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CamEd Business School

Building 64, Street 108, Wat Phnom, Daun Penh, Phnom Penh, Cambodia

Inquiries: editorial@jafess.com



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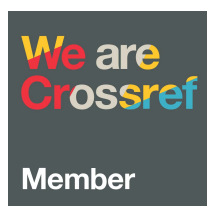
Editor-in-Chief

Prof. Tapas R. Dash
CamEd Business School
Phnom Penh, Cambodia

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Is CSX Index a Random Walk?

Siphath Lim and Casey Barnett*

ABSTRACT

The growth or decline in stock value depends on information. The Efficiency Market Hypothesis (EMH) consists of three different forms: strong-form, semi-strong-form, and weak-form states that stock price reflects its true value properly, and thus includes all information, public and private. If market inefficiency is discovered, an abnormal return may be created via risk-adjusted technical analysis. The Random Walk Hypothesis (RWH) argued that the price of stock tomorrow is computed based on the price of stock today, and the price of stock cannot be anticipated when a random number is consistent with weak-form efficiency. The empirical findings from this research have shown that the CSX index is not a random walk or weak-form inefficient, as indicated by the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests, and the Variance Ratio (VR) test.

Keywords: CSX, EMH, RWH, Unit Root test, VR test

INTRODUCTION

Market efficiency means that the values of assets represent all information, public and private. Thus, by employing particular investment skills or techniques, no-one could beat the market or generate risk-adjusted excess return because all relevant information related to asset pricing was already taken into account, while asset prices, in accordance with Efficient Market Hypothesis (EMH), are fairly traded in the markets, Fama (1970). Three different types of market formats exist—strong form, semi strong form and weak form. An asset price, as indicated by the strong form efficiency, includes public and private information in the market. Referring to semi-strong form efficiency, price of an asset is determined only by publicly available information in a market. All previous asset prices subject to current reference are represented in the current asset price based on the availability of historical asset values as claimed by the weak form efficiency of EMH. The notion of the Random Walk Hypothesis (RWH) is closely connected with the term of weak form efficiency. Therefore, it is impossible to utilize technical analysis to anticipate and beat the market. The RWH is a well-known financial theory to examine stock price or stock index behavior. The theory of RWH mentions that changes in stock price are alleged, which means that today's stock price is determined by the sum between yesterday's stock price and a random number, thus,

the movement of stock price is not predictable, Malkiel (1973).

The Cambodia Securities Exchange (CSX), known as Cambodia's stock market, is a joint venture operated between the Royal Government of Cambodia and the Korea Exchange. CSX has been operating its business in Cambodia for more than 10 years, and currently, there are seven listed firms. Two best-known financial theories, Efficient Market Hypothesis and Random Walk Hypothesis, are nevertheless unjustified in Cambodia's stock market. The main aim of this study is to find out a response to a research question: "Is CSX index a random walk?" Similarly, this research is attempting to examine whether or not there is a weak form efficiency of the EMH with the return of the CSX index. In the light of this study, two random walk tests are employed, unit root tests and variance ratio (VR) tests. The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) are two of the most popular unit root tests on offer. The null hypothesis of ADF, PP and VR test stated that the return of CSX index is random walk. These tests are conducted on a continuous daily return of CSX index within the time span between 18 April 2012 and 20 July 2021.

LITERATURE REVIEW

Numerous empirical studies were undertaken to examine the weak-form market efficiency in different financial markets of developed economies. Lee (1992) investigated if the weekly stock returns of ten industrialized countries, which include Austria, Belgium, Canada, France, West Germany, Italy,

* Lim Siphath, PhD, Professor, CamEd Business School
Email: lsiphath@cam-ed.com
Casey Barnett, FCCA, MBA, CFA, Professor, CamEd Business School
Email: president@cam-ed.com

Japan, Netherland, Switzerland, and the United Kingdom followed a random walk process between 1967 and 1988. Using a variance ratio test, the research confirmed the existence of the weak-form efficiency in most selected markets where the random walk hypothesis was not rejected. Another study by Choudhry (1994), investigated the efficient market hypothesis (EMH) and the stochastic trends of stock indices in seven OECD markets between 1953 and 1989. The study employed several tests, such as means of the augmented Dickey-Fuller test (ADF), the KPSS test, the Cochrane variance ratio test (CVR), Lo-MacKinlay test, and the Campbell-Mankiw Decomposition test (CMD), in addition to Johansen's cointegration test. The study indicated that the selected stock markets are efficient during the sample studied period. Al-Loughani and Chappell (1997) found that the Financial Times Stock Exchange (FTSE) 30 share index of the UK stock markets did not follow a random walk during the investigation period between 1983 and 1989. Worthington and Higgs (2004) conducted a test on the weak-form EMH for sixteen developed markets and four emerging economies using the daily returns between 1995 and 2003. The analysis illustrated that most emerging markets were not associated with the random walk hypothesis, while five developed countries met the most stringent random walk criteria.

Several other studies were conducted on the emerging economies, including Karemera et al. (1999). The study adopted the multiple variance-ratio test to analyze the random walk hypothesis for fifteen emerging capital markets in terms of both the US dollar and local currency. The results demonstrated that most emerging markets' equity returns followed a random walk. A similar study by Smith and Ryoo (2003) indicated that the Turkey stock market, the only market among five European emerging economies in the study, followed a random walk under the variance ratio test. Applying autocorrelation analysis, runs test, and variance ratio test, Guidi et al. (2011) found that stock markets of the Central and Eastern Europe did not follow a random walk. Gilmore and McManus (2003) studied three main Central European markets, particularly the Czech Republic, Hungary, and Poland, using an array of tests and the analysis rejected the random walk hypothesis. Other studies on the individual stock market were also identified. The studies on the Russian capital market by Abrosimova et al. (2002) and later by Darushin and Lvova (2015) illustrated the existence of weak-form market efficiency. Borges

(2009) assessed the Lisbon Stock Market between 1993 and 2006 by conducting a serial correlation test, a runs test, an augmented Dickey Fuller test and the multiple variance ratio test. The results suggested that the stock market index followed a random walk model. Panas (1990)'s research presented the weak-form efficient market in the case of Athens stock market, which contradicted the results from Dockery and Kavussanos (1996). Similarly, Zychowicz et al. (1995), Antoniou et al. (1997) and Tas and Atac (2019) rejected the random walk hypothesis for the Istanbul stock market, whereas Buguk and Brorsen (2003) suggested that the Turkey market was weak-form efficient.

In addition, the African stock markets also attract significant interests from the researchers. Smith evaluated 11 African markets in 2008 and the random walk hypothesis was rejected in the selected markets. Smith et al. (2002) used multiple variance ratio tests to investigate eight African equity markets and found that the South African market was the only market that followed a random walk. Similarly, according to Enowbi et al. (2009), weak-form efficiency was evidenced in the South African capital market, while other three stock markets in the study, such as Egypt, Morocco, and Tunisia, did not follow a random walk. The evaluation of weak-form EMH for the Nigerian Stock Exchange (NSE) presented a mixed result.

Olowe (1999) indicated that the NSE was efficient in weak-form using the monthly data between 1981 and 1992. It was later supported by further research from Ajao and Osayuwu (2012), and Ogundina and Omah (2013). However, Gimba (2012), Ogbulu (2016), Falaye et al. (2018), and Ejem et al. (2020) found that the NSE did not follow a random walk model, and thus was not weak-form efficient.

Several empirical studies pointed out the invalidity of the weak-form efficient market hypothesis for the Latin American stock markets (Charles & Darné, 2009; Worthington & Higgs, 2004). However, Ojah and Karemera (1999) identified the presence of random walk-in stock return for the Latin American emerging equity markets, employing multiple variance ratio and auto-regressive tests. According to Urrutia (1995), the variance ratio tests rejected the random walk hypothesis for the equity markets of Argentina, Brazil, Chile, and Mexico, while the runs tests indicated the selected stock markets are weak-form efficient.

Likewise, an impressive number of empirical studies assessed for the weak-form efficient market

hypothesis on the Asian stock markets. Hoque et al. (2006) tested the eight Asian equity markets using alternative variance ratio tests, namely Hong Kong, Indonesia, South Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand. The results showed that stock prices of the eight Asian markets did not follow a random walk with the possible exception of Taiwan and South Korea.

The research by Poshakwale (1996) showed a non-random behavior in Bombay Stock Exchange between 1987 and 1994 and hence, the Indian stock market was not weak-form efficient. Later, Gupta and Basu (2007) and Gupta and Yang (2011) found that the Indian stock markets were weak-form inefficient between 1991 and 2007 and met the criteria of weak-form EMH between 2007 and 2011. However, Nisar and Hanif (2012) investigated four South Asian capital markets, including India, Pakistan, Bangladesh, and Sri Lanka. The result showed no evidence of random walk hypothesis between 1997 and 2011, and as such, the four selected markets were not weak-form efficient.

Caporale et al. (2020) employed Engle and Granger (1987) co-integrated technique to investigate whether the index of five European stocks such as IBEX35, FTSE100, DAX30, FTSE MIB40, and CAC40 in Spain, United Kingdom, Germany, Italy, and France, respectively, consist of weak-form inefficiency or not. The daily time frame of all stock indexes were taken under consideration beginning from January 2011 to January 2019. The empirical result of this research indicated that the five stock market indexes' presence of long memories or market is inefficient under the weak-form efficiency hypothesis of the EMH.

To assess the degree of market efficiency of some nations of the European Union: Bulgaria, Croatia, Czech Republic, Hungary, Romania, Poland, and Slovenia and seven countries in Central and Eastern Europe, Milos et al. (2020) developed a method known as Multifractal Detrended Fluctuation Analysis (MF-DFA) to examine the dynamic resources of multifractality. MF-DFA is carried out in three main stages: calculating stock index return, seasonal and trend decomposition using loess and MF-DFA. The research started at various times, but ended in August 2018. The result of the study indicated that stock markets under investigation were neither efficient, nor the progression of each market reached the mature stage.

Hari and Pratil (2021) performed three types of

random walk tests: autocorrelation, run, and ADF tests on daily return of NEPSE Index in Nepalese Stock Markets. The study concluded that the Nepalese stock market is inefficient in weak form indicating that future price movements can be predicted based on their past price movements.

METHODOLOGY

A deterministic trend with stationary first autoregressive, AR(1), component of time series data, Y_t , is written as follows:

$$Y_t = \beta_1 + \beta_2 t + \beta_3 Y_{t-1} + u_t \quad (1)$$

where β_1 is a drift, t is time trend, β_2 is coefficient of time trend, β_3 is slope parameter of the first lag of Y and u_t is assumed to be white noise $\sim(0, \sigma^2)$. A restriction that impose on any of the three parameters: β_1 , β_2 and β_3 , in Equation (1) would create many types of random walk models in Table I below,

Table I. Random Walk Models

Models	Equations	Restrictions
Pure random walk	$Y_t = Y_{t-1} + u_t$	$\beta_1 = 0, \beta_2 = 0, \beta_3 = 1$
Random walk with drift	$Y_t = \beta_1 + Y_{t-1} + u_t$	$\beta_1 \neq 0, \beta_2 = 0, \beta_3 = 1$
Deterministic trend	$Y_t = \beta_1 + \beta_2 t + u_t$	$\beta_1 \neq 0, \beta_2 \neq 0, \beta_3 = 0$
Random walk with drift and deterministic trend	$Y_t = \beta_1 + \beta_2 t + Y_{t-1} + u_t$	$\beta_1 \neq 0, \beta_2 \neq 0, \beta_3 = 1$

Three most famous unit root tests were conducted to evaluate if time series data represent a random walk process: Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) tests. The theory of econometrics relating to the unit root tests are discussed below.

Augmented Dickey-Fuller (ADF) test

In 1979, Dickey and Fuller conducted many unit root tests to determine if the selected time series data under study had a unit root or non-stationary device or no unit root or stationary unit. A stationary data shows a mean reverting process. An assessment of the first order autoregressive (AR) model of the form is a fundamental estimate for the Dickey-Fuller (DF) test:

$$y_t = \beta_1 + \beta_2 t + \beta_3 y_{t-1} + \varepsilon_t \quad (2)$$

Where y is time series variable, β_i are parameters or coefficients, $i=1,2,3$, t is time trend, ε is residual or error term which is assumed to be i.i.d. In a different way, equation (2) may be written as:

$$\Delta y_t = \beta_1 + \beta_2 t + \beta_3^* y_{t-1} + \varepsilon_t \quad (3)$$

where $\beta_3^* = \beta_3 - 1$. In the DF test, the DF had presumed that the remaining conditions were not linked in serial form. In the event of a serial relationship between the error components anticipated in equation (3) in violation of the DF test assumption, the estimated test result is inconsistent. It is worth noting that the Dickey-Fuller test hypothesis is $\beta_3 = 1$ and the alternative $|\beta_3| < 1$. If you cannot reject the null hypothesis, the y_t has a root unit or a non-stationary one. By contrast, if a zero hypothesis is rejected, the y_t has either stationary or no unit root (Dickey & Fuller, 1979). Dickey and Fuller created a different test known as the Augmented Dickey-Fuller (ADF) test to overcome the serial correlation problem of the error term. The ADF test will be conducted in a regression form. The null hypothesis is that the series has a unit root versus the alternative hypothesis is that the series has no unit root or stationary. This test is performed in the following form of a regression.

$$\Delta y_t = \beta_1 + \beta_2 t + \delta y_{t-1} + \sum_{j=1}^p \beta_j \Delta y_{t-j} + \epsilon_t \quad (4)$$

Where y is time series data, Δ is first difference operator, β_1, β_2, δ and β_j are parameters or coefficients, t is time trend, ϵ is error term or residual term, i.i.d. The optimal lag length determination of the regression model (4) is the most important task in completing the ADF test since it does not result in a small lag length or a residual noise error, and it also fails to estimate the standard error in any of the respected parameters. The optimal lag length is established by utilizing information criteria such as the Akaike Information Criterion (AIC) or the Schwarz Information Criterion (SIC). The following hypotheses are provided of the ADF test, null and alternative:

$$H_0: \delta = 0$$

$$H_1: \delta < 0$$

The null hypothesis of $\delta = 0$ can't be dismissed when the critical value of t-tests retrieved from the DF table is lower than t-statistics, implying that a unit root or non-stationary for the time series under study is present. If t-statistic is higher than the critical t-test that can be comprehended that the time series is stationary or has no unit root, the null hypothesis is rejected or the alternative $\delta < 0$ hypothesis is accepted (Dickey & Fuller, 1979).

