

Implementation of Cluster-Based sme E-Commerce Control and Maintenance

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ABSTRACT: *The implementation of cluster-based SME e-commerce systems is a stage after analysis and design. However, although SEO could be operated and implemented, this stage cannot be regarded as perfect in fulfilling the development of information system. It is still too risky for the continuity of cluster-based e-commerce business in the future. It is because the lack of control, maintenance and development managements applied to e-commerce business with such cluster model. This study aims to develop and offer strategies of control, maintenance and development of cluster-based SME e-commerce in order for the operation to sustainably able to run and grow. These include regularly-updated contents of the website, more improved privacy protection and cares for stakeholders, and continued increase of SEO ranking on the top level, for ease of customers' browsing activities. Meanwhile, the system control methods used include general control, e-commerce application control, access control to e-commerce systems, and administrative control with COSO approach. In terms of maintenance, preventive, corrective and perfective maintenances are performed in a post-implementation model of development by means of prototyping. E-commerce Operating Standards and Procedures are implemented so that e-commerce system can be effectively controlled and maintained to reduce risks of its operations.*

KEYWORDS: *e-commerce, SEO, SME, cluster, maintenance, control*

I. INTRODUCTION

Electronic Commerce (E-Commerce) and Electronic Marketing (E-Marketing) in this digitized era have become state of the arts, which is finally to affect steady development of the business with high efficiency. Not only does the implementation of e-commerce involve e-commerce domain applying SEO (Search Engine Optimization) that can operate through websites but also most importantly undertake its control and maintenance activities. It also applies to e-commerce in both micro businesses and small and medium-sized enterprises (SMEs).

It was not until 2013 that the number of SMEs in Indonesia reached 57,900,787, namely being dominated by 57,189,393 units of micro business group, 654,222 units of small enterprises and 52,106 units of medium enterprises (Depkop, 2014). In many cases, it turns out that the development of SMEs business in Indonesian is not satisfactory. Most of them have major problems namely, lack of quality human resources (HR), weak business networks and poor market penetration capability (*UKMIndonesia*, 2013). Therefore, clusters on similar business in a special territory are created to solve such problems. From such clusters, however, only few of them have built e-commerce.

Based on the study of Indonesian Internet Service Provider Association (APJII), in 2014 there were 88.1 millions of Internet users in Indonesia (MarketPlus, 2015). According to data from Facebook in 2014, only about 6.6 percent of total SMEs in Indonesia utilized the new digital world, primarily to advertise using

Facebook pages (Kompas, 2015). And up to 2012, only about 0.15 percent of SMEs had their own websites (Kompas, 2012). Thus, it is clear that the number of SMEs taking advantage of the digital world to advertise or having websites for business is very low. Meanwhile, SMEs are critical components for the success of economy in many developing countries (Chenglin, et al., 2009).

Based on the researchers' provisional observations with respect to the number of websites being built, there are still many of them that have not designed e-commerce correctly nor implemented SEO yet. As well, e-commerce control and maintenance have not been very much employed. Therefore, this paper discusses the implementation of cluster-based e-commerce control and maintenance strategies on SMEs by making the best use of SEO application.

II. E-Commerce and Seo

E-Commerce is the implementation of some functions of traditional commerce by means of electronic networks (Internet). The resulted innovation delivers business effectiveness and improves customer satisfaction (Chenglin, et al., 2009). The process for conducting business electronically among various entities is to meet the objectives of organization or individual. It shows that the main factors for the success of electronic sales and marketing are not only determined by product quality factor but also factors such as website quality and company credibility, which are more important in internet the world (Wells, et al., 2011). In another study, it was found that not all SMEs having websites are able to increase sales significantly, although they have great and broad marketing opportunities. Only about 6.3% of companies in Southern Africa appear at the top of search engines, (Chambers, 2005).

E-Commerce content will be easily accessed by customers if it is displayed with good and reliable content management system (CMS) model. This is a software to add or manipulate the contents of a website. Generally, a CMS consists of two elements i.e *content management application* (CMA), and *content delivery application* (CDA). CMS is a website applying content-oriented system, (Rockley, 2002).

