# The Development of an Effective Model for Implementing Information Management Strategies in Higher Education Institutions

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## Abstract
This research aimed to: 1) study the components of the information technology management strategies' implementation in higher education institutions; 2) develop an effective model for information management strategies' implementing in higher education institutions. This research used quantitative research methodology. The study indicated that there were 8 components of the information technology management strategies' implementation in higher education institutions which was, database development and information system security, budget allocation, information systems strategic assignment and review before implementation, leadership, organizational culture, organizational capabilities, internal communication and rewards an incentives. The result of Bartlett's Test of Sphericity includes all components in accordance of Chi-Square statistically significant at the 0.05 level and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.850. The result of the development an effective model for information management strategies' implementing showed that causal relationship was consistent with the empirical data. The first three of causal factors which had directly influence on organizational capabilities was internal communication, information systems strategic assignment and review before implementation and leadership. And the causal factors which had influence on organizational capabilities was information systems strategic assignment and review before implementation, leadership and organizational culture.
**Keywords:** Strategy, Implementation, Information Systems Management

## Introduction
The world was constantly evolving and changing based on various factors that cannot be clearly defined Alvin Toffler (1980: 30) use waves as a sign of change. It was divided into 3 ages, starting from the first wave or the agricultural society. Later, a second wave or industrial era. And into the third wave or the information era. This era of information had been transformed from the era of the industry that using of machines instead of human power only for work efficiency and standard. Although the information era was still dependent on the traditional industry but more focus on the information. And it was noted about the nature of the third wave that the information society was a society where the majority of the population works in information more than works in factory. Farmers in this era were mostly service workers who use the brain more than labours. And education was very important in preparing the population into the information society in order to be able to adapt to the

current development stress and pressures. As well as depending on technology and innovation in information system to facilitate the work management to be more flexible.
To improve the quality of human life in the changing world. The institution that plays a major role except a family institution was educational institution. It was a social institution that shaped a humanity into a stronger, in term of academic and everyday life. Especially the higher education institutes that were affected by the civilization and the development direction including the rate of population decline continuously. It cause the results of high competition. New administrators needs to determine the strategies that can create competitive advantage and modern. The implement of proactive information system operations or the management of information technology to meet the needs both inside and outside the organization was important which mean to focus on the staff, the students and the people who will enrol to class including the expansion of knowledge through the telecommunication network as a link between data which help to immediate coordination. The study of information in higher education institutions found that most of universities set up and implement strategies for managing information systems. The strategic plan was related to overall university's strategic plan. Then divided into sub strategies so that it was easy to understand. However, it also had problems in manage of information systems such as lack of the readiness in term of modern technology development, the limitation in and lack of information systems to exploit in planning future systems. (Boonprasert et al., 2006: 2)
From the mention above, it lead to this research to the development of an effective model for implementing information management strategies in higher education institutions to identify the components which lead to a guideline for managing the information systems in higher education institutions or other universities as well as interested person.

## Literature Reviews and Conceptual Framework

The implementing in information systems management strategy in higher education institutions was the first important after setting the strategies by administrator in higher education institutions. It was included in the university's strategic plan. As competition in the present day places emphasis on bringing information technology to the advantage of competition. The information technology was the key tool to drive the strategy to achieve the goal. However, the upgrading requires systematic planning and organization capabilities. Therefore, it was necessary to find an effective development model for implementing information management strategies in higher education institutions. In order to promote the work process in a quick and accurate way, the researcher studied the components of the implementation of information technology management strategies in higher education institutions by studying theories and related research as follow;

**The principal strategic implementing tasks**

Thompson and Strickland (Thompson and Strickland, 2003: 271) mentioned that Strategy implementation of the manager was required not only adjusting to external circumstances, but it was also required a key principal implementing tasks in 8 components were: 1) Strengthening the organization to be strong, capable, competent, and resourceful, to be used in the implementation of the strategic plan to achieve success. 2) Budgeting to control the resources available and sufficiently to use in the chain of values. 3) Define policies and procedures to support the strategy. 4) To set up the best practices and to push for continuous improvement. 5) Install the information system, communication and operations to help staff in able to carry out their strategic role in each day 6) Provide rewards and incentives for accomplished staff who achieve objectives and strategic management. 7) Create a work environment that supports the strategy and organizational culture. 8) Use the necessary strategic leadership to push work forward.

Feuzi Okumus (2001: 327-338) presented the research on: Towards a Strategy Implementation Framework. The research's objective was to develop a conceptual framework for the implementation of the strategy by grouping the variables related to the implementation of the strategy into four groups: strategic content; organizational process, strategic outcome and organizational context; environment context.

It was evident that the implementation of the strategy will be closely related to strategic planning. But what was different and important was that the understanding of the strategies and the work. Therefore, both administrator and staff need to study the content of the strategy and management procedures including the expected results after the strategy had been implemented in advance.

**Concepts of Information Systems Management Strategies**

The use and the progress in the use of computer and information technology in organizations create an attention and seek for different tools to facilitate and service the need of the users. In the present, the adoption of modern technology alone cannot make the organization completed other organizations. If not analyzed and study the needs of users to the system thoroughly, it may be more disadvantage affected more than beneficial since the device was expensive which considered as one of limitation of information system as Suchada keeranant (1998), Kowalski (2003), and Lockard and Abrams (2004) stated that the information systems were developed as information science or Informatics. Thus, Information technology was a system that has a significant component of computer hardware. database software, System developers, system users, to work together to put data into memory storage, which can process the data into grouping, sorting, prioritizing and ordering to be informative. It was useful to set policies, planning, monitoring and management for the work in government or private sector. In order to understand the information system, it will explain in details in the next section.

Sakchai Tangwannawit (2012: 57) stated that the reason that businesses need information technology to manage the system to use for strategic planning for business competition. It also support work to be more efficiency. Therefore organizations need to allocate a budget for continuous management of information systems. It was important to understand the use and the structure of the information system. The components of the information system are consist of 3 parts: 1) the tool to create information management system. Refers to the components or infrastructure that were integrated into the management information system. 2) Method or process of information processing. To get the results or information as required, it must planned and processed correctly. 3) Display of the results. Once the data had been processed according to the methodology. It may be presented in tables, graphs, pictures, or voices. The effective presentation depends on the data characteristic and purpose of data use.

Moreover, Ward and Pepper (Ward and Peppard, 2002) described that organizations require strategic in information systems, at the same time, the development of information systems requires information technology strategies for information collecting and processing as well as information communicating including the scope of information systems implementation and information management strategy to support the use of information systems in various fields. Consequently, the information management strategy and information technology strategy was related to information system strategy. The strategy of the organization was the core or framework for other strategies to follow in a clear goal.

The conceptual framework is as follows.

