The Design of Cloud Computing Management Information System Accordance with Thai Qualifications Framework for Higher Education

Thassanee Rodmunkong and Panita Wannapiroon

Abstract—The objectives of this research were to 1) development of cloud computing management information system in accordance with Thai qualifications framework for higher education and 2) evaluation of cloud computing management information system in accordance with Thai qualifications framework for higher education. The subjects in this study were five experts, whose experience in their field was not less than one year, comprising of two experts in management system, two experts in Thai Qualifications Framework for Higher Education and one expert in cloud computing. The purposive sampling technique was applied to select the subjects. The research instruments were 1) cloud computing management information system in accordance with the Thai qualifications framework for higher education and 2) evaluated of cloud computing management information system in accordance with Thai qualifications framework for higher education. The statistics utilized in this study were means and standard deviation (S.D.). The findings reveal that 1) cloud computing management information system in accordance with Thai qualifications framework for higher education was appropriate and 2) evaluation of cloud computing management information system in accordance with Thai qualifications framework for higher education from five experts indicated that this system was appropriate at the high level.

Index Terms—Management information System, cloud computing, qualifications framework, higher education.

I. INTRODUCTION

Currently, information technology and communication (ICT) has been approved that it is an important tool to increase the work efficiency and become the instrument for high performance organization (HPO). Increasing the organization performance to meet the standard in providing service of information technology [1] become the key policy for several education institutions and it conform with the target to develop information technology for education as stated that the development of information technology and communication for education in accordance with strategy, measurement and criteria to develop that was specified the key target of restoration to connect other information technology data to be able to individually apply together with the contexts from other institutions. In the strategy to develop the system of information technology and communication, strategy four has stated the contexts to use information technology and communication to encourage education management and service to support the building of the good governance, to encourage the educational personnel, especially in the administration level to apply the system of information technology and communication as a tool to perform their responsibility. In addition, there has been the integral development of database of information technology in education in order to make it correct, up-to-date and convincible in its application of data and system by each institution. The center can connect and synchronize information technology as if it is the same information technology system.

The rapid development and changes of information technology and educational management in higher education of other countries influenced on the quality of graduates and the advancement of education management. The framework of learning method of new graduate in 21st century, desirable characteristics of graduate after the integration of ASEAN Community, education reformation in Europe and America continents force Thai higher education to adjust itself to get ready for the changes of globalization. The criteria to develop the quality of higher education then emphasizes on the operation to level up the education quality, including to make the network of collaboration in developing quality of Thai higher education. This leads to efficient education management and responds to the national needs. This conformed to the target to reform the education in the second decade (A.D. 2009-2018) which focuses on the development in education quality and learning to create the opportunity in education for Thai people to assess the learning qualitatively and to encourage the participation from all sectors in society. In fact, this is for Thai people and Thai education to gain quality and reach international standards [2].

National Education Act B.E.2542 (1999) and Amendments (Second National Education Act B.E. 2545 (2002) specified that the education quality assurance system is to develop education quality and standard at all levels. To step up in quality assurance, Commission on Higher Education has operated the project of Thai qualifications framework in order to create accurate understanding of the related stakeholders in higher education including higher education institutions, standard controllers, and graduate users. This is to clearly guarantee the quality of the graduates from higher education institution. Moreover, this is to motivate each educational institutions to raise their educational quality [3].

Crucial keys of Thai qualifications framework for higher education (TQF: HEd) are 1) to be the instrument to follow policy of the development of quality and standards for
educational evaluation as stipulated in higher education standard and education quality assurance to operate in educational institutions in practice, 2) to emphasize on Learning Outcomes which are the lowest standards to guarantee the quality of the graduates, 3) to link regulation and notifications related to curriculum and learning management, 4) to be the effective communicative tool in creating comprehension and confidence among related groups/stakeholders such as students, parents, entrepreneurs, community, society and both nationally and internationally institutions related to desirable characteristics of the graduates, 5) to make the qualifications or degrees from Thai institutions to be acceptable and relevant with other good higher education institutions in and out of the country. This can be done by providing the opportunity for higher education institutions to set up variety of curricula including teaching process with the confidence of the graduate quality to meet perspective learning outcomes. The graduates, hence are able to work happily and their employers are proud of them, 6) to encourage life-long learning [3].

