

A Study on Course Management System Implementation in Indonesian Higher Education Institutions

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Abstract. Information technology development nowadays has brought new colors in the higher education learning process. In Indonesia, the current trend showed a higher use of CMS to support the existing conventional learning method in the classrooms. This paper attempts to understand the characteristics of CMS implementation based on a survey at several higher education institutions in Indonesia. There were 9 selected higher education institutions observed in this study. The objectives were to find out the CMS implementation in terms of: 1) the management of CMS implementation, 2) the evaluation, 3) originality of materials, platform, and feature; and 4) participation level. The result showed that the use of CMS in these institutions, in general, was to support the classroom conventional learning method by providing a repository of lecture notes and communication forum/media outside the classroom. The management task mostly was taken care by a specific unit. A Moodle (freeware) was found as a typical platform in use, and none of the institutions chose to use paid platform i.e. Blackboard. The accessibility of CMS used was kept closed for limited group of people due to high cost of material originality assurance. Observation also found that there was not much attempts in evaluating the success of CMS implementation in each institution, whereas the success measurement was limited to the users' satisfaction level. The majority of institutions claimed a good internal participation level (with lecturers and students as the main users), but in general we found that lecturer participation in most institutions were low or even very low.

1. Introduction

Information and communication technology (ICT) development nowadays has led to many improvements in the education learning process. Technology development on Web 2.0 that brought up E-Learning 2.0 in 2004 has made the use of ICT in learning process became higher. The development of E-learning in form of Course Management System (CMS) has been a symbol of innovation adopted and implemented in many higher educations in the world [1].

Although the implementation has been going on for many years, pros and cons on CMS were still highly discussed in many research. Several cons on CMS highlighted that this system was originally implemented as a distance learning method, but in the development it has changed its purpose and act as a supporting media for in-classroom learning as well as a communication media for lecturer and students outside the classroom [2][3]. Thus, the investment purpose of the CMS development became questionable, as the use of the system itself is more for the in-campus learning rather than distance learning. However, regardless which role the CMS played, researchers also noted several benefits of



CMS implementation. Some suggested that CMS was a set of technology to support and leverage learning process [4], while other saw CMS as a simple tool to help lecturers/teachers with the least web design knowledge creating a website to support courses they teach [5]. CMS can be defined as a comprehensive web-based set of tools, either static or interactive, that support any aspects of learning process, including preparation, presentation, communication, participation, and interaction [6]. On top of that, based on the case studies in several higher educations in South Ontario, Canada; it is reported that students and lecturers found CMS very positive for learning process although the usage was limited to the basic function of CMS (as repository) [7].

In spite of the fact that pros and cons are still debatable, many higher education's thought of CMS in the long term as strategic and it would bring a better learning process. Massachusetts Institute of Technology (MIT) was a pioneer in the use of CMS as knowledge dissemination medium in learning process, not only for internal users but also for the external through a mechanism so called Open Courseware (www.ocw.mit.edu) developed in September 2002. This courseware was strategically beneficial for the internal stakeholders while at the same time it also put an idea in the external users' mind about MIT contribution for academicians in the entire part of the world. The fact has made the management of MIT to consistently focus on the attempt of periodic evaluation of the CMS implementation. Peer comparison with several US universities on CMS, Course Material Life Cycle, and the involved cost was an example of one of many attempts the MIT made to improve the implementation of CMS [8]. At about the same time, Universities and Colleges Information System Association (UCISA) UK also put a significant consideration about CMS implementation as one of ICT components to be used in the higher education learning process next to Managed Learning Environment (MLE) [9]. Started in 2001, UCISA has surveyed the implementation of Technology Enhance Learning (TEL) for its members in England, Wales, Scotland, and Ireland.