Phillips-Perron (PP) test

In order to resolve the serial correlation problem of the residual or error term, the lags of the first different terms of the regressors were introduced

to the regression models (2), which led to the incoherence of the estimated result as carried out by Dickey and Fuller. In 1988, Phillips and Peron created a more completed notion of unit root testing later on. In the PP test, exactly the same regression model form as the DF test is used, as seen in the following equation (5).

$$\Delta q_t = \beta_1 + \beta_2 t + \delta q_{t-1} + \epsilon_t \quad (5)$$

Despite the regression of the two tests, PP and DF, the t-statistic adjustments, assumed in a DF test, are transformed instead into a Philips-Peron Z-statistic rather than a lag of the first difference terms of the regressors, to eliminate the serial correlation of the residual term problem (Phillips & Perron, 1988).

In this research, a different sort of test known as the Variance Ratio Test (VR) is also carried out, along with unit root tests such as ADF and PP for a random walk process. Below is a description of the VR testing method.

Variance Ratio test

Considering a vector of time series

$$[Y_t] = (Y_1, Y_2, Y_3, \dots, Y_T) \text{ satisfying}$$

$$\Delta Y_t = \mu + \epsilon_t \quad (6)$$

where μ is a parameter of arbitrary drift. Two crucial tests must be carried out, $E(\epsilon_t) = 0$ for all t and $E(\epsilon_t \epsilon_{t-j}) = 0$ for any positive j , as each of the test is a property of a random walk. Lo and MacKinlay (1988 & 1989) compile two random-walking properties test statistics, which apply in distinct sets of null hypotheses on ϵ_t . First, Lo and MacKinlay assume strongly that ϵ_t is i.i.d. Gaussian with variance σ^2 (though the normality assumption is not strictly necessary). This is the homoskedastic random walk hypothesis, while some refer to it as the i.i.d. null. On the other hand, outline the heteroskedastic random walk hypothesis where i.i.d. assumptions are weak and enable very wide types of dependency and conditional heteroskedastic. Sometimes, this hypothesis is called the martingale null since it provides a number of enough (but not essential) criteria for ϵ_t to be a martingale sequence (m.d.s.). The mean of first difference and the scaled variance of the q-th difference estimators are defined:

$$\hat{\mu} = \frac{1}{T} \sum_{t=1}^T (Y_t - Y_{t-1})$$

$$\hat{\sigma}^2(q) = \frac{1}{T_q} \sum_{t=1}^T (Y_t - Y_{t-q} - q\hat{\mu})^2 \quad (7)$$

and the relevant variance ratio $VR(q) = (\hat{\sigma}^2(q)/\hat{\sigma}^2(1))$. In the event of no-drift, T in equation (7) can be substituted for the variance estimators for bias by $(T-q+1)$ or $(T-q+1)(1-q/T)$ in the case of a drift. The VR z-statistic is defined as follows:

$$z(q) = [VR(q)-1] \cdot [s^2(q)]^{-1/2} \quad (8)$$

where the z is asymptotically $N(0,1)$ for optimal estimator choice $s^2(q)$. The sample estimator is defined as follows based on the i.i.d. hypothesis:

$$\hat{s}^2(q) = \frac{2(2q-1)(q-1)}{3qT} \quad (9)$$

In the m.d.s. assumption, the kernel estimator is employed as follows:

$$\hat{s}^2(q) = \sum_{j=1}^{q-1} \left[\frac{2(q-j)}{q} \right]^2 \cdot \hat{\delta}_j \quad (10)$$

where

$$\hat{\delta}_j = \left\{ \sum_{t=j+1}^T (y_{t-j} - \hat{\mu})^2 (y_t - \hat{\mu})^2 \right\} / \left\{ \sum_{t=j+1}^T (y_{t-j} - \hat{\mu})^2 \right\}^2 \quad (11)$$

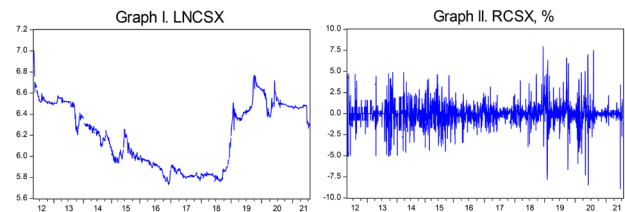
Because the variance ratio restrict is applicable for every $q > 1$ difference, the statistics upon several selected q values are often evaluated. Chow and Denning (1993) propose to check the joint test size a (coherent) testing statistics that evaluate a set of maximum Variation Ratio statistics with the highest absolute value. The p-value of the Chow-Denning statistics is limited from above by the probability of the parameter m and T-degree-freedom distribution with the Studentized Maximum Modulus (SMM). The bound is estimated via the asymptotic ($T \rightarrow \infty$) SMM distribution. For i.i.d. null, variance ratio testing a second technique is offered. Under this set of assumptions, the joint covariance matrix of the variance ratio test statistics is formed as in Richardson and Smith (1991), and calculate Wald standard statistics on a joint hypothesis that all variance ratios statistics is 1. The statistics on Wald are asymptotic chi-squares under the null, with m degrees of freedom.

Three distinct types of random walk tests, such as the ADF, PP and VR, are performed on the daily continuous return of CSX index to examine the weak-form efficiency of the EMH in the Cambodia Securities Exchange. The duration of the study is between 18 April 2012 and 20 July 2021. Natural log return of CSX index is calculated as follows:

$$RCSX_t = LN \left(\frac{CSX_t}{CSX_{t-1}} \right) \times 100$$

EMPIRICAL RESULT

From April 2012 to the beginning of April 2015 the CSX series has been declining. The index value continued to decrease again until mid-December 2016 when the peak on 1 July 2015 was raised. The volatility of the Index series remains steady from January 2017 and October 2018, however, at the end of January 2019, it has risen to a higher and halt. The CSX index hit the maximum position in early October 2019 over the research process. A large movement of the series is portrayed between that time and the end of July 2020. The volatility of the index is relatively minimal between August 2020 and early July 2021.



The average daily return of CSX is -0.0287 percent throughout this research period. The highest and lowest returns are 7.9528 percent and -8.9565, respectively. The volatility of the index return is 1.4512 percent. Regarding the result of the normality test, Jarque-Bera, the null hypothesis that the return of the index is distributed as normal distribution is highly rejected at 1 percent significance level. The total number of observations is 2,133. The histogram and Kernel distribution of the return is presented in Graph III.

Table I. Descriptive Statistics, RCSX

	RCSX
Mean	-0.028796
Maximum	7.952889
Minimum	-8.956559
Std. Dev.	1.451248
Jarque-Bera (JB)	3834.501
Probability of JB	0.000000
Observations	2133

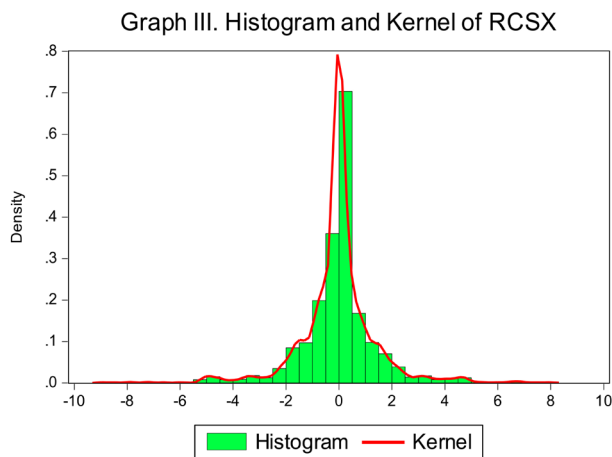


Table II. ADF and PP Unit Root Test of RCSX

Null Hypothesis: The variable has a unit root

		ADF test	PP test
With Constant	t-Statistic	-29.1436	-41.5183
	Prob.	0.0000 ***	0.0000 ***
With Constant & Trend	t-Statistic	-29.2287	-41.5566
	Prob.	0.0000 ***	0.0000 ***
Without Con- stant & Trend	t-Statistic	-29.1307	-29.1307
	Prob.	0.0000 ***	0.0000 ***

Notes:

a: (*)Significant at the 10%; (**)Significant at the 5%;
(***) Significant at the 1% and (no) Not Significant

b: Lag Length based on SIC

c: Probability based on MacKinnon (1996) one-sided p-values.

Two different types of unit root tests, ADF and PP, are applied on the return of the CSX index. Each test is performed on three random walk models: model with drift, model with drift and trend, and model without drift and trend. The null hypothesis of the test stated that the return of the index is a random walk. Results from stationary unit root testing under the three models have shown that the change in the CSX index is not a random walk since the null hypothesis is highly rejected at 1 percent significance level as indicated in Table III. In addition to ADF and PP tests, the variance ratio test at 2, 4, 8, and 16 days is also conducted to investigate the RWH. According to joint tests presented in Table IV, the probabilities of studentized maximum modulus and Wald (Chi-Square) are close to zero which are less than 1 percent significance level, thus the null hypothesis that RCSX

is a random walk is highly rejected. Under period 2, 4, 8, and 16 days, the hypothesis is also rejected at 1 percent significance level. The result of the Variance Ratio test is consistent with ADF and PP tests.

Table III. Variance Ratio Test of RCSX

Null Hypothesis: RCSX is a random walk

Sample: 4/18/2012- 7/20/2021

Included observations: 2132 (after adjustments)

Standard error estimates assume no heteroskedasticity

Use biased variance estimates

User-specified lags: 2 4 8 16

Joint Tests	Value	df	Probability
Max z (at period 2)*	22.26078	2132	0.0000
Wald (Chi-Square)	498.0351	4	0.0000

Individual Tests				
Period	Var. Ratio	Std. Error	z-Statistic	Probability
2	0.517889	0.021657	-22.26078	0.0000
4	0.292193	0.040517	-17.46926	0.0000
8	0.139210	0.064063	-13.43652	0.0000
16	0.067396	0.095329	-9.782958	0.0000

*Probability approximation using studentized maximum modulus with parameter value 4 and infinite degrees of freedom

CONCLUSION

This research shows no evidence of the existence of random walk in the Cambodia Securities Exchange using the ADF and PP unit root tests and the VR test. The unit root and variance ratio tests consistently show that the null hypothesis stating that the change of CSX index is random walk is rejected at 1 percent significance level. Under the Efficiency Market Hypothesis, the Cambodia Securities Exchange is regarded as a weak-form inefficient or CSX index that does not accurately reflect its true value. Therefore, an abnormal return can be achieved by examining the behavior of previous pricing using some technical analysis.

In general, there are several specific reasons for market inefficiency: illiquid market, high transaction costs, asymmetric information, etc. All of these reasons might have taken part or all into consideration to explain the weak-form inefficient in the stock market of Cambodia. Based on the results of this research, there is a doubt that might generate different results from this study, a structural break seems to be depicted on the natural log return of CSX

index as indicated in Graph I, thus, applying unit root tests, ADF or PP, alone without taking into account this break might not be adequate to justify weak-form efficiency in the Cambodia Securities Exchange. This research provides an opportunity for future scholars who are willing to conduct studies related to EMH in the stock exchange of Cambodia. In addition, the other tests like Run test and Multifractal Detrended Fluctuation Analysis should also be employed notwithstanding ADF, PP, and VR tests.

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Triple Bottom Line Reporting in Cambodia

Edman Padilla Flores*

ABSTRACT

The primary aim of this study is to gain a better understanding of Cambodian public interest enterprises' awareness of and commitment to triple bottom line (TBL) reporting. Public interest enterprises (PIEs) in Cambodia include publicly listed companies, banks, microfinance institutions, and insurance companies. Numerous managers of Cambodian PIEs believe that balancing profit, planet, and people is crucial to the organization's success now and in the future. While they may be unfamiliar with the specific TBL name, they understand the concept of sustainability in general. Furthermore, the research reveals that Cambodian PIEs are not particularly committed to TBL reporting. While many PIE managers in Cambodia are aware of the numerous benefits of TBL implementation, they lack the commitment necessary to develop a TBL strategy and track their TBL efforts. This low level of commitment to TBL reporting demonstrates the critical need for further education and awareness of the TBL concept. Finally, education is necessary to establish a link between financial performance and sustainability.

Keywords: Sustainability, triple bottom line

INTRODUCTION

The traditional method of evaluating a business's success is to examine the income statement's bottom line, which reflects the company's net profit and maximizes shareholder value. However, recent economic developments have emphasized the importance of evaluating a company's performance in terms of the triple bottom line — profit, planet, and people. This holistic business perspective necessitates the implementation of sustainable operations and management practices that account for social, environmental, and economic responsibilities (Longoni & Cagliano, 2018). According to the TBL concept, social and environmental stewardship and behavior can contribute to a business's sustainability through positive financial performance (Geminez et al., 2012).