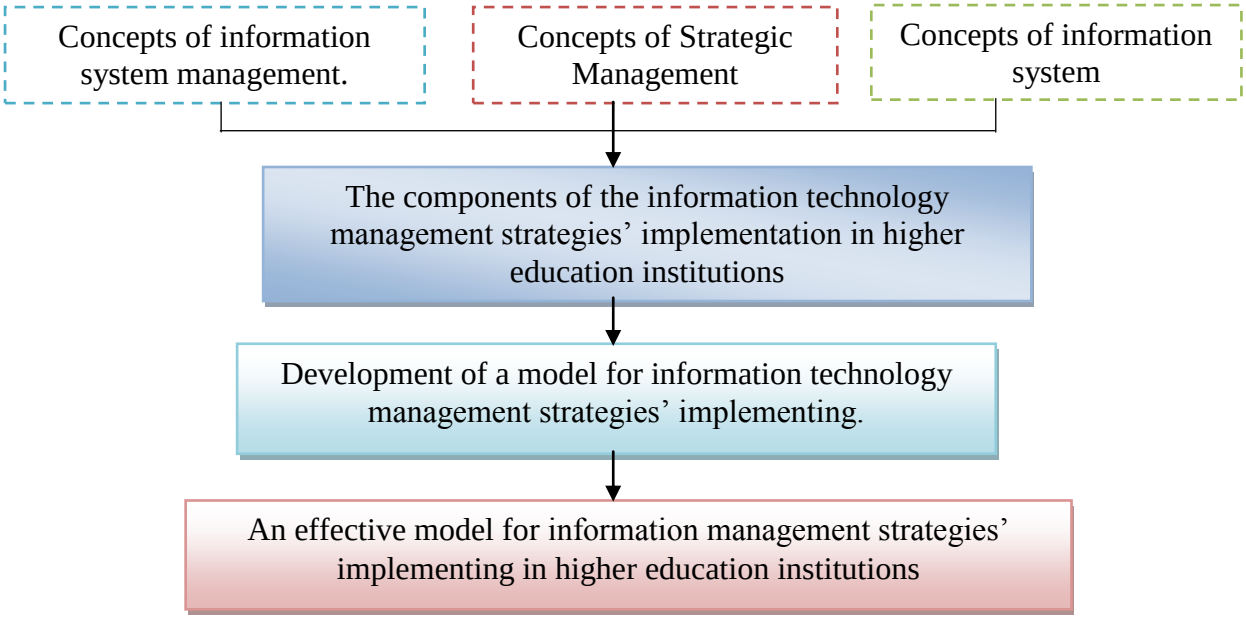


**Figure 1** Research Conceptual Framework

## Research Methodology

**Participants:** There were 25 samples such as the national universities, the governmental universities, rajamangala university of technology, rajabhat universities and the private universities. These samples were selected to represent an information system management at universities from the world's top 100 university ranking by purposive sampling, totally 879 respondents.

The quantitative research, participants were divided into 2 parts.

1. University level: Vice President for Planning and Information Technology, Director of Planning and Information Technology Division, and Operation Officer, Planning and Information Technology.
2. Faculty Level: Associate Dean for Planning and Information Technology, Chief of Planning and Information Technology, and Operation Officer, Plan and Information Technology.

**Data collection:** Data collection through using questionnaire about the components of information management strategy's implementing. The quality of the tools was checked through the method of content validation (IOC) as an index of Item-Objective Congruence (IOC), which considers the IOC value of more than 0.80. Then try out a revised tools to collect data and analyze the reliability. The reliability of the questionnaire was calculated by using Cronbach's coefficient (∝-coefficient) (Cronbach 1984: 126). The process of collecting data was as follows. (1) Coordinate the staff in higher education institutions in target areas. The educational institution issues an official requested letter for assistance in answering the research questionnaire. (2) Collect data by sending a questionnaire by post and wait for response in 2 weeks. The method of telephone call for requesting to answer the questionnaire and return was used when there was no responses from the post after 2 weeks. (3) Compile all collected data, data validation and data analysis.

**Data analysis:** After data was collected, researcher used the following statistics: (1) Descriptive Statistics were the statistics used to describe the characteristics of the data collected from the sample. The statistics were frequency, percentage, arithmetic mean and standard deviation. (2) Inferential Statistics were the statistics used to analyse the components that influence to the development of effective models for information management strategies'

implementing in higher education institutions which was Factor analysis and for modelling of effective of information management strategies' implementation in higher education institutions was Path analysis. The analysis was analyse by using a Statistical program to study the consistency of empirical data and the model from the study.

## Research Results

### Analysing of components of Information Systems Management Strategies' Implementation

An analysis of the level of feedback on the components of the implementation of information technology management strategies in higher education institutions by considered on the average ($\bar{x}$) and standard deviation (S.D.), found that the overall variance of 70 variables was ($\bar{x}$) between 3.35 - 4.49. The standard deviation (S.D.) was from 0.23 to 0.75 which mean that the informants stated on the level of variables was from moderate to high. When analyzing the exploratory factor through the Bartlett's Test of Sphericity in a total of all components showed that Chi-Square statistically significant at the 0.05 level which indicates that the correlation matrix of the variables and the data obtained can be analyzed for the components. In addition, the KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)) of all components, equal to 0.850, represents a sufficiently high level of data availability. It can be used to analyze components at a very good level. And the components which had Eigenvalues more than 1.00 were 8 components. The variance of the components can be explained as 82.018%

Exploratory factor analysis was used to determine the critical variables by analyzing of the Maximum Likelihood Analysis to obtain the critical variables. It presented that the components of the implementation of information technology management strategies in the higher education institutions was 8 components. Component 1 was the development of database and information system security. The second was the budget allocation for information systems. The third was strategy assignment and review before implementation. Component 4 was leadership. Component 5, organizational culture, Component 6 Organizational Capabilities, Component 7 Internal communication and component 8 Rewards and incentives. The link diagram can be summarized as follows:

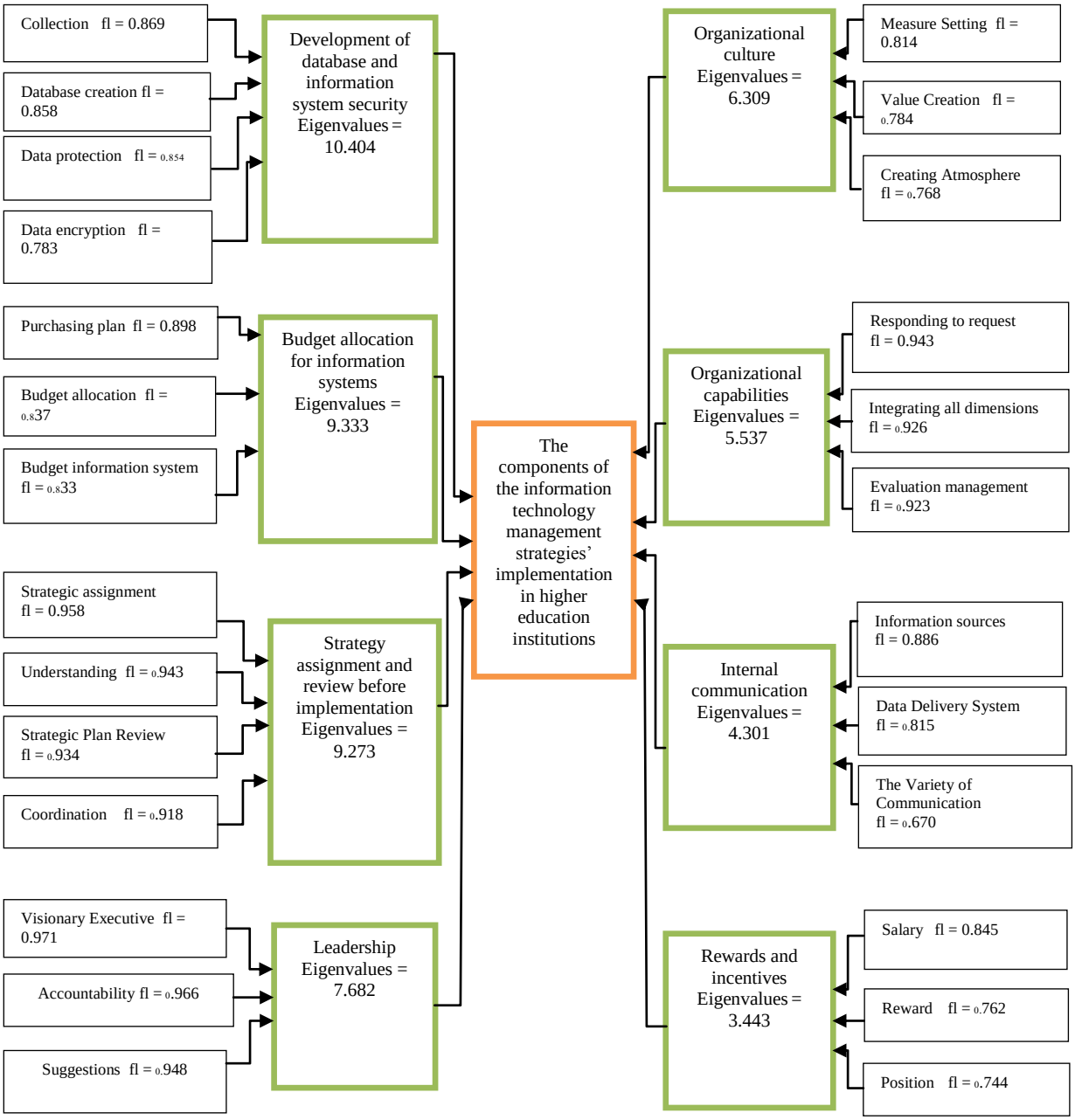


**Figure 2** Result of analyze component

**Developing an effective model for implementing information management strategies in higher education institutions**.

The results of the causal relationship analysis of effective models of implementation of information system management strategies in higher education institutions in accordance with empirical data.