With the rapid development of ICT, CMS has become a new part of education learning process in the Indonesian higher educations. Large number of universities, both public and private, have developed and implemented CMS with high variation in terms of investment level, complexity level, and operational standards. Some higher educations developed its own platform; e.g. Universitas Gajah Mada (UGM) with E-Lisa (www.elisa.ugm.ac.id) and Amikom Jogja with <http://elearning.amikom.ac.id>; while the others developed their system using open source platforms; e.g. Institut Teknologi Sepuluh Nopember (ITS) with its www.share.its.ac.id, Universitas Indonesia with its www.scele.ui.ac.id, and Institut Teknologi Bandung (ITB) with www.kuliah.itb.ac.id. While the implementation of CMS is still in the development stage, some higher educations that have implemented CMS; such as UGM, Universitas Gunadarma, ITB, and Universitas Indonesia; try to disseminate the contents in their CMS as an Open Courseware as that used by MIT.

At the macro level, E-Learning Readiness of Indonesia was ranked 53 out of 60 countries observed [10]. This result reported in 2003 would change a lot in the nowadays measurement, especially because the CMS development in Indonesia has grown rapidly these recent years. In November 2013, Webometrics reported this growth by placing 11 Indonesian universities (higher educations) within 15 top universities in the South East Asia in term of openness.

Earlier research about CMS implementation in Indonesia was mainly limited at micro level; in general it evaluated the success of CMS implementation in a specific institution. This early research included a study that evaluated the acceptance of CMS in the *Universitas Pendidikan Indonesia* using the Technology Acceptance Model (TAM) approach [11] and an evaluation of E-Learning Maturity Model implementation in a certain university using an approach adopted from eMM 2.0 of New Zealand Standard [12]. This was few research that reported the evaluation of CMS in Indonesia at macro level as those available publications [8][9][13]. Therefore, this paper attempts to explore the profile of macro characteristic of CMS implementation in Indonesia based on the survey of public and private higher education institutions in Indonesia.

2. Methodology

This study used a survey as the main approach. The selection and the number of respondents in this survey were mainly defined with a consideration of the following factors: 1) the availability of information from the previous research, 2) respondent willingness to share the required information, and

3) limitation on time and resources. Questioners were designed to at least accommodate the early mapping on important information that is necessary to explain the profile of CMS implementation in the selected higher education. The survey was then conducted using the questioner form, through discussion session, and direct interview with the information source.

With the approach, finally there were 9 higher education institutions data to be used in this study as shown in Table 1.

Table 1. List of higher education institutions (universities) surveyed.

No	Institution Name	CMS Address	Rank Webometrics (2013)	
			South East Asia	Indonesia
1	Institut Teknologi Sepuluh Nopember (ITS)	www.share.its.ac.id	48	13
2	Institut Pertanian Bogor	www.lms.ipb.ac.id	34	7
3	Universitas Diponegoro	www.kulon.undip.ac.id	40	10
4	Universitas Gunadarma	www.elearning.gunadarma.ac.id ; ocw.gunadarma.ac.id	28	5
5	Universitas Airlangga	www.aula.unair.ac.id	38	9
6	Universitas Paramadina	www.elearning.paramadina.ac.id	900	93
7	Universitas Kristen Petra	www.lentera.petra.ac.id	37	8
8	Universitas Surabaya	www.elearning.ubaya.ac.id	157	45
9	UIN Syarif Hidayatullah	http://ais.uinjkt.ac.id	829	75

The questioner sheet was divided into 4 aspects with 19 questions in total (5, 7, 4, and 3 for each). Table 2 explains each aspects and the questions.

Table 2. List of questions, the objective, and the reference of each question used in the survey.

