections: findings and contribution, implications, research limitations, and future research suggestions.

### 5.1 Findings and contribution

The main contribution of this research is furthering our understanding on how to identify, evaluate and develop the technology acceptance model basing on McExam. The technology acceptance for marking multiple-choice objective questions on McExam is defined as a polyhedron that can be developed, evaluated according to four factors: The Perceived Usefulness of Using McExam, The Perceived Ease of Using McExam, The Behavioral Intention to Use McExam and Actual System Use of McExam. Each successful direction is defined as a method measured by gathering the evaluation of a number of factors obtained through surveys.

### 5.2 Suggestions

Through analyses, the study has found out that the software to mark multiple-choice objective questions basing on McExam has been successfully developed. Moreover, the structure of the factors presented Venkatesh & Davis (1996) have been confirmed in the current context in Vietnam universities and colleges using the software to mark multiple-choice objective questions McExam successfully.

The results of table 10 show the ease of use and a positive effect on the usefulness of McExam. For this reason, MOET should make McExam easier for users so that they will find it more useful, more convenient. Users will see this software as a means to help them do the job better than working manually. When we analyzed the result of research, we found that the factors Perceived Ease of Using McExam has relevant and positive effect on mind, behavior, user acceptance.

Otherwise, the research found that Perceived Usefulness of Using mcExam has not positive effect on Behavioral Intention to use of mcExam. Thus, through examining in actual use of mcExam, this is a compulsory software for all of universities have to used. But, in the user view, they dont want to joint on Committee of Testing of the

university, because testing need high responsibility, has many concerns, but not corresponding wages. This issue is belong to the salary policy of the Government.

This study provides implications for the management, effective use of the software to mark multiple-choice objective questions McExam. The experimental results have emphasized the importance of the assumption of an approach of the multidimensional analysis. It is compulsory for managers to focus on the success level of the different systems.

The influence of McExam has a major impact on the success of the exams, ensuring the exams of safety, seriousness, within prescribed time and preserving the regulations of university, college enrollment statues issued by Ministry of Education and Training. In addition, McExam has contributed to ensuring the fairness and objectiveness of exams marking and it serves as supporting tool in changing the exams forms from subjective testing to objective testing. This form has been implemented by Ministry of Education and Training, Vietnam.

Otherwise, based on the result of this study, I propose some suggestions for Ministry of Education (General Department of Education Testing and Accreditation) to improve user acceptance of mcExam as following:

- Need to upgrade mcExam software for more ease use;
- Need to adjust salary policy for users who use this software and MOET don't make the pressure to the user in using this software;
- It's more favor when administrator is younger man and they should be trained by IT degree;
- MOET should request all of universities have to use unify mcExam for bring high effect in testing management.

I hope that the success of this study will be an important suggestion for Ministry of Education and Training, universities, colleges, General Department of Education Testing and Accreditation on making correct decision on using McExam. Accordingly, the quality will be improved and the fairness, accuracy, objectiveness, quick in test marking will be ensured. Furthermore, the reports, statistics are scientific, sufficient and reliable.

### **5.3 The limitations of the study**

Although this study has developed and proven as technology acceptance model, there are some limitations.

First, the results of this study are limited by the inherent limitations of testing study compared to field research. In addition, the amount of information obtained from subjects will be limited by the use of a questionnaire excluding open questions. Another method, "voice communication" can be used. This method will provide much richer information and explain the model in more detail (McKnight, Choudhury & Kacmar, 2002). A possible replication of the present findings in such a study would provide significant indication of their validity.

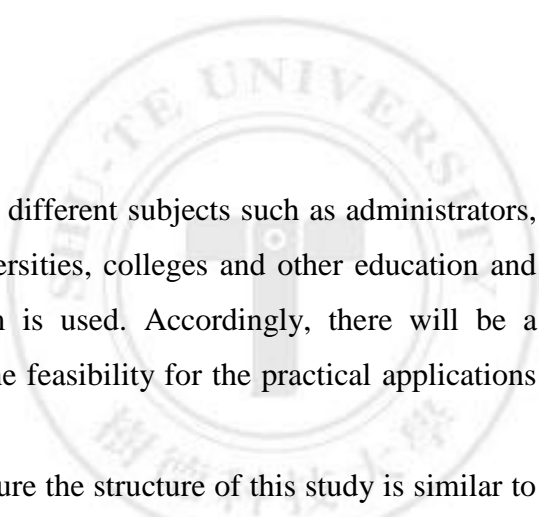
Second, the study sample is only the administrator of McExam, not all users McExam (managers, technical experts and staff, etc.). Therefore, the results of the acceptance of McExam users are not well-represented.