According to the changes in information technology and communication together with the needs to level up the Thai education system to meet the international standard and to operate the curriculum and a large amount of document of Thai qualifications framework (TQF) of higher education institutions, to manage with the existing data including retrieving data with speed for administrators and related persons to use the data promptly, the researcher has developed the cloud computing management information system conforming to Thai qualifications framework for higher education. This system is the data operating system of related information technology related to the creation of curriculum, TQF. 3, TQF. 4, TQF. 5, TQF. 6 and, TQF. 7, including the supervision and follow-up of each framework in each curriculum in university. In fact, this is to integrate the information and to create database to benefit for academic work and quality assurance in the future.

II. PURPOSE OF THE RESEARCH

1) To synthesize the characteristics of cloud computing management information system in accordance with Thai qualifications framework for higher education.
2) To design cloud computing management information system in accordance with Thai qualifications framework for higher education.
3) To evaluate cloud computing management information system in accordance with Thai qualifications framework for higher education.

III. RESEARCH FRAMEWORK

Conceptual framework in designing cloud computing management information system in accordance with Thai qualifications framework for higher education can be shown in Fig. 1.

From the conceptual framework to synthesize document and research studies related to designing cloud computing management information system in accordance with Thai qualifications framework for higher education, the researcher has synthesis the conceptual framework about the use of ICT in administrating of curriculum with framework for higher education of Thailand which conformed to National Education Act B.E.2542 (1999) and Amendments (Second National Education Act B.E. 2545 (2002) issuing about the use of technology for education and education quality assurance. This mentioned design is the development of cloud computing system which is the most popular processing system this day and it can replace cluster computing system and grid computing system.

**Fig. 1. Conceptual framework in designing cloud computing management information system in accordance with Thai qualifications framework for higher education.**

IV. METHODOLOGY

A. The Development of Cloud Computing Management Information System in Accordance with Thai Qualifications Framework for Higher Education Can Divide into Three Phases as Follows

1) Synthesize the characteristics of cloud computing management information system in accordance with Thai qualifications framework for higher education by the principle of Software Development Life Cycle (SDLC) to analyze and synthesize document and research studies related to designing cloud computing management information system in accordance with Thai qualifications framework for higher education.
2) Design the development of cloud computing management information system in accordance with Thai qualifications framework for higher education from Phase 1.
3) Evaluate the development of cloud computing
management information system in accordance with Thai qualifications framework for higher education and it can be divided into four stages as follows:

- Send the developed cloud computing management information system in accordance with Thai qualifications framework for higher education and the curriculum following Thai qualifications framework for higher education to five experts for evaluating.
- Adjust the system following the experts’ suggestions
- Present developed system
- Analyse the results of evaluation of the new design using means (\(X\)) and standard deviation (S.D.) following the weighing criteria of appropriateness of the design using five rating scales of Likert.

B. Population and Subjects

Population were the experts in information technology management, cloud computing and Thai qualifications framework for higher education.

Subjects were selected from the experts in the population using purposive sampling technique. The five experts comprised of two experts in management system, two experts in Thai qualifications framework for higher education with no less than five-year experience in their field and one expert in cloud computing with no less than one-year experience in his field.

C. Variables in This Study

1) Independent variable was the development of cloud computing management information system in accordance with Thai qualifications framework for higher education.
2) Dependent variable was the results of evaluation of development of cloud computing management information system in accordance with Thai qualifications framework for higher education.

V. CONCLUSION

The findings from the research study of the developed cloud computing management information system in accordance with Thai qualifications framework for higher education can be shown in Fig. 2.

1) Management Information System is the information technology system related to internal operation of middle-class operator. The data were collected in computer system to process and report the results in order to report for planning, administrating and controlling. The system will link the data from Transaction Processing System (TPS) in order to process and create information technology necessary to administration. MIS system is a tool for making decision and can help develop efficiency and to boost up the high performance of the organization.