Today's businesses have recognized that they cannot survive or thrive if they are unconcerned about the social and environmental challenges they face (Suttipun & Setyadi, 2017). The growing demand for sustainable operations has emphasized the importance of entities' annual reports, including TBL reporting. This need has been fueled by environmental and social concerns, as well as the changing global economic landscape. Numerous sustainability issues

have garnered significant attention in recent years from both the public and private sectors, including climate change, environmental degradation, and unfair labor practices. These concerns have prompted businesses to incorporate sustainability into multiple facets of their operations, from policy design to supply chain collaboration.

Businesses implementing the TBL report that it benefits them by lowering operating costs, improving risk identification and management, creating value through enhanced reputation and positive customer response, increasing ability to attract and retain employees, and increasing learning and innovation (SBN & MfE, 2003). A responsible business may leverage these benefits to contribute to the development of a framework that recognizes and rewards leadership actions and decisions that advance sustainability and the TBL.

Currently, no study has been conducted on Cambodian companies' use of TBL reporting. However, given the numerous benefits that such a commitment can bring to a business, it is reasonable to assume that a business committed to social concerns and sustainable development communicates and makes this visible in some way (Miethlich, 2019). The purpose of this study is to evaluate the level of awareness and commitment of Cambodian public interest enterprises (PIEs) to TBL reporting. PIEs in Cambodia include publicly listed companies, banks,

* Edman Padilla Flores, MBA, CPA, Lecturer, CamEd Business School
Email: Edman@cam-ed.com

microfinance institutions, and insurance companies. The researcher hopes to gain a better understanding of Cambodian PIEs' awareness of and commitment to TBL, the outcomes and benefits associated with TBL efforts, the integration of TBL efforts into day-to-day operations, and the ways in which organizational culture and systems support or obstruct TBL efforts.

LITERATURE REVIEW

Sustainability

Sustainability is widely regarded as the business paradigm of the 21st century, as well as the barrier to entry for businesses seeking long-term success. As defined by WCED (1987), sustainability is “the ability of current generations to meet their own needs without jeopardizing future generations’ ability to meet their own.” According to Quinn and Baltes (2007), sustainability encompasses all aspects of an organization, including research and development of non-toxic products; innovation and creativity, in which organizations discover novel ways to reuse or minimize waste; marketing and advertising that addresses or supports local issues and social causes; and increased scalability. Sustainability is rapidly establishing itself as a fundamental market force, fueled by the customer, shareholder, and stakeholder demand.

Beck et al. (2019) define sustainable development in terms of three pillars: environmental, social, and economic dimensions. Environmental sustainability entails making responsible choices and taking action to preserve the natural world, with a particular emphasis on preserving the environment’s capacity to support human life. The ability of a system to function at a reasonable level of social well-being is referred to as social sustainability. Economic sustainability refers to an organization’s impact on its stakeholders’ financial conditions and economic systems at the local, national, and global levels.

The United Nations (UN) established a set of seventeen (17) Sustainable Development Goals (SDGs) as a framework for addressing global issues such as poverty, inequality, climate change, environmental degradation, peace, and justice, and ensuring that everyone has a better and more sustainable future (UN, n.d.). Numerous businesses have since incorporated the UN SDGs into their sustainability programs. According to KPMG’s Survey of Sustainability Reporting 2020, the impact of the UN SDGs on reporting increased significantly between

2017 and 2020. This reporting shift may have been prompted by increased pressure on businesses from stakeholders such as investors and peers to be more transparent about supply chain impacts, labor standards, and diversity (Threlfall et al., 2020).

Cambodia bases its development policy on the UN SDGs. It encourages all stakeholders, including the private sector, academia, and civil society, to contribute to the country’s priority sustainable development goals of attaining upper-middle-income status by 2030 and high-income status by 2050 (RGC, 2019).

Sustainability reporting has gained prominence as a means for businesses to monitor and manage their environmental impacts. A sustainability report is a document published by an organization that details the economic, environmental, and social impacts of its daily operations (GRI, n.d.). Additionally, a sustainability report must include information about the company’s values and governance model, as well as connections between the company’s business strategy and its commitment to a sustainable global economy. Sustainability reporting enables organizations to improve their economic, environmental, social, and governance performance, to build and maintain trust, to address sustainability-related risks and opportunities, and to make long-term decisions (GRI, 2020). Additionally, it assists businesses in developing successful plans for addressing critical concerns for sustainable development, such as poverty, climate change, and other critical issues addressed by the UN SDGs, which have grown in importance as a resource for businesses.

Large multinational corporations are frequently pioneers in sustainability reporting, and their activities frequently anticipate trends that are later widely adopted (Threlfall et al., 2020). According to KPMG’s 2020 Survey of Sustainability Reporting, 80% of the global N100 report on sustainability. Since the last KPMG survey in 2017, the worldwide underlying rate of N100 companies reporting on sustainability has increased by 5 percent, from 75% to 80%. According to KPMG, the rate of N100 reporting will continue to increase steadily in the coming years. The N100 is made up of 5,200 businesses from around the world. It comprises the top 100 revenue-generating businesses in each of the 52 countries and jurisdictions examined by KPMG. These N100 statistics provide a global snapshot of large and mid-cap companies’ sustainability reporting.

Cambodia has experienced tremendous growth over the last few decades. Cambodia's government prioritizes socioeconomic inclusion and environmental sustainability in its national development plan in order to secure and accelerate growth. While other countries have debated sustainability and TBL reporting for decades, these concepts are new to Cambodia (Miethlich, 2019). As a result, the majority of businesses and their stakeholders are unaware of the strategic importance of sustainability reporting in achieving a competitive edge. According to Miethlich's (2019) research, Cambodia ranks fourth last among Southeast Asian countries in terms of sustainability reporting, ahead of Brunei Darussalam, Lao PDR, and Myanmar.

Triple Bottom Line Reporting

Historically, businesses have measured their performance against a single bottom line – the financial one. They are, however, increasingly being asked to consider their impact on the environment and their communities. TBL is a method for evaluating a company's performance in terms of three bottom lines: economic, environmental, and social. Elkington (1997) defines TBL reporting as a set of sustainable business principles that account for both profit maximization and a business's impact on society and the environment. TBL is distinct from traditional reporting frameworks in that it incorporates environmental and social metrics for which appropriate measurement methods can be difficult to determine (Slaper & Hall, 2011). TBL is frequently referred to as the integration of three Ps — profit, planet, and people.

Profit is synonymous with traditional net income, which is a widely used financial performance indicator in all businesses. Profit, when viewed through a triple bottom line lens, is more than income statement figures. While financial health is necessary to sustain operations, the business must also consider community integration (Supayakit, 2018).

Planet is a term that refers to resource utilization and the footprints that businesses leave behind as a result of their operations, which frequently include waste and pollution reduction, energy efficiency, and emission reductions (Supayakit, 2018). TBL makes an effort to avoid operations or activities that have a negative impact on the environment or degrade their ecosystem. Going green, reducing waste, limiting energy consumption, and minimizing carbon emissions are all fundamental concepts. Numerous

TBL businesses go above and beyond in their pursuit of sustainable development goals, such as the use of renewable energy sources or the development of safe and healthy products for people and the environment.

Supayakit (2018) explains that people — the social bottom line emphasizes equitable opportunities, the promotion of diversity, the promotion of connectedness within and beyond the community, the assurance of a high standard of living, and the establishment of democratic processes and accountable governance structures. Therefore, a TBL company should pay fair wages and salaries, provide adequate working conditions, maintain a safe and attractive work environment, provide health care, maintain reasonable work hours, and refrain from exploitation or human trafficking.

TBL reporting is an emerging accounting trend that aims to quantify and improve a company's sustainability performance (Udeh & Akporien, 2016). It expands the scope of traditional reporting, which is primarily concerned with financial performance, to include a company's environmental and social sustainability efforts. As a result, it prioritizes stakeholders other than shareholders. Typically, a business's objective is to maximize profits. However, as a result of the current global concern toward environmental and social sustainability, businesses are beginning to prioritize their environmental and social responsibilities.

The TBL framework proposes that a company's ultimate success or health should be determined by its financial bottom line and its social and environmental performance (Alhaddi, 2015). TBL is a consistent framework in that it always refers to the economic, social, and environmental lines (Elkington, 1997). Because the concept is based on integrating the three lines, consistency is built into the structure of TBL. Additionally, TBL emphasizes each of the three lines equally, resulting in a structure that is more balanced and coherent (Elkington, 1997).

One issue with the TBL is that the three Ps do not have a standard unit of measurement, making it difficult to add them up (Supayakit, 2018). It is tough to measure the planet and people accounts in the same terms as financial profits. Most companies report TBL components according to the guidelines of the following renowned organizations, which have evolved as the dominant framework for sustainability reporting.

Global Reporting Initiative (GRI): The GRI is a global, multi-stakeholder initiative that aims to establish a consistent but credible framework for voluntary economic, environmental, and social impact reporting on organizational activity (GRI, n.d.). The GRI was founded in 1997 with the goal of developing a globally recognized framework for reporting on sustainability in order to improve the quality of sustainability reporting. It recognizes that sustainability reporting is a component of integrated reporting and is aligned with TBL. The current GRI standards became effective on July 1, 2018, following years of research and consultation with numerous experts and stakeholders. They serve as the global standard for reporting on economic, environmental, and social impacts.

According to the KPMG Survey of Sustainability Reporting 2020, the GRI provides the world's most widely used sustainability reporting standards, with adoption spanning national boundaries and sectors. The GRI framework is used by a sizable majority of reporting companies in both the N100 (67 percent) and G250 (73 percent) categories (Threlfall et al., 2020). The G250 is defined in the 2019 Fortune 500 as the world's 250 largest companies by revenue.

Sustainability Accounting Standards Board (SASB): The SASB Foundation is a not-for-profit organization headquartered in the United States with the mission of developing industry-specific environmental, social, and governance disclosure standards to assist companies and investors in communicating financial material, decision-useful information (SASB Foundation, n.d.). The SASB develops sustainability disclosure standards for issues that are likely to have a material impact on an organization's financial situation or performance. It emphasizes financially measurable issues as a distinguishing feature among various frameworks for reporting on sustainability. Each SASB standard contains accounting measures specific to the industry, data collection techniques, and activity metrics for data normalization. According to the SASB Foundation, adhering to its standards enables businesses to achieve greater transparency, improved stakeholder communication, enhanced risk management, improved performance, and increased brand value.

The United Nations Global Compact (UNGC): The UNGC is a principle-based framework for companies. It is the world's largest corporate social responsibility initiative. It is a voluntary initiative that assists the private sector in managing risks and opportunities

related to the environment, social issues, and governance. The UNGC provides recommendations and tools, called the Ten Principles, for businesses to follow in order to achieve each of the UN's 17 SDGs and long-term success (UNGC, n.d.). The UNGC is a well-known global platform for companies from all around the world.

ISO 26000 Social Responsibilities: ISO 26000 is a global standard that was developed to assist organizations in assessing and responding to social responsibilities that are relevant and significant to their mission and vision, operations and processes, customers, employees, communities, and other stakeholders, as well as their environmental impact (ISO 26000, n.d.). ISO 26000 is not a certification standard; however, it makes recommendations regarding how businesses and organizations should conduct themselves responsibly. According to ISO 26000, social responsibility comprises seven critical elements: accountability, transparency, ethical behavior, stakeholder interests, the rule of law, international standards of conduct, and human rights. As a result, businesses prefer to implement ISO 26000 on their own initiative because it enables them to achieve sustainable development. Additionally, implementing ISO 26000 enhances a business's reputation and instills confidence in its social responsibility performance.

Dow Jones Sustainability Indices (DJSI): The DJSI was established in 1999 as an international standard for sustainability, tracking the stock performance of the world's most successful companies using a sustainability score calculated using a variety of economic, environmental, and social factors (DJSI, n.d.) The DJSI has established itself as a critical point of reference for investors as the gold standard of business sustainability.

Profit, planet, and people are all interconnected, and any decision made about one affects the others (Smith, 2016). Numerous academic researchers who have attempted to unravel the connections between profit, planet, and people have discovered that any action taken in support of the TBL has a significant impact on others. As a result of implementing the TBL concept, the business will become more sustainable, competitive, and relevant.

According to SBN & MfE (2003), businesses that implement the TBL attest the following benefits:

- *Cost savings in operations:* Cost savings can be realized by reducing energy consumption,

increasing manufacturing efficiency, and recycling and reusing waste.

- *Increased capability for identifying and managing risks:* Assessing environmental and social impacts, as well as listening to the concerns and perceptions of employees, suppliers, regulators, and customers, can assist organizations in anticipating risk and ensuring legal compliance.
- *Improved reputation and positive customer response:* When an organization's environmental and social performance is positive, it can help build reputation, whereas when it is negative, it can erode brand value.
- *Enhanced capacity for recruiting and retaining talent:* Companies that demonstrate a strong commitment to corporate social responsibility find it easier to recruit employees. Additionally, retention rates may be higher, resulting in reduced recruitment and training expenses.
- *Increased capacity for learning and innovation:* Addressing environmental and social impacts can result in innovation, resulting in the creation of new markets and value.

Further, the research conducted by Gimenez et al. (2012) states that internal environmental programs have a favorable effect on all three TBL components; however, internal social programs have a favorable effect on only two: social and environmental performance. Social activities improve employees' working conditions and safety, which results in cost savings from fewer workplace accidents and tardiness (Gimenez et al., 2012).

Cambodian corporate regulators do not require businesses to prepare a TBL report. However, Article 43 of the Prakas on Corporate Governance for Listed Companies requires listed companies in Cambodia to submit a report on corporate governance (including CSR initiatives) to the Securities and Exchange Commission of Cambodia as an appendix to the annual report (SECC, 2019).

