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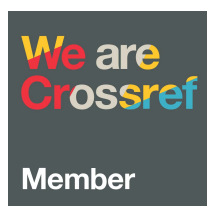
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An Empirical Study of Pairs Trading in Cambodia Securities Exchange

Siphat Lim*

ABSTRACT

A pair trading strategy of two shares works when there is a co-integration between the two equities. This paper uses the two-step Engle and Granger method to establish whether or not the two stock price series had a long-run relationship. Since the residual term predicted from the sample regression function between the dependent variable, PPSP, and the independent variable, PWSA, is stationary, as indicated by the ADF test, all listed stocks in CSX, a pair of equities, PPSP and PWSA, are co-integrated. During the research period, the price spread increased three times to two standard deviations. At any point, one unit of outperformance stock is short, and one unit of co-integrated ratio is long. Pair trading has an average investment return of 8.0264 percent, outperforming the weighted average return of 1.1651 percent.

Keywords: Pair trading; CSX; Co-integration; ADF test

INTRODUCTION

Investors are seeking new methods, instruments, and solutions in the face of growing market volatility and upheaval to support their capital. Many structured products have been developed and are too complex for average investors to approach, such as Synthetic Options and Knock-In Knock-Out options or the growth of derivatives products. A strategy for investment instead remained on newspaper pages despite the decade-long fall from one-pair trading, one of the most widely used investment techniques.

Pair trading is a market-neutral strategy that enables investors to take advantage of various market movements. Gerry Bamberger pioneered the pair trading strategy, which Nunzio Tartaglia's Investment Bank Morgan Stanley team built in the 1980s (Wilmonett, 2004). If their connection is less in the near term owing to the news and income, one stock is rising, and one stock is decreasing, it is a way to cut a prolonged and excessive stock, risking the spread of prices between two stocks to average. The shift in demand and supply, large purchases or sales volumes, and market reaction to the news or revenue reporting of the firm, among other factors, are believed to generate this short-term variation.

Since April 2012, the Cambodia Securities Exchange (CSX) has been in operation. There are now seven listed stocks, such as Pestech (Cambodia) Plc. (PEPC),

ACLEDA Bank Plc. (ABC), Sihanoukville Autonomous Port (PAS), Phnom Penh Special Economic Zone (SEZ) Plc. (PPSP), Phnom Penh Autonomous Port (PPAP), Grand Twins International (Cambodia) Plc. (GTI), and Phnom Penh Water Supply Authority (PWSA). The listed firms have been divided into five distinct industries, which are as follows: financial, port services, SEZ developer, apparel clothing, and power. Even though the market capitalization of the listed stocks in CSX was USD 2.4 billion in June 2021 and has been classified as one of the world's smallest capital markets, it is worthwhile to investigate if a pair trading method exists in this market. The primary goal of this research is to provide a system for constructing pair trading that can be used for any pair of stocks listed on CSX.

LITERATURE REVIEW

According to Gatev et al. (1999), each stock is paired with a matching partner with the minimum normalized historical price deviation. The pair-trading introduced by Gatev et al. (1999) yields profitable results after an allowance for trading costs, and these profits are inherently different from a pure mean-reversion strategy. Patanapol (2001) further confirmed that the approach could generate an abnormal return, exceeding the average market return in the Stock Exchange of Thailand (SET) during 2001-2002. Nath (2003) is more concerned with risk control and prevents huge losses by employing a stop-loss trigger to close the position once the distance widens further

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to hit the 5th percentile. The additional measure can improve the portfolio performance relative to various benchmarks. The distance approach mainly employs the statistical relationship between two pairing stocks. While the method is not prone to model misspecification and misestimating, being nonparametric statistics suggests that the strategy cannot forecast the portfolio's expected holding period or convergence time.

Co-integration test on long-term co-movement of stock prices is considered a critical criterion for pairs-trading. Lin et al. (2006) employed Co-integration-based analysis using daily closing price data of two shares from the Australian Stock Exchange between January 2, 2001, and August 30, 2002. The findings indicate that the trading strategy can generate a substantial return and is unrestricted by implementing a reasonable minimum profit condition to secure against losses. Hong & Susmel (2003) undertake pairs-trading analyses on 64 Asian shares listed in their local market and the U.S. as ADRs (American Depositary Receipts). The outcomes of this study demonstrate that pair trading in this market could yield significant profits. The results are robust to various profit measures of the strategies and holding periods. Further, research on Co-integration-based pairs-trading was done by Vidyamurthy (2004) to develop the forecasting framework, though empirical results still needed to be done. The approach presented by Vidyamurthy (2004) may be subject to errors arising from the econometric models, particularly misspecification and misestimating. The Engle-Granger method's two-step Co-integration procedure raises a question about selecting the independent and dependent variables in the equation.

Zapart (2004) introduces an approach in which stocks from the same industry are paired following their wavelet correlation measure. Correlation analysis for the two chosen stocks based on time series would be performed using a highly optimized wavelet correlation measure with artificial neural networks and genetic algorithms. Based on twenty-five NYSE stocks, trading simulations suggest the model can exploit consistent profits in rising and falling markets even when a typically established long-short arbitrage strategy remains flat. Comparing the two measures by the statistical arbitrage fund managers, the static wavelet correlation measure outperforms a trading system based on a dynamic risk model during the studied period between 2000 and 2004.

Elliott et al. (2005) estimate a parametric spread model using a Kalman filter. The method can provide a consistent and robust model to predict the spread for making an investment decision, with several advantages from the empirical perspectives. First, it utilizes the mean reversion strategy of pairs-trading. Second, the continuous-time feature of the model makes it capable of forecasting the expected holding period. However, the fundamental issue of this approach is that the model restricts the long-term relationship between the two stocks to one of return parity. In the long run, the two chosen stocks must offer the same return, and any deviation from it will be expected to be corrected in the future. In practice, finding such two stocks with identical returns is challenging.

According to the research of Jurek and Yang (2007) on dynamic portfolio selection in arbitrage, if two equities are co-integrated, and one share is overpriced while the other is underpriced at some point, the prices of the mispriced pair should coincide. Thus, a position should be opened by shorting the overpriced share and longing for the underpriced share. This technique is known as the "Long-Short (LS) Strategy." In terms of portfolio weight or number of shares, the position should be taken at the same magnitude but with the opposite sign.

Profit was made by employing the pair trading strategy on the New York Mercantile Exchange. The trading concept arose from the mean-reversion process of the price gap between two separate assets under consideration in the same or different sectors. The spread's strong mean-reversion and high volatility contribute to the expected return from trading. Kanamura et al. (2008) discovered that this approach works effectively with natural gas, heating oil, and WTI crude oil futures (2008).

Krauss (2017) identified five types of pair trading approaches: distance trading, co-integration trading, time series trading, stochastic control trading, and other trading strategies. Distance and co-integration techniques are the most popular, with several literature evaluations done by several researchers. Several distance measures based on the distance method are utilized throughout the formation stage to discover co-moving shares. During the trading session, simple nonparametric threshold criteria activate trade alerts. The significant advantages of this method are its simplicity and transparency, which enable large-scale empirical applications. The findings establish distance pairs trading as a profitable

over a wide range of markets, asset classes, and time periods. For the co-integration approach, in a formation phase, Engle and Granger co-integration or other co-integration tests are employed to detect co-moving stocks. Simple algorithms are used to produce trade signals during the trading period, with the bulk of them based on the Gatev et al. (1999) threshold criterion mentioned earlier. Of course, this research study is likewise conducted by these criteria.

To evaluate the five pair trading techniques: correlation, distance, stochastic, stochastic differential residual, and co-integration, Blázquez and Román (2018) used empirical pair trading approaches to determine how pair trading is selected. The research focuses on the banking industry in the United States, represented by the S&P500 index. This study analyzed daily stock prices from January 1, 2008, until December 31, 2013. The empirical results of this study show that co-integration and distance procedures of a pair of stocks meet the property of residual series better than other approaches. The results of the two techniques also show that the larger the co-integrated ratio of a pair of stocks, the better the residual series fulfills the essential properties. The outcome of the stochastic approach used in this study is also consistent with the findings of Elliott et al. (2005), Jurek and Yang (2007), and Kanamura et al. (2008), which revealed to be dependent on the premise that the strategy's residual series is represented by an Ornstein-Uhlenbeck stochastic model with constant k , θ and σ parameters, which is extremely difficult to solve.

Namwong et al. (2019) applied a Markov-switching GARCH model in two different regimes, which have different variances in each regime, and the sum of the two variances is used as a pair-trading signal in the Stock Exchange of Thailand (SET). The empirical results demonstrate that the Markov-switching GARCH model trading signals provide positive returns for all selected pairings and give the greatest return of up to 14.27 percent. Furthermore, pair trading yields a larger return than solo stock trading.

Due to the need for an efficient approach to determining the long or short ratio of investment in the equity of a particular pair of companies, Ramos et al. (2020) created a novel strategy for defining the investment ratio. Six distinct techniques have been discovered in determining weighted components indicated as b: equal weight, stock price standard deviation, minimal distance of the log-prices, correlation of return, co-integration of prices, and

lowest Hurst exponent of the pair. This research paper employed four pair trading methods: correlation, co-integration, distance method, and Hurst exponent on the components of the Nasdaq 100 index technological sector in the United States of America. Daily stock price sample sizes were separated into two sub-periods: January 1999 to December 2003 and January 2007 to December 2012. The first sub-sample experienced the "dot.com boom and burst," whereas the second experienced the "subprime mortgage crisis." According to the outcomes of this study, a novel approach to computing weighted factors caused the return to surpass the current methods employed.

It is essential to check whether the data series are stationary or non-stationary in time series econometric techniques. The time series data are usually non-stationary, and modeling with non-stationary data series may increase the possibility of a spurious regression problem from which no valid statistical inference can be made. Moreover, the variance of a non-stationary series changes with time, and the critical assumption of OLS estimation breaks down.

So stationary or lack of it is an important property of time series processes. In general, a collection of N -dimensional random vectors $y_{t-1}, y_t, \dots, y_{t+1}$ is called a stochastic *stationary* process if,

- i. All the random vectors have the same mean vector $E[y_t] = \mu$ for all t , so $E[y_t] = E[y_{t+1}]$ for any t and k .
- ii. The variance of all involved random variables is a finite constant σ_y^2 $\text{var}(y_t) = \sigma_y^2$ for all t , so that $\text{var}(y_t) = \text{var}(y_{t+k})$ for any t and k .
- iii. The covariance matrices of vector y_t and y_{t+k} that are k periods apart do not depend on t but only on k .

$$\text{cov}(y_t; y_{t+k}) = E[(y_t - \mu)(y_{t+k} - \mu)'] = \Gamma \text{ for all } t$$

so that $\text{cov}(y_t; y_{t+k}) = \text{cov}(y_{t+n}; y_{t+n+k})$ for any t, k or n

Estimating the abovementioned conditions implies that the time series under consideration must not have trends, fixed seasonal patterns, or time-varying variances. If time series variables do not possess the properties (i), (ii), and (iii), the variables are said to be generated by a non-stationary process. The significant difference between stationary and non-stationary time series is that shocks to a stationary time series are necessarily short-lived.