No	Aspect	Objective	References
I. The management or the operation handling of the CMS			
a.	Management structure	To find out whether it is outsourced or in-house. For an in-house, is it centralized or decentralized within the school, faculty, or department? For the centralized, what unit is assigned to manage the operation?	Question 3.2.a in Walker et al. [9] also used in the strategic section in Ingraham et al. [13]. Adopted by adding the characteristic of general practice found in Indonesia.
b.	Access restriction	Important to understand whether a CMS is accessible for everyone or closed only for internal use. The question also tries to identify the opportunity of <i>Open Courseware</i> development.	Added in this survey.
c.	Reasons for CMS implementation	To investigate the reasons behind the implementation of CMS.	The question was used in Landon et al. [8] to understand the strategic motive and the importance of CMS for the university. This question was also discussed in Walker et al. [9]
d.	Amount of investment cost and its components	To find out the amount of investment an institution willing to pay, and the components of the cost (including the major component).	Initial investment in the US based on Landon et al. [8] varied, ranged from US\$ 23K to US\$ 500K.
e.	Operating cost and its major component	To identify the operating cost and its major components.	Landon et al. [8] showed that operational and maintenance cost ranged from US\$ 275K to US\$ 1.3M. License fee for Blackboard was estimated at US\$ 100K per year and for WebCT was about US\$ 20-25K
II. The choice of platform and the management of contents and features			
a.	Existing platform used	To understand the variation of platform used in each institution.	Based on Landon et al. [8] the platform used was dominated by Blackboard, while Walker et al. [9] suggested the major use of Moodle followed by the Blackboard.
b.	Reasons for platform selection	To understand the reasons for platform selection.	Based on Walker et al. [9] the main reasons were cost and reliability.

No	Aspect	Objective	References
c.	Evaluation or plan on platform change	To find out whether the institutions perform periodic evaluations on the use of existing platform. Who would perform the evaluation? Is there any plan to change the platform and why?	Based Walker et al. [9] a periodic evaluation was commonly found. Platform change was also commonly found in universities.
d.	Available features	To identify what features are currently available, and the possibility of Self-Developed features.	Question 3.16 in Walker et al. [9] The same question was also found in Landon et al. [8]
e.	Plan on feature development	To find out whether the institutions have a plan to develop their own features.	Landon et al. [8] confirmed that there were several plans in feature development among the US universities.
f.	Originality of contents and teaching material	The access restriction was suspected to be influenced by the originality of teaching materials. The institutions would make the access open when they can assure the originality.	The MIT Open Courseware required an intensive teaching material development with a great support from staffs Landon et al. [8]
g.	Strategy on content development and originality assurance	To find out whether there is a certain strategy to improve the content development and the material originality. If it is so, what it is and how much it would cost.	An incentive of US\$ 3000 was awarded for each course to participate in the MIT OpenCourseWare. It required about US\$ 5.1 Million, only for the development of contents Landon et al. [8]
III	Participation Level		
a.	Participation level of lecturers	The management record on lecturers participation level in the implementation of CMS	Participation level is normally measured in term of course number and the number of students involved[13]. It was reported that there was an aggregate estimation of 69% student enrollment recorded as active users in the US Landon et al. [8]. The strategy to increase the participation level was discussed in section 15a in Walker et al. [9]
b.	Strategy to raise the participation level of lecturers	The use of specific strategy to raise the participation level of lecturers	
c.	Participation level of students	The management record on students participation level in the implementation of CMS	
d.	Strategy to raise the participation level of students	The use of specific strategy to raise the participation level of students	
IV	Evaluation		
a.	Availability of evaluation on implementation success	To check whether there is an evaluation method developed in this case. Does it follow a certain assessment standard or the local standard based on the institutions' policy?	54 out of 98 universities in the UK performed an evaluation to check the impact of CMS implementation to the students' learning experience Walker et al. [9]; while 34 out of 98 universities performed an evaluation on the impact of CMS implementation to the pedagogic practice.
b.	The benefit of evaluation	The benefits identified by the institutions from the implementation of CMS based on the last evaluation	Question 3.25 in Walker et al. [9]
c.	Obstacles of CMS implementation	The obstacle identified by the institutions in the implementation of CMS based on the last evaluation	Additional question designed in this survey to complete information related to the benefits of CMS implementation.

3. Results

Based on the survey, we found several unique facts regarding the implementation of CMS in Indonesia that differed from those reported in the US and UK. Explanation on each aspect is provided in subsection 3.1 to subsection 3.6.

3.1. In-sourcing

The UCISA showed that 20 out of 98 universities in the UK employed a third party to host the CMS [9]. This indicates that CMS was no longer seen as something to be managed in house. In the other hand, the survey in this study indicated that the institutions generally managed CMS in-house. Most of the managements were centralized under a specific unit.