The easiest way to find a website is by using search engines such as Google or Yahoo. However, such search process sometimes results in inappropriate and unexpected websites because of *spamdexing* actions, namely techniques that seem to find a website being sought. This technique is used by the *netters* who often utilize SEO to improve their websites to be the top ranking position by using unusual techniques, (Zuze, 2011). SEO refers to a behavioral approach to improving a website structure and contents in accordance with the rules and standards of search engine in order to improve its ranking in search engines. Search engine optimization is marked by the effectiveness, timeliness and convenience (Wu, 2011).

About 80% of internet users have utilized search engines. In this respect, the website developers, in order for the websites to be easily found, have to use unique keywords and tags to position the websites at the top ranking level. In addition, the keywords in use has to be maintained and updated on a regular basis to comply with the website materials and to avoid spams, (Kritzinger, 2007). In the selection of keywords, it is needed to show the right attributes of keywords so that they are easily recognizable by internet users and facilitating the search engine algorithms in processing them, (Visser, 2011).

In another study, it was stated that the use of SEO is to optimize web in obtaining *top rank*. However, the results suggest that each website applying SEO does not always occupy *top rank* because one of the main factors affecting the *top rank* is the presence of other endorser websites by making links to the targeted sites, (Evans, 2007). The number and quality of external links is still recognized as SEO major ranking. With the continuous development of search engine technology, new tactics are required to improve optimization continuously and in a long-term (Kumar, 2011).

III. E-Commerce And Seo Architecture Of Sme Cluster

In applying SEO to SME Cluster e-commerce, it is necessary to clarify in advance about the purpose of SME cluster. In cases occurring in Indonesia, SME cluster means the formation of an association consisting of some SMEs having similar type of product. For example, handicraft clusters, fashion and batik clusters, culinary clusters, and so on. An association of some clusters that have the same vision and mission in a region will form a master SME organization such as BDS (Business Development Services) under the guidance of Local Government. Each BDS is led by BDS chairman having direct subordinates consisting of a secretary and a treasurer.

The formation of cluster aims to provide power to expand marketing network in order to increase the sales of SMEs products. Due to limited range of penetration of traditional markets, it is necessary to develop SME marketing and sales model using e-commerce. Because of limited resources, especially financial and technology resources in SMEs, then, SME e-commerce with SEO being developed is based on clusters. Management of e-commerce is carried out by an administrator supervising e-commerce operators in each cluster. Each cluster leader makes coordination with e-commerce administrator. The simple organizational structure of cluster-based SME e-commerce is shown in Figure 1 below.

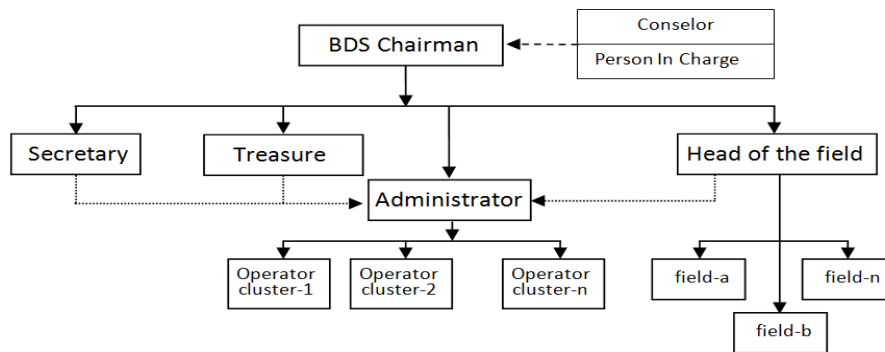


Figure 1. E-commerce organizational Structure In cluster-based SMEs

Some SME clusters existing in a master organization are developed into one principal website or domain with a domain having position as the principal web, and several domains as endorser webs. The principal website is connected to the endorser websites, through *links* and *backlinks* either On-Pages or Off-Pages. The *link* is established by writing the domain name which is directly linking it to the other websites.

Principal web and endorser web mutually put the name of its partners' websites (both principal and endorser) that is automatically linked to the website so that interlink is formed between the said websites. Meanwhile, *backlinks* can be conducted by both internal links and external links. Internal link is performed from content to another or content contained in the same website or domain. External links perform link process from one website to another with the penetration process to other websites through external regulation of backlinks.