The “carry over” effect of an old shock on the current value of the series would be insignificant if the shock happened long enough ago. Over time, the results of the shock will dissipate, and the series will return to its long-run mean level. In other words, a stationary series will have a well-determined mean which will not vary significantly with the sampling period. On the other hand, in the case of a non-stationary series, an old shock will still have a noticeable impact on the current value of the series. A non-stationary series’s mean and/or variance are time-dependent, and we cannot generally properly use the term mean without referring to some particular time period.

The simplest example of a non-stationary process is the random walk, which is well represented by the following equation:

$$x_t = x_{t-1} + \varepsilon_t \quad (1)$$

where $\varepsilon_t \sim iid(0, \sigma^2)$, so that if $x_0 = 0$,

$$x_t = \sum_{t=1}^T \varepsilon_t$$

The previous equation implies that old shocks have equal weight to new shocks in determining the current value of x_t . The variance of x_t is $t\sigma^2$, which becomes indefinitely large as $t \rightarrow \infty$. It is also clear that the concept of a mean value for x_t has no meaning. While modeling time series data, it is essential to know whether or not the underlying stochastic process that generated the series can be assumed to be invariant concerning time.

If the characteristics of the stochastic process change over time, i.e., if the process is non-stationary, it will be challenging to represent the time series over past and future time intervals in a simple algebraic model. Moreover, the statistical properties of regression analysis and estimators using non-stationary time series are dubious, as evidenced by the substantial literature on “spurious regression.” For example, the Gauss-Markov theorem will not hold if a random walk has no finite variance. Hence, OLS would not yield a consistent parameter estimator. If the series are non-stationary, the series is likely to end up with a model showing promising diagnostic test statistics even when there is no sense in the regression analysis.

To overcome the problem of non-stationary data and “spurious regression,” the usual and common practice is to differentiate the time series to achieve stationary. A non-stationary series is said to contain an

integrated component, and it should be differenced before the estimation process to achieve stationary. Following a formal definition by Engel and Granger (1987) who introduced the concept of integrated series into econometrics, a series x_t is said to be integrated of order d (denoted $I(d)$) if it is a series which has a stationary, invertible, non-deterministic ARMA representation after differencing d times.

Based on this definition, a stationary series is said to be integrated of order zero, $x_t \sim I(0)$. For a linear combination of two series, each integrated at different levels, the resulting series will be integrated at the higher of the two orders of integration. For example, suppose:

$$Z_t = bx_t + cy_t \text{ where } x_t \sim I(d_x), x_t \sim I(d_y) \quad (2)$$

Then, in general, $Z_t \sim I(\max(d_x, d_y))$.

However, this need is always the case. The exception to this rule gives rise to the new concept of co-integration. An important exception to this rule occurs when the common integrating factor of two or more variables exactly offsets each other to give a stationary Z series $Z \sim I(0)$. The basic idea of a set of co-integrating variables is that if two or more series move closely together in the long run, even though the series themselves are trended, the difference between them is constant. A detailed discussion of the concept of co-integration will follow (Hamilton, 1994; Hayashi, 2000).

The following discussion outlines the basic features of unit root tests. By necessity, the discussion will be brief.

Consider a simple AR(1) process:

$$y_t = \rho y_{t-1} + x_t' \delta + \varepsilon_t \quad (3)$$

Where x_t are optional exogenous regressors consisting a constant or a constant and trend, ρ and δ are parameters to be estimated, and the ε_t are assumed to be white noise. If $|\rho| \geq 1$, y is a nonstationary series, and the variance increases with time and approaches infinity. If $|\rho| < 1$, y is a (trend-) stationary series. Thus, the hypothesis of (trend-) stationarity can be evaluated by testing whether the absolute value of ρ is strictly less than one.

The unit root tests in some programs provide a general test the null hypothesis $H_0: \rho = 1$ against the one-sided alternative $H_1: \rho < 1$. In some cases, the null was tested against a point alternative. In contrast, the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS)

Lagrange Multiplier test evaluates the null of $H_0: \rho < 1$ against the alternative $H_1: \rho = 1$ (KPSS, 1992).

The standard *DF* test was carried out by estimating equation (3) after subtracting y_{t-1} from both sides of the equation:

$$\Delta y_t = \alpha y_{t-1} + x_t' \delta + \epsilon_t \quad (4)$$

where $\alpha = \rho - 1$. The null and alternative hypothesis may be written as,

$$H_0: \alpha = 0$$

$$H_1: \alpha < 0$$

and evaluated using the conventional *t-ratio* for α :

$$t_\alpha = \frac{\hat{\alpha}}{se(\hat{\alpha})} \quad (5)$$

where $\hat{\alpha}$ is the estimate of α , and $se(\hat{\alpha})$ is the coefficient standard error.

Dickey and Fuller (1979) show that under the null hypothesis of a unit root, this statistic does not follow the conventional Student's *t*-distribution, and they derive asymptotic results and simulate critical values for various tests and sample sizes. More recently, MacKinnon (1996) implemented a much larger set of simulations than those tabulated by Dickey and Fuller. In addition, MacKinnon estimates response surfaces for the simulation results, permitting the calculation of Dickey-Fuller critical values and *p*-values for arbitrary sample sizes. Some programs constructing test output use the more recent MacKinnon critical value calculations. The simple Dickey-Fuller unit root test described above is valid only if the series is an *AR*(1) process. If the series is correlated at higher order lags, the assumption of white noise disturbances ϵ_t is violated. The Augmented Dickey-Fuller (*ADF*) test constructs a parametric correction for higher-order correlation by assuming that the series follows an *AR*(*p*) process and adding *p* lagged difference terms of the dependent variable to the right-hand side of the test regression:

$$\Delta y_t = \alpha y_{t-1} + x_t' \delta + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \dots + \beta_p \Delta y_{t-p} + \epsilon_t \quad (6)$$

This augmented specification is then used to test (4) using the *t-ratio* (5). A significant result obtained by Fuller is that the asymptotic distribution of the *t-ratio* for α is independent of the number of lagged first differences included in the *ADF* regression. Moreover, the assumption that *y* follows an autoregressive (*AR*) process may seem restrictive.

A frequent question raised in time series analysis is whether one economic variable can forecast another economic variable. According to Granger (1969), testing causality involves using *F-tests* to identify whether lagged information on a variable *x* provides any statistically significant information about a variable *y* in the presence of lagged *y*. If not, then “*x* does not Granger-cause *y*.”

A bivariate vector autoregression is specified and applied to implement the Granger causality case. Assume a particular autoregressive lag length *p*, and estimate the following equation by ordinary least squares (*OLS*):

$$y_t = \theta + \sum_{i=1}^p \alpha_i y_{t-i} + \sum_{i=1}^p \beta_i x_{t-i} + \epsilon_t \quad (7)$$

The null and alternative hypotheses are set as follows,

$$H_0: \beta_i = 0 \text{ for all } i$$

$$H_1: \beta_i \neq 0$$

Then, an *F-test* is conducted of the null hypothesis by estimating the following equation by *OLS*:

$$y_t = \delta + \sum_{i=1}^p \phi_i y_{t-i} + \mu_t \quad (8)$$

Compare their respective sum of squared residuals.

$$RSS_\epsilon = \sum_{t=1}^T \epsilon_t^2, \quad RSS_\mu = \sum_{t=1}^T \mu_t^2$$

If the statistic test

$$S = \frac{(RSS_\epsilon / RSS_\mu) / p}{RSS_\epsilon / (T - 2p - 1)}$$

is greater than the specified critical value, then reject the null hypothesis that *x* does not Granger-cause *y* (Greene, 2003).

Co-integration test is an economical technique for measuring the correlation between non-stationary time series variables. If two or more time series are non-stationary, but a linear combination of them is stationary, then the series is said to be co-integrated.

In regression model

$$y_t = \alpha + \beta x_t + \epsilon_t \quad (9)$$

where y_t and x_t are both non-stationary and *I*(1) processes. The difference between them is increasing, not stable as time passes. Unless there is a relationship between y_t and x_t , then there should be α and β such that

$$\epsilon_t = y_t - \alpha - \beta x_t \quad (10)$$

is $I(0)$ or stationary. Intuitively, if two series are both $I(1)$, then this partial difference might be stable around a fixed mean. Two series that satisfy this requirement are said to be co-integrated. A long-run relationship between y_t and x_t can be estimated in such a case.

The most well-known test, suggested by Engle and Granger (1987), is to run a static regression (after having verified that y_t and x_t are both $I(1)$). In the single equation approach, the co-integration test can be conducted in the following manner. First, y_t and x_t are regressed by ordinary least squares method and obtain the OLS residuals, ε_t .

$$\varepsilon_t = y_t - \alpha - \beta x_t \quad (11)$$

where α and β denote the OLS estimates.

$$H_0: \beta = 0$$

$$H_1: \beta < 0$$

Accepting the null hypothesis, $\beta = 0$, implied that the residual contains unit root and is non-stationary. Rejection of the null hypothesis, $\beta < 0$, means that the residual converges to the long-term mean or being a stationary time series.

Stock prices change over time, following a random walk. Testing the hypothesis that there is a statistically significant correlation between two series of stock price can be performed based on a co-integration procedure. Thus, the formula is presented as follows:

$$\bar{\alpha} = y_t - \bar{\beta} x_t \quad (12)$$

Where,

$\bar{\alpha}$: Estimated mean spread of stock x and y

$\bar{\beta}$: Estimated Co-integration coefficient

y_t : Price of stock y at time t

x_t : Price of stock x at time t

This formula will produce a buying or selling signal for the trading program. In the event of a buying signal, a long position will be entered on one share of stock y and simultaneously going short on $\bar{\alpha}$ share of stock x , and vice versa for a selling signal.

METHODOLOGY

To check whether a series of stock price has a unit root, non-stationary, or stationary, Augmented Dickey-Fuller (ADF) test is carried out. If each data series is non-stationary, the ADF test is applied again on the first difference of the series. The series is said

to be integrated of order one or $I(1)$, when stationary result is found on the first difference of the data series, but non-stationary is found on the level of data series. If two stock prices are integrated of order one, the Granger causality test is applied to determine which stock price is classified as the dependent and independent variable. The linear relationship between two stock prices is defined by using two steps Engle and Granger co-integration test. Firstly, the logarithms of stock Y are regressed again, and the logarithm of stock X as a co-integration equation is

$$\log(p_t^Y) = \mu + \vartheta \log(p_t^X) + \varepsilon_t \quad (12)$$

Where,

p_t^Y : Price of stock Y ,

p_t^X : Price of stock X ,

μ : Intercept,

ϑ : Co-integration coefficient,

ε_t : Residual term,

The estimated method is Fully Modified Least Squares (FMOLS). The predicted residual from equation (12) could be generated as follows:

$$\hat{\varepsilon}_t = \log(p_t^Y) - \hat{\mu} - \hat{\vartheta} \log(p_t^X) \quad (13)$$

Secondly, unit root test is performed on the predicted residual value from equation (13). If the residual term is stationary or has no unit root, it could be concluded that a linear relationship between the two stock prices exists.

After estimation of the co-integration coefficient, a trading position is opened when price spread between two stocks climbs up to 2 standard deviations (SD) and the position is closed out when the price spread reverts back to the mean or climbs up to 4 standard deviations or any price spread during the last trading day. A position is opened by a long one underperforming stock and a short $\hat{\theta}$ overperforming stock

Ratio of share number = $1:\hat{\theta}$

Amount of invested capital = KHR100,000

$$\text{Ratio of short unit} = \frac{\text{Invested capital}}{\text{Price of short unit at time } t_t}$$

Ratio of long unit = Ratio of short unit * $\hat{\theta}$

$$\text{Investment return} = \frac{\text{Cash inflow at time } t_{t+1} - \text{Cash outflow at time } t_t}{\text{Invested capital}} \times 100$$

If the trade rule is complied with, the abovementioned trading is repeatedly applied. The average return on investment is determined for the study period. In order to assess the performance of Pair Trading, two techniques compare the weighted average portfolio return and the average return of the CSX Index.

Weighted average return during the period=

$$(C_Y \times R_Y) + (C_X \times R_X)$$

Where, C_Y is co-integration of stock Y, C_X is co-integration of stock X, R_Y is the return of stock Y and R_X is the return of stock X. The return on stock i or the CSX index is computed as follows, $R_{i,t} = \text{Log}(S_{i,t}/S_{i,t-1}) \times 100$. Where, $S_{i,t}$ is the stock i price at time t , $S_{i,t-1}$ is the stock i price at time $t-1$ and Log is logarithm. The research will run from June 7, 2017 through July 7, 2021. Daily stock prices are obtained from the Bloomberg terminal.

EMPIRICAL RESULT

Of course, there are seven listed stocks on the Cambodia Securities Exchange; however, during the study period from June 7, 2017 to July 7, 2021, only four stocks have enough data set: Sihanoukville Autonomous Port (PAS), Phnom Penh Special Economic Zone (SEZ) Plc. (PPSP), Grand Twins International (Cambodia) Plc. (GTI), and Phnom Penh

Water Supply Authority (PWSA). The equities under consideration have been divided into four industries: port services, SEZ developer, apparel garments, and water utility. Table 1 shows the descriptive statistics of the daily returns of the selected equities and market index.

To begin, each stock price or stock index series is given a natural logarithm to make the series continuous data. Second, the series is converted to the first difference and then multiplied by 100, resulting in each stock's daily growth rate or daily return. The average return on stock PAS and PWSA is 0.1062 percent and 0.0629 percent, respectively, which is higher than the average return on the CSX index. Furthermore, the coefficient of variation (CV) of the two stocks, which shows the ratio of standard deviation over mean, is higher than the market one, at 4.8997 percent for PAS and 3.8708 percent for PWSA, compared to 3.2338 percent for the CSX index. Based on the CV comparison, it is possible to conclude that the returns of PAS and PWSA beat the market. In contrast, GTI's daily average return is 0.0000 percent, while PPSP's daily average return is -0.0243 percent, lower than the CSX index's daily return. Nonetheless, the CV of the two stocks is smaller than that of the market. As a result, the returns on the two stocks underperform the market return.

Table 1: Descriptive Statistics

	DLOGCSX	DLOGGTI	DLOGPAS	DLOGPPSP	DLOGPWSA
Mean	0.0485%	0.0000%	0.1062%	-0.0243%	0.0629%
Median	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Maximum	7.9529%	9.5310%	9.5003%	9.3010%	9.5310%
Minimum	-8.9566%	-12.9356%	-10.5361%	-10.5361%	-10.4106%
Std. Dev.	1.4998%	3.0856%	2.1675%	1.9860%	1.6250%
Skewness	-0.094325	-0.015820	0.304799	0.181084	0.273979
Kurtosis	12.996490	6.569771	10.516650	11.380160	15.350000
CV	3.2338%	0.0000%	4.8997%	-1.2236%	3.8708%



level. This finding may be understood as the logarithm of each stock price series being integrated into order one, $I(1)$. A pair trading relationship has been created between PPSP and PWSA. The Granger causality test examines the causal link between PPSP and PWSA, whether run from PPSP to PWSA or vice versa, or to identify which variable is dependent and independent.

Table 3: Granger Causality Test, PPSP and PWSA

Null Hypothesis:	Obs	F-Statistic	Prob.
LOGPPSP does not Granger Cause LOGPWSA	961	3.02854	0.0489
LOGPWSA does not Granger Cause LOGPPSP		3.44856	0.0322

Table 3 shows that PPSP Granger causes PWSA and vice versa since the p-value is less than 5% significant. As demonstrated by this finding, it makes no difference whether PPSP is considered a dependent or independent variable; hence, PPSP is categorized as a dependent variable, and PWSA is classed as an independent variable. A Fully Modified Least Squares (FMOLS) method is used to identify sample parameters.

Table 4: Co-integration Equation between PPSP and PWSA

Dependent Variable: LOGPPSP				
Method: Fully Modified Least Squares (FMOLS)				
Sample (adjusted): 6/08/2017 7/08/2021				
Included observations: 962 after adjustments				
Cointegrating equation deterministics: C				
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 7.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOGPWSA	-0.366341	0.057243	-6.399729	0.0000
C	10.93578	0.487396	22.43715	0.0000
R-squared	0.222608	Mean dependent var		7.818329
Adjusted R-squared	0.221799	S.D. dependent var		0.197561
S.E. of regression	0.174280	Sum squared resid		29.15846
Long-run variance	0.209194			

A sample regression function between PPSP and PWSA is written as below:

$$\widehat{LogPPSP}_t = -0.366341LogPWSA_t + 10.93578$$

Based on this estimated result, PWSA is highly significant in explaining PPSP at 1 percent level. This sample regression function is used to predict the residual term, and the unit root test is applied

to check whether the term is stationary or non-stationary.

Table 5: Unit Test, Residual Term between PPSP and PWSA

Null Hypothesis: RESID01_PPSP&PWSA has a unit root				
Exogenous: None				
Lag Length: 0 (Automatic- based on SIC, maxlag=21)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.918696	0.0526
Test critical values:			1% level	-2.567371
			5% level	-1.941153
			10% level	-1.616478
*MacKinnon (1996) one-sided p-values.				

According to the ADF test results in Table 5, the residual term is stationary at a 10% significant level, indicating that the two data series are co-integrated or have a long-run connection. The stock price spread between PWSA and PPSP is computed next, and summary statistics are shown in Table 6.

Table 6: Summary Statistics, Stock Price Spread between PWSA and PPSP

	SPREAD_PWSA_PPSP
Mean	2596.376
Median	3220
Maximum	6270
Minimum	180
Std. Dev.	1499.936
Observations	963

The mean spread is KHR 2,596.376, with a standard deviation (SD) of KHR 1,499.936. Furthermore, the spread's 2SD and 4SD are KHR 2,999.872 and KHR 5,999.744, respectively. As previously stated, if the spread clams up to 2SD, a position will be opened by shorting one unit of the outperformance stock and longing for some quantity of share equal to the co-integration ratio between the two stocks obtained in the co-integration calculation above. The position will be closed when the spread reverts to the mean, and the investment return is determined. If the trading rule is met, this procedure will be performed several times during the research. KHR 100,000 is set to be the starting investment. PWSA and PPSP have co-integrated ratios of 0.36634 and 0.62669, respectively.



Figure 2: Stock Price Spread between PWSA and PPSP

Table 7: Open and Close Position with respect to Trading Rule

			1st Price Spread Climb up to 2SD			
	Units	Position		Date	PWSA	PPSP
			t_0	1/28/2019	KHR 6,200	KHR 3,500
Short (PWSA)	15.87	Open	t_1	1/29/2019	KHR 6,300	KHR 3,300
Long (PPSP)	5.81	Close	t_2	1/31/2019	KHR 5,700	KHR 3,090
			2nd Price Spread Climb up to 2SD			
				Date	PWSA	PPSP
			t_0	2/7/2019	KHR 5,940	KHR 3,100
Short (PWSA)	16.13	Open	t_1	2/8/2019	KHR 6,200	KHR 3,090
Long (PPSP)	5.91	Close	t_2	2/18/2019	KHR 5,580	KHR 2,960
			2nd Price Spread Climb up to 2SD			
				Date	PWSA	PPSP
			t_0	2/22/2019	KHR 5,660	KHR 2,960
Short (PWSA)	16.67	Open	t_1	2/25/2019	KHR 6,000	KHR 2,960
Long (PPSP)	6.11	Close	t_2	3/12/2019	KHR 5,600	KHR 2,940

During the research period, the stock price gap between PWSA and PPSP rose to 2SD three times before reverting to mean, on January 29, 2019, February 8, 2019, and February 25, 2019. The position is opened at time t_1 when the spread reaches 2SD and terminated at time t_2 when the spread returns to mean. Table 7 shows that t_0 indicates the day before the spread reached 2SD. When comparing t_1 and t_0 , the PWSA's price rises while the PPSP's price falls all three times; the spread reaches 2SD and is converted back to the mean.

Table 8: Weighted Average and Pair-trading Return

Number of pair-trading	Weighted average return	Pair-trading return
1	-0.1318%	8.3027%
2	1.4339%	9.2319%
3	2.1933%	6.5446%
Average	1.1651%	8.0264%

At each point, the return on pair trading always surpasses the weighted average return between PWSA and PPSP, as illustrated in Table 8. Only two stocks, PWSA and PPSP, demonstrated a long-term relationship or co-integration over the study period.

CONCLUSION

Identifying an investing strategy in the stock market that would provide the best possible return is difficult. Investors may use numerous trading strategies to maximize their return on investment, with pair trading being one of the most prominent. Pairs trading is a sophisticated trading technique that entails opening one long of underperformance stock and one short position of over-performance stock. When two stocks have a long-run relationship (co-integration), the strategy may effectively create outperformance profit. Even though the Cambodia Securities Exchange only has seven listed stocks from six distinct industries: financial, port services, SEZ developer, apparel garments, power, and water utility, co-integration between two listed stocks, PPSP—Special Economic Zone developer and PWSA—Water utility, has been identified. The empirical value for the co-integrated ratio is 0.366341. The stock price spread between PWSA and PPSP during the study period reached 2SD three times. Shorting one unit of outperformance stock and longing 0.366341 units of underperformance stock is used to establish a trade each time. In contrast, the trade is closed when the spread is converted to mean. The findings of this study show that the pair trading method works in a tiny securities market like Cambodia since the return on investment from the technique outperforms the weighted average return between the two equities.

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Sustainability Reporting in Cambodia: A Tale of Two Companies

Edman Padilla Flores*

ABSTRACT

This study examines the current state of sustainability reporting in Cambodia by conducting a qualitative content analysis of the sustainability reports of two prominent Cambodian companies, NagaCorp Ltd. and Smart Axiata Co., Ltd. The findings show that both companies are committed to sustainability in their sustainability reports by emphasizing environmental responsibility, social responsibility, and governance. NagaCorp prioritizes reducing emissions, conserving resources, and promoting employee well-being and good governance, whereas Smart Axiata prioritizes economic growth, inclusivity, and process improvements. Both companies adhere to recognized reporting frameworks and prioritize standard compliance. The recommendations include collaboration, strengthening governance reporting for Smart Axiata, and engaging with stakeholders. Implementing these recommendations will improve the case companies' sustainability performance and create long-term value for stakeholders and communities. The main limitation of this study is that it relies solely on information provided in sustainability reports, which may not accurately represent the companies' sustainability practices. Additionally, constraints associated with research instrument development, data collection, and data analysis must be acknowledged, as they may affect the validity and reliability of the research findings. Future studies should include a larger sample size, develop standardized coding schemes, incorporate additional data sources, conduct comparative analyses across industries or countries, and track sustainability practices over time to observe trends and evolution of sustainability practices by Cambodian companies.

Keywords: Sustainability; Sustainability reporting; ESG; Cambodia

INTRODUCTION

In recent years, businesses have recognized the need to address environmental, social, and governance (ESG) responsibilities, resulting in increased interest in sustainability. Companies are now expected to consider their financial profits and impact on the environment, society, and ethical practices. Sustainability reports have become essential for organizations to disclose their sustainability initiatives and demonstrate their commitment to responsible business practices.

Sustainability reporting is a means of communicating to the community that the organization is not pursuing profit at the expense of its responsibilities to its employees, customers, the environment, and society (Rahman & Alsayegh, 2021). Sustainability reporting is also known as triple bottom line (TBL) reporting and, more recently, ESG reporting. According to PWC (n.d.), a sustainability report is a company's report on its environmental, social, and governance

impacts. It allows the company to be more open regarding its risks and opportunities. It is an essential communication tool for convincing skeptics that the company's actions are genuine.

Sustainability reporting is a relatively new concept in Cambodia. While several Cambodian companies have begun to produce sustainability reports, there is a need to evaluate the sustainability reporting practices of prominent Cambodian companies, including identifying key sustainability themes, aligning sustainability disclosures with global sustainability frameworks and standards, and comparing sustainability reporting practices. By addressing this problem, the study aims to contribute to the assessment and improvement of sustainability reporting practices in Cambodia, thereby increasing transparency and accountability in sustainability initiatives of Cambodian companies. Furthermore, the study aims to contribute to the broader body of literature on sustainability reporting practices to promote adopting best practices within the Cambodian corporate sector.

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The study specifically aims to (1) identify the key sustainability themes addressed by case companies in their sustainability reports, (2) assess the alignment of case companies' sustainability disclosures with global sustainability frameworks and standards, and (3) analyze and compare the sustainability reporting practices of case companies, highlighting their similarities and differences.

The study seeks to answer the following questions to achieve its objectives:

RQ1: What key sustainability themes are case companies addressing in their sustainability reports?

RQ2: How do the sustainability disclosures of these companies align with global sustainability frameworks and standards?

RQ3: What are the similarities and differences in the sustainability reporting practices of case companies?

This paper is organized into six sections. The first section is an introduction, while the second is a literature review. Section three describes the paper's research methodology. The fourth section provides an overview of the case companies, the fifth section discusses the research findings, and finally, a concluding remark is made in the last section.

LITERATURE REVIEW

Corporate Accountability and Sustainability Reporting

Corporate accountability and sustainability reporting play crucial roles in today's business landscape, ensuring organizations take responsibility for their actions and operate transparently. By doing so, they contribute to the overall well-being of the economy, society, and environment.

The United Nations' Sustainable Development Goals (SDGs), depicted in Figure 1, have significantly influenced corporate accountability and sustainability reporting. These goals establish a globally recognized framework for addressing pressing social, environmental, and economic challenges (UN, n.d.). They have shaped the expectations placed on businesses regarding their responsibility to contribute to sustainable development. Consequently, companies have altered their approach to accountability and reporting on sustainability efforts.



Figure 1: United Nations' 17 Sustainable Development Goals

Source: UN. (2015). Sustainable Development Goals. www.un.org/sustainabledevelopment

Cambodia has aligned its development policy with the United Nations' SDGs, urging all stakeholders, including the private sector, academia, and civil society, to contribute to the country's priority sustainable development goals of achieving upper-middle-income status by 2030 and high-income status by 2050 (Royal Government of Cambodia, 2019).

While sustainability reporting has predominantly been voluntary for the past three decades, there is now a shift towards mandatory and regulated reporting driven by policymakers. This transformation will significantly impact the reporting landscape. KPMG's (2022) Global Survey of Sustainability Reporting findings reflect the current state of sustainability reporting, highlighting key business strategies that facilitate compliance with rising regulatory expectations while generating societal value and impact. According to KPMG (2022), 96 percent of the world's top 250 companies engage in sustainability reporting. As new regulations on non-financial reporting are introduced, reporting rates are expected to increase. The survey also reveals that most companies report on the United Nations SDGs, with 10 percent reporting on all 17 goals. Among the SDGs, companies predominantly focus on SDG 8 (Decent Work and Economic Growth), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) as their primary areas of attention.

Combining the SDGs and the shift towards regulated reporting signifies a growing emphasis on corporate accountability and sustainability. It emphasizes the importance of organizations' roles in contributing to sustainable development and positively impacting on society and the environment.

Motivations for Sustainability Reporting

The motivations behind sustainability reporting are diverse and can be understood through various theories, including legitimacy, stakeholder, accountability, signaling, and political economy theories.

Legitimacy theory emphasizes the social contract between an organization and society, whereby the organization must operate within the bounds of acceptable community behavior (Beck et al., 2019). Companies seeking legitimacy publish sustainability reports to demonstrate that they are operating within society's acceptable bounds, ensuring the continuity of their operations (Kuzey & Uyar, 2017).

Stakeholder theory posits that companies should consider the needs of a broader range of stakeholders beyond just shareholders (Hussain et al., 2018). Sustainability reporting helps organizations manage relationships with stakeholders by disclosing information about their economic, social, and environmental impacts, illustrating how they create value for various stakeholder groups (Vaz et al., 2016).

Accountability theory emphasizes an organization's responsibility to inform stakeholders about its activities, even if they may be detrimental (Comyns et al., 2013). Sustainability reporting supports this responsibility by providing accurate information about the organization's activities, even if it may have potentially negative effects (Gillet-Monjarret, 2015).

Signaling theory suggests that companies use sustainability reporting to signal positive behavior and position themselves as "good corporate citizens" (Verrecchia, 2001). By disclosing sustainability practices and performance, organizations communicate to stakeholders that they effectively manage key business risks and can gain a competitive advantage in the market (Daher & Bashatweh, 2018).

Political economy theory emphasizes the interconnectedness of political, economic, and social activities (Lakhani & Herbert, 2022). Sustainability reports serve as social, political, and economic documents, enabling organizations to satisfy the informational needs of their broader stakeholders and gain support for their interests (Cotter et al., 2011).

The legitimacy theory offers valuable insights into how companies strive to align their actions with societal expectations and gain legitimacy by practicing sustainability reporting. Stakeholder theory contributes essential perspectives on the

significance of considering the interests of a broader range of stakeholders in sustainability reporting. Accountability theory brings forth a valuable viewpoint on organizations' responsibility to provide stakeholders with information, even when disclosure may have adverse consequences. Signaling theory sheds light on using sustainability reporting as a method for companies to communicate positive behavior and address market information asymmetry. Finally, political economy theory explains the interrelatedness among economic, social, and political factors in sustainability reporting.

Although the theories discussed offer valuable understandings of the motivations behind sustainability reporting, critically assessing their strengths and limitations would present a more balanced evaluation. This analysis would yield a more comprehensive comprehension of the intricacies and factors that influence motivations for sustainability reporting by exploring potential challenges, trade-offs, and tensions associated with each theory.

Sustainability Reporting Frameworks

Most companies prepare sustainability reports following the guidelines of renowned organizations that have become the dominant framework for sustainability reporting. These organizations include:

Global Reporting Initiative (GRI): The GRI is a global initiative involving multiple stakeholders that aims to establish a consistent and trustworthy framework for organizations to voluntarily report on their economic, environmental, and social impacts (GRI, n.d.). The GRI standards cover many sustainability themes, including governance, ethics, labor practices, human rights, society, product responsibility, customer satisfaction, environmental management, biodiversity, emissions, energy, water, waste, and stakeholder engagement.

Sustainability Accounting Standards Board (SASB): The SASB Foundation is a non-profit organization developing specialized disclosure standards for environmental, social, and governance matters. These standards aim to help companies and investors effectively communicate financially relevant information (SASB Foundation, n.d.). Tailored to specific sectors, the SASB Standards cover more than 77 industries and focus on five key sustainability themes: environment, social capital, human capital, business model and innovation, and leadership and governance. These standards also offer a minimum set of topics for each industry, including quantifiable and comparable accounting metrics to address sustainability concerns.

Integrated Reporting (IR): The <IR> framework promotes the integration of both financial and non-financial data in company reports to provide a comprehensive view of their performance (IR, n.d.). The <IR> Framework defines six capitals, seven guiding principles, and eight content elements for an integrated report. However, it does not provide specific guidelines on disclosure topics or measurement approaches. The framework tracks how the business model utilizes and generates these capitals while revealing a company's strategies about risks and future prospects.

Task Force on Climate-related Financial Disclosures (TCFD): The TCFD provides guidelines for companies to disclose information on their vulnerability to climate-related risks and opportunities (TCFD, n.d.). These recommendations are applicable to both non-financial companies and financial institutions, such as banks, insurance companies, asset managers, and asset owners. TCFD's key sustainability themes revolve around governance, strategy, risk management, metrics, and targets related to climate change and its impact on the organization's operations, financial performance, and resilience.

The United Nations Global Compact (UNGC): The UNGC is a principle-based framework for companies and is recognized as the largest corporate social responsibility initiative globally. The UNGC is a voluntary program designed to help the private sector effectively address environmental, social, and governance risks and opportunities. The UNGC offers guidelines and resources known as the Ten Principles, which companies can adopt to align their efforts with the UN's 17 SDGs and ensure sustainable long-term success (UNGC, n.d.). The critical sustainability themes the UNGC addresses include human rights, labor standards, environmental sustainability, anti-corruption, and sustainable development goals.

Carbon Disclosure Project (CDP): The CDP, a non-profit organization, collects and discloses environmental information from companies worldwide (CDP, n.d.). Its key sustainability themes include carbon emissions reduction, climate change adaptation strategies, water stewardship, deforestation, and supply chain engagement.

While the GRI, SASB, <IR> Framework, TCFD, UNGC, and CDP have made significant contributions to sustainability reporting and have played an essential role in advancing the field and providing guidance to companies, it is important to note that each framework has its strengths and limitations. The GRI Standards

provide a comprehensive approach to sustainability reporting, encompassing economic, environmental, and social aspects. Nonetheless, their extensive nature results in lengthy and complex reports that necessitate significant resources for implementation. The SASB Standards, on the other hand, are industry-specific and focus on financial material issues. While this approach allows for more concise and targeted reporting, it may limit coverage of non-financial impacts. The <IR> framework encourages the integration of financial and non-financial information, allowing for a comprehensive view of company performance. However, it needs more specific guidelines for disclosure topics and measurement approaches, which could lead to consistent reporting practices. The TCFD guidelines specifically address climate-related risks and opportunities, an important aspect of sustainability. However, their narrow focus on climate-related issues may necessitate the consideration of additional frameworks to address broader sustainability concerns. The UNGC provides a framework based on principles and is widely regarded as a pioneering initiative for corporate social responsibility. Despite this, its non-binding nature and reliance on voluntary participation may result in inconsistent and selective reporting practices among companies. The CDP framework focuses on environmental information disclosure, particularly greenhouse gas emissions. Although this is critical for addressing climate change, it may overlook other significant sustainability impacts that businesses should consider.

Furthermore, it is essential to recognize the evolving landscape of sustainability reporting and the emergence of new frameworks and initiatives. Companies must carefully assess which frameworks are most relevant to their context, industry, and stakeholder expectations. Moreover, it is crucial to critically evaluate the frameworks' requirements and recommendations in order to ensure transparency, accuracy, and meaningful reporting.

The Current State of Sustainability Reporting in Cambodia

While sustainability reporting has been extensively researched in many countries, research focused on Cambodia has yet to be explored.

Miethlich (2019) conducted a study on sustainability reporting in Cambodia and highlighted the importance of interaction between the state and companies for sustainable development. The study

found that sustainability reporting in Cambodia is relatively new but is gaining importance as a tool for CSR communication and competitive advantage. The study also revealed that Cambodia ranks lower in sustainability reporting than other ASEAN countries. However, Cambodia emerges as a hidden champion in sustainability reporting when considering the GDP based on purchasing power parity.

Maáji (2020) focused on the broader topic of sustainability reporting and regulations in Cambodia. The study aimed to collect relevant literature on sustainability reporting and regulations specific to Cambodia. The results emphasized the need for more transparent reporting to convey the quality and sustainability of business performance. Sustainability reporting was identified as a mechanism to create a more attractive and differentiated image of the business, leading to better investor understanding and improved stakeholder relationships.

Flores (2022) investigated the awareness and commitment of Cambodian Public Interest Entities (PIEs) to TBL reporting. The study found that many managers of PIEs recognized the importance of balancing profit, planet, and people for the success of their organizations. However, the study revealed a low level of commitment to TBL reporting, indicating a need for further education and awareness of sustainability concepts. This study focused on the specific context of PIEs in Cambodia.

Ma'aji et al. (2022) analyzed the development and evolution of sustainability reporting practices in Cambodia. The study found that while a significant percentage of respondents were aware of sustainability reporting and its importance, a few companies reported on environmental and social impacts. The study attributed the lack of disclosure to factors such as the absence of regulatory requirements, limited incentives, and a lack of understanding of the strategic advantages of sustainability reporting. This study identified the need for further analysis of the factors influencing environmental and social activities disclosure through sustainability reports.

The literature review shows a clear need for more research on sustainability reporting in Cambodia. While studies have touched on the current situation, more comprehensive analysis of the practices, trends, and perceptions of sustainability reporting in Cambodian companies needs to be done. This study aims to fill these research gaps by conducting a thorough content analysis of sustainability reports from prominent Cambodian companies.

METHODOLOGY

Research Design

Based on the research objectives and questions, a qualitative research design utilizing content analysis of sustainability reports would be appropriate for this study.

A comprehensive analysis of the content of NagaCorp and Smart Axiata's sustainability reports was conducted to identify the key sustainability themes disclosed in each report. This was done to answer the first research question. Coding schemes were utilized to categorize and classify sustainability disclosures into various themes or domains of sustainability, including social responsibility, environmental responsibility, and governance.

The study comprehensively reviews existing sustainability reporting frameworks to determine the most frequently addressed sustainability themes. This was done to answer the second research question. The sustainability reports were analyzed to determine the extent to which the sustainability disclosures of the case companies aligned with global sustainability frameworks and standards.

The results of research question 1 and research question 2 were compared to identify the similarities and differences between the case companies' sustainability reporting practices. This was done to answer the third research question. Understanding their similarities and differences enables a comprehensive analysis of their approaches to sustainability.

The research findings were then used to draw conclusions and formulate recommendations.

Sample Selection

The study employs a non-random sampling technique known as purposive sampling. Purposive or judgmental sampling allows for discretion in selecting cases that best enable the researcher to answer the research questions and meet the objectives. This sample type is commonly used when working with small samples, such as case study research, and when the researcher wishes to select particularly informative cases (Saunders et al., 2009).

NagaCorp Ltd and Smart Axiata were chosen as case companies for the following reasons:

Visibility: NagaCorp and Smart Axiata are well-known companies in Cambodia, and their sustainability reports are likely to be publicly available. Access to

comprehensive and up-to-date information on their sustainability practices will facilitate a robust content analysis.

Industry representation: NagaCorp and Smart Axiata represent two distinct industries in Cambodia, enabling a broader comprehension of sustainability reporting practices across multiple industries. This diversity can improve the generalizability of research results and provide insight into sector-specific challenges and opportunities.

Comparability: Analyzing the sustainability reports of these two companies allows for a comparative analysis. Through such comparisons, the researcher can identify commonalities and differences in sustainability reporting practices, allowing for a more in-depth understanding of reporting trends in Cambodia.

Influence on stakeholders: NagaCorp and Smart Axiata are industry leaders in Cambodia, and their sustainability practices can influence other companies and stakeholders in their sectors. By studying their sustainability reports, the study can gain insights into best practices that may be relevant for other industry players, and contribute to knowledge sharing and the improvement of sustainability reporting in Cambodia.

Data Collection

The sustainability reports of the case companies were downloaded from their websites. These reports are intended for public consumption; therefore, permission from the case companies' management is not required.

Data Analysis and Interpretation

Importing sustainability reports into NVivo: NVivo is a program for analyzing qualitative data. It enables researchers to organize, store, and analyze data from various sources, including interviews, surveys, audio files, videos, social media, and documents. NVivo includes tools and features to help with content analysis, which analyzes data to identify themes, patterns, and relationships.

Coding: This procedure entails assigning labels or codes to various sustainability reports' themes, concepts, or categories. Key themes or topics in sustainability reports are identified, and codes are assigned to text segments corresponding to those themes using descriptive-focus coding. Numerous studies have emphasized the significance and benefits of descriptive-focus coding. For instance, Saldaña (2021) describes descriptive-focus coding as

a valuable technique for generating an initial overview of the data and identifying patterns and emerging themes. Furthermore, Charmaz (2014) emphasizes the importance of descriptive-focus coding in capturing the essence of data, which serves as a foundation for further analysis and interpretation.

Thematic Analysis: Thematic analysis identifies patterns, trends, and themes in coded data. The thematic analysis of sustainability reports allows a systematic examination of case companies' sustainability-related themes, concerns, and practices. It helps to understand how sustainability is being addressed by highlighting critical focus areas, identifying emerging trends or issues, and providing insights into sustainability initiatives' level of commitment or transparency.

Cross-case Comparison: The content analysis findings of NagaCorp and Smart Axiata's sustainability reports were compared to identify similarities and differences. This comparison can facilitate peer learning and best practice sharing, encouraging companies to improve their sustainable practices and reporting transparency.

THE CASE COMPANIES

NagaCorp Ltd.

NagaCorp Ltd., the largest operator of hotels, gaming, and leisure in Cambodia, has been listed on the Hong Kong Stock Exchange (HKEX) since 2006. It is the first Cambodian company publicly traded, and gaming-related company traded on the HKEX. NagaCorp's flagship establishment, NagaWorld, is the exclusive integrated hotel and entertainment complex in Phnom Penh. It holds the rights to operate casinos within a 200-kilometer radius of Phnom Penh, except for the Cambodia-Vietnam border region, Bokor, Kirirom Mountains, and Sihanoukville, until 2045 (NagaCorp, 2022, February 7).

NagaCorp recognizes its significant role as a responsible corporate citizen actively involved in its community. Through ongoing evaluation and enhancement, the company strives for sustainable growth while contributing positively to the environment and the community, not just focusing on financial gains. Since its establishment in 1995, NagaCorp has maintained a steadfast commitment to generating long-term value that is sustainable and beneficial for all its stakeholders.

The primary responsibility for the company's sustainability strategies, reporting, and risk

evaluation lies with the board of directors (BOD). The BOD ensures the presence of adequate controls by identifying and assessing related risks. The company consistently conducts internal risk assessments and identifies material topics that support investors and stakeholders in making informed investment decisions. The company actively engages stakeholders to gain valuable insights, understand different industry perspectives, benchmark against peers, and adhere to sustainability reporting best practices to facilitate this evaluation. These insights are sourced from diverse channels, including guest feedback, the NagaWorld Rewards program, collaborations with local suppliers, charitable sponsorships, employee training and development, and investor meetings.

The company employs established reporting frameworks like the HKEX ESG Reporting Guide and SASB standards to produce its sustainability reports. These platforms serve as a structure for determining material issues and shaping the report's content. The BOD continuously assesses risks and opportunities for the company, considering its priorities and meeting expectations.

Smart Axiata Co., Ltd.

Smart Axiata Co., Ltd., Cambodia's leading mobile telecommunications provider, is a subsidiary of Axiata Group Berhad, a prominent telecommunications company in Asia. To become Cambodia's top and most admired communication technology brand by 2022, Smart is committed to upholding strong corporate social responsibility and sustainability initiatives for the nation's socio-economic development. Their workforce comprises a diverse group of local and international professionals united in the mission to connect people and enhance their quality of life (Smart, n.d.).

Smart Axiata's fundamental principles revolve around sustainability, leading the company to actively support Cambodia's nation-building endeavors by empowering entire communities. This support is demonstrated through initiatives like digital inclusion and creating opportunities for entrepreneurship. As Smart Axiata looks to the future, it aims to align itself more effectively with the increasing sustainability concerns of the government, investors, and the general public. The company strives to engage all internal and external stakeholders in a more comprehensive sustainability journey that benefits everyone involved. Moreover, Smart Axiata will continue contributing to Cambodia's development by implementing various digital and environmental

initiatives. It is committed to ensuring that the most vulnerable segments of society are not left behind as the economy prospers (Smart, n.d.).

ANALYSIS AND FINDINGS

Content Analysis of NagaCorp's Sustainability Report

NagaCorp's sustainability report is embedded in its annual report. The 2021 annual report's sustainability section is 71 pages long. The report has been designed to be both comprehensive and visually appealing. Table 1 shows the keywords in all three ESG areas, organized from most frequent to least frequent, based on the word frequency report generated by NVivo.

Table 1: ESG Keywords in NagaCorp's 2021 Sustainability Report

Environmental	Word Count	Social	Word Count	Governance	Word Count
Emissions	30	Employees	102	Company	235
Reduce	30	Program	61	Board	152
Water	30	COVID-19	40	Group	109
Energy	28	Company	34	Committee	101
Air	25	Safety	34	Directors	100
Waste	25	Football	33	AML	96
Operations	22	Kind	31	Shares	80
Consumption	21	Support	28	Business	69
Environmental	16	Sports	26	Management	69
Use	14	Business	25	Report	68

Source: NagaCorp. (2022, February 7). 2021 Annual Report. <https://doc.irasia.com/listco/hk/nagacorp/annual/2021/ar2021.pdf>

Tables 2, 3, and 4 summarize NagaCorp's key environmental, social, and governance disclosures based on the identified five keywords/themes.

Table 2: NagaCorp's Environmental Responsibility Disclosures

Key Themes	Key Disclosures
Emissions	Our goal is to minimize direct and indirect emissions to minimize our environmental impact, while maintaining high levels of customer satisfaction and operational efficiency. In order to minimize indirect emissions, we are carrying forward our energy-saving initiatives implemented in 2018. These initiatives aim to enhance efficiency and further decrease energy usage.
Reduce	Since 2018, we have implemented a comprehensive set of 15 initiatives to conserve energy and reduce expenses. NagaWorld is actively striving to reduce its greenhouse gas (GHG) emissions and minimize its environmental impact.

Water	Our dedication lies in responsible water utilization, and we have devised approaches to reduce water consumption through enhancements in mechanical systems and processes. Additionally, we are actively educating our customers and employees about the significance of water conservation. This is achieved by providing water-saving signs and informative materials in every hotel room, public area, office, and toilet.
Energy	Electricity serves as our primary source of energy. In 2021, we observed a significant decrease in our overall energy consumption and intensity, which were 27% lower than the previous year.
Air	Our goal is to ensure our employees and customers' safety and comfort by creating a conducive environment with clean air and a suitable temperature. NagaWorld Complex, we plan to install an indoor air quality filtration system capable of eliminating pollutants.
Waste	At NagaWorld, we prioritize preserving our environment and recognize the significance of preventing waste pollution, preserving biodiversity, conserving resources, and promoting reforestation. We adopt a strategic waste management approach called the "5R" strategy, which entails refusing unnecessary waste, reducing waste generation, reusing or replacing items, recycling materials, and continually reminding ourselves of the importance of responsible waste management.

Source: NagaCorp. (2022, February 7). 2021 Annual Report. <https://doc.irasia.com/listco/hk/nagacorp/annual/2021/ar2021.pdf>

Table 3: NagaCorp's Social Responsibility Disclosures

Key Themes	Key Disclosures
Employees	We have implemented support programs to help our employees transition smoothly into their roles with us. Our commitment to developing local talent is reflected in our succession plan, which prioritizes promoting local employees to management positions whenever possible. NagaWorld upgraded and performed maintenance work on various employee areas to ensure a safe, healthy, and empowering work environment.
Program	The company has created a training program to raise awareness about child labor among our suppliers and ensure they follow our policy of prohibiting child labor. As part of our Corporate Social Responsibility (CSR) initiative, we work with the Ministry of Education, Youth, and Sports to educate school children and local communities on fire safety. Our ongoing partnership with the NGO Cambodia Outreach for the Children@Risk Program involves supporting the education of ten Cambodian children.
COVID-19	While Cambodia has handled COVID-19 relatively effectively, we are still dedicated to prioritizing our employees' and guests' safety and welfare.

Company	Our company is committed to offering competitive salaries and benefits that surpass market standards. Our minimum wage for the garment sector is nearly 30% higher than the government minimum wage. We strive to deliver exceptional services and ensure a superior experience for all our customers during their stay.
Safety	Our dedication lies in creating a safe and healthy environment for all our company's including employees, guests, visitors, suppliers, and contractors. To accomplish this, we have established a structured process to identify and evaluate health and safety hazards, and allocate the necessary resources to manage these risks effectively. Compliance with local and international standards and regulations is strictly followed to ensure food safety remains a top priority. The safety of our guests and employees is of utmost importance. NagaWorld has an internal fire safety department comprising a team of seasoned firefighters and professionals specializing in emergency response and management.

Source: NagaCorp. (2022, February 7). 2021 Annual Report. <https://doc.irasia.com/listco/hk/nagacorp/annual/2021/ar2021.pdf>

Table 4: NagaCorp's Governance Disclosures

Key Themes	Key Disclosures
Company/Group	The company's Code of Conduct includes well-defined standards and principles. Throughout 2021, neither the company nor its employees faced corruption-related legal allegations. The company strictly prohibits retaliation against employees who report actual or suspected misconduct in good faith. The company donated of US\$20 million to support the RGC's COVID-19 initiatives, specifically aiding in the timely acquisition of vaccines.
Board/Directors	The Board of Directors ensures that the company's governance practices comply with all regulations and adhere to the highest standards in all aspects of our operations. The Board carefully examines and evaluates the Group's internal control system for Anti-Money Laundering (AML) through the AML Oversight Committee and reports provided by an independent AML specialist firm. The Board takes on a crucial role in overseeing and managing risks by considering them while setting strategies.
Committee	The Board has formed several committees, such as the Audit Committee, Remuneration Committee, Nomination Committee, and AML Oversight Committee, granting them the power to monitor and manage specific areas of the company's operations.
AML	We have implemented robust internal controls to prevent money laundering and fraud, aiming to uphold the highest standards of compliance and integrity in our AML practices. We have created a comprehensive program to safeguard our reputation and mitigate AML risks. A four-tier AML control structure supports this program.

Source: NagaCorp. (2022, February 7). 2021 Annual Report. <https://doc.irasia.com/listco/hk/nagacorp/annual/2021/ar2021.pdf>

In response to research question 1, the following are the key sustainability themes addressed by NagaCorp in its sustainability report.

Environmental responsibility: NagaCorp emphasizes its commitment to directly and indirectly reducing emissions in the environmental responsibility section. It has implemented energy-saving initiatives and aims to reduce greenhouse gas emissions. It also emphasizes its efforts to conserve water through improved mechanical systems and educational initiatives for customers and employees. NagaCorp has noticed a decrease in energy consumption and intensity, and it intends to install an indoor air quality filtration system to ensure clean air for employees and customers. The company also prioritizes waste management through its “5R” strategy, which focuses on reducing, reusing, recycling, and responsibly managing waste.

Social responsibility: NagaCorp has implemented employee support programs, including a succession plan that promotes local employees to management positions. It has also upgraded and performed maintenance work to create a safe and empowering work environment. The company is committed to combating child labor through training programs and collaborates with the Ministry of Education to educate schoolchildren about fire safety. NagaCorp also participates in CSR initiatives by supporting Cambodian children’s education through a partnership with an NGO. During the COVID-19 pandemic, the company prioritizes its employees’ and guests’ safety and well-being.

Governance: The governance disclosures highlight NagaCorp’s commitment to compliance with regulations and ethical practices. The company has a well-defined Code of Conduct, and no legal allegations of corruption were filed in 2021. It prohibits retaliation against employees who report misconduct in good faith. NagaCorp demonstrates good governance by contributing significantly to the Cambodian government’s COVID-19 initiatives. The Board of Directors ensures compliance with regulations and high standards in all operations. They assess the internal control system for AML and manage risks through various committees. NagaCorp has established strong internal controls to prevent money laundering and fraud, and a comprehensive AML program.

In response to research question 2, NagaCorp’s sustainability efforts align with established sustainability reporting frameworks such as the HKEX

ESG Reporting Guide (linked to GRI and disclosures) and SASB industry standards. Compliance with local and international standards and regulations is also a top priority for the company.

Content Analysis of Smart Axiata’s Sustainability Report

Smart Axiata’s sustainability report needs to be more concise but still comprehensive. The report is visually appealing, with tables, charts, and graphics to present the information concisely. The entire sustainability report is 39 pages long. Table 5 summarizes the key sections of the company’s sustainability report.

Table 5: Key Sections of Smart Axiata’s Sustainability Report

Sustainability Pillar	SDG addressed	Focus Areas
Beyond short-term profits	SDG 8, 9 and 17	Providing financial support to digital startups and local technopreneur organizations to enhance the local economy. Allocating resources toward developing of advanced network infrastructure is crucial in meeting the growing demands of a developing nation and stimulating economic growth. Expanding the coverage of base stations to promote the accessibility of affordable digital services, thereby contributing to economic expansion.
Nurturing people	SDG 4, 5, 8 and 10	Recognizing and appreciating the valuable contributions of a diverse workforce, and aims to establish an inclusive work environment that values diversity, fair hiring practices, and respect. Discrimination of any kind will not be tolerated. Enhancing productivity and establishing a pool of talented individuals by providing training opportunities to upskill the workforce. Actively involve employees by understanding their requirements and supporting their career development.
Process excellence	SDG 8, 9 and 16	Prioritize the support of local businesses and maintain ethical and cost-effective supplier relationships. Place utmost importance on customer satisfaction as it is crucial for the business’s success. Establish a culture that relies on data-driven decision-making to implement digital processes that minimize costs and enhance operational efficiencies. Take proactive measures to develop business resilience and ensure uninterrupted operations and continuity.

Planet and society	SDG 4, 8, 9, 10, 12, 13 and 17	Dedicated to decreasing carbon emissions and utilizing technologies to minimize the company's environmental impact. Contribute to society by endorsing education and sports initiatives that empower the youth of Cambodia. Coordinate and endorse an array of programs that foster technological advancement and innovation.
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Source: Smart. (n.d.). 2021 Sustainability Report. <https://www.smart.com.kh/sustainability-report-2021/>

Table 6 lists keywords and themes, ranked by their frequency, as generated by NVivo's word frequency report.

Table 6: Key Words in Smart Axiata's 2021 Sustainability Report

Key Words	Word Count
People/employees	97
Digital	57
Society	53
Planet	46
Sustainability	44
Excellence	43
Process	43
Profits	41
Management	33
Development	31

Source: Smart. (n.d.). 2021 Sustainability Report. <https://www.smart.com.kh/sustainability-report-2021/>

Table 7 summarizes Smart Axiata's critical sustainability disclosures based on the top 10 keywords identified.

Table 7: Smart Axiata's Key Sustainability Disclosures

Key Themes	Key Sustainability Disclosures
People/employees	The call center provides job opportunities for people with disabilities. The Smart Leaders Program is a leadership initiative designed for department heads and people managers. Work benefits are extended to all employees, whether full-time or part-time. The Smart Values Mobile App enables employees to learn about Smart's Core Values. The Gratitude Card allows employees to express their gratitude and appreciation for one another. A total of 1,039 employees received training, accumulating 43,530.52 training hours. Engagement initiatives were implemented to improve communication between the SLT team and employees. Support was provided to employees during lockdown periods, including the delivery of food to employees and those in quarantine. Additionally, weekly calls and a healthcare app monitored employees' health. We also traced contact to identify potential risks to our employees and their families.

Digital	Smart Axiata, in collaboration with Mekong Strategic Partners (MSP), has established the Smart Axiata Digital Innovation Fund, a venture capital fund worth 5 million USD. This fund is dedicated to supporting digital companies and startups operating in Cambodia. To bridge the digital divide, the Universal Service Obligation Fund contributes 2 percent of the total annual service revenue. The Digital Internship Program accommodated over 15 interns, of which three were offered full-time employment opportunities. The Digital Academy aims to enhance the skills of the Analytics team by providing training in data engineering, data analytics, data science, and related fields. This training is conducted through Coursera.
	A digital literacy program was organized with the Ministry of Post and Telecommunications, the Ministry of Education, Youth and Sports, UNICEF, Action Pour Le Enfants (APLE), and Improving Cambodia's Society through Skillful Parenting (ICS-SP). This program consisted of a series of talk shows on "Online Safety and Protection for Adolescents in the Digital Age."
Society	We assisted in various locations to fulfill essential needs and taught vital life skills to individuals, helping them endure the challenges brought about by the pandemic. A total of 165 community service initiatives were created and executed by young individuals to address local issues and actively contribute to the development of their communities. We offered flexible alternative education programs, including blended classes, to individuals in Cambodia who were unable to complete their formal education. These programs allowed them to continue their studies and earn a secondary school equivalent certification within five months. We supplied 12,000 books to children residing in 20 target locations. Through 17 different projects, we empowered community members to actively participate in making beneficial social changes. We installed solar panels in rural schools to ensure uninterrupted learning opportunities for students.
Planet	Established an internal Green Team to spearhead energy-saving initiatives and promote employee awareness. Conducted internal workshops focused on investigating the future of energy in Cambodia. Implemented impactful initiatives to decrease energy consumption. • Implemented solar systems to power base stations. • Introduced artificial intelligence technology to identify opportunities for energy savings. • Upgraded equipment to minimize energy loss. Recognized and honored three primary and three secondary schools for their dedication to promoting environmental sustainability. Teamed up with WWF Cambodia to raise awareness about responsible consumption, environmental protection, and the importance of sustainability for our planet.

Process Excellence	Enhanced charging history and top-up history. Improved the top-up process to provide a better experience for customers. Upgraded the billing system to ensure efficiency. Achieved a 91% compliance rate with the Supplier Code of Conduct. Implemented language preference options for all customer interaction channels. Created a unified customer service experience. Implemented a data privacy policy and privacy notices. Adopted the National Institute of Standards and Technology (NIST) framework and working towards obtaining ISO 27001 certification. Implemented a system to streamline and expedite equipment and service procurement and payment processes.
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Source: Smart. (n.d.). 2021 Sustainability Report. <https://www.smart.com.kh/sustainability-report-2021/>

In response to research question 1, the following are the key sustainability themes addressed by Smart Axiata in its sustainability report.

Beyond short-term profits: Smart Axiata emphasizes its support for digital startups and the local technopreneur ecosystem under the pillar of beyond short-term profits to strengthen the local economy. It also allocates resources to develop advanced network infrastructure and expand coverage to promote affordable digital services and contribute to economic growth.

Nurturing people: Smart Axiata values diversity and strives to create an inclusive work environment with fair hiring practices. The company offers training opportunities to upskill its workforce, involves employees in decision-making processes, and supports their career development.

Process excellence: Smart Axiata aims to support local businesses and maintain ethical supplier relationships. It prioritizes customer satisfaction, data-driven decision-making, and digitized processes to reduce costs and improve operational efficiencies. The company also prioritizes business resilience and continuity.

Planet and society: Smart Axiata's commitment to the planet and society is evident in its efforts to reduce carbon emissions and use technologies to reduce their environmental impact. It supports education and sports initiatives that empower Cambodian youth and programs that promote technological advancement and innovation.

In response to research question 2, Smart Axiata's sustainability report is prepared using the GRI Standards: Core Option. The report covers vital

sections related to sustainability pillars, focus areas, and SDGs. The company emphasizes inclusivity, talent development, digital innovation, community support, environmental sustainability, and process excellence in its sustainability reporting practices.

Comparing the Content Analysis of NagaCorp's and Smart Axiata's Sustainability Reports

Responding to research question 3, the findings from the content analyses of NagaCorp and Smart Axiata sustainability reports were compared, and the following similarities and differences were identified.

Similarities

1. Environmental responsibility: Both companies prioritize environmental responsibility by implementing measures to reduce emissions and conserve resources. They emphasize energy-saving initiatives, waste management strategies, and aim to decrease their environmental impact.
2. Social responsibility: Both companies demonstrate their commitment to social responsibility by implementing programs and initiatives that support their employees, promote safety and well-being, and contribute to the local community. They address child labor, employee support programs, and NGO partnerships.

Differences

1. Governance: NagaCorp's sustainability report highlights its commitment to compliance with regulations and ethical practices. It has a well-defined Code of Conduct and emphasizes good governance through various measures. Smart Axiata on the other hand, needs to mention governance practices in its sustainability report explicitly.
2. Beyond short-term profits vs. Process excellence: Smart Axiata's sustainability report emphasizes the importance of beyond short-term profits, focusing on supporting digital startups, promoting economic growth, and investing in network infrastructure. NagaCorp's report, on the other hand, does not explicitly address these themes. Instead, NagaCorp focuses on process excellence in waste management, energy-saving initiatives, and reducing greenhouse gas emissions.

3. Planet and society: While both companies address the planet and society in their sustainability reports, there are differences in their approach. NagaCorp's report focuses on environmental sustainability, addressing efforts to reduce energy consumption, install air quality filtration systems, and implement waste management strategies. Smart Axiata, on the other hand, emphasizes reducing carbon emissions, using technologies to minimize environmental impact, and supporting education and sports initiatives for youth.
4. Sustainability reporting framework: NagaCorp aligns its sustainability disclosures with the HKEX ESG Reporting Guide and SASB standards. On the other hand, Smart Axiata's sustainability report adheres to the GRI Standards: Core Option and covers sustainability pillars, focus areas, and SDGs.

These findings reveal that both companies prioritize sustainability in their operations but have different areas of focus and approaches in their reporting practices. NagaCorp heavily emphasizes environmental and governance aspects, while Smart Axiata focuses on economic growth, nurturing people, and making process improvements.

CONCLUSION AND RECOMMENDATIONS

Both NagaCorp and Smart Axiata demonstrate a commitment to sustainability in their operations, as evidenced by their sustainability reports.

NagaCorp focuses on environmental responsibility, social responsibility, and governance. It prioritizes reducing emissions, conserving resources, implementing waste management strategies, promoting employee well-being, combating child labor, and ensuring good governance practices. The company aligns its sustainability efforts with recognized reporting frameworks such as the HKEX ESG Reporting Guide and SASB standards.

Smart Axiata, on the other hand, emphasizes beyond short-term profits, nurturing people, process excellence, and the planet and society. It prioritizes supporting digital startups, promoting inclusivity and employee development, maintaining ethical supplier relationships, reducing carbon emissions, and supporting education and innovation. Smart Axiata's sustainability reporting adheres to the GRI Standards and addresses various sustainability pillars and SDGs.

The case companies share similarities in their commitment to environmental and social responsibility. They both prioritize reducing emissions, conserving resources, and promoting employee well-being. However, they differ in their focus areas, with NagaCorp emphasizing governance and waste management and Smart Axiata emphasizing economic growth and process improvements.

By implementing the following recommendations, NagaCorp and Smart Axiata can further enhance their sustainability performance, contribute to their respective industries, and create long-term value for their stakeholders and the communities in which they operate.

1. NagaCorp and Smart Axiata can explore collaboration and knowledge-sharing opportunities to enhance their sustainability efforts further. They can share best practices and experiences to drive continuous improvement in their focus areas.
2. Smart Axiata can enhance its sustainability report by including more explicit governance reporting. This can involve highlighting governance practices, ethical standards, and their approach to compliance and anti-corruption measures.
3. Both companies can further engage with their stakeholders to gather feedback, understand their expectations, and incorporate their input into their sustainability strategies. This can help ensure their efforts align with stakeholder needs and enhance transparency and accountability.

However, there are some research limitations to consider. First, the content analysis is based solely on the information provided in the sustainability reports and may not capture the full scope of the companies' sustainability efforts. Supplementing this analysis with additional data sources, such as interviews and site visits is critical, to provide a more comprehensive understanding of their sustainability practices. Second, the study may need to be revised regarding research instrument development. Developing coding schemes to classify sustainability practices is based on subjective judgment and may introduce biases. Furthermore, the need for standardized or validated coding schemes specific to the Cambodian context may impact classification accuracy and consistency. Third, the limited availability of comprehensive and up-to-date sustainability reports may compromise

the analysis's thoroughness and precision. The reliance on self-reported data also raises questions regarding the transparency and reliability of the information presented in sustainability reports. Lastly, the interpretation and categorization of reported sustainability practices can be subjective and may vary between coders, compromising the reliability of the findings.

Future studies could include a larger sample size of Cambodian companies to enhance the representativeness and generalizability of the findings. This would provide a more comprehensive understanding of sustainability practices in the country. Further research can also focus on developing standardized and validated coding schemes specific to the Cambodian context. This would enhance the consistency and reliability of the classification of sustainability practices. Additionally, future studies could consider incorporating additional data sources, such as interviews or surveys, to supplement the analysis of sustainability reports. This would provide a more well-rounded and comprehensive understanding of the companies' sustainability efforts. Furthermore, conducting comparative analyses across different industries or countries would allow for a better understanding of the unique challenges and opportunities for sustainability in different contexts. Comparisons could also be made with companies from other developing countries to identify common themes and best practices. Finally, tracking and analyzing sustainability practices over time would enable researchers to observe trends and changes in companies' sustainability efforts. Longitudinal studies could provide insights into the effectiveness and evolution of sustainability practices in Cambodian companies.

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International Financial Reporting Standards (IFRS), Corporate Social Responsibility, and Sustainable Development

Parmindar Singh*

ABSTRACT

This paper describes a brief evolution of IFRS and its benefits. It then explains the organized hypocrisy of firms that, on the one hand, eulogized the importance of IFRS and quality financial reporting while, on the other hand, using corporate social responsibility (CSR) and sustainable development as a form of earnings management to depress profits, so that a firm's share of fair tax is not paid to the State; as such there is some form of organized hypocrisy. This article also explains what can be done to address tax avoidance. Since the precursor of tax avoidance is earnings management, a simple cosmetic earnings management is analyzed using Benford's Law for a public-listed Cambodian firm. This paper aims to illuminate that once cosmetic earnings management occurs, a grander scale of earnings management may occur for tax avoidance purposes, which, while legal, is unethical. This study sheds some light on the discourse of tax avoidance, which may become rampant among Cambodian firms in the future.

Keywords: *IFRS; CSR; Sustainable development; Earnings management; Tax avoidance; Organisational culture; Benford's Law*

INTRODUCTION

Tax avoidance has proliferated with offshore tax sheltering (through tax havens), accounting manipulation, and legal obfuscation (Dowling, 2014). Tax avoidance is the pursuit of transactions and structures to reduce tax responsibility that goes against the letter and spirit of taxation laws (Prebble & Prebble, 2010, cited in Bird & Davis-Nozemack, 2016). In addition, many firms use their corporate social responsibilities (CSR) and sustainable development to avoid paying their fair share of tax. At the same time, many countries have started to adopt International Financial Reporting Standards (IFRS) to improve financial reporting quality. Hence, there is an impasse and conflict as organizations carry out their tax avoidance via their CSR and sustainable development activities while simultaneously adopting IFRS.

As such, this paper aims to analyze these issues and provide some ways to resolve this entanglement. The paper is divided as follows: The next section will undertake a literature review on IFRS, its evolution, and its benefits. The literature review will also examine social responsibility and sustainable development as a means of earnings management for tax avoidance, thus paying a fair share of tax to the State – the dark side of stakeholder management. Subsequently, a section

on the conflicts arising from this organized hypocrisy (Sikka, 2010) on adopting IFRS but undertaking social responsibility to avoid paying higher taxes and means to resolve this impasse will be devoted. Since earnings management is a prerequisite for tax avoidance, cosmetic earnings management is carried out on a public-listed Cambodian firm using Benford's Law. Finally, a section will be on the conclusions of the study.

LITERATURE REVIEW

This section will first discuss the evolution of IFRS. Subsequently, the benefits of IFRS will be expounded. A tax avoidance literature will follow this via CSR and sustainability developments.

International Financial Reporting Standards (IFRS)

The International Accounting Standards Committee (IASC) was conceived in 1973 and operated for 27 years till 2000 (Zeff, 2012; Tweedie & Seidenstein, 2005). It was then taken over by the International Accounting Standards Board (IASB) in 2001 and its subsequent release of IFRS (Zeff, 2012; Tweedie & Seidenstein, 2005). The previous Asian financial crisis, as well as the recent financial scandals in the United States, coupled with previous corporate governance failures, have made investors, countries, and companies realize the importance of good

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financial reporting (Tweedie & Seidenstein, 2005; Camfferman & Wielhouwer, 2019). Therefore, many countries have adopted IFRS to improve the quality of financial reporting. Currently, 166 countries have adopted IFRS (IFRS.org, 2021). In addition, IFRS has been adopted due to coercive-, mimetic- and normative isomorphism. Coercive isomorphism arises from resource needs and legitimacy concerns. For example, the International Monetary Fund (IMF) regularly provides aid to needy countries. In return, the IMF will demand that reforms be implemented, such as implementing IFRS in their home country (Judge et al., 2010). Mimetic isomorphism refers to the tendency of social actors to imitate other social actors, such as individuals, organizations, and nations, which are viewed as successful and legitimate. Touron (2005, cited in Judge et al., 2010) found that large French firms seeking legitimacy in the global marketplace moved away from domestic accounting standards due to mimetic pressures. Finally, normative isomorphism refers to collective values that bring about conformity of thought and deed within an institutional environment. A country's educational achievement may predict normative pressures brought about through professionalization. Thus, better-educated societies would be more likely to be exposed to and be influenced by the professional standards of the accounting profession (Judge et al., 2010), hence adopting IFRS.

There are some differences between IFRS and the US GAAP (Generally Accepted Accounting Principles). GAAP is a rules-based system with particular accounting guidelines to cover the range of business transactions. It has been tested and subjected to extensive scrutiny and interpretation in the US legal system (Sherman et al., 2009). However, failures like Enron and WorldCom, among others, show that it is not infallible (Tweedie & Seidenstein, 2005). In IFRS, management and auditors are given leeway to consider what constitutes a fair representation of revenues and expenses with a broad set of guidelines (Sherman et al., 2009). As such, IFRS is a principles-based system (Accountingtools, 2021).

There are many benefits of IFRS. The use of one set of high-quality financial reporting has the potential to improve comparability and transparency. When IFRS is used appropriately, many stakeholders, among them shareholders, will have high-quality information and can make better decisions. This will result in better fund allocation by markets and organizations, achieving a lower cost of capital. In

this way, consistent use of IFRS will facilitate the development of national capital markets and the integration of financial markets (Tarca, 2012).

Integration of financial markets may take many forms, such as listing by firms from one country in the stock exchanges of other countries, foreign direct investments (FDIs), cross-border mergers and acquisitions, and free capital flows across countries (Yoshikawa & Rasheed, 2009). These can all result in common financial reporting standards being used, chiefly IFRS. One of the reasons for foreign listing, either through cross-listing or initial public offerings (IPOs), is to engage in bonding.

One example of a foreign IPO is Alibaba, listed in the US (Reuters, 2018). Cross-listing is the process by which a firm incorporated in one country elects to list its equity on the public stock exchange of another country (Ferris et al., 2009). These will signal to investors that firms are willing to comply with higher standards than required in their home country (Vaaler & Schrage, 2006, cited in Yoshikawa & Rasheed, 2009). Bonding increases a firm's share value (Coffee, 2002, cited in Yoshikawa & Rasheed, 2009) and improves corporate governance (Ferris et al., 2009). Other reasons for cross-listing include a desire to obtain investment capital at a lower rate, achieve higher share valuation (through legal and reputational bonding), enjoy increased liquidity and market depth for its shares, and obtain a more significant market share for its products and services (Karolyi, 2006 cited in Ferris et al., 2009). Hence, if many firms undertake cross-listing and subsequent bonding as well as undertaking foreign IPOs, in the long run, the corporate governance of such firms and, ultimately, countries will converge. Harmonizing accounting principles through IFRS can facilitate and bring about such convergence.

IFRS adoption has also benefited security analysts; Horton et al. (2012, cited in Tarca, 2012) state that security analysts had experienced more accuracy in their forecasts following IFRS adoption due to improved information quality and comparability. IFRS can also help to reduce earnings management (EM) (Leventis et al., 2011, cited in Tarca, 2012). There needs to be proper infrastructure in place to support IFRS. This takes place in the form of laws. A common law country with vigorous enforcement will have better investor protection than civil law countries (La Porta et al., 1997, cited in Davies, 2008), thereby ensuring IFRS benefits can materialize.

Social Responsibility and Earnings Management Process to Avoid Taxes

This section analyses the use of corporate social responsibility (CSR) and sustainable development to undertake earnings management to declare lower profits and, consequently, lower taxes. As such, CSR and sustainable development carry out tax avoidance.

Corporate social responsibility has been defined as the duty of organizations to conduct their business in a manner that respects the rights of individuals and promotes the most outstanding human welfare (Manakkalathil & Rudolf, 1995). On the other hand, Steiner and Steiner (2004) defined it as the duty a corporation has to create wealth by using means that avoid harm to societal assets, protect them, and even enhance societal assets.

According to the World Commission on Environment and Development (1987, cited in Strachan, 1997), also known as the Brundtland Commission Report (Watson & Emery, 2004, p. 917), sustainable development is defined as “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs.”

This report postulates that environmental costs could no longer be treated as an externality; organizations would need to internalize it (Watson & Emery, 2004). Sustainable development entails an organization ensuring that its usage of resources is sufficient, not only for the present generation but also for the future generation. In addition, an organization should ensure that its repletion of environmental resources is greater than or equal to its depletion of environmental resources, thus leaving a small environmental footprint (Professional Accountant, 2007).

There are many ways that an organization demonstrates that it is practicing its social responsibility and undertaking sustainable development. Among them are complying with codes or principles, such as the UN Global Compact Principles (Scherer & Palazzo, 2011) and OECD guidelines for MNEs (Steiner & Steiner, 2004), altering human resource management practices to align performance appraisal and reward to CSR (Steiner & Steiner, 2004), social auditing – hiring independent auditors to assess the impacts of a corporation on society (Zadek, 2004; Pirsch et al., 2007), triple-bottom-line reporting (Elkington, 1998, cited in

McCann & Sweet, 2014), environmental certification (Rezaee & Elam, 2000), integrated reporting (Hughen et al., 2014), circular economy (Esposito et al., 2018), among others. As a result, many benefits occur from practicing CSR and sustainable development, such as lower cost of equity, lower cost of debt, higher analyst following, more favorable analyst recommendations, and higher firm value (Cui et al., 2015).

Hence, a firm undertaking CSR and sustainable development demonstrates its relationship management with diverse stakeholders. According to Carrol (1979, cited in Carroll, 1999), CSR encompasses an organization’s economic, legal, ethical, and discretionary responsibilities. Therefore, paying an organization’s fair share of tax is part of its legal and ethical responsibilities in demonstrating its CSR. Nevertheless, this stakeholder management has a dark side (Cennamo et al., 2009). This can occur when organizations pursue legal tax avoidance or creative tax accounting (Dowling, 2014). Many corporations produce reports on their commitments to being socially responsible but carry out large-scale tax avoidance (Sikka, 2010).

There is general agreement that organizations should pay their fair share of tax and adhere to both the letter and spirit of taxation laws and their payments must be timely (Paine et al., 2005, cited in Dowling, 2014). This fair share of tax is the government’s statutory tax rate, a reference point to evaluate actual tax payments. This fair share of tax is also in line with Smith’s (1776, cited in Dowling, 2014) proportionality; people should pay tax in proportion to their ability, and tax payments should not be arbitrary. The tax rate imposed by the government should not affect an organization’s survivability and the ability to compete.

Tax avoidance is a form of earnings management (EM), broadly defined as deliberate actions by managers to bring about desired financial outcomes (Jordon & Clark, 2011). EM can be classified into two types – those involving changes in accounting methods and those relating to operating decisions (Fischer & Rosenzweig, 1995, cited in Jordon & Clark, 2011). Legal tax avoidance is an example of changes in both accounting methods or creative tax accounting and operating decisions, especially when decisions on CSR are made.

Firms undertake tax avoidance for myriad reasons. For multinational corporations (MNCs), the complexity of the current tax regime within and between countries allows MNCs to reallocate their activities to realize

profits from countries with the most favorable tax jurisdictions. MNCs believe that different tax rates are healthy competition among countries to attract them, hence tax havens. In addition, it is hard for stakeholders to determine whether companies are paying their fair share of tax due to the complexity of modern accounting practices and private negotiations with tax authorities (Dowling, 2014).

Moreover, some firms specialