



The Influence of COSO Control Environment Elements on the Effectiveness of E-Commerce Information Systems

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ABSTRACT

Companies that run E-Commerce Information Systems (online companies) must be managed with a good management process, supported by adequate Information System quality. Various risks that may occur (IT Risk) must be overcome in the short term with the Hard Approach approach. However, in the long term, the Internal Control System (ISC) COSO Framework model must be used because it is more systematic, continuous and comprehensive, especially the use of Control Environment Elements. Control Environment is also effective in supporting the Control System with the Hard Approach approach, if the company environment is also quite mature in terms of Technology (IT Maturity). However, the results of this study indicate that the IT management of E-Commerce companies is not yet familiar with the COSO Framework framework

INTRODUCTION

Nowadays, information technology and the business world are like two sides of a coin that cannot be separated. The increasingly complex, multidimensional and global business climate means that only companies that are able to continuously innovate, including control over their various business activities, can achieve competitive advantage. One of these efforts is to integrate information technology into the e-Commerce business process, namely the use and application of Internet technology to carry out various online product/service buying and selling transactions, conducting marketing activities via the Internet (cybermarketing) with global consumer reach, which is no longer limited by the constraints of distance and time dimensions, as traditional companies (James O'Brien, 2003:214). In the E-Commerce system, COSO Internal Control is rarely carried out systematically. High operational risks cause Company management to be more comfortable using the Hard Approach approach in every IT Risk faced from E-Commerce activities, which are very open (high risk) because they use websites. The potential for digital crime (Computer Crime) disruption to E-Commerce sites is always considered to be sufficiently overcome by installing special IT Security hardware or applications.

Problems such as Cyber Security (IT Security) against attacks from hackers and crackers, guarantees of the authenticity of consumer credit card data that make online payment transactions, are things that are the main weaknesses of E-Commerce Information Systems everywhere, including in Indonesia. The problems that previously seemed simple as in the traditional/conventional company environment, are now complex problems for companies that carry out E-Commerce activities. In other words, various problems related to Confidentiality, Integrity, Authenticity, and Non-Repudiation are always problems that often cause Information Technology Managers, Web Masters, Web Programmers, Web Administrators and also Information Technology/Information System Auditors to solve them quickly with the Hard Approach.

Although almost all companies that carry out E-Commerce activities use certain sophisticated security technologies/applications (IT Security) to secure their respective websites from various increasingly sophisticated IT Risks. However, in line with the development of Internet Technology itself, new ways and spaces (security holes) are always found that can be exploited by outsiders or IT people from within the company environment itself (Insiders). Many management parties of an E-Commerce company do not realize the importance of then creating an Internal Control System (SPI) with another approach (to complement), namely the Soft Approach (a system approach based on People oriented).

The Internal Control System (SPI) for the company's activity environment based on Electronic Data Processing (EDP) such as E-Commerce requires an integration of two approaches, namely the Hard Approach and Soft Approach (SPI COSO). Starting from securing company assets in terms of digital aspects, such as control over software/hardware reliability, to covering aspects of the physical security of the hardware storage location, data backup location, building conditions, restrictions on access procedures to the computer room. SPI must also

be designed in such a way that it can also cover non-technological aspects, such as awareness of company stakeholders towards various forms of threats and sensitivity to risk (IT Risk) from the E-Commerce business model. Such comprehensive control requires a comprehensive understanding of COSO SPI.

This study will measure and analyze how COSO Control Environment Elements can improve the effectiveness of E-Commerce Information Systems.

LITERATURE REVIEW

Every website that runs an E-Commerce business has implemented various IT security methods/aspects (IT Security Engineering). However, this Hard Approach often has its own weaknesses (Security holes) that are difficult to control continuously because they are in the form of Tools (Technology). Therefore, this study tries to complement IT Security with the COSO Internal Control System, especially the Control Environment element which focuses more on management aspects, IT Culture and People Oriented. To what extent can this element strengthen (add value) the Effectiveness of the E-Commerce Information System in improving the quality of Information and also the quality of control over various IT Risks in the E-Commerce Information System.

Abel Manas et al.'s research (2025) shows that "a strong internal control environment, alongside an effective internal audit function, significantly contributes to improved financial performance in the insurance sector." Then, what about the E-Commerce sector?