2) Cloud Computing Technology is the new model of information technology emphasizing on flexible expansion. It can be adjusted its size by customer satisfaction and resource allotment focusing on working from the remote area. When user specifies his requirement and the service provider then shows the results to customers. Cloud computing technology consists of Cloud Server, User Interaction Interface, Services Catalog, System Management, Provisioning Services and, Monitoring and Metering. The developed system provides Software as a Serviced (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). Cloud computing technology can help raise efficiency of the technology and reduce the complexity in data-to-user management.
3) Thai qualifications framework for higher education is the framework showing education qualification in higher education consisting with qualification level, connection of one degree to a higher degree, field separation. The standard of learning outcome in each level has to increase by the higher degree of qualification, the quantity of learning together with the time. The characteristics in each curriculum should open the opportunity for transfer learning outcomes from experience which will encourage life-long learning including system and mechanics to trust the efficiency of the operation of Thai qualifications framework for higher education that this can produce graduate and can attain the quality as specified in learning outcomes.

The results from evaluation of the developed cloud computing management information system in accordance with Thai qualifications framework for higher education can be seen in Table I.

<table>
<thead>
<tr>
<th>Evaluation Lists</th>
<th>Results</th>
<th>Level of suitability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. principles and conceptual framework in system developing</td>
<td>5.00 0.00</td>
<td>Highest</td>
</tr>
<tr>
<td>2. Model characteristics</td>
<td>4.60 0.55</td>
<td>Highest</td>
</tr>
<tr>
<td>3. System objectives</td>
<td>4.40 0.55</td>
<td>High</td>
</tr>
<tr>
<td>4. Up-to-date content and technology applying to develop the system</td>
<td>4.40 0.89</td>
<td>High</td>
</tr>
<tr>
<td>5. Appropriateness to program development</td>
<td>4.60 0.55</td>
<td>Highest</td>
</tr>
<tr>
<td>6. Appropriateness to the real practice</td>
<td>4.80 0.45</td>
<td>Highest</td>
</tr>
<tr>
<td>Summary</td>
<td>4.63 0.50</td>
<td>Highest</td>
</tr>
</tbody>
</table>

The Table I shows that the experts agree that a CCMIS for TQF From the results of the evaluation as shown in Table I, the appropriateness of details in the developed cloud computing management information system in accordance with Thai qualifications framework for higher education reveal that the appropriateness was at the highest score (means = 4.63). In fact, the first three highest means from the highest to the lowest were Principle and conceptual framework in system developing with the highest score of \( \bar{x} = 5.00 \). The second rank went to Appropriateness to the real practice \( \bar{x} = 4.80 \) and Model characteristics and Appropriateness to program development were at the third rank of \( \bar{x} = 4.60 \).

VI. DISCUSSION

The above results indicate the appropriateness of theoretical basic and the characteristics of the developed cloud computing management information system in accordance with Thai qualifications framework for higher education which passed the consideration and evaluation from the experts at the highest level of 4.63. The key characteristics were (1) Management Information System, (2) Cloud Computing Technology, (3) Thai qualifications framework for higher education including details of each characteristic which was at the high level. The developed system is the applied information technology system used to collect, analyze and process data systematically, including it can be tool for administrator to make a decision, adjust the defectives at work which conformed to [4] saying that cloud computing technology can assist user to access database resource through the Internet from anywhere as users like without awareness of maintenance or resource management. This is because data presentation is dynamic and adjustable as customers like. Characteristics of cloud computing technology were High scalability, Agility, High availability and reliability, Multi-Sharing, Services in pay-per-use mode and support for all service oriented applications, and conform to research study [5] which was said that clouding computing is the new process for cloud computing is a new and promising paradigm delivering IT services as computing utilities. It can share the use of resource and competency emphasizing on resource planning and effective security safety system. CCMIS can help increase competency and flexibility of computer system which is the system to collect data and present data as user desires. In addition, it was in accordance with research study [6] about the development of cloud computing system, comprising of Business Proces (BPaaS), Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS).

VII. SUGGESTIONS FOR FURTHER STUDIES

1) There should be a study and the development of the developed cloud computing management information system in accordance with Thai qualifications framework for higher education that provided service with on characteristics Composite Service (CaaS) and data Storage as a Service (dSaaS)

2) The developed cloud computing management information system in accordance with Thai qualifications framework for higher education should be tested in practice.

REFERENCES

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