Third, the study sample is only conducted at universities, colleges and the Vietnam General Department of Education Testing and Accreditation, therefore, the study results is mostly suitable for universities, colleges. For this reason, the results will not be appropriate for Provincial Departments of Training and Education, high schools in case they want to use the software to mark multiple-choice objective questions.

### **5.4 The proposal of this study in the future**

Although the Study on the factors affecting Administrator' adoption of McExam in Ministry of Education and Training, Vietnam has brought certain results, many other issues remain to be concerned, researched into to find the full and comprehensive elements to decide on the use of McExam for all universities and colleges in Vietnam.

First, other research methods such as focus groups, interviews with experts on the approach to determine the relationship between The Perceived Usefulness of Using McExam, The Perceived Ease of Using McExam, The Behavioral Intention to Use McExam and Actual System Use of McExam can be used in the future study. These methods aim to identify the most suitable solution to deploy McExam at all universities and colleges.

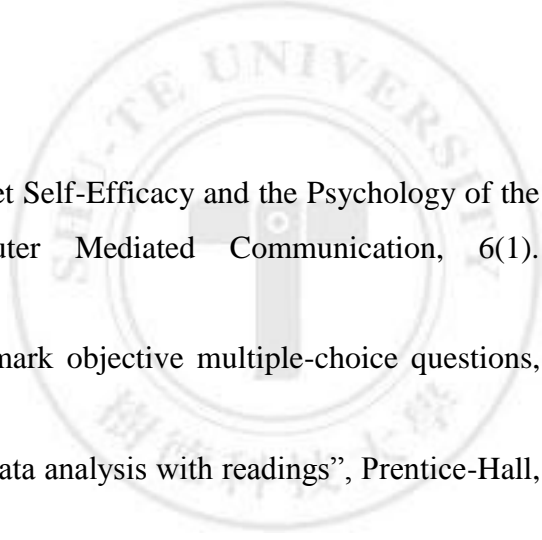
The logo of Shanghai University is a circular seal. The outer ring contains the text "SHANGHAI UNIVERSITY" at the top and "上海大学" at the bottom. The inner ring contains the text "SHEJIE UNIVERSITY" at the top and "设计学院" at the bottom. In the center of the seal is a stylized emblem featuring a vertical bar and a circular element.

Second, this study should be tested on different subjects such as administrators, managers, technical experts and staff at universities, colleges and other education and training units, high schools where McExam is used. Accordingly, there will be a comprehensive view and analysis to ensure the feasibility for the practical applications of McExam.


Third, although the scale used to measure the structure of this study is similar to the existing scale, further study should be done to consider the more complex measures of development so that the scale of richer coverage is possible.

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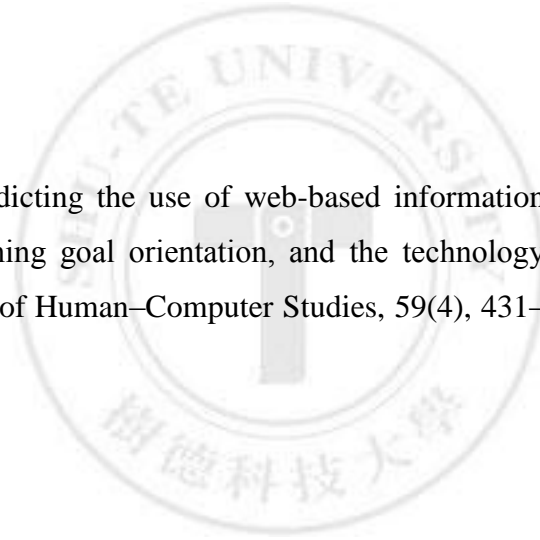
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## Appendix A

### QUESTIONNAIRES SURVEY MCEXAM

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Title: *“A Study on the factors affecting Administrator’ adoption of McExam in Ministry of Education and Training, Vietnam”*