The process of CMS development varied. Some used vendors to help the development, while the rests developed their own CMS. We also found that CMS maintenance service providers were not commonly available in Indonesia. It is clearly different than what was found in the UK where the free or paid platform of CMS have already had several partners to provide the service that included not only platform development, but also the management and the maintenance of CMS.

3.2. Moodle Domination

There was only 1 out of 9 university that did not use Moodle as the platform of CMS. This university chose to use a Joomla-based platform instead of Moodle. There was also one institution used the mixed of Moodle and Joomla, while the rest 7 institutions used Moodle.

The reason for choosing Moodle was mainly due to the fact that it was an open source. That way the institutions could minimize the investment and operational cost, but at the same time this option forced the institutions to develop their own CMS. However, most respondents chose to develop their own CMS rather than to outsource.

The domination of Moodle was also caused by the period of CMS development in these institutions that were happened at nearly the same time. As the pioneer gained a success on the implementation, the followers then took the same step by choosing the same platform. This factor is a stronger influence than the previously mentioned, as we found that most institutions to choose the Moodle did not perform a comprehensive study on it. Extending the sample outside the survey, we can see that several public institutions in Indonesia, in majority used Moodle as their platform; e.g. Institut Teknologi Bandung (ITB), Universitas Indonesia (UI), and Universitas Brawijaya.

The Moodle domination is actually the same phenomenon reported in [9]. It was reported that Moodle has made Blackboard move to the second position in the platform domination in CMS; 58% of the universities in the survey have been reported to use Moodle. However, Moodle domination in Indonesia was far stronger.

Another notable finding is that most of higher education in Indonesia based on this survey, used a single platform of CMS, whereas in the US and the UK, it was very common for a university to have more than one CMS. For example MIT had Stellar and Sloan Space, California Berkeley used B-Space, Blackboard, and WebCT, Stanford University employed CourseWork, WebCT, Blackboard, and CCNet [8]. Additionally, a periodic evaluation on platform, including the needs to add more features and the needs of change, was commonly performed by the universities in the UK and US. The similar phenomenon was not found in Indonesia. Most institutions did not perform an evaluation. Thus, we can say that the basic reason for Moodle domination is merely influenced by the cost efficiency and trend instead of the result of comprehensive evaluation.

3.3. Investment, operations, and maintenance cost

The practice of CMS in the US at first was for a knowledge repository. By the development, it changed its function to be a media of knowledge dissemination for public. This change of course required a relatively high cost. In general, CMS implementation cost can be classified as follows [8]:

1. Cost of investment, operational and maintenance; this includes periodic maintenance, operational routines, human resource, troubleshooter, license fee, etc.
2. Cost of CMS development for students with disability
3. Cost of personnel to support the implementation of CMS
4. Cost of socializing and educating the users (students and lecturers)
5. Cost of material development and other supporting material

Investment cost for materials development in general was relatively not high. High cost in this particular item was only found in Stanford where it reached US\$ 1 million, while the rest was commonly found in the range of US\$ 20K up to few hundred thousand.

The biggest cost component for CMS implementation in US universities was found at the fifth. MIT spent about US\$ 5.4 Million per year to develop the OpenCourseWare, while the cost was varied in the other universities with the smallest cost as low as below US\$ 200K per year [8]. As for this survey, it is rather difficult to classify the cost in term of components suggested in [8]. To simplify, we divided the

cost in two big parts: 1) investment cost, and 2) operations and maintenance cost (non-investment cost). Details on both costs based on the survey result are shown in Table 3.

Table 3. Comparison on investment and operation-maintenance cost of CMS implementation across the surveyed institutions.