METHODOLOGY

Sample selection

The study employs a non-random sampling technique called purposeful sampling. The researcher focuses on PIEs in Cambodia, including banks, microfinance institutions, insurance companies, and publicly listed companies, due to their stricter financial reporting requirements (e.g., PIEs in Cambodia should comply

with Cambodia International Financial Reporting Standards). Using Slovin's formula, the sample size is 56 PIEs with a 95 percent confidence level and a 5 percent margin of error.

DATA COLLECTION

The researcher conducted an online survey of all 56 respondents with the assistance of CamEd's CSSA Department. Two weeks were allotted for the online survey.

After a series of follow-up emails and SMS, the researcher received eight responses, a response rate of 14 percent. The low response rate is mainly due to Cambodian PIE managers being unaware of or oblivious to TBL reporting. Many of them prioritize financial matters above all else.

FINDINGS

AWARENESS OF TBL REPORTING

37.5 percent of PIEs responding to the survey indicated that TBL companies should prioritize environmental, social, and financial factors, 25 percent indicated that environmental and social factors should be prioritized, and 37.5 percent indicated that they do not have a TBL report. The responses suggest that while Cambodian PIEs may be unfamiliar with the specific TBL name, they are familiar with the concept of sustainability in its broadest sense. Surprisingly, the leaders most familiar with the TBL concept appear to be at lower management levels, most likely because they are members of Cambodia's new generation of business leaders.

Table 1: How does your company define the triple bottom line?

TBL Definition	Response Rate
Priority should be given to environmental, social, and financial factors.	37.5%
Priority should be given to environmental and social factors.	25.0%
There is no TBL report for this organization.	37.5%

When asked if their organizations incorporate TBL activities into their strategies and operations, four out of eight PIEs responding to the survey indicated that they do. Of the four PIEs that incorporate TBL activities into their strategies and operations, 50 percent are 100–999 employee PIEs, 25 percent are 1,000–4,999 employee PIEs, and 25 percent are less than 99 employee PIEs. According to this set of responses, the size of the organization had no bearing on whether or not it engaged in TBL activities.

Table 2: Do you incorporate triple bottom line initiatives into the strategies and operations of your company?

Overall	Yes	No
Total	4	4
Organizational level	yes	No
Middle Management	1	3
Lower Management	3	1
Number of employees	yes	No
1,000 to 4,999	1	2
100 to 999	2	2
99 and below	1	0

Cambodian PIE managers were asked to provide a list of the TBL activities in which their organizations participate regularly. According to Table 3, most Cambodian PIEs who responded to the survey are involved in community-oriented activities. Half of them are involved in waste reduction initiatives, and more than a third have conducted public education and recycling programs. Several of them are committed to environmental stewardship, energy conservation, and fair trade practices.

Table 3: TBL initiatives of Cambodian PIEs

TBL Initiatives	Response Rate
Support for the community	75.0%
Waste reduction	50.0%
Education programs for the general public	37.5%
Recycling	37.5%
Pollution reduction	25.0%
Energy conservation	12.5%
Fair trade practices	12.5%

Note: The sum of the percentages exceeds 100 percent because there are multiple TBL initiatives in each response.

Table 4 shows the benefits of implementing a TBL strategy, according to the respondents. Increased community support was cited as the primary benefit of Cambodian PIEs implementing TBL initiatives. Beyond the organization's walls, organizations that support the community have an impact on their surroundings through educational development, charitable events, and public awareness of issues. Additionally, they believe that by engaging the community in discussions about the company's environmental and social impacts and its role in resolving community issues, the company establishes itself as a responsible corporate citizen and partner, facilitating dialogue and positive stakeholder relationships.

Increased revenue and market share indicate that Cambodian PIE managers believe their organizations can benefit significantly from TBL efforts. The market share advantage also demonstrates managers' confidence in customers' positive responses and other stakeholders to TBL efforts. It is clear that these managers see economic value in the TBL; it can result in cost savings as well as revenue from new market opportunities and innovations.

Furthermore, increased employee retention and ease of recruitment were cited as benefits of implementing the TBL. Numerous Cambodian PIEs realize the value of a robust sustainability program in terms of talent recruitment and retention.

Table 4: Positive impacts of TBL initiatives

Advantages	Response Rate
Increased community support	75.0%
Increased revenue/market share	37.5%
Positive public relations	37.5%
Reduced costs	25.0%
Ease of recruitment	12.5%
Increased employee retention	12.5%

Note: The sum of the percentages exceeds 100% because there are multiple TBL advantages in each response.

As shown in Table 5, the primary challenges in implementing a TBL strategy for Cambodian PIE managers are a lack of understanding or awareness of the TBL concept within the organization and financial considerations taking priority over anything else. These challenges indicate a need for further understanding and education on the TBL concept. Additionally, education is required to demonstrate the connection between positive financial performance and sustainability.

Table 5: Obstacles to implementing a TBL strategy

Obstacles	Response Rate
Not understanding/Not aware of triple bottom line concept	25.0%
Priority is given to financial matters	25.0%
No requirement	12.5%

Note: The sum of the percentages is less than 100 percent because some respondents did not respond to the related question.

COMMITMENT TO TBL REPORTING

When asked if the organization has a formal or informal structure in place to oversee the development and implementation of TBL initiatives, 75 percent of PIE

managers who responded to the survey said “no.” This demonstrates the Cambodian PIEs’ low level of commitment to TBL reporting, which is not surprising, given that SECC does not require PIEs in Cambodia to prepare a TBL report. What is surprising is that those who responded “yes” are Cambodia’s smaller PIEs. This corroborates the previous findings that the organization’s size had no bearing on whether or not it engaged in TBL activities. While many of the Cambodian PIE managers are aware of the numerous benefits of TBL reporting, they lack the commitment to implement a TBL strategy and report on their TBL initiatives.

CONCLUSION

Numerous managers of Cambodian PIEs believe that balancing profit, planet, and people is critical to the organization’s success now and in the future. While they may not be familiar with the specific TBL name, they are familiar with the concept of sustainability in general. When asked if their organizations incorporate TBL activities into their strategies and operations, more than half of PIE respondents indicated that they do. These TBL initiatives include community support, waste reduction, public education, recycling, pollution reduction, energy conservation, and fair trade practices. Furthermore, Cambodian PIE managers believe that TBL efforts can benefit their organizations. According to our surveyed PIEs, the primary benefits of a TBL strategy are increased community support, increased revenue/market share, and positive public relations.

TBL implementation entails confronting new obstacles and challenges. The findings indicate that the primary barriers to implementing a TBL strategy for Cambodian PIE managers are a lack of understanding or awareness of the TBL concept within the organization and financial considerations taking priority over anything else. These difficulties highlight the importance of further understanding and knowledge about the TBL concept. Additionally, education is necessary to establish a link between financial performance and sustainability.

Finally, the research findings demonstrate a low level of commitment of Cambodian PIEs to TBL reporting. While numerous Cambodian PIE managers are aware of the numerous benefits of TBL implementation, they lack the commitment to develop a TBL strategy and report on their TBL efforts.

RECOMMENDATIONS

Given the numerous benefits of TBL reporting, the researcher recommends that Cambodian PIEs consider building a “leadership capacity” to address TBL challenges and opportunities, emphasizing systemic/integrative thinking, a long-term perspective balanced with immediate results, and stakeholder engagement. The process of creating a TBL report will undoubtedly bring to light critical aspects of their business that they may have overlooked using traditional reporting framework. Moreover, producing a TBL report enables them to recognize their accomplishments and serves as a helpful management tool for refining their range of sustainability initiatives.

Furthermore, SBN & MfE (2003) suggested the following key questions to consider when determining which TBL initiatives are most effective for a particular business:

- Are there any specific goals or objectives that we believe our business should pursue?
- What is the value proposition of our product or service? Product or service that is low-cost, innovative, boutique, environmentally friendly, and friendly to the environment?
- What impact do we want our business to have on society?
- What impact does our business currently have on the environment and society (and how do we know)?
- Are our competitors taking social and environmental issues into account?
- How is the quality of our relationships with employees (including, if applicable, those with a union)?
- Are our customers conscientious of social and environmental stewardship?
- What events would have a detrimental effect on our economic / social / environmental performance if they occurred?
- What are we not doing that we could have done to avoid negative consequences or capitalize on opportunities?

By asking themselves these types of questions, they are reassessing their business’s primary purpose. This is essentially what some businesses do when they conduct a review of their mission, vision, and core values. Certain businesses take the time to formalize their responses in the form of a brief

written statement. This is typically expressed in one or more sentences that encapsulate the business's overarching purpose – a response to the question “Why are we in business?”

Finally, the researcher would like to present the 2020 Integrated Sustainability Report of PTT Global Chemical Public Company Limited (PTTGC) as an example of the TBL report in order to provide a realistic view of TBL reporting (see Table 6). PTTGC is involved in a variety of petrochemical operations, including the manufacturing and distribution of petrochemical products at the upstream, intermediate, and downstream levels. PTTGC has incorporated sustainability into every aspect of its operations and supply chain, establishing itself as a leader in sustainable growth and operational excellence by adhering to the principles of good governance, transparency, and fairness with all stakeholders, as well as continuous technological improvement and the development of environmentally friendly products. As a result, PTTGC was ranked first globally in the 2020 DJSI chemicals sector for sustainability (PTTGC 2020).

Table 6: TBL Reporting of PTTGC in 2020

Profit	Planet	People
Net profit amounting to 200 million Baht	Energy reduction of 1.16 million GJ per year	86.14% community satisfaction
EBITDA amounting to 20,291 million Baht	Greenhouse gas emissions of 8.43 million tons CO _{2e}	Total Case Incident Rate of 0.22 cases/1 million man-hours
Sales revenue amounting to 326,270 million Baht	Greenhouse gas intensity of 328 kg CO _{2e} per ton production	75% employee engagement
93% customer satisfaction	Reused 1.2 million m ³ of wastewater	136 million Baht investment in employee training
R&D investment amounting to 1,097 million Baht	Zero industrial waste to landfill	Zero cybersecurity incidents
Launched 30 new products in the market	21 products passed the eco-design criteria assessment	Zero information insecurity complaints

Source: PTTGC Integrated Sustainability Report 2020.
<https://sustainability.pttgcgroup.com/en/flipbook/320/integrated-sustainability-report-2020>

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SOC for Cybersecurity & SOC 2® for Service Organizations – An empirical study on industry’s perspective

Anil K. Makhija*

ABSTRACT

Businesses across the globe have been going digital. A paradigm that has been accelerated due to pandemic. This has resulted into creation of a complex cyberspace. Further, organizations have become linked and dependent on each other, due to increased outsourcing as well as shift towards cloud computing. This has also led to creation of various industry standards and frameworks that help organizations evaluate their own and their provider’s practices related to system reliability, information security and cybersecurity. Amongst these, SOC2 for service organizations and SOC for Cybersecurity are two leading reports that help organizations assess system reliability and cybersecurity. AICPA recognizes it has that there is confusion amongst the applicability of these reports, and therefore it has created some guidance on how these two reports are different and how they can be leveraged by organizations. This guidance provides an inside-out perspective driven by purpose of these reports and the methodology used to create these reports. The industry (practitioners, implementors and vendor managers, CXOs) perspective on the applicability and distinction of these reports was not yet available. This research brings out industry (practitioners, implementors and vendor managers, CXOs) perspective on the applicability and distinction of these reports. Findings indicate that SOC2 demand and usefulness is perceived high whereas SOC for Cybersecurity demand and usefulness is perceived low by the industry. Findings of this research also indicate that industry expects AICPA to simplify SOC2 reports and make them easier to understand.

Keywords: SOC2, SOC for Cybersecurity, systems reliability, AICPA, trust services criteria

INTRODUCTION

Technology has been enabler for businesses to improve their operational efficiencies and effectiveness. With the growing reliance on technologies, companies have adopted to outsourcing their work to service providers across the globe. Companies that outsource their work are interested to understand how effective are the systems reliability controls, both in terms of design and operating effectiveness. SOC2 report framework, from AICPA, is one such mechanisms that has helped user organizations to get assurance on systems reliability controls of the outsourced work/functions. AICPA introduced SOC for Cybersecurity in 2017, though the adoption of SOC for Cybersecurity has been much lower as compared to SOC2. the Aim of this research is to get perspective of industry practitioners on SOC2 and SOC for Cybersecurity. Industry practitioners, from user organizations,

service provider organizations and service auditor companies have been interviewed through a survey questionnaire. Those practitioners are in the roles of CxOs, Vendor Managers, Service Auditors and Compliance professionals. They were interviewed on both the demand as well as usefulness of SOC2 and of SOC for Cybersecurity. They were also asked about any improvement suggestions for both these reports.

LITERATURE REVIEW

Cyberspace & Cybersecurity

Organizations across the world have been undergoing significant digital shift during the last decade. This digital shift has accelerated even further during the times of covid-19 pandemic. One of the effects of this shift has also been the increased exposure of almost every organization to the cyberspace risks. Cyberspace risks have always been there. However, pandemic driven increased digital reliance, has led to an increase in this exposure. Cyberattacks have been going up and at the same

* Anil K. Makhija, B.E., PGDIM, MBA, Assistant Professor, CamEd Business School
Email: anil@cam-ed.com

time, there is a trend that managers disclose only less severe cyberattacks or disclose them when investors and other stakeholders already suspect that an attack has happened. Thus, cybersecurity topic is getting immense attention these days. Exponential growth of internet connections has not only led to an increase in cybersecurity incidents, the impact of such incidents has also gone up significantly. There is a strong realization on the part of governing boards within many organizations that keeping their organization secure in the cyberspace shall come under the purview of corporate governance (Amir et al., 2018; Jang-Jaccard & Nepal, 2014; Von & von, 2018).