**PART I: GENERAL INFORMATION**

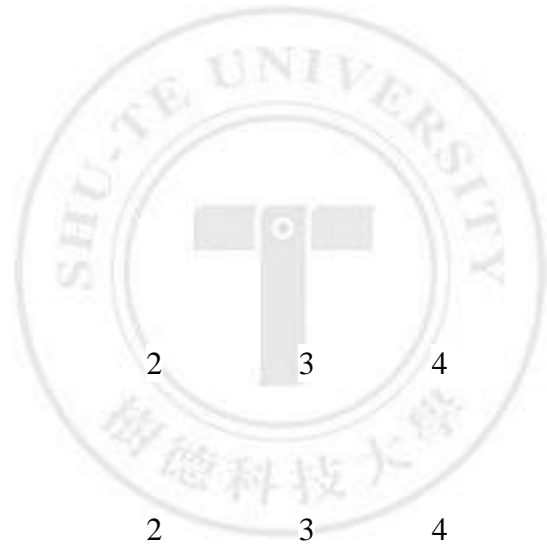
This section covers some of your private information. Please kindly tick the squares corresponding with assumed statements of your private information.

- 1. Gender:            Male;                            Female;
- 2. Age:                from 20 to 25;    from 25 to 45;    Over 45;
- 3. Major in Undergraduate Program:  
 Information technology;  Economic;    Technical;    other .....
- 4. For how long have you been using the McExam?  
 Less than 3 year;    3 to 5 years;    More than 5 years;

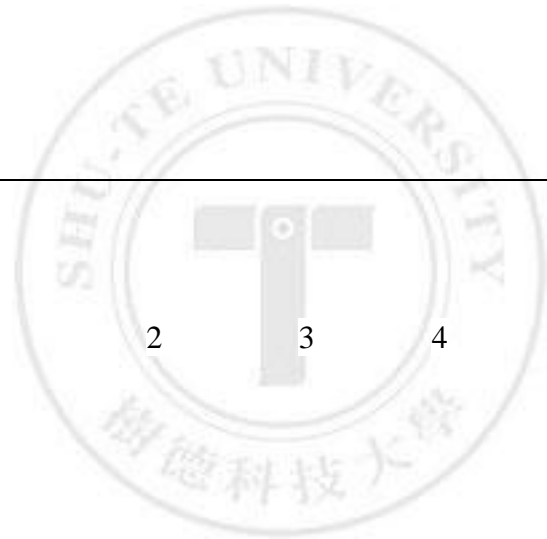
**PART II: ABOUT SOFTWARE TO MARK OBJECTIVE MULTIPLE-CHOICE QUESTIONS MCEXAM**

This section includes items concerning factors affect on customer’s adoption while using the Software to mark objective multiple-choice questions McExam. Items are assumed statements of your intention and willingness. Please circle the numbers corresponding with your degree of agreement to each item with the denoted scale: “1”= strongly disagree; “2”= disagree; “3”= No idea; “4”= agree; “5” = strongly agree.

Or. No	Part I: Perceived Usefulness of McExame	Strongly disagree	Disagree	No idea	Agree	Strongly Agree
1	PUU1. Using McExam enables me to accomplish my task quickly.	1	2	3	4	5
2	PUU2. Using McExam would improve my	1	2	3	4	5



	performance in my work place.					
3	PUU3. Using McExam would help me increase my productivity	1	2	3	4	5
4	PUU4. Using McExam would enhance my effectiveness in the job.	1	2	3	4	5
5	PUU5. Using McExam would make it easier to do the job.	1	2	3	4	5
	<b>Part II: Perceived Ease of Use McExame</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>No idea</b>	<b>Agree</b>	<b>Strongly Agree</b>
6	PEU1. I will find it easy to get the McExam to do what I want them to do.	1	2	3	4	5
7	PEU2. My interaction with the McExam will be clear and understandable.	1	2	3	4	5
8	PEU3. I will find the McExam to be flexible to interact with.	1	2	3	4	5
9	PEU4. I will find the McExam easy to use.	1	2	3	4	5
	<b>Part III: Behavioral Intention to Use</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>No idea</b>	<b>Agree</b>	<b>Strongly Agree</b>
10	BIU1. I will use the McExam rather than manual methods to	1	2	3	4	5



	complete the job.					
11	BIU2. My intention to use the McExam rather than manual methods in completing the job.	1	2	3	4	5
12	BIU3. In completing the job, I would rather use the McExam than use manual method alone.	1	2	3	4	5
	<b>Part IV: Actual System Use</b>	<b>Strongly disagree</b>	<b>Disagree</b>	<b>No idea</b>	<b>Agree</b>	<b>Strongly Agree</b>
13	ASU1. I usually use McExam.	1	2	3	4	5
14	ASU2. I think the McExam should be upgraded yearly in order to suit the practice.	1	2	3	4	5
15	ASU3. I think the McExam need to be applied extension.	1	2	3	4	5

Thank you very much