In this paper, external prioritized links are made between endorser webs and principal web making up interlink in direct-link category. It is easier to make *reciprocal link* or two-way backlinks process. Meanwhile, *back-link* with *indirect-link* is relatively one-way back-link. This is what distinguishes external links in direct-links category with external-link through free indirect-link process by performing back-link with other websites or domains without the need for direct linking bond procedures. In addition, this process will be so easily recognized by search engines such as Google because it is considered as back-links process that are highly relevant to website being back-links.

The architecture model of SEO implementation in cluster-based SME e-commerce can be illustrated as Figure 1 below.

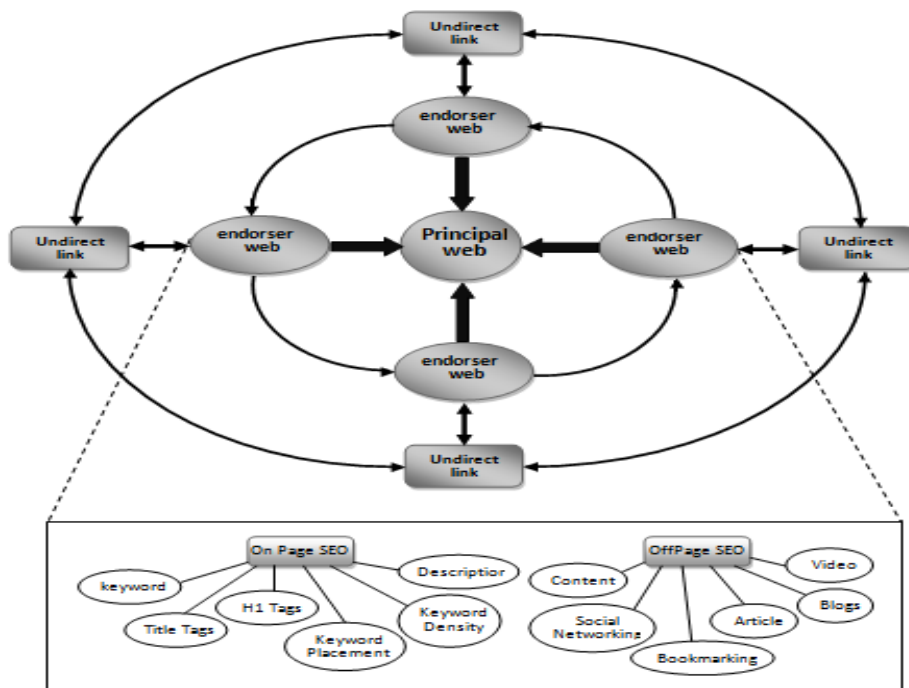


Figure 2. SEO Architecture of e-Commerce In cluster-based SMEs

IV. REQUIREMENTS FOR CONTROL AND MAINTENANCE

In the stage of system implementation, upon being tested, system control and maintenance are required. This is performed so that the system being developed becomes complete and in case of any constraints in the operation of e-commerce, they can be overcome by providing the right solution. And if there is further e-commerce development, it is able to explain and even able to make self-development without having to depend on the third party developing the previous system. The control and maintenance activities must meet the existing operating standards.

System control methods used include general control, e-commerce application control, controlling access to e-commerce systems, and administrative control. General control methods being discussed include SME e-commerce management organization control, documentation control, hardware control, physical security control, and information and communication data control. Method for controlling e-commerce applications being discussed here include input control, processing control, output control, and file or database control. Controlling access to e-commerce systems include user control to user login access and physical access. While the administrative control method used is the one with COSO (Committee of Sponsoring Organizations) standard that includes five elements: environment policies and procedures, management risk assessment, communication and information systems, control activities, and monitoring.

Maintenance of SME e-commerce discusses about the maintenance setting, mechanisms of e-commerce maintenance, post-implementation development, and the requirements for e-commerce Standard Operating Procedures (SOP). Meanwhile, the system maintenance methods being applied include preventive maintenance, corrective maintenance, adaptive and perfective maintenance.