METHODOLOGY

The objects of this study are the Control Environment and the Quality of the E-Commerce Information System. The companies selected as samples are Brick-and-mortar companies, namely companies that carry out their operational activities conventionally, but also carry out their business activities online. Because traditional companies generally have to run SPI COSO on "land" and IT Security Concept in "cyberspace" Because this research has never been done before, this type of research is Exploration using Survey Techniques (Explanatory Survey). A technique that explains the relationship between variables from the population that will be generalized (inference) based on sample data based on certain criteria.

This research model will measure two variables, namely the causal/independent variable (exogenous variable), in this case, Control Environment as Variable X. And Variable Y (effect/dependent/endogenous variable), namely the Quality of E-Commerce Information Systems. .

The following are indicators of the two research variables:

Table 1. Indicators of Variables X and Y

Variabeles	Indicator
<i>The Control Environment (X1) is sets the tone of an organization by influencing the control consciousness of people. It may be viewed as the foundation for the other components of internal control (Whittington and Pany, 2003:232)</i>	- Integrity and Ethical Values - Commitment to Competence - Management Philosophy and Style
1. Variabel Dependen (Y), yaitu as Sistem Informasi E-Commerce yang dikur berdasarkan indicator sebagai berikut:	a) <i>Ease of Use</i>, namely the ease of using the Website, by consumers or visitors - b). Information Quality (Information Quality) produced by the E-commerce Information System that is accurate and reliable

RESULTS AND DISCUSSION

Sample

The research sample was taken using the Nonprobability Sample approach, namely the sample is selected in such a way from the population with certain requirements, where each member does not have the same probability or opportunity to be sampled. The selection of sample members is based on the largest minimum sample size with the following considerations:

- a. The number of companies running E-Commerce activities in both cities, namely Bandung and Jakarta.
- b. The standard deviation of the population of 541 E-Commerce companies in Indonesia is unknown
- c. Sample allocation is carried out using a simple method, namely a minimum sample of 10% of the total population carried out through the Judgment Sampling technique, namely drawing samples based on an assessment of the characteristics of sample members that are adjusted to the research objectives (Suharyadi et al., 2004: 332)

Based on the sampling method, the number of samples in this study was 54 companies, of which after being processed only 51 companies met the requirements for further processing.

Data Analysis Technique

After the data was collected, it was then analyzed using the Regression Technique. Based on the hypothesis and constructs of the research variables as previously stated, the hypothesis testing is carried out by first calculating the path coefficient. This coefficient is the ratio of the standard deviation for each independent variable X to the total standard deviation. For simplicity, this study uses the Recursive Structural Model, which does not involve the direction of reciprocal influence.

Response to Control Environment Variable (X1)

The Control Environment variable is a variable that is the basis for all other internal control variables in the COSO model. The Control Environment measures the extent to which an organization's environment is conducive, thus supporting the prevention and supervision of various business risks (Business Risks) and risks from the technology used (IT Risks). Top Management is a party that is very competent in creating various policies and procedures to form a conducive control environment. There are three indicators in this study to measure the effectiveness of the implementation of the Control Environment, namely Integrity and Ethics, Competence Commitment, and Management Philosophy and Style.

Table 2. Response to Integrity and Ethics Indicators

No Ite m	q	SS		S		R		TS		ST S		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Do you agree that personnel working in the IT department must take a psychological test first to measure integrity before being accepted to work?	22	42%	16	31%	8	15%	6	12%	0	0%	51	100%
2	Do you agree that E-Commerce companies must have Professional Ethical Standards as a work guide and must have a Code of Conduct?	26	50%	18	35%	1	2%	0	0%	0	0%	51	100%

(Source: Research data, processed)

Description:

SS = Very Often/Strongly Agree/Very Appropriate

S = Often/Appropriate/Agree

R = Undecided/Rarely/Neutral

TS = Never/Disagree/Disagree

STS = Very Disagree/Strongly Disagree

Table-1 above shows that, from the two question items that measure the Integrity and Ethics indicators, most respondents, namely 42% stated Strongly Agree and 31% Agree (a total of 73%), so that employees who will be employed in the Information Technology department really have good integrity. Generally, companies measure it through an aptitude test, considering that companies that run E-Commerce activities are companies that are very dependent on the reliability of the performance of these Information Technology workers. The dominant role of IT workers in companies that run E-Commerce activities is such that almost all respondents, namely 85% Strongly Agree and Agree, require the existence of Professional Work Standards and a Code of Conduct that regulates the professional code of ethics and behavior of IT workers in the company.