Institutions Name	Investment cost	Highest expense	Annual O&M cost	Highest operational cost
IPB	19k – 37k USD	Software and hardware	19k – 37k USD	Course material development
Universitas Gunadarma	> 75k USD	Network infrastructure	> 75k USD	Incentive for content& material development
UIN Syarif Hidayatullah Jakarta	1k – 4k USD	Hardware, server, and network infrastructure	4k – 7.5k USD	Hardware
Universitas Diponegoro	< 1000 USD	Teaching/course material development and socialization	< 1000 USD	Managing the material, server maintenance, spam handling
Paramadina	3.5k – 7.5k USD	Server	3.5k – 7.5k USD	Data maintenance
Universitas Kristen Petra	3.5k – 7.5k USD	CPU Camel Application	< 1000 USD	Server sharing
UBAYA	<1000 USD	Server	< 1000 USD	Maintenance
ITS	19k – 37k USD	Hardware, software, and network infrastructure	19k – 37k USD	Data maintenance, server, and teaching material development
Universitas Airlangga	37k – 74k USD	Preparation and Lab. Building Construction	19k – 37k USD	Training (education the users)

In general, it was clear that the majority of the institutions in Indonesia spent an investment cost of less than 7500 USD. Only a few of the institutions were found spending more than 7500 USD. Universitas Gunadarma spent the biggest investment among all, with the cost of more than 75.000 USD that spent mostly in the development of network infrastructure. In term of operations and maintenance cost, once again Universitas Gunadarma spent the highest cost among respondents, with the value of more than 75.000 USD in an annual basis. The amount of the cost this university has spent can be seen as a serious commitment to be the leading university in the implementation of CMS in Indonesia. The biggest contribution in the O&M cost of Universitas Gunadarma was given by the cost of developing teaching material/contents development that were renewed in a yearly basis.

To sum up, the survey showed that the aggregate expense paid by the Indonesian institutions for CMS implementation is not as much as that found by the universities in the US or UK. It is probably one of the factors affecting the quality of features and contents of the CMS.

3.4. Internal evaluation

The survey result indicates that in average, the institutions did not retain an integrated application to perform an evaluation on the success level of CMS implementation. Only 5 out of 9 have developed evaluation tools although they were limited to the user's satisfaction.

Evaluation in the success of CMS implementation should not be merely a user satisfaction survey. It should have covered the assessment on the level of technology acceptance, the quality of teaching material, platform handling/management, organization, and other relevant assessments. The phenomenon of insufficient or the absence of evaluation, may also imply that it was not the culture of the organization. In term of concept, we suggest that evaluation on CMS implementation to be performed by applying the principals of E-Learning Maturity Model (eMM) 2.2 that was developed by the Ministry of Education of New Zealand [14] eMM 2.2 developed an evaluation system based on 5 dimensions of evaluations: organization, evaluation, learning, development, and support. Assessment can be performed by asking questions on each dimension with a scoring for each question. This mechanism should be relatively easy to adopt. It is also considerably good reference for self-assessment or internal audit related to the evaluation of the implementation of CMS in the university.

Poor evaluation practice found in the survey may also indicate that investment spent on CMS these days can be merely for a reason to be a part the current trending. In a better maturity level, these institutions/universities should see CMS as a necessity. Having said that, a mechanism of periodic evaluation would help the institution to formulate a strategy for continuous development.

3.5. Development of course material

The development of teaching material as the main content in a CMS has gain significant attentions in the universities. This success of this activity required a specific strategy. It includes but not limited to giving an incentives for developing a teaching material, educating the users to better formulate a teaching material, and optimizing the use of technology for better learning experience. In a long term, teaching materials can be disseminated broadly as an attempt to contribute and develop the community (known as Open Courseware).

In Indonesia, the strategy of teaching material development was not a main focus. Most institutions surveyed decently wished that the lecturers would participate to the implementation of CMS. Only a few institutions used an active strategy to encourage the lecturers to develop teaching material to be shared in the CMS as an Open Course. Universitas Gunadarma, ITS, and IPB were some to put the strategy in practice. Those three institutions have provided an amount of funding to make better quality of teaching material available in the CMS.