Concepts of information security and cyber security have significant overlap and are closely related. General security objectives for cyber security consist of confidentiality, integrity and availability, which are very similar to the objectives of information security (Von & Van, 2013).

According to the international standard, ISO/IEC 27002 (2013), information security is the preservation of the confidentiality, integrity and availability of information. As per this explanation, information can be printed or it can be written on paper or it can be stored electronically. It can be transmitted by electronic means, shown on various medias or conveyed in conversations and so on (ISO/IEC 27002, 2013).

Value of information is driven by the characteristics it possesses. Three characteristics of information, that make information valuable for organizations are known as CIA triangle or confidentiality, integrity, and availability. However, in the constantly changing environment, in addition to these three elements, accuracy, authenticity, utility and possession are the additional characteristics of the information that need to be protected (Whitman & Mattord, 2012).

There is significant overlap in the scope of information security and cyber security. Preserving the confidentiality, integrity and availability of information in the cyber space is what comes under the purview of cyber security. According to the international standard, ISO/IEC 27032 (2012), cyberspace is a very complex environment, created by interactions amongst people, software and services over the internet by means of technology devices and networks connected to it (ISO/IEC 27032, 2012).

Information security focuses on protecting the information from possible harm resulting from

various threats and vulnerabilities. Cyber security focuses on protecting the cyberspace, protecting those who function in the cyberspace and protecting any of their assets that can be reached via the cyberspace. Boundaries of cyber security and of the risks protected by it are wider than those of information security (Reid & Van, 2014).

Increasing adoption of outsourcing and shift towards cloud computing has led to increased usage of third-party vendors. This has created a need to not only ensure internal controls for information and cyber security within the organization, but also to assess and evaluate the validity (both design and operating effectiveness) of the internal controls put in place by these third-party providers (Fanning, 2014).

Standards and Frameworks for managing Information Security and Cybersecurity

Over the last 30 years, many industry standards have been rolled out to help IT Governance and information security. Most of them contain elements to help organizations address IT security and Information Security. The most popular ones related to information security are ISO 27001, BS7799, PCI-DSS, ITIL and COBIT (Susanto et al., 2012).

AICPA, in 2010, rolled out SOC for Service Organizations. These reports were designed to help service organizations that provide services to other entities. SOC reports help build trust and confidence in the services performed and controls related to the services. These reports are created by an independent CPA. Of these reports, SOC 2® report is of particular interest in the context of security, availability, processing integrity, confidentiality or privacy (SOC for Service Organizations: Information for Service Organizations, n.d.).

AICPA's SOC 2® - SOC for Service Organizations

AICPA's SOC 2® - SOC for Service Organizations: Trust Services Criteria (SOC 2® - SOC for Service Organizations: Trust Services Criteria, n.d.) provides detailed information and assurance about the controls at a service organization relevant to security, availability and processing integrity of systems that are used by service organization to process the user's data, and confidentiality and privacy of the information that is processed by these systems, as indicated in Figure 1. Privacy criteria was added as a dedicated section in 2016 (Giulio et al., 2017). A SOC 2® report is a restricted use report and is of two types.

- Type 1 report is about management's description of a service organization's systems and suitability of design of controls
- Type 2 report is about management's description of a service organization's systems and suitability of design and operating effectiveness of controls.



Figure 1: Soc Criteria

High-profile breaches and cybersecurity incidents at Equifax, Sony, and Target have increased the cybersecurity focus of both the professionals as well as the regulators. Cybersecurity risk management has taken a strategic dimension and strategy, IT management, cybersecurity investment, and improving the internal controls are considered integral part of it (Janvrin & Wang, 2019).

Some of the academic research suggests Cybersecurity practices and policies being reactive and not able to address the challenge of rapidly evolving cyber threats. It is also recommended that addressing this will require rapid transformation in computing and systems architecture (Sheldon & Vishik, 2010). Research also indicates that cybersecurity strategy (CSS) also has a significant role in managing the cyberthreats. It will have three broad components of formulation, implementation, and evaluation. Some of the research has proposed a holistic cybersecurity implementation framework to implement CSS (Atoum et al., 2014). There has been research indicating that developing cybersecurity culture and awareness and making IT Audits and Information Security audits address cyber threats, risks and attacks is necessary. Holistic cybersecurity models, combining the best practices from Cybersecurity Framework of NIST and few other models have been proposed (Sabillon et al., 2017). In order to assess the cybersecurity maturity, Cybersecurity Capability Maturity Model,

consisting of four levels and based on three dimensions of people, process and technology have also been introduced (De Bruin & von Solms, 2015). Researchers have also recommended some industry specific cybersecurity frameworks, such as SHIELD framework for telco environment which offers security as a service or Buildings Cybersecurity Framework (BCF) for residential, small commercial, large commercial, and federal buildings (Gardikis et al., 2017; Mylrea et al., 2017). Earlier research has also indicated that while mobile financial services are an enabler for financial inclusion to provide banking to the unbanked, lack of resilient cybersecurity governance is a challenge and having a robust cybersecurity framework implemented can help address this challenge (Ambore et al., 2017). Emergence of multiple frameworks to manage cybersecurity risks has also created a challenge of how those frameworks have to be implemented and optimized so as to existing resources are not strained or mis utilized. To address that, researchers have proposed models that guide how various elements / factors within an organization, such as people, process and technology can be leveraged to the objective of cybersecurity risk management programs in compliance with NIST Cybersecurity framework (Teodoro et al., 2015). Managing cyber risk is therefore extremely important for businesses to ensure their sustenance and reliability. Managing cyber risks using a systematic approach is extremely important (Kosub, 2015).

AICPA's SOC for Cybersecurity

In 2017, in response to these growing challenges, the American Institute of Certified Public Accountants (AICPA, 2017; Eaton et al., 2019) developed an entity-level voluntary cybersecurity reporting framework that firms can use to disclose useful information to stakeholders about their cybersecurity risk management program and its effectiveness. The framework consists of the following three components that aim to assist stakeholders in monitoring a firm's cybersecurity risk management program:

- Description Criteria
- Control Criteria
- Attestation Guidance

SOC for Cybersecurity also consists of Type 1 Report and Type 2 report. Type 1 report, which is also referred to as a point-in-time report, describes the

service organization's system and verifies whether the controls are suitably designed to meet the specified control objectives. Type 2 report, which is also referred to as a specific point-in-time report, includes same information as the Type 1 report and additionally includes management assertion and an auditor's opinion on operating effectiveness of the controls.

SOC 2® and SOC for Cybersecurity reports have similar structure. Management has the flexibility of choosing the scope of SOC 2® relating to products and services assessed. However, the assessment has to be based on Trust Services Criteria. In case of SOC for Cybersecurity, objectives are defined by the management. The report then provides an assessment on entity's cybersecurity risk management program and the effectiveness of controls to meet those objectives.

CURRENT CHALLENGES & RESEARCH OBJECTIVES

Current Challenges / Open Issues

Ever since the release of SOC for Cybersecurity in 2017, there have been questions about distinction between SOC2 examination and SOC for Cybersecurity examination. AICPA has made an attempt to clarify these differences and categorized them into audience, subject matter and scope of each of the report.

- One of the key differences explained by AICPA is that while a SOC for Cybersecurity report would contain an opinion about the effectiveness of controls within a cybersecurity risk management program, it would not include the details of the tests performed to evaluate this effectiveness and neither would it include the results of those tests. Such information about details of tests conducted and the results of those tests are included in SOC 2 report.
- To measure and evaluate the cybersecurity risk management program's effectiveness, in SOC for Cybersecurity, management can choose the control criteria to be used. Management has the option to use AICPA Trust Services Criteria for security, availability, and confidentiality as control criteria. Whereas, a SOC 2 examination can only be performed using the AICPA trust services criteria.
- SOC 2 reports are restricted use (for specified users) reports whereas SOC for Cybersecurity are for general use (for general users).

Despite this guidance from AICPA, which are provided more from an inside-out perspective, leveraging the purpose and methodology to create these reports, there is a need to understand the industry perspective on these two reports.

RESEARCH OBJECTIVES

Hence the research involves conducting a survey, based on interview/questionnaire, of practitioners and implementors (in the organizations that provide the services) and vendor managers and CXOs (in the recipient of service organizations). The geographical coverage would be organizations in North America, Europe, and Asia. The interview would focus on gathering empirical information on the following dimensions (which will then be analyzed and presented as research findings):

- How are these two reports, namely SOC 2 and SOC for Cybersecurity, perceived by organizations, especially the provider organizations (practitioners and implementors) and receiver organizations (vendor managers, CXOs)?
- Which of these two reports they find more useful, in which context and why?
- What improvements can be made in these two reports?

METHODOLOGY

This research aims to understand how the two reports, namely SOC2 and SOC for cybersecurity are perceived by the practitioners in the industry, both on the service provider side as well as user organization side. It also aims to get their perspective on the usefulness of these reports and what improvements they can recommend in these reports to make them more meaningful and useful from their perspective.

A survey questionnaire was designed to understand the following dimensions:

- Demand / Requirements for SOC2 reports
- Demand / Requirements for SOC for Cybersecurity reports
- Usefulness of SOC2 reports
- Usefulness of SOC for Cybersecurity reports
- Suggested improvements in SOC2 reports
- Suggested improvements in SOC for Cybersecurity reports
- Other industry certifications that are considered important / relevant in addition to SOC2 and SOC for Cybersecurity

Information Technology & Services companies and outsourcing services providers who provide SOC2 and / or SOC for cybersecurity reports to their client organizations, leading banks and financial services companies (user organizations) who request SOC2 and SOC for Cybersecurity reports from their vendor partners and auditing companies that are involved as service auditors were identified as entities in the scope of the survey. Professionals working in these organizations involved directly with the compliance programs, working as implementers or working as service auditors were reached out.

Out of total 140 persons reached out;

- 106 persons provided their responses, mostly through on-call interviews though some preferred to respond offline after the survey objectives and questions were explained to them
- 13 persons responded that they would not feel comfortable in sharing the details
- 2 persons responded that they do not have sufficient details to be able to provide meaningful responses
- 19 persons did not respond to the survey request

Distribution of survey respondents with respect to geographic coverage and organization size (measured in terms of headcount) is shown in Table 1 and 2 and Chart 1 and 2. The coverage is across all geographies of the world and organization size wise distribution is also uniform.

Table 1: Survey Respondents- Geographic Distribution

Geographic Coverage - Based on Place of Work	Count	% Distribution
Asia	37	35%
Australia & New Zealand	7	7%
EMEA (Europe, Middle East, Africa)	26	25%
Americas (USA, Canada, LATAM)	36	34%
Total	106	100%

Chart 1: Survey Respondents- Geographic Distribution

Survey Respondents - Geographic Distribution

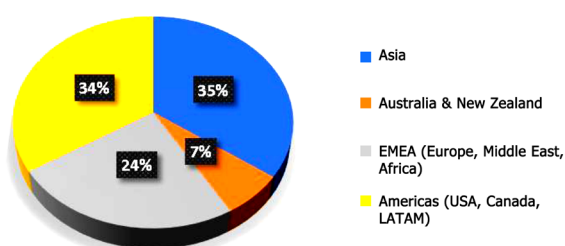
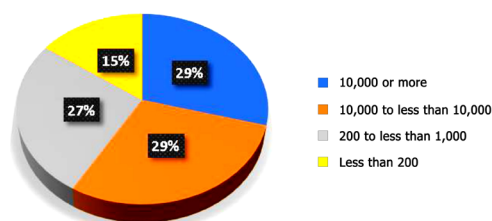


Table 2: Survey Respondents – Distribution based on Organization Headcount

Organization Headcount	Participants	% Participants
10,000 or more	31	29%
1000 to less than 10,000	31	29%
200 to less than 1,000	28	26%
Less than 200	16	15%
Total	106	100%

Chart 2: Survey Respondents – Distribution based on Organization Headcount

Survey Respondents - Distribution based on Organization Headcount



RESULTS

SOC2 Demand & SOC for Cybersecurity Demand Comparison

From the survey responses, it is evident that SOC2 demand is considered as “high”, considering all the survey responses. Demand for SOC for Cybersecurity is tending towards “very low”. This is shown in Table 3A and Table 3B. There are significant number of respondents who believe that there is no demand for SOC for Cybersecurity or they don’t have a perspective on it. The pattern of “high” demand for SOC2 and “very low” demand for SOC for Cybersecurity is consistent across the functions/roles of vendor management, service auditors, compliance professionals, CxOs and others. This is reflected in the tables, from Table 4A and 4B onwards till Table 8A and 8B.