The correlation between the model and the empirical data showed that the chi-squared ($X^2$) value was 432.25 (P = 0.00014). The results showed no significant difference in statistics which mean an effective model of implementing information management strategies was consistent with empirical data. In addition, value-added indicators can also be considered in such as the Goodness Fit Index (GFI) and the Adjusted Goodness of Fit Index (AGFI) that value was near 1, GFI = 0.92 and AGFI = 0.91, which was more than 0.90, it indicated that an effective model of implementing information management strategies was consistent with empirical data. The Root Mean Squared Residual (RMR) value was 0.058 indicated that a

model was consistent with empirical data, the Index Root Mean Square Error of Approximation (RMSEA) was equal to 0.045, which ranged from 1 to 0.05, indicating that the model was consistent with the empirical data in a good level. The reliability of variables in the measurement model was measured by the total confidence (Composite Reliability (CR) value) of 0.70 and above. (1) Convergent Validity was determined by Average Variance Extract (AVE) with a value of 0.50 or higher, and (2) Discriminant Validity was determined by the value of Maximum Shared Variance (ASV) and Average Shared Variance (ASV), which was less than AVE (Hair et al., 2010). It found that confidence value and the reliability of the model in this research meets the criteria. The correlation coefficient between the components of the information management system in the higher education institutions was found to be statistically significant at 0.05 and 0.01. The analysis and interpretation of the results from the computer program can be shown as follows.

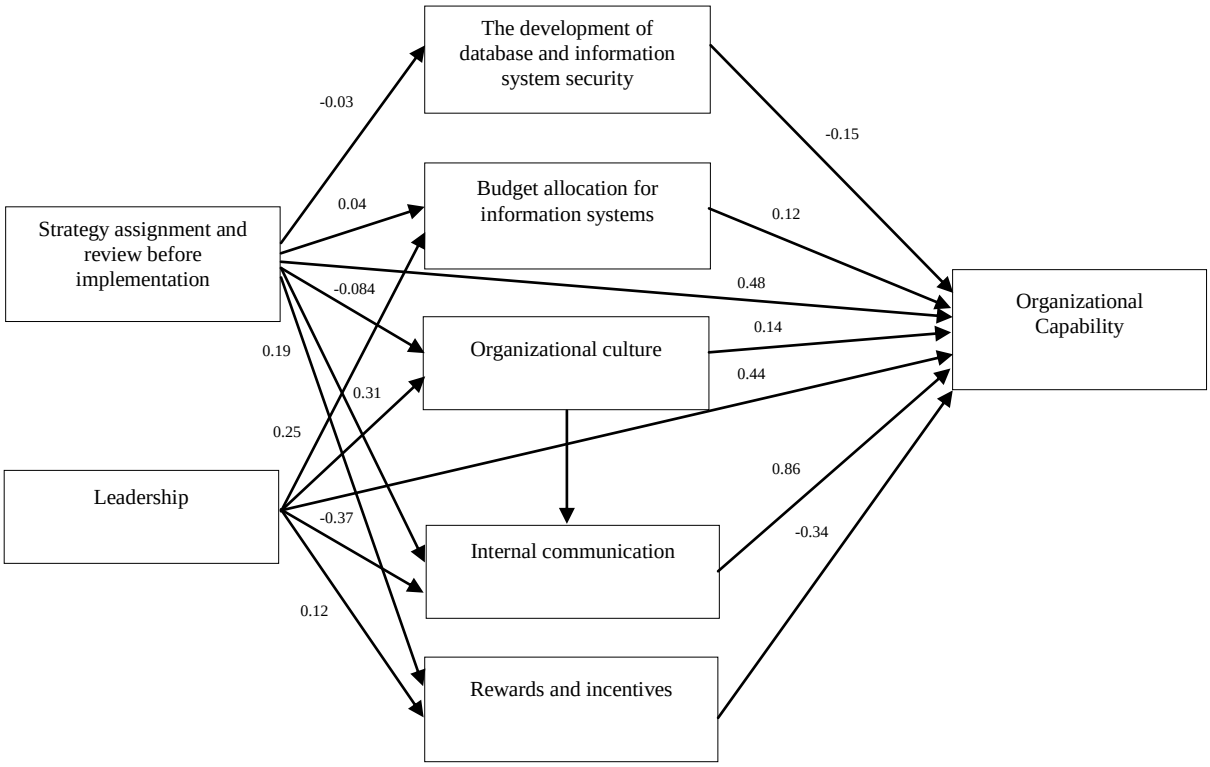


**Figure 3** The result of path analysis

## Discussion

Information technology was a process for information analysis and dissemination to improve efficiency, accuracy and usefulness for organizations. Nowadays, information technology was important to the development of the organization such as distance education, internet searching and information system through computer network. Turban et al. (Turban et al., 2001: 17) stated that the information management system was compiled, data processing, data analysis and dissemination. Jeerakan Temponsin (2006) states that the Management Information System (MIS) was a system that collects and stores data from both internal and external sources of information to process and format to support the work and decisions making of administrators of the organization. The information system was used in many organizations especially in higher educational institutions was use information system to develop organization work. Based on the study of key components in the implementation of information management system through exploratory factor analysis was conducted from the

sample of 25 higher education institutions to identify most important variables through Maximum Likelihood Analysis. The implementation components of the strategy in higher education institutions were 8 components: database development and security of information systems. Budget allocation for information systems, strategic assignment and review before implementation, leadership, organizational culture, organizational capabilities, internal communication and awards and incentives. Each components was consistent to the theory and research as follow:

Component 1: Database Development and Security of Information Systems was an important component in the implementation of information technology strategy according to the concept of Sakchai Tangwannawit (2012: 57) which stated that note that database was the core of information management system. Quality information was based on good, reliable, up-to-date information and systematic management including user can access and use it quickly and easily. Therefore, the database was an important component to ensure completeness and effectiveness of system. It was also related to the research by Nattawut Uttgrit (2007) who studied The Development of Information System Management, from King Mongkut's Institute of Technology North Bangkok. The research found that development and management of information systems should develop human resources database, research database and researcher database.

Component 2: Budget allocation for information systems. It was an important component in bringing information systems strategy to implement according to Thompson and Strickland's concept (Thompson and Strickland, 2003: 271) which mentioned that Strategy implementation of the manager was required not only adjusting to external circumstances, but it was also required a key principal implementing tasks in 8 components. One of the important components was budgeting to control the resources available and sufficiently to use in the chain of values. Therefore, education institutions had budgeted for information systems will result in greater efficiency in driving the work.

Component 3: Strategic assignment and review before implementation was an important component in the implementation of information technology strategy according to Pitts and Lei (2000: 301), mentioned that "Understanding of strategic implementation was very important since the success of any organization depends on how well the people in the organization work together. To transform the strategic plan into action, managers and employees were the most important to gaining competitive advantage. It was related to Boonkiat Chivatakulkit (2005: 172-177) which stated that strategic work that assigned to various agencies to share their responsibility, it help helping each agency realize their vision and mission (Shared vision).

Component 4: leadership was an important component in the implementation of information technology strategy regarding to Somyot Naveekan (2003: 930-933) stated that one of the key factors in strategy implementation was leadership which mean the ability to influence individuals to adopt behaviors behaviours for strategy implementation. Leadership was related to communication, motivation and cultural change. Administrators or executives who try to implement a new strategy may need creating an understanding to individual, establishing the partners and encouraging the middle managers to accept company's vision. If the leader allow other executives to participate in the strategy, the strategy implementation was easier. Because those executives will understand and engage with new strategies. Leadership was used to motivate people to adopt new behaviours and cultivating new values and attitudes as a new organizational values. It was also related to Wilson's research (Wilson, 1996) which studies the use of information systems in public organizations management: a case study of Richmond, Virginia. The research aimed to study the attitudes of senior administrator in city of Richmond on applying information systems in public organization management. The research results showed that senior administrators had positive attitude to

apply information systems into organization management. It was an important tool of management.

Component 5, organizational culture was an important component in the implementation of information technology strategy as Brenes and others (2008: 590-598) conducted a research study on key success factors for strategy implementation in Central America. The research presented that organizational culture was a critical success factor for implementing strategies which related to Wheelen and Hunger (2006: 248-249) stated that organizational culture can influence the behavior of all employees. It can affect a company's ability to change its strategic direction.

Component 6 Organizational Capabilities was an important component in the implementation of information technology strategy regarding on the concept of Pakpajong Wattanasin and Phasu Decharin (1999: 285-304) stated that the ability of an organization to effectively apply the strategy depends on the quality of its staff. Before implementing a strategy, the executives must build their own organization to be competent and effective. It should recruit an appropriate person for the position then build their capacity in term of skills and competency according to organization requirement. And lastly the process of work decision making and systematic to implement the strategy as effectiveness.