In order that the operation, control, and maintenance of cluster-based SME e-commerce can be implemented in a systematic and focused manner, it is required to establish Standard Operating Procedures (SOP) for e-commerce implementation to e-commerce maintenance. SOP is applied to e-commerce administrator and operator personnel. The purpose is that each step from operation to the maintenance of cluster-based SME e-commerce

can be carried out in accordance with the provisions and meets the requirements and procedures becoming the reference or guidance for each e-commerce personnel. It also aims to avoid and minimize the risks that may arise from the operation of e-commerce, so that the work mechanism becomes effective and efficient.

Each provision, condition and procedure are written clearly, documented in detail and the step-by-step sequence can be understood by e-commerce personnel in accordance with the duties. Important aspects that need SOP are services to customers, e-commerce operations, and the security e-commerce systems. Every aspect has guideline or reference becoming the work procedures for each personnel in charge. Each SOP will have standard contents including the steps or the sequence from beginning to end, time required, and results of an action to make a decision.

V. SME E-COMMERCE CONTROL STRATEGY

5.1. E-commerce General Control

General control to e-commerce is a control that is not directly related to the application of SME e-commerce data processing system. This control consists of organizational control, documentation control, hardware control, physical security control, and information and communication data control. Organizational control, structurally, can be seen in figure 1 above. Serious attention that must be paid, prior to preparing organizational control system with respect to internal and external environment of BDS organization, the size of organization, which, especially, should be based on the number of SME clusters, infrastructure of organizational and e-commerce control. Documentation control is in the form of documentation of basic documents such as sales records and written reports on e-commerce product list and current account list of SME business income (revenue).

E-commerce hardware control is in the form of computer hardware administrator and operator in clusters, including internet network, such as cable, modem, and e-commerce physical security. Meanwhile, information control is conducted to all information related to customer data, e-commerce transaction data, stock updates and other related data of SMEs themselves. It is performed by creating *data log* and file protection, access restriction, and making *back up* and *recovery* to e-commerce data. Communication control is done to the existence of internet communication network that at any time shall have sufficient bandwidth to conduct SME e-commerce transactions. Therefore, it is necessary to select good internet operator communication network (ISP) which is supported with a reliable modem device.

5.2. Control to Cluster-Based E-commerce Application

The purpose of Input Controls is to ensure that the valid transaction data is complete, collected totally and free of errors prior to processing. Control to input to be entered into a computer is done at data collecting and data entry steps. It is designed to ensure that a wide range of SME e-commerce transactions is valid, accurate, and complete. Input control consists of control to source documents, data encoding, data batch, validation, input errors, and common data input system.

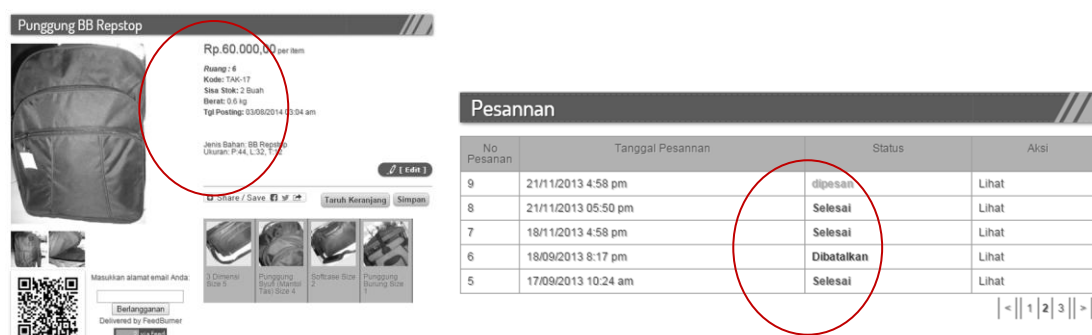


Figure 3. Example of e-Commerce Coding Control (left) and Order Control (Right)

Processing Controls in SME e-commerce aims to prevent errors that occur during e-commerce data processing, and is conducted after data is entered into the computer. Processing errors can occur because of any errors in e-

commerce application program used to process data. To detect these errors, then, at this stage, several controls can be done in the form of checking on data processing. The processing control to SME e-commerce system consists of run to run control, operator intervention control, and audit trail control.