3.6. Other Findings

Apart from the above aspects discussed, the survey also highlighted the reasons behind the implementation of CMS in the surveyed institutions as follows:

- To strengthen the learning method and to provide variation in learning process
- To lift up the institution's rank
- To provide communication media/forum outside the classroom and outside the learning hours
- To support submission for assignment and online examination
- To facilitate teaching material update
- To improve the academic atmosphere
- To manage knowledge in teaching
- It is a trend in a learning method development

This study also observed the obstacles commonly found in implementing CMS as follow:

- Slow internet connection. It can be influenced by the price of connection or the availability and capability of the network offered.
- Cultural problem and conventional mindset that CMS is not an urgent support made CMS less important to some groups of people.
- Literacy problems on the usage of CMS, from both sides (lecturers and students) can be one of many reasons for low-level participations in the implementation of CMS.
- The availability of funding.

Table 4 summarizes the results in four surveyed aspects as explained in this section.

Table 4. Results summary.

No	Aspect	Findings
I	The management of CMS implementation	
a	Management structure	All of the respondents use an in-house management. None of them outsourced the management to the third party.
b	Access restriction	Most institutions restricted access only for registered internal users (closed access). There was only one institution that opened the access for both internal and external users. However, it also limited few contents to internal users only for license/patent reasons, standard compliance reasons, and other.

No	Aspect	Findings
c	Reasons for CMS implementation	– To give the students new experience in learning method variation and technology application. – For easier management of teaching material (repository) and to provide communication forum for students outside the classroom. – In a long term, it could lift up the institutions Webometrics rank (especially when it is made open).
d	Amount of investment cost and its components	See Table 3. The biggest expense on investment was commonly in the component of hardware and application development. There was only one institution where the most expense was on network infrastructure. In most institutions there was no License Fee because none of them use paid platform or feature. The investment cost of CMS in Indonesia was ranged roughly from 1000 to 75K USD, far below the investment of CMS in the US that ranged from 23K to 1 million US\$.
e	Operating cost and its major component	Annual rough estimation (excluding cost of staffs): • 2 institutions spent less than 1000 USD • 1 institution spent 1000 to 7500 USD • 2 institutions spent 3500 to 75k USD • 3 institutions spent 19k – 37k USD • 1 institution spent more than 75k USD – See Table 3 for more details on operation cost. – The result confirmed the implementation of Open Course Ware and funding support to enrich teaching material as the biggest component other than maintaining hardware and software.
II The choice of platform and the management of contents and features		
a	Existing platform used	9 institutions used Moodle as the platform, 2 of them combined the Moodle with Joomla. It confirmed those reported in [9], a relatively high migration to Moodle. Furthermore, it also confirmed the absence of License Fee because Moodle was free.
b	Reasons for platform selection	Most institutions explained the ease of use as the main reason, very few mentioned about doing a comparison between platforms. Moodle was dominating the selection, and the more institutions used Moodle, the more followers decided to use Moodle too. Another reason for choosing Moodle is because it is free. The finding showed that an in depth analysis was not something to define the selection of platform. The most important targets were low cost and that CMS was in place.
c	Evaluation or plan on platform change	Most of institutions mentioned that there was no evaluation method, nor did it plan to change the platform. Except for Universitas Gunadarma that planned to develop a videoconference based platform and web mobile. Although the implementation duration can be considered as long enough (3-6 years), doing the evaluation did not seem to be a culture.
d	Available features	The features used were commonly the standard available one. Only two universities took the advantages of Single Sign On (SSO). In this SSO, there is an integrated login access between CMS and other information system facilities available. The majority of users were at the basic level in term of feature usage. Most of the institutions used CMS only for a repository of teaching material and assignment submissions.
e	Plan on feature development	There was only one institution planned on exploring the multimedia contents. It was possibly do to the effect of poor evaluation method in general.
f	Originality of contents and teaching material	Most institution claimed that the originality of material was a high priority. However, observations showed that the level of originality mostly was around 50-75%, one institution was at 25-50%, and another claimed that it never did a specific measurement. Assuring the originality of material was considerably difficult to perform, unless there is a commitment from the institution managements to do so.
g	Strategy on content development and originality assurance	The content development strategy was one important factor to consider. Three institutions have been applying “Funding Grant” to encourage the submission of teaching material to be disseminated in the CMS. The rest has not considered the strategy. In Universitas Paramadina, Guidance for prevention of Academic violation was used to encourage the development of original teaching material.

No	Aspect	Findings
III Participation Level		
a	Participation level of lecturers	Participation level of lecturers was considerably low. Most institutions reported that the participation level was between 25% and 50%. Higher level of participations (>50%) were found in three institutions.
b	Strategy to raise the participation level of lecturers	The answers on this question varied. The strategy included socialization, training (educating), responsibility assignment, etc.
c	Participation level of students	Most institutions were at 75%-100%. There were 2 institutions stated that they never did any measurement in the past.
d	Strategy to raise the participation level of students	Training (educating), socialization, coaching, and adding the number of courses available in the Moodle.
IV Evaluation		
a.	Availability of evaluation on implementation success	The evaluation practice was minimum. Some of the institutions performed it but limited to the users satisfaction assessment. None of the institutions applied a comprehensive evaluation like eMM 2.2. It was also found that none of them has officially evaluated the impact of CMS implementation on the students.
b.	The benefit of evaluation	Because evaluation was not performed, it was hard to define the benefit for the institutions.
c.	Obstacles of CMS implementation	– Slow internet connection – Cultural problem and conventional mindset that CMS is not an urgent support made CMS less important to some groups of people. – Literacy problems on the usage of CMS, from both sides (lecturers and students) can be one of many reasons for low-level participations in the implementation of CMS. – The availability of operational funding support (when available, it is normally small).

4. Conclusion

A survey has been performed to 9 higher education institutions in Indonesia. It aimed to understand the characteristics of CMS implementation in terms of: 1) the handling of the operation and its mechanism, 2) the evaluation, 3) originality of material, platform, and feature; and 4) participation level.

In most surveyed institutions, we found that the purpose of implementing the CMS was mainly to support conventional learning where CMS functioned as a material repository and communication forum outside the classroom. This finding confirmed what has been suggested by [7]. This study also found that the management of CMS in most institutions was handled by a specific unit/office/department within the institution organization and none of the institutions outsourced the management of CMS. The majority of platform used was Moodle (freeware) and none of the institutions used paid platform like Blackboard. Most developed CMS was designed to be closed access due to high cost in assuring the material originality.

In term of cost, there was a significant difference between the amount of money spent for investment and operations and maintenance cost in the implementation of CMS in Indonesia compared to those in the US and the UK. This relatively small amount of fund made the Indonesian institutions hard to improve the quality of teaching materials and contents. Insufficient or even absence of attempts in the evaluation of the CMS implementation was another problem. The existing evaluation was simply to measure the satisfaction of the users. The majority of the institutions claimed a good level of students and lecturers participation, but this study found that lecturer participation level was relatively low.

Among 9 institutions surveyed, Universitas Gunadarma can be seen as the best one in implementing CMS, the year in which the implementation started, the expense it has spent, and the commitment of the management were evidence. In the other hand, the implementation of CMS in most institutions was at the early stage. At this stage, most institutions have tried to adopt and implement, but they were still dealing with many problems found in the development, management, and organization. If the institution management considered CMS simply as a support facility, then current phenomenon of the implementation can be seen as sufficient. But if the management would like to see it from different perspective, for example as a strategic tool to improve the effectiveness and efficiency of learning process, knowledge dissemination for community development, or a must-have system to lift up the

institutions rank, then there should be plenty of space for improvement, and it can be started from the investment.

A potential future research in this topic would be best conducted by comparing the maturity level of the CMS implementation between institutions. The use of assessment concepts such as 2.2 [14] would be very interesting to discuss considering the finding regarding the evaluation practice in the institutions. Furthermore, in reference to the TEL survey (2012) conducted in every other year [9], the questioners in this survey can be improved to make it appropriate for periodic survey with a bigger sample size for mapping the implementation of CMS in Indonesia.

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