Table 3. Responses to the Competency Commitment Indicator

No Item	Questionnaire Questions	SS		S		R		TS		ST		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
3	In your opinion, does the company mgt continuously evaluate the effectiveness of the performance of the Information Technology department?	1	25	2	50	1	25	2	50	0	0	5	100
4	Do you agree that the current decentralization policy of Computer Network implementation makes it difficult to find reliable network administrators?	4	80	1	20	2	40	1	20	2	40	9	180
5	Shouldn't a company's management create a website protection policy that relies solely on firewalls?	1	20	2	40	2	40	7	140	6	120	0	0
6	IT workers need to keep up with developments by attending training, workshops and providing the resources needed to make them work effectively?	3	60	1	20	3	60	2	40	2	40	0	0

(Source: Processed research data results))

As many as 54% Agree and 29% Strongly Agree that the performance of Information Technology personnel must always be evaluated periodically based on the rapid development of Information Technology, which at any time can cause a gap between the effectiveness that must be achieved and the competence of IT workers at that time. The respondents' responses indicate that the management of E-Commerce companies in the cities of Bandung and Jakarta are generally quite effective in anticipating technological changes that can affect the competence and performance of IT personnel.

The development of increasingly sophisticated and user-friendly computer and Information Technology applications today has caused the area of IT application to be increasingly broad, covering almost all parts of the organization/company. This condition often causes a lag in the competence of IT personnel and an overload of the Information Technology service function. This is the basis for the tendency of IT management in various companies to implement a Decentralization policy for handling and servicing Information Technology, which results in the increasing need for reliable managers of company computer sub-networks (Networking Administrators). In terms of E-Commerce website security, 42% of respondents stated Agree and 35% Strongly Agree that E-Commerce website security is not enough to depend entirely on technological aspects (Hard Approach), such as installing Firewalls hardware and software alone to prevent the entry (intruders) of external parties (outsiders)

into the company's network system. This shows that, in general, E-Commerce company management realizes that Firewalls applications are only a tool that is a security for the first level of overall security of an E-Commerce Information System. In addition to Firewalls applications, E-Commerce companies must also protect their websites through non-technological aspects (Soft Approach), such as creating various procedures and policies related to effective and adequate internal control. This shows that IT management in companies that carry out E-Commerce activities in the cities of Bandung and Jakarta are strongly committed to implementing internal Information Technology management quite well, and there is a tendency to increasingly realize the complexity of the dimensions of disruption to E-Commerce Information Systems today.

The effectiveness of E-Commerce information system security is also determined by the extent to which workers in the Information Technology field are able to follow the development of Information Technology which continues to change and develop so rapidly. Most respondents, namely 63% Strongly Agree and 33% Agree, that workers in the IT field should be given the opportunity to follow these developments through various training and workshops, especially those related to the security factor of the company's E-Commerce Information System.

Table 4. Responses to Indicators of Philosophy and Management Style

No Item	Questionnaire Questions	SS		S		R		TS		ST S		Tot al	
		f	%	f	%	f	%	f	%	f	%	f	%
10	In your opinion, is the IT management always open to suggestions and criticisms regarding the effectiveness of the implementation of the Information Technology being operated?	1	25%	2	50%	1	25%	1	25%	2	50%	5	100%
11	Generally, E-Commerce company leaders set a policy that consumer data (Privacy Statement) is not used by other parties for Internet Marketing?	1	25%	2	50%	1	25%	1	25%	2	50%	5	100%
12	Generally, E-Commerce companies have a Security Policy that can motivate employees to care about Computer Fraud problems that may occur, and is this policy always evaluated so that it is not rigid?	1	25%	2	50%	1	25%	1	25%	2	50%	5	100%

(Source: Processed research data results)

The philosophy and management style of an organization/company's leadership in other business sectors greatly influences the effectiveness of the E-Commerce Information System, although indirectly. As many as 37% of respondents Agree and 29% Strongly Agree that the leadership of the E-Commerce company should be open to suggestions and criticisms from subordinates as far as it concerns improving the performance of the implementation of the Company's Information Technology and IT Security. This is based on the awareness that the development of IT is so fast and complex, so that input is needed from various parties (including subordinates). In other words, the expected management style of the company's Information Technology leadership tends to be more informal and open.

A transparent management style is also expressed in interacting with E-Commerce consumers. One thing that consumers do not like when transacting on an E-Commerce website is if the consumer's E-mail address is used for other purposes such as promotions (Internet Marketing) that force promotion of something that is not always needed. Therefore, the company must firmly state that the consumer's data will not be used by third parties, even if only for promotions (E-mail Spamming), where a statement like this is called a Privacy Statement. As many as 38% of respondents Agree and 29% Strongly Agree, that E-Commerce companies have implemented the policy and stated it clearly on their Website. This shows that the sensitivity of IT management to online consumer behavior on the Internet is relatively good

Response to Information Quality Indicators (Variable Y)

The E-Commerce Information System must be able to present quality information with the help of a website that is suitable for handling E-Commerce activities. Equipped with a properly designed database, good validation process, application programs to process data. Information produced by the E-Commerce information system must meet the requirements as good information quality, such as meeting the following criteria: Information must be Accurate, Information must be Complete, Information must be Relevant and Actual, Information must be Verifiable and Information must be Easy to Understand by consumers. If the Internal Control implemented by the company runs well, the E-Commerce Information System will produce quality information as indicated in the indicators above.

The following are the Respondents' responses related to the measurement indicators of variable Y which consist of Information Quality Indicators and Website Quality. An effective information system means an Information System that is able to produce quality information. In the context of E-Commerce, it also means an information system supported by a website that meets the criteria of a good website (good website quality).

Table 5. Response to Accurate Information Presentation Indicators

No Item	Questionnaire Questions	SS		S		R		TS		ST S		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Is the information presented by the E-Commerce Information System accurate?	9	100%	0	0%	0	0%	0	0%	0	0%	9	100%

(Source: Processed research data results)

Based on table-5 above, it can be seen that 37% of respondents stated Agree, that the company's E-Commerce Information System should present accurate information. Even 17% stated Strongly Agree, which means a total of 54% of the company's E-Commerce Information System has presented accurate information. As many as 29% of respondents stated they were hesitant, which means that there are still quite a lot of companies that run E-Commerce activities whose website information is inaccurate.

Table 6. Responses to Complete Information Presentation

No Item	Questionnaire Questions	SS		S		R		TS		ST S		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
2	Is information about the company including address, etc., presented completely and clearly on the website?	2	40%	2	40%	0	0%	0	0%	0	0%	4	80%
3	Is the information about after sales service for certain goods/services presented completely?	1	20%	1	20%	1	20%	0	0%	0	0%	2	40%
4	Is the information regarding the ordering procedure and delivery of the goods sold presented completely?	1	20%	1	20%	1	20%	0	0%	0	0%	2	40%

(Source: Processed research data results)

The quality indicator of an information system can be measured from the presentation of complete information in accordance with the objectives. Completeness of information in the E-Commerce Information System includes the presentation of brief information about the company such as address, telephone number and e-mail, to show that this E-Commerce website really

belongs to the company (legitimate) and is open to verification. Information like this in relation to E-Commerce activities is an indicator of whether the website is serious about handling E-Commerce activities so that the public can trust it. Respondents' responses showed that 46% stated Agree, that generally E-Commerce websites in the cities of Bandung and Jakarta have clearly displayed the company's identity to the public so that verification can be carried out.

Another criterion is, information about the goods sold must be complete, including clear images of each product/service sold, including price, discount (if any), type or size and various other information that can help consumers make the right decision in choosing the product/service. In the E-Commerce Information System, these goods cannot be tried or seen directly, so the after-sales service aspect needs to be shown completely. As many as 38% of respondents stated Agree and even 38% stated Strongly Agree, that the company's E-Commerce Information System website should meet the criteria such as After Sales Service policy statements and other forms of service (support), including software products that need installation and further tutorials on how to use them.

Table 7. Responses to Relevant Information Presentation Indicators

No Item	Questionnaire Questions	SS		S		R		TS		STS		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
5	Is the information provided always updated?	1	33	2	40	1	17	3	6	2	4	5	10
		7	%	1	%	9	%	3	%	2	%	1	0%

(Source: Processed research data results)

The quality of an E-Commerce information system is also determined by whether the information presented on the website is always updated so that it is relevant and actual with the changes that occur (not static). As many as 40% of respondents stated Agree and 33% Strongly Agree that the company's E-Commerce Information System should always update its information according to changes and developments. However, as many as 24% stated that there are still many E-Commerce Information Systems that present outdated information.

Table 8. Response to Indicator Easy to Understand Information

No	Questionnaire Questions	SS		S		R		TS		ST S		Tot al	
Item		f	%	f	%	f	%	f	%	f	%	f	%
7	Is the information presented on the E-Commerce website clear enough to be understood by various levels of consumers?												
			3		4		1						1
		1	3	2	4		7		2		4	5	0
		7	%	3	%	9	%	1	%	2	%	1	%

(Source: Processed research data results)

The following criteria that must be possessed by a good E-Commerce Information System is being able to present information in a form that is easy to understand by consumers at various levels. Information will be easy to understand if it is equipped with graphs, diagrams, images/photos, tabular form, detailed and concise reports and so on. As many as 44% of respondents said that the company's E-Commerce Information System has presented its information with criteria that are quite easy to understand, even as many as 33% said that the information presented is Very Easy to Understand. This means that as much as 78% of the information presented is easy to understand by the minimum Computer Literacy Level of visitors to the E-Commerce website.

Response to the Quality of the E-Commerce Website (Variable Y)

In the E-Commerce Information System because all information is presented on a website that is specifically designed for this purpose, the Effectiveness of the E-Commerce Information System is also determined by the extent to which the quality of the website is used and managed. Quality website design together with the quality of the information produced will determine the overall quality of an E-Commerce Information System. Good website quality is determined by what elements are needed and displayed on the website, including how to use the elements and the relationship between the elements called Website Navigation. E-Commerce Website Quality is measured based on the following factors: Website Attractiveness, Website Navigation, and Operational Performance.

Table 9. Respondents' Responses to E-Commerce Website Display Indicators

No Item	Questionnaire Questions	SS		S		R		TS		STS		Total	
		f	%	f	%	f	%	F	%	f	%	f	%
8	Is the E-Commerce website designed with an attractive, attractive and innovative design?	1	35	2	52	6	3	6	3	2	1	5	10
		8	%	7	%	3	%	3	%	1	%	1	%

(Source: Processed research data results)

The most important factor that causes a website on the Internet to be visited by many visitors when surfing, namely moving quickly from one site to another is if the website is designed as attractively as possible, especially the first page of the Homepage which must be made with an eye-catching concept. In addition to being attractive, a website must also be designed using a unique and innovative form. This also applies to the website of an E-Commerce Information System.

As many as 52% agree that their company's E-Commerce website and also several other E-Commerce websites that they have visited have generally been designed quite attractively and professionally. Even as many as 35% of respondents stated that the company's E-Commerce website was designed Very Attractively. Only 10% stated that the quality of the company's E-Commerce site was not determined by just the appearance.

Table 9. Respondents' Responses to Website Navigation Indicators

No Item	Questionnaire Questions	SS		S		R		TS		STS		Total	
		f	%	f	%	f	%	f	%	f	%	f	%
9	Easy website page accessible to visitors?	1	31	2	50	17	9	2	1	0	0	5	100
		6	%	6	%	9	%	1	%	0	%	1	%

(Source: Processed research data results)

A website on the Internet consists of two or more document pages (Web Document) containing various information presented to visitors (the public). On some more complex websites, the number of these pages can consist of tens to hundreds of pages, plus links through each page of the website, which allow visitors to access information pages to other relevant websites. The complexity of the arrangement and hierarchy of pages that are usually used to carry out E-Commerce activities means that the process of going to one section or from one page to another becomes an important indicator of the quality level of an E-Commerce Information System website, which is called Navigation.

As many as 50% of respondents said they Agree, that the company's E-Commerce website should be designed in such a way based on a good navigation concept that makes it easy for visitors to move and enter various sections and

pages of the website document. Even as many as 31% of respondents stated Strongly Agree, which means that the navigation design concept in most E-Commerce Companies today is very systematic and makes it easy for visitors to search for information. .

The Influence Coefficient of Variable X1 on Variable Y

The hypothesis of the relationship between variable X (Control Environment) is as follows: "There is a significant positive influence between the Control Environment variable (X) on the Effectiveness of E-Commerce Information Systems (Y)". From the results of data processing, the Path Diagram Standardized Solution coefficient shows an influence of 0.05. While the t-value is 0.38, which means that this influence is quite large but not significant. By taking a significance level of α of 5%, then for the sample data of 50 companies, a t-table value of 1.67 is obtained for one-sided testing (because theoretically variable X must have a positive effect). Because the value of 0.38 is smaller than the t-table of 1.67, the Null Hypothesis (H0) is then Accepted and H1 is rejected. In other words, "The Internal Control Element called Control Environment is important, but does not have a strong enough (significant) influence on the effectiveness or improvement of the quality of E-Commerce Information Systems. Many other factors are not measured by the research model" This means that Respondents' Perception still considers the Hard Approach to be more suitable (and has a high value) in securing IT Risk from E-Commerce Information Systems. The COSO System Approach which they are not familiar with is considered good as a supporting factor. This means that the Control approach based on systems, culture and People is still not commonly used by 50 E-Commerce companies from the cities of Bandung and Jakarta.

Research Finding

Respondents from 50 companies running E-Commerce Information Systems in Bandung and Jakarta (as the center of IT development in Indonesia) When asked to assess the company (Current State) and other companies that are understood, showed that the majority agreed that there was another approach (Soft Approach) to improve the effectiveness of their E-Commerce Information Systems, especially in terms of controlling various IT Risks in an increasingly complex E-Commerce environment. However, in reality, the Control Environment (Soft Approach) approach that focuses on aspects of IT Culture, Company Environment (IT Environment) and People Oriented is not widely known by IT staff and Managers. So they doubt it has a significant effect.

This is a different perception in financial reporting where "Internal control based on the COSO framework in the aspects of control environment and monitoring positively affected financial reporting reliability" (Khwanchat Wongjantip et al, 2025). In fact, both of them manage Information.

Research by M. Difa Riz et al (2024) is also in line with the research conducted by the author that the Control Environment strengthens or weakens the Control System (Hard Approach), if the Information Technology Governance in the E-commerce Company has a low or high Maturity Level (IT Maturity). Integrity, Ethics, Competence, Culture, Management Style (human resources) always have a significant positive effect on the E-Commerce Information System

in the Company's Environment (Control Environment) whose environment is already Mini atang.

Richard Semanda Junior's research (2024) also concluded that "The control environment has a significant effect on performance. This means that any efforts put in the Control Environment in the form of, upholding ethical values, maintaining an approved code of ethical conduct, staff training, reprimanding unethical behaviors creating free na dopen channels of communication plus monitoring ".

CONCLUSION AND RECOMMENDATION

Based on the results of this study and the discussion as previously described above, it can be concluded that Internal Control for companies that run E-Commerce Information System activities is the most important factor in maintaining the sustainability of operations, because the website can be accessed by anyone from all over the world (very open and High Risk). One effort to reduce the vulnerability of this E-Commerce business activity is to increase the effectiveness of the company's E-Commerce Information System by implementing the Soft Approach concept to complement (substitute) the Hard Approach that has been applied so far.

Based on the conclusions above, the author submits suggestions to the management of companies that run E-Commerce activities in Indonesia, especially those located (brick) in the cities of Bandung and Jakarta, to complement the old paradigm, which only focuses on controlling operational activities (Hard Approach) in the form of IT Hardware and Software. Not yet in accordance with the Soft Approach concept which includes the System Approach and Risk Management Process.

FUTHER STUDY

This research still has delays, so it is necessary to conduct further research related to the topic The Influence of COSO Control Environment Elements on the Effectiveness of E-Commerce Information Systems in order to improve this research and add insight for readers.

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