Output Control is the product of data processing that can be presented in two main forms, namely in hard copy and soft copy. The most common form of hard copy is report printed using the printing device (printer) and the most common form of soft copy is on-screen display.

File or database controls are control measures against the intervention of SME e-commerce file and database applications. File or database is the data source, it is because the file and database are place used to store all data to be inputted and processed in e-commerce application systems. Database access control shall be conducted strictly so as not all users can access it. E-commerce database integration shall be maintained, and the database ownership and access rights shall also be clear. Therefore, it is required to appoint a person as the data owner who is responsible for establishing the rules of access and integrity, such as who may access the data and what functions they can perform (security). In this case, SME e-commerce database become the responsibility of administrator.

Table	Action	Records	Type	Collation	Size	Overhead
admin		1	MyISAM	latin1_swedish_ci	2.0 KiB	-
captcha		1	MyISAM	latin1_swedish_ci	3.4 KiB	392 B
cara_belanja		1	MyISAM	latin1_swedish_ci	3.3 KiB	-
partners_links		1	MyISAM	latin1_swedish_ci	2.1 KiB	-
setting		1	MyISAM	latin1_swedish_ci	2.4 KiB	-
simpan_produk		1	MyISAM	latin1_swedish_ci	2.2 KiB	-
tabel_alamat		18	MyISAM	latin1_swedish_ci	3.5 KiB	-
tabel_bukutamu		6	MyISAM	latin1_swedish_ci	2.3 KiB	-
tabel_cart		3,850	MyISAM	latin1_swedish_ci	632.1 KiB	148 B
tabel_kategori		8	MyISAM	latin1_swedish_ci	2.2 KiB	-
tabel_orders		17	MyISAM	latin1_swedish_ci	3.8 KiB	-
tabel_produk		49	MyISAM	latin1_swedish_ci	21.0 KiB	-
tabel_slide		4	MyISAM	latin1_swedish_ci	2.1 KiB	-
tabel_users		12	MyISAM	latin1_swedish_ci	3.2 KiB	88 B
ttgkami		1	MyISAM	latin1_swedish_ci	2.2 KiB	-
15 table(s)	Sum	3,971	MyISAM	latin1_swedish_ci	687.7 KiB	628 B

Figure 4. Implementation of E-commerce Database Control

5.3. E-commerce Access Control

It is done to the access for login to SME e-commerce applications and login to computer physical devices. Access controls are in the form of entry access through login authentication system. Whereas, physical access control is in the form of physical interference to computer or computer room. In SME e-commerce, login access log must be made by all users from customers, operators, to administrators. Customers make login access in order to make registration transaction as a customer who is ready to make order and purchase of SME products. Operator does login access to perform the goods selling transaction, i.e to ascertain whether a customer will buy goods or not, to count purchase recap, and the number of orders. While the administrator login is used for administrator who will manage and has full responsibility and authority to SME e-commerce systems.

Login access facility shown in Figure 5 below is the application of access security to database and customer applications as well as administrators. In addition, there is another security login access i.e in accessing CPanel. CPanel is an access control to determine whether e-commerce statistic function has been able to implement good SEO or not. Here is the user interface (UI) of access login.



Figure 5. Access Login Control

5.4. Administrative Control

Administrative controls in SME e-commerce is intended to ensure that all control frameworks can be implemented fully in the organization based on the clear procedures. To ensure that the the purpose of management control in the implementation of e-commerce in SMEs can be achieved, primarily in organization administrative control, then, according to COSO recommendations, five elements of policies and procedures can be implemented in e-commerce, they are:

1. Control environment. It is infrastructure existing in an organization or SME e-commerce business to run good internal control structure. Some components that affect the organization's internal control environment of cluster-based SME e-commerce is BDS and cluster's management commitment, organizational structure and clear duties, audit committee, HR policies, and organization external considerations.
2. Understanding on the risks. BDS and SME cluster managements must be able to identify the various risks faced by organization. By understanding the risks, management can take preventive measures, so that the organization can avoid big losses. There are three groups of risk being faced, i.e strategic risks, financial risks, and informational risk.
3. Control activities. Supervisory control is a range of processes and efforts made by organization management in order to do supervision or control to the organization's operations.
4. Information and Communication. The planner of information system organization and top management must understand how transaction begins, how data is recorded, how file is read, how information is performed, and how transactions can be successful.
5. Monitoring. It is used to follow the course of e-commerce management information system, thus, if something does not go as expected, immediate action can be taken. Various forms of monitoring in the company can be implemented so that one or all of supervision processes can be effective and accountable, and therefore, internal audit of BDS organization can be performed.

VI. SME E-COMMRECE MAINTENANCE STRATEGY

The main challenge in the maintenance of cluster-based SME e-commerce is the personnel maintaining this cluster-based e-commerce itself. This is because there are several SME clusters but they are still under one organizational management. It is more complex than individually-based e-commerce. However, in its development, a cluster-based e-commerce system has simplified for ease of maintenance. Consequently, energy and costs spent for maintenance can be lower or can be accordingly reduced. This simplification is made by considering that business being developed in cluster-based e-commerce is SME, in which, in addition to marketing factor, capital or financial factors are the main obstacles. The mechanism of cluster-based SME e-

commerce maintenance is performed with a comprehensive maintenance models characterized as being preventive, detective, and corrective in nature.

- a. Preventive maintenance to cluster-based SME e-commerce is performed by making routine data backups, periodic changes to user authentication, avoiding the use of hardware and software freely, routine inspection, preventing other parties access and bringing awareness to personal user.
- b. Detective maintenance to clusters-based SME e-commerce can be done in conjunction with perfective maintenance. Measures that can be taken are antivirus scanning periodically, developing features and SEO according to the needs of e-commerce.
- c. Corrective maintenance to cluster-based SME e-commerce is performed by making sure that the backup result is clean and clear, recovering error operating system, giving warning to personal violating the rules, immediately changing the login if it is suspected to be unsafe, and replacing device that is not functioning normally.

Below is a table of maintenance schedule that should be performed by Administrator and Operator of cluster-based SME e-commerce.

Table 1. Maintenance schedule for e-Commerce Administrator

Type of Maintenance	Maintenance schedule for Administrator				
	Daily	Weekly	Monthly	Semi-annually	Anually
Application Content	Monitor User Login, link building	Recap user login, monitor user transaction	Update File Master (as Necessary) , CMS & SEO	Evaluate e-commerce application, CMS and SEO	Evaluate e-commerce application wholly, domain
S/W OS	Monitoring	Scan Antivirus	Backup All Users' Transactions	Scandisk & Backup All Users' Transactions	Monev Network OS, Scandisk & Backup All Users' Transactions
Hardware	Monitoring	H/W Cleaner	Check H/W Admin Client (user)		
Network	Monitoring	Check Server and Client (user)	Check Modem (Internet Top Up)		

Table 2. Maintenance schedule for e-commerce Operator (User)

Type of Maintenance	Maintenance Schedule for Operator (User)				
	Daily	Weekly	Monthly	Semi-annually	Anually

Apprlication Content	Monitor any Transaction s (Customer Registratio n, Goods Order and / Purchasing), link building	Update Contents (Add/Delet e/Change Goods Profiles)	Recapitulatio n : a. Transaction (Order, Purchase, Cancellation, Return) b. Update goods &/ Stock update	Recapitulati on: a. Transaction (Order, Purchase, Cancellation, Return) b. Update goods &/ Stock update	Recapitulation : a. Transaction (Order, Purchase, Cancellation, Return) b. Update goods &/ Stock update
S/W OS	Shut Up/Down	Scan Antivirus H/W Cleaner	Transaction Backup	ScanDisk	
Hardware					
Network			Check Modem (Internet Top Up)		

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VIII. CONCLUSION

In order to increase the capacity of cluster-based SME e-commerce, in addition to the implementation of SEO, it is also required to develop control and maintenance strategies. The implementation of SEO in cluster-based SMEs is conducted through both direct-link and indirect link to principal web and endorser web. The establishment of a cluster-based SME organization implementing e-commerce requires a different structure when compared with conventional structures. Control strategy that can be conducted, in addition to e-commerce general control, also include application and access control. And e-commerce administration can be performed on SME cluster. Whereas, maintenance strategy is preventively and correctively carried out, assigning maintenance schedule that needs to be performed by e-commerce administrators and operators.

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