Component 7 Internal Communication was an important component in the implementation of information technology strategy as the concept of Anivat Kaewjamnong (2008: 9-10), strategic implementation was the work of individuals at all levels in the organization. With each manager applying and creating an understanding the strategy implementation. It was necessary to communicate to the people in the organization to understand and follow the strategy. If it cannot be done, it may result in the implementation of the strategy and directly administrators. Lawrence Herbiniak, (2008: 276, 359) stated that the responsibility and monitoring of all functions must be clear. If all workers know who to contact as well as understanding or responsibility of others, the strategy will be successful. It will create the exchange of information between each other and the transfer of knowledge which affect to organizational capabilities. Defining responsibilities or the role of supervision including strategies monitoring as well as delegation of duties and responsibilities to ensure that those involved in the change were aware of it was a great need for effective management.

Component 8: Rewards and incentives was an important component in the implementation of information technology strategy as the concept of Sakorn Suksriwong (2008: 2001-2) mentioned motivation makes the person happy to perform their duty. Motivation was very important since when organization issued new strategy and implementing new strategies. it create the change, and those change may be offensive to the people in the organization, or may not be consistent with the expectations of the people in the organization. Therefore, the executive need to encourage and motivate staff to follow the strategy. Herbiniak (2008: 346) had the idea that compensation motivates will encourage a performance-oriented behavior, which strengthen the strategy implementation and also be as a mechanism that helps to validate and correct the process, as well as encourage the learning and change within the organization. The incentive compensation and control was an important factor that drives the strategy to be concrete.

## Recommendations

### General recommendations

1. Database development and information systems security: Management administrators and executives of the university and the faculty should set policies and implement measurement as follows: information systems database's security, a database controller, creating a new database which faster and easier access to information in each section and also updates every month. Develop or provide effective prevention systems for information systems (Hackers).

Setting the password for users in the organization which can check the usage throughout the period. Staff was able to change their access password. The period of changing password might set at every six months.

2. Information systems' budget allocation: Management administrators and executives of the university and the faculty should designate the responsible department for procurement of IT equipment according to their needs and appropriateness by calculating the return on investment (monetary and non-monetary costs) and building credibility of return on investment assessment from the first step to report results. Need assessment must be conducted every year and it should consistent and link to strategies, operation plan and information systems development for budgeting and financial management so it can be used as a budget management information in each department.

3. Strategy assignment and review before implementation: Management administrators and executives of the university and the faculty should delegate the information management strategy to the responsible person based on their abilities and experiences including create an understanding of information management purpose and objectives to all staff before implementation. In addition, the strategic plan for the information management system should review annually though emphasizing the coordination between the key responsible and the co- responsible person at all stages.

4. Leadership: Management administrators and executives of the university and faculty should demonstrate a clear vision on information management and adhered to as well as increasing responsibility of managing information systems to meet the needs of the staff including should allow the staff to independently express their opinions in the process of information management systems and also bring those ideas to improve the work to be more efficiency.

5. Organizational culture: Management administrators and executives of the university and faculty should set social measurement to allow staffs in the organization able to use the information system such issues as information publishing to a person who do not use the information system in their work including clearly create value in the work of information management system through academic progress 'atmosphere in term of information technology using as a media for learning in all the activities in at each level. As well as promote the integration of organization's activities and benefits of information technology using without feeling forced.

6. Organization Capabilities: Management administrators and executives of the university and faculty should set policy that promote the comprehensive use of information systems at cover all levels and dimensions including evaluate through a balanced scorecard that covers in term of the client's financial, the operations and information systems innovation and learning to prevent an error and able to develop system in a timely manner.

7. Internal Communication: Management administrators and executives of the university and faculty should support the establishing of information resources to assist staff in implementing the information management strategy, such as the meeting preparation and knowledge management for new knowledge delivery and sharing including increasing channel and system for swift information exchanging between staffs, both inside and outside the organization, such as telephone, internet, meeting rooms and vehicle reservation system to ensure the speed and not duplicate of work.

8. Rewards and incentives: Management administrators and executives of the university and faculty should promote motivation by raising salary based on the achievement performance. Moreover, should create an encouragement by giving a reward to staff who manage of ad hoc information system successfully including the system of position promoting according to the achievement or those who use the information system to scale up and increase the

effectiveness of work as well as those who present or link the benefits of using information systems, such as the importance of employee welfare systems.

**Recommendations for future research**

1. Should study the problems and limitations of information management strategies' implementing in higher education institutions which lead to effectiveness of the information system development plan in higher education institutions.
2. Should develop a strategy for managing information systems in higher education institutions as a long-term development plan for managing information systems in the organization.
3. Should study of the human resources' potential to drive the development of information systems in higher education institutions which lead to human resources development in advanced IT.

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