All Participants

Table 3A: SOC2 Demand – All Participants

SOC2 Demand	Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	16	15%
4- High	53	50%
5- Very High	37	35%
There is No Demand for it	0	0%
I don't have a perspective on it	0	0%
Total	106	100%

Table 3B: SOC for Cybersecurity Demand – All Participants

SOC for Cybersecurity Demand	# Participants	% Participants
1- Very Low	47	44%
2- Low	17	16%
3- Medium	11	10%
4- High	2	2%
5- Very High	0	0%
There is No Demand for it	24	23%
I don't have a perspective on it	5	5%
Total	106	100%

Vendor Management Function

Table 4A: SOC2 Demand – Vendor Management Team

SOC2 Demand	Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	1	7%
4- High	5	33%
5- Very High	9	60%
There is No Demand for it	0	0%
I don't have a perspective on it	0	0%
Total	15	100%

Table 4B: SOC for Cybersecurity Demand – Vendor Management Team

SOC for Cybersecurity Demand	# Participants	% Participants
1- Very Low	4	27%
2- Low	1	7%
3- Medium	5	33%
4- High	0	0%
5- Very High	0	0%
There is No Demand for it	5	33%
I don't have a perspective on this	0	0%
Total	15	100%

Service Auditors

Table 5A: SOC2 Demand – Service Auditors

SOC2 Demand	Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	0	0%
4- High	10	45%
5- Very High	12	55%
There is No Demand for it	0	0%
I don't have a perspective on it	0	0%
Total	22	100%

Table 5B: SOC for Cybersecurity Demand – Service Auditors

SOC for Cybersecurity Demand	# Participants	% Participants
1- Very Low	10	45%
2- Low	3	14%
3- Medium	2	9%
4- High	0	0%
5- Very High	0	0%
There is No Demand for it	7	32%
I don't have a perspective on this	0	0%
Total	22	100%

Compliance Professionals

Table 6A: SOC2 Demand – Compliance Professionals

SOC2 Demand	Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	1	5%
4- High	11	55%
5- Very High	8	40%
There is No Demand for it	0	0%
I don't have a perspective on it	0	0%
Total	20	100%

Table 6B: SOC for Cybersecurity Demand – Compliance Professionals

SOC for Cybersecurity Demand	# Participants	% Participants
1- Very Low	7	35%
2- Low	6	30%
3- Medium	0	0%
4- High	0	0%
5- Very High	0	0%
There is No Demand for it	7	35%
I don't have a perspective on this	0	0%
Total	20	100%

CxOs

Table 7A: SOC2 Demand – CxOs

SOC2 Demand	Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	7	37%
4- High	8	42%
5- Very High	4	21%
There is No Demand for it	0	0%
I don't have a perspective on it	0	0%
Total	19	100%

Table 7B: SOC for Cybersecurity Demand – CxOs

SOC for Cybersecurity Demand	# Participants	% Participants
1- Very Low	8	42%
2- Low	6	32%
3- Medium	3	16%
4- High	2	11%
5- Very High	0	0%
There is No Demand for it	0	0%
I don't have a perspective on this	0	0%
Total	19	100%

Others

Table 8A: SOC2 Demand – Others

SOC2 Demand	Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	7	23%
4- High	19	63%
5- Very High	4	13%
There is No Demand for it	0	0%
I don't have a perspective on it	0	0%
Total	30	100%

Table 8B: SOC for Cybersecurity Demand – Others

SOC for Cybersecurity Demand	# Participants	% Participants
1- Very Low	18	60%
2- Low	1	3%
3- Medium	1	3%
4- High	0	0%
5- Very High	0	0%
There is No Demand for it	5	17%
I don't have a perspective on this	5	17%
Total	30	100%

SOC2 Usefulness & SOC for Cybersecurity Usefulness Comparison

From the survey responses, it is evident that SOC2 usefulness is considered as “high”, considering all the survey responses. Usefulness of SOC for Cybersecurity is tending towards “low”. This is shown in Table 9A and Table 9B. There are significant number of respondents who don’t have a perspective on usefulness of SOC for Cybersecurity. The pattern of “high” usefulness of SOC2 and “low” usefulness of SOC for Cybersecurity is consistent across the functions/roles of vendor management, service auditors, compliance professionals, CxOs and others. This is reflected in the tables, from Table 10A and 10B onwards till Table 14A and 14B.

All Participants

Table 9A: SOC2 usefulness – All Participants

SOC2 Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	30	28%
4- High	55	52%
5- Very High	21	20%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	106	100%

Table 9B: SOC for Cybersecurity usefulness – All Participants

SOC for Cybersecurity Usefulness	# Participants	% Participants
1- Very Low	27	25%
2- Low	34	32%
3- Medium	18	17%
4- High	6	6%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	21	20%
Total	106	100%

Vendor Management Function

Table 10A: SOC2 usefulness – Vendor Management Team

SOC2 Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	1	6%
4- High	7	47%
5- Very High	7	47%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	15	100%

Table 10A: SOC for Cybersecurity usefulness – Vendor Management Team

SOC for Cybersecurity Usefulness	# Participants	% Participants
1- Very Low	9	60%
2- Low	3	20%
3- Medium	3	20%
4- High	0	0%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	15	100%

Service Auditors

Table 11A: SOC2 usefulness – Service Auditors

SOC2 Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	0	0%
4- High	14	64%
5- Very High	8	36%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	22	100%

Table 11B: SOC for Cybersecurity usefulness – Service Auditors

SOC for Cybersecurity Usefulness	# Participants	% Participants
1- Very Low	12	55%
2- Low	4	18%
3- Medium	3	14%
4- High	1	5%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	2	9%
Total	22	100%

Compliance Professionals

Table 12A: SOC2 usefulness – Compliance Professionals

SOC2 Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	3	15%
4- High	15	75%
5- Very High	2	10%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	20	100%

Table 12B: SOC for Cybersecurity usefulness – Compliance Professionals

SOC for Cybersecurity Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	10	50%
3- Medium	2	10%
4- High	2	10%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	6	30%
Total	20	100%

CxOs

Table 13A: SOC2 usefulness – CxOs

SOC2 Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	7	37%
4- High	8	42%
5- Very High	4	21%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	19	100%

Table 13B: SOC for Cybersecurity usefulness – CxOs

SOC for Cybersecurity Usefulness	# Participants	% Participants
1- Very Low	4	21%
2- Low	8	42%
3- Medium	5	26%
4- High	2	11%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	19	100%

Others

Table 14A: SOC2 usefulness – Others

SOC2 Usefulness	# Participants	% Participants
1- Very Low	0	0%
2- Low	0	0%
3- Medium	19	63%
4- High	11	37%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	0	0%
Total	30	100%

Table 14B: SOC for Cybersecurity usefulness – Others

SOC for Cybersecurity Usefulness	# Participants	% Participants
1- Very Low	2	7%
2- Low	9	30%
3- Medium	5	17%
4- High	1	3%
5- Very High	0	0%
It's not useful	0	0%
I don't have a perspective on it	13	43%
Total	30	100%

OVERALL COMPARISON - DEMAND

Based on the responses from survey respondents, overall demand on a scale of 0 to 5, with 5 representing “very high” and 1 representing “very low” and 0 representing no demand, the demand for SOC2 is 4.2 and the demand for SOC for Cybersecurity is 1.21. The underlying data, captured based on responses to the survey, is shown in Table 15A and 15B.

Table 15A: SOC2 quantified demand

Role Category	SOC2 Demand						Weighted Score
	1-Very Low	2-Low	3-Medium	4-High	5-Very High	0-No Demand	
Vendor Management	0	0	1	5	9	0	4.53
Auditor / Service Auditor	0	0	0	10	12	0	4.55
Compliance Professional	0	0	1	11	8	0	4.35
CxO (USER ORGNIZATION)	0	0	7	8	4	0	3.84
Others	0	0	7	19	4	0	3.90
Overall Total	0	0	16	53	37	0	4.20

Table 15B: SOC for Cybersecurity quantified demand

Role Category	SOC for Cybersecurity Demand						Weighted Score
	1-Very Low	2-Low	3-Medium	4-High	5-Very High	0-No Demand	
Vendor Management	4	1	5	0	0	5	1.40
Auditor / Service Auditor	10	3	2	0	0	7	1.00
Compliance Professional	7	6	0	0	0	7	0.95
CxO (USER ORGNIZATION)	8	6	3	2	0	0	1.95
Others	18	1	1	0	0	5	0.92
Overall Total	47	17	11	2	0	24	1.21

OVERALL COMPARISON - USEFULNESS

Based on the responses from survey respondents, overall usefulness on a scale of 0 to 5, with 5 representing “very high” and 1 representing “very low” and 0 representing “not useful”, the usefulness of SOC2 is 3.92 and the usefulness of SOC for Cybersecurity is 2.11. The underlying data, captured based on responses to the survey, is shown in Table 15A and 15B.

Table 15A: SOC2 usefulness- quantified

Role Category	SOC2 Usefulness						Weighted Score
	1-Very Low	2-Low	3-Medium	4-High	5-Very High	0-No Demand	
Vendor Management	0	0	1	7	7	0	4.40
Auditor / Service Auditor	0	0	0	14	8	0	4.36
Compliance Professional	0	0	3	15	2	0	3.95

CxO (USER ORGNIZATION)	0	0	7	8	4	0	3.84
Others	0	0	19	11	0	0	3.37
Overall Total	0	0	30	55	21	0	3.92

Table 15B: SOC for Cybersecurity usefulness- quantified

Role Category	SOC for Cybersecurity Usefulness						Weighted Score
	1-Very Low	2-Low	3-Medium	4-High	5-Very High	0-No Demand	
Vendor Management	9	3	0	3	0	0	1.80
Auditor / Service Auditor	12	4	0	4	0	0	1.80
Compliance Professional	0	10	2	2	0	0	2.43
CxO (USER ORGNIZATION)	4	8	5	2	0	0	2.26
Others	2	9	5	1	0	0	2.29
Overall Total	27	34	12	12	0	0	2.11

CONCLUSION

SOC2 report is based on trust principles/criteria and it is performed under the AICPA attestation standard, AT 101. SOC2 is a restricted use report. Entities that outsource tasks and functions to service providers are interested in getting an assurance over non-financial controls revolving around systems reliability. SOC2 has been widely used report by user organizations that are outsourcing their work. With the increase in cybersecurity threats and risks, AICPA launched SOC for Cybersecurity in 2017. There have been some user organizations which have started utilizing SOC for cybersecurity internally to assess effectiveness of their cybersecurity risk management programs. It is evident from the findings of this survey, in which 106 participants representing various functions / roles such as CxOs, Vendor Managers, Service Auditors, Compliance professionals, that industry is seeing very low demand when it comes to SOC for Cybersecurity. Demand for SOC2 is very high. In terms of usefulness, usefulness of SOC for Cybersecurity is low whereas usefulness of SOC2 is high.

In terms of possible improvements, there were very limited or no suggestions on how SOC for Cybersecurity reports can be improved. For SOC2 report, there were significant number of participants, 46%, who suggested that SOC2 report needs to be simplified further for it to be more meaningful and useful. An equal number of survey respondents suggested making reports easier to understand. An overwhelming number of participants (70 percent), out of those who had a perspective on SOC for Cybersecurity report, suggested that there is lack

of clarity on whether just the SOC2 report suffices since their view was that cybersecurity risks and cybersecurity risk management programs will have significant bearing on SOC2 report as well.

In terms of recommended actions, AICPA shall evaluate how to bring more clarity on SOC for Cybersecurity both in the user organizations and the service provider organizations.

LIMITATIONS AND FUTURE RESEARCH SUGGESTIONS

One of the limitations of this research was that a small percentage (5 percent) of the participants did not have any perspective on SOC for Cybersecurity. Another limiting factor is that there is very limited past research on SOC2 implementations and SOC2 effectiveness and almost no research on SOC for Cybersecurity. With the accelerating shift towards digital and increased reliance on cloud, systems reliability is one of the most important topics. More research can be conducted on how effective is SOC2 (and SOC for Cybersecurity) vis a vis actual systems availability and reliability as observed in the user organizations. The challenge with that would be the willingness of user organizations to share their actual availability and reliability data.

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Investors' behavior to earnings announcement during the COVID-19 pandemic: Evidence from Cambodia

Muhammad M. Ma'aji and Lee Siang Hi*

ABSTRACT

This study investigates the reaction of investors to annual earnings releases as reflected in the share price movements of common stocks and volume of trade during the COVID-19 pandemic. Event methodology is employed, and the returns in an event window, defined conventionally as the days before to days after a firm-specific public earnings announcement, are not abnormal. We provide an apparent example where investors did not react to firm-specific positive earnings announcements. This could be influenced by the government in response to COVID-19 as we have seen governments and central banks worldwide quickly enacted sweeping and sizable fiscal and monetary stimulus measures to limit the human and economic impact of the COVID-19 pandemic. These actions during an economic downturn or crisis have helped to stabilize the economy and increase confidence in the market.

Keywords: *Event study, information and market efficiency, corporate earnings announcement, COVID-19, Cambodia market*

INTRODUCTION

Financial information about listed companies including takeover announcements, shareholder details, periodic earnings reports, asset acquisitions and disposals, dividend announcements, stock splits, company administrations, insider dealings to mention a few, are crucial while forecasting future performance and valuation of a company's equity. Investors consider this financial information when making investment decisions. Share prices of a company can rise and fall based on a company's financial information such as earnings performance. This is because earnings information reveals the financial health of a business. Earnings represent the measure of a firm's profits or loss from business activities and events during a stipulated period. Long-term investors may not be persuaded by one quarter of disappointing earnings, but some investors think more immediately and favor short-term profits. Earnings are not the only development investors focus on, but they are relevant during and before earnings season. Dividend and earnings announcements are commonly the two most important financial information used by the investors for deciding

whether or not to buy or sell a particular company's share (Syed & Bajwa, 2018; Ma'aji & Abdullahi, 2014). Therefore, an announcement on a company's earnings is used in the stock market as a yardstick to assess the profitability and financial strength of any firm. Additionally, as the earnings news about a company is normally unpredictable, the stock market prior to the disclosure of the announcements, creates expectations and speculations about the announcements.

Investors in the market react differently to unexpected announcements of a firm's earnings if they differ from the market expectations. However, this reaction will entirely depend on whether the market is efficient or not. For the market to be considered efficient according to Fama (1991), financial markets are termed informationally efficient if security prices react to the announcement of new unanticipated information immediately, accurately, and in the right direction with no subsequent price trends. These timely and accurate adjustments to the share price indicate that the prices neither overreact nor underreact to any specific information announced. Therefore, investors cannot beat the market based on any set of new information, whether it is historical, publicly available information or private information (Fama, 1969). However,

* Muhammad M. Ma'aji, PhD, Professor, CamEd Business School
Email: muhammad@cam-ed.com
Lee Siang Hi, MSc, Lecturer, CamEd Business School
Email: lsianghi@cam-ed.com

empirical studies have suggested that stock prices do not always accurately reflect available information. Stock markets under-react to information in some cases, while over-reacting in others (Barker & Imam, 2008; Bloomfield, Libby, & Nelson, 2002; Cready & Gurun, 2010; Louhichi, 2008).

Furthermore, there is extensive literature that investigates the reflection of earnings announcements on the stock prices. During the last decades the information content of news and the capital market efficiency was tested by focusing on how the market reacts to earnings announcements. However, it must be noted that the main emphasis in respective researches is being put on the categories of earnings announcements (annual, semi-annual, quarterly, monthly, forecasts of earnings, analysts' ratings among others – as the most popular category), the types of earning announcement (commonly classify the announcements as “good” and “bad”) as well as investor's overreaction for both good and bad earnings information (Piccoli et al., 2017; Spyrou et al., 2007; Piccoli & Chaudhury, 2018). However, the reaction to investors earnings announcements on share prices during macroeconomic-uncertainty in the wake of a financial difficulties or a pandemic is being analyzed only by a few authors (Angelovska, 2017a; Johnson & Zhao, 2012; Salminen, 2008). Angelovska, (2017b) found that investors in Macedonia did not react to companies' positive earnings news during economic uncertainty. The findings do not coincide with Salminen (2008), who found that the abnormal returns during the recession were positively slightly higher than during the boom, and Johnson (1999), who found that investors during a recessionary period of the business cycle will be more interested in assessing the information nature of earnings announcements by observing the share price movement around the public announcement of earnings.

This study aims to investigate investor's reaction to earnings announcements on share prices during macroeconomic-uncertainty in the wake of COVID-19 pandemic by employing an event study methodology to observe the share price movement across listed companies on Cambodia Securities Exchange (CSX). The main gap this study aims to fill is whether earnings announcements possess informational value for investors during macroeconomic-uncertainty in the wake of a pandemic. Therefore, the specific objectives are to investigate the behavior of the share prices after the event day and if the volume is usual within the event window.

LITERATURE REVIEW

COVID-19 and Government Stimulus

The novel coronavirus (COVID-19) pandemic has caused a crisis for the global economy and markets. As a consequence of the COVID-19 no business, industry, or economy has been spared from the devastating effects of the pandemic as it shut down many countries' economies for a number of months in order to control the spread of the infectious disease. This has disrupted different macroeconomic or industry factors in the economy such as supply chains across international boundaries, demand for goods and services domestically and overseas, and in the labor force supply. However, despite these challenges, some industries have naturally taken the impact much harder than others, such as airlines, financial institutions, oil and gas, restaurants, live event companies, tourist companies, movie theaters, and many more. But these are hardly not the only one's suffering. Each industry is experiencing its own unique set of challenges that are threatening to undermine a thriving and booming business environment. This can largely be attributed to decreased consumer confidence as consumers globally continue to experience a decrease in income and expect a longer-lasting impact on their routines and finances as a result of the COVID-19 (McKinsey, 2020). Therefore, these changed business conditions in light of the COVID-19 pandemic will affect corporate earnings and consequently will cause companies to review their dividend policies. Chief financial officers (CFOs) of many organizations are becoming increasingly pessimistic about the impact COVID-19 will have on their top and bottom lines, according to a new survey from PricewaterhouseCoopers (PwC). The result of the survey indicates that about 80 percent of the CFOs and other finance leaders expect COVID-19 to decrease revenue and/or profits in 2020 (PwC, 2020).

Furthermore, in response to this crisis, governments and central banks worldwide quickly enacted sweeping and sizable fiscal and monetary stimulus measures to limit the human and economic impact of the COVID-19 pandemic. The hope is to avoid a long-term economic recession due to coronavirus lockdowns. Previous studies have shown that government actions during economic downturn or crisis have helped to stabilize the economy and increase confidence in the market (Agnello, & Sousa, 2011; Al-Eyd & Barrell, 2005; Checherita,

Nickel & Rother, 2009; Hemming, Kell & Mahfouz, 2002; Somani, 2015). Decreasing the federal funds rate appears to be the most practical way for the government to change expectations, increase confidence in the market and thereby increase stock prices (Somani, 2015). Fiscal policy actions can have significant multiplier effects when undertaken in the outcome of severe housing busts, therefore, suggesting the importance of the implementation of fiscal stimulus packages (Agnello & Sousa, 2011). Moreover, increases in government spending during financial crisis is likely to be more effective in supporting the economy than tax reductions, while tax cuts seem to work better in the long run but their effectiveness fades away in the medium to long run (Al-Eyd & Barrell, 2005; Hemming, Kell & Mahfouz, 2002). Higher social transfers usually have a quick positive impact if well targeted to credit-constrained households, but if persistent, they tend to be detrimental to long-term growth by creating distortions in the allocation of resources and impeding labour mobility (Checherita et al., 2009).

Earnings Announcements

This section reviewed the empirical studies around earnings announcements. Investors' reaction to earnings announcements has gained a lot of attention in modern finance literature. This is because share prices of a company can rise and fall based on a company's earnings performance. Earnings information reveals the financial health of a business and its future prospects. However, the findings on investors' reaction to earnings announcements are contradictory. Additionally, Brown (1979) examined the adjustment of stock prices to earning per share (EPS) information and results suggested that statistically significant cumulative abnormal returns appeared from day 15 to day 45. This indicated that the market failed to adjust instantaneously to the new EPS information and provided an opportunity to earn excess returns on the EPS information after 45 days of announcement. Bernard and Thomas (1990) found statistically significant abnormal returns after quarterly earnings announcements. A higher-than-expected earnings announcement is found to have a positive cumulative average abnormal return (CAAR) and tend to move the share price higher (Cready & Gurun, 2010). Similarly, Barker and Imam (2008) found that investors viewed companies with higher earnings more favorably than a company with low earnings. Hussin et al. (2010) found that lower earnings lead to negative market reaction.

Earnings announcements usually contain information which is not publicly available to investors, thus the reaction (Ball & Kothari, 1991; Jegadeesh & Livnat, 2006). Accordingly, managers take actions to avoid announcing lower than expected earnings or earnings surprises, as managers believe that such announcements would lead to large negative price reactions and negative publicity (Burgstahler & Eames, 2006). CEOs are even willing to forgo positive net-present-value projects just to add to the earnings per share (EPS) to meet market expectations (Graham et al., 2005).

Furthermore, studies have recently examined how investors react to earnings announcements during macro-economic uncertainty. During economic uncertainty, investors tend to lose confidence in the market and become more concerned about corporate earnings due to increased future uncertainty (Todorov, 2010). Investors react little less to earnings announcements during economic uncertainty where they attribute bad (good) performance to bad (good) luck rather than to less (more) managerial effort and/or ability during uncertain periods (Stein & Wang, 2016). Furthermore, based on investors' aversion to uncertainty, studies found that there is a larger investors reaction to bad news compared to good news following increased macro-uncertainty (Williams, 2015; Bird & Yeung, 2012). Investors react more to negative earnings announcements (bad news) than a positive earnings announcement (good news) with increased economic uncertainty. Uncertainty-averse investors take a conservative approach and place more weight on negative news than on positive news following an increase in uncertainty. However, Angelovska (2017) finds that investors in Macedonia did not react to companies' positive earnings news during economic uncertainty. Additionally, Ball and Shivakumar (2008) report that earnings announcements provide a modest but not overwhelming amount of information in relation to the market. During the financial crisis, investors were exposed to an unusually high volume of dramatic and unexpected news (Dzielinski 2011). Receiving (too) much information can result in information overload which stimulates status-quo bias, thus potentially reducing individual investors' trading activity during the crisis (Agnew & Szykman 2005). Glaser and Weber (2005), for example, find an increase in the standard deviation of individual investors' return and volatility forecasts directly after September 11 and the subsequent stock-market turmoil.

On the other hand, individual investors earn a significantly weak positive excess return after the day of the earnings announcement while institutional investors do not earn excess return before or after the announcement (Dey & Radhakrishna, 2008). New earnings information exerts its full influence on the stock price within an hour of announcement (Bernard & Thomas, 1990). The abnormal market performance occurred prior to the release of the earnings report. This suggests that although earnings are meaningful measures of a firm's financial performance, by the time they are published they are no longer news and have little or no impact on the market (Davis et al., 2012). Das et al. (2008) found no evidence of significant abnormal returns around quarterly earnings announcements and it could not be established whether the share price drifts are positive in the case of good announcements or negative in the case of bad announcements. Similarly, Hawaldar (2018) concludes that there is no significant difference between the number of positive and negative average abnormal returns (AARs) and based on the CAAR, investors who bought shares either before or after the announcement of quarterly financial results and held them would have earned abnormal returns that are not attributable to market factors. Therefore, the study concludes that the reaction of the Indian stock market to the announcement of quarterly financial results is very slow. The finding is consistent with the study by Iqbal and Mallikarjunappa (2011), Iqbal (2014) and Hawaldar (2016). An event study methodology is employed to test the following hypotheses:

H₀: Expected abnormal return is zero for each stock for each day t in the event window.

H₁: Expected abnormal return is different from zero for each stock for each day t in the event window.

METHODOLOGY

The study adopts an event study methodology to analyze investors reactions to earnings announcements and the impact of the announcement share price around the event period. Event study methodology has been used extensively in finance, economics and political economy literature to empirically estimate market reactions to specific events by studying the reactions of relevant variables around the event window. The methodology is based on the assumption that capital markets are efficient and the effects of an

event will be reflected immediately in the stock price. Normal rate of return means the expected rate of return of the testing period if the event did not occur. An event study analysis could determine whether there is an 'abnormal' return associated with an unanticipated event. The event of interest is the public announcement of earnings, and the event date is the first day on which such an announcement is made.

The market model which provides a linear specification of the return of the given stock to the return of the market portfolio is applied to help gauge the expected returns and to illustrate abnormal returns around the event date. The abnormal return is the difference between the realized return observed from the market and the benchmark return. The benchmark return is supposed to be the return of the stock if there is no event. This model is adopted because it reduces the variance of abnormal returns by removing the portion of the stock return that is related to variation in the market return. The abnormal return is determined as the residual of the market model expressed in (1).

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_i \quad (1)$$

Where R_{it} is the return of stock i,

R_{mt} is the return of market index,

β_i is systematic risk of stock i,

ε_i is the error term.

The empirical model can be stated as follows: when an event occurs, market participants revise their beliefs causing a shift in the firm's return-generating process. Ordinary least squares (OLS) regression is performed to estimate the coefficients of the market model separately for each event using the non-event return data. The estimated coefficients, α_i and β_i are used to form predictions of R_{it} during the event period. Thus, the abnormal return for security i on event day t AR_{it} , is calculated as:

$$\varepsilon_{it} = AR_{it} = R_{it} - \alpha_i - \beta_i R_{mt} \quad (2)$$

We test each firm in our sample for abnormal returns for every day in the event window, using the methodology proposed by Brown and Warner (1985). Abnormal returns or excess returns were computed by subtracting the normal return of the security from actual return of any security over the event window. In this paper, the estimation period is defined as 70 days before the event window and a

21-day event window (observation period) is used to calculate the abnormal returns of the security and 21 days' event window consists of 10 trading days before (anticipation days) and 10 trading days after the event (adjustment days) (Ball and Kothari, 1991; Capstaff et al., 2004; Hussin et al., 2010). A t-statistic for each firm for each day in the event window (defined as 10 days, i.e., -10 to -1, before the announcement day to 10 days after the announcement day, i.e., +1 to +10) is calculated. Our null hypothesis is that excess returns for each day are equal to zero.

The mean abnormal return across event observations on day t denoted as $\overline{AR}_t$, is the sum of individual abnormal returns on day t divided by the number of events (N),

$$\overline{AR}_t = \frac{1}{N} \sum_{i=1}^n AR_{i,t} \quad (3)$$

These $\overline{AR}_t$ were average for all the five stocks in the analysis summed over the event window to calculate the cumulative average abnormal return (CAAR) as follows:

$$CAAR_k = \sum_k \overline{AR}_{i,t} \quad (4)$$

where: $k = -10, \dots, 0, \dots, +10$. The CAAR is a useful statistical analysis in addition to the AR because it helps us get a sense of the aggregate effect of the abnormal returns. Particularly if the influence of the event during the event window is not exclusively on the event date itself, the CAAR can prove very useful.

To find out if the volume is unusual during corporate earnings announcements, the average standardized volume was calculated. First, an individual share's daily volume (V_i) in a particular day t is divided by the average daily volume ($\bar{V}_{ie}$) for that share in the event period ($e = -80$ to $+10$).

$$\bar{V}_{it} = \frac{V_i}{\bar{V}_{ie}} \quad (5)$$

This gives us a normalized measure that is independent of firm size. Second, the normalized volume for each share is averaged across all shares for each day.

$$\bar{V}_{it} = \frac{1}{N} \sum_{i=1}^n \bar{V}_{it} \quad (6)$$

Table 1: Company earnings announcement in Cambodia (2020-2021)

Company Ticker	Event window	Event date	Earning (million KHR)	Year-on-year (YoY) change
GTI	17/12/2019-28/04/2020	09/04/2020	5,545	-4.22%
PAS	09/12/2019-22/04/2020	01/04/2020	43,463	-3.77%
PPAP	09/12/2019-22/04/2020	01/04/2020	46,806	42.84%
PPSP	23/01/2020-09/06/2020	26/05/2020	61,636	699.24%
PWSA	21/02/2020-10/07/2020	26/06/2020	33,292	-54.77%

Grand Twins International (Cambodia) Plc (GTI), Sihanoukville Autonomous Port (PAS), Phnom Penh Autonomous Port (PPAP), Phnom Penh SEZ Plc (PPSP), Phnom Penh Water Supply Authority (PWSA). Date format (dd/mm/yy).

SAMPLE AND DATA DESCRIPTION

The study is based upon listed companies on Cambodia Securities Exchange (CSX) that released their annual financial reports released, during 2019–2021. The daily returns of all the seven stocks listed on the CSX Index, published by CSX, are used for analyses. The daily closing prices and the daily volumes of trade are extracted from the official website of the CSX. The daily returns are computed based on the closing price of each trading day. Event day is defined as a day when any company made the annual financial report announcement and the company's share was traded on that day ($t = 0$). For each event in the sample, a maximum of 91 daily returns are hand-collected. Given the limitations of the data-collecting process, we chose to limit the period under study within the period when COVID-19 was first announced as a global pandemic 2019–2020. The dates and times of the company news announcements have been listed in Table 1; it is taken to be the day on which the news was first reported on CSX. Despite COVID-19, some Cambodian companies reported good earnings that should be rejoice by the investors as shown in Table 1.

EMPIRICAL RESULTS

The market model using equation (1) is calculated by each year, and estimated coefficients are shown in Table 3. These are coefficients that explicate the relationship between the stock and the market. Beta is the stock's sensitivity to market return (the slope coefficient) and measures the sensitivity of a

particular stock to general market movements or returns. It measures the systematic risk based on how returns co-move with the overall market. The level of sensitivity is between 0.12% and 1.61%. The coefficients are significant at 10% (GTI, PPSP and PWSA), 5% (PPAP) and 1% level (PAS).

Table 2: OLS coefficients estimate using equation (1)

Company Ticker	intercept (α)	Beta (β)	R2
GTI	-0.00166	0.35327*	0.04357
PAS	0.00064	1.61157***	0.96337
PPAP	-0.00181	0.24702**	0.08508
PPSP	-0.00058	0.19698*	0.02458
PWSA	-0.00104	0.11718*	0.04230

*, **, *** indicates significance at 10%, 5% and 1% level respectively. Grand Twins International (Cambodia) Plc (GTI), Sihanoukville Autonomous Port (PAS), Phnom Penh Autonomous Port (PPAP), Phnom Penh SEZ Plc (PPSP), Phnom Penh Water Supply Authority (PWSA).

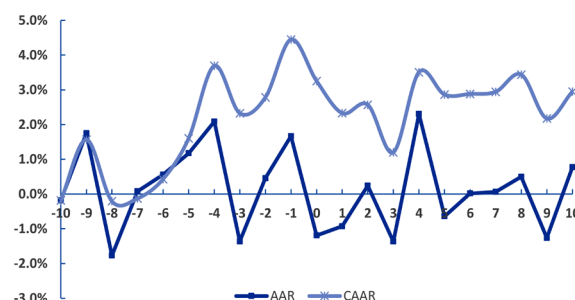


Figure 1: AAR and CAAR across all 5 stocks over the estimation window

Table 3: Result of the test statistics for ARs and corresponding p-values in 21 days' event window for each company

Day	GTI		PAS		PPAP		PPSP		PWSA	
	AR	p-value	AR	p-value	AR	p-value	AR	p-value	AR	p-value
-10	-0.14%	0.97	-0.85%	0.17	1.76%	0.28	-1.05%	0.72	-0.65%	0.66
-9	7.92%	0.02**	-0.11%	0.86	-0.68%	0.67	1.46%	0.61	0.16%	0.92
-8	-9.66%	0.00***	-0.14%	0.83	2.20%	0.17	-0.13%	0.96	-1.13%	0.44
-7	0.22%	0.95	-0.33%	0.60	0.20%	0.90	0.10%	0.97	0.21%	0.89
-6	2.46%	0.46	0.31%	0.62	0.45%	0.78	-0.71%	0.81	0.28%	0.85
-5	0.20%	0.95	-1.32%	0.04**	5.28%	0.00***	0.06%	0.98	1.64%	0.27
-4	9.71%	0.00***	1.15%	0.07*	-0.95%	0.56	0.57%	0.84	-0.05%	0.97
-3	-4.35%	0.19	-0.32%	0.61	-2.08%	0.20	0.09%	0.97	-0.17%	0.91
-2	0.15%	0.96	0.98%	0.12	0.92%	0.57	0.18%	0.95	0.06%	0.97
-1	9.42%	0.01***	-0.09%	0.89	-0.72%	0.65	0.08%	0.98	-0.36%	0.81
0	-1.62%	0.63	-0.12%	0.84	-2.61%	0.11	-1.70%	0.56	0.08%	0.95
1	-2.11%	0.52	-0.05%	0.94	-0.78%	0.63	-4.78%	0.10*	3.09%	0.04**
2	0.07%	0.98	-1.30%	0.04**	0.32%	0.84	-0.88%	0.76	3.00%	0.04**
3	-0.32%	0.92	0.92%	0.14	0.14%	0.93	-4.32%	0.14	-3.27%	0.03**
4	1.19%	0.72	0.36%	0.57	2.29%	0.16	7.62%	0.01**	0.07%	0.96
5	-1.77%	0.59	-3.12%	0.00***	0.40%	0.80	0.77%	0.79	0.51%	0.73
6	-0.19%	0.95	0.98%	0.12	-0.51%	0.75	0.05%	0.99	-0.25%	0.87
7	0.04%	0.99	0.36%	0.57	0.08%	0.96	0.76%	0.79	-0.93%	0.53
8	-1.06%	0.75	1.06%	0.09*	0.09%	0.95	2.21%	0.44	0.17%	0.91
9	-4.14%	0.21	-0.57%	0.36	0.02%	0.99	-1.74%	0.55	0.11%	0.94
10	1.86%	0.57	-0.15%	0.81	1.54%	0.34	0.14%	0.96	0.46%	0.76

*, **, *** indicates significance at 10%, 5% and 1% level respectively. Grand Twins International (Cambodia) Plc (GTI), Sihanoukville Autonomous Port (PAS), Phnom Penh Autonomous Port (PPAP), Phnom Penh SEZ Plc (PPSP), Phnom Penh Water Supply Authority (PWSA). First column (Days) shows 21 days' event window. -10 to -1 are 10 days before event, 0 is the event day and 1 to 10 days are 10 days after event day. AR is the deviation of actual returns of a security from expected returns.

As indicated in Figure 1, the CAAR plot show that to some extent the market gradually learns about the forthcoming announcement. The average CAAR gradually drifts up in Day 3 before the announcements most probably due to anticipation of the announcements. In the days after the announcement, the CAAR is relatively volatile, as would be expected. Furthermore, the CAAR start moving upward 7 days before the event, and it reaches a peak 4 days before the earnings announcements are made. Additionally, the CAAR start moving upward again 2 days before the earnings announcements and surprisingly, it becomes negative a day prior to announcements, and it stays negative until the third day after the announcement is made. It comes to positive range from Day 5 onward after the event. The AR also behaves in the same manner, except it again touches back the positive value at the fourth day after the announcement.

As discussed in methodology, we apply t-statistics to test the statistical significance of aforementioned AR and CAR for each stock. Table 3 presents the results of the t-statistics within the event window (-10 to +10 days) for AR of each stock. It is evident from the results that the absolute value of AR is greater in the case of the GTI and PPSP compared to PAS, PPAP and PWSA. This observation is true for the anticipation window, adjustment window and day of the event. This specifies that compared to PAS, PPAP and PWSA, market reacts more strongly in GTI and PPSP sample.

The results of the t-statistics within the event window (-10 to +10 days) for AR shows few significant abnormal returns before and after the earnings announcement for each stock. The AR for GTI where only found to be significant for Day 1, 4, 8 and 9 before the announcement while the rest of the days in the event window especially after the announcement were found not to be significant. Additionally, the AR for PAS where only significant for Day 4 and 5 before the announcement and Day 2, 5 and 8 after the announcement while the rest of the days are insignificant. For PWSA, the significant days appeared to be immediately after the announcement (Day 1, 2 and 3) while for PPAP and PPSP only one day appeared to be significant throughout the event window. Moreover, in all the five stocks analyze, the event has not created significant impact on the share price on the announcement day. The movement of share prices is not influenced by the announcement. Sharma (2020) shows that COVID-19 has a statistically significant effect on stock volatility, but the impact

actually varies with countries involved, with the markets in higher-income countries overreacting in the beginning and bouncing back more rapidly than lower-income countries.

Furthermore, the none responses and reaction by Cambodian investors to the companies' earnings announcement as empirically evidence could be influence by the government in response to COVID-19. We have seen governments and central banks worldwide quickly enacted sweeping and sizable fiscal and monetary stimulus measures to limit the human and economic impact of the COVID-19 pandemic. The hope is to instill confidence in the short- term and avoid a long-term economic recession due to coronavirus lockdowns. Previous studies have shown that government actions during economic downturn or crisis have helped to stabilized the economy and increase confidence in the market (Agnello, & Sousa, 2011; Al-Eyd & Barrell, 2005; Checherita, Nickel & Rother, 2009; Hemming, Kell & Mahfouz, 2002; Somani, 2015).

Table 4: CAAR T-statistics for combined days in window

Windows	Number days	CAAR	t-stat	p-value
(-1, +1)	3	-0.455%	-0.12029	0.905
(-2, +2)	5	0.245%	0.05023	0.960
(-3, +3)	7	-2.488%	-0.43086	0.668
(-4, +4)	9	-3.138%	-0.47927	0.633
(-5, +5)	11	2.434%	0.33626	0.738
(-6, +6)	13	3.009%	0.38229	0.703
(-7, +7)	15	3.151%	0.37274	0.710
(-8, +8)	17	1.876%	0.20839	0.836
(-9, +9)	19	2.362%	0.24824	0.805
(-10, +10)	21	2.945%	0.29442	0.769

*, **, *** indicates significance at 10%, 5% and 1% level respectively. CAAR is the cumulative average deviation of actual returns of a security from expected returns of all the five stocks in the analysis.

Therefore, to obtain robust results, we developed the CAR by aggregating AR to test the significance of return in combined days in the event window (such as -1, +1; -2, +2; -4, +4; etc.). These results as shown in table 4 for CAR t-statistics indicate that the reaction of the stock returns in the selected windows do not appears to be statistically significant. Therefore, if the corporate announcement has an effect on stock prices, we would expect to see rejections of the null hypothesis on each day in the event window. Rejections in the event window are not found. This suggests that corporate announcements in our sample have no impact on returns. If the corporate

announcement has an effect on stock prices, we would expect to see rejections. The findings are not consistent with Salminen (2008), who found that the abnormal returns during the recession were positively slightly higher than during the boom, and Johnson (1999), who found that investors during a recessionary period of the business cycle will be more interested in assessing the information nature of earnings announcements by observing the share price movement around the public announcement of earnings.

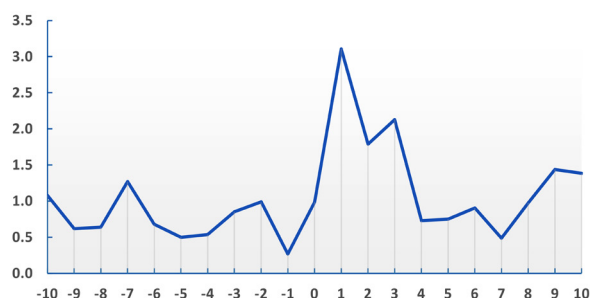


Figure 2: Average standardized volumes over the estimation window

To find out if the volume is unusual during the event window period, the standardized average across the stocks volume is calculated. Figures 2 plot this daily volume figure in the event period (–10 to +10). As can be seen, there is sharp increase on Day 1 before the announcement, on the announcement day and then a sharp decrease in the standardized average volume back to the usual volume observed in the event window. In the market microstructure literature, high volumes are associated with information arrivals (Kyle, 1985). In general, we could observe that there is no unusual volume in the event window.

CONCLUSION

In this study, we compute abnormal return for individual stocks and the cumulative average abnormal return around earnings announcements to measure the information efficiency of earnings announcements on the Cambodian Securities Exchange. To investigate the announcements' effects, we used event study approach to probe investor's reaction to corporate earnings announcements made by the listed companies on CSX. First, we estimated normal returns, using market model; subsequently, these returns were used to calculate abnormal returns for the share price. This study aimed at investigates investor's reaction to the announcement in the wake of COVID-19 pandemic on CSX, scrutinizing the impact of information efficacy in

earnings announcement and existence of abnormal returns. Empirical evidence demonstrates that the Cambodian investors did not react to the companies' earnings announcement. The null hypothesis could not be rejected in favor of the alternate hypothesis.

The study intended to contribute to the existing literature on earnings announcements by analyzing the information content of earnings announcements in a small Cambodian stock market during the COVID-19 pandemic period. Even though it was expected that earnings announcements during a recessionary period would result in positive price reaction, the study has indicated that the information content of earnings was beyond investors' interest. The puzzling price pattern following a major price shock on the Cambodian stock market may be explained by behavioral principles, an issue to be addressed in further research. Cultural dimensions and their disparity between countries can also be reflected differently on pricing models. Further research on corporate stock prices' reactions requires the direction of corporate events and investors' behavior towards these events and the information they get indicators that enable them to evaluate their performance and determine their value in the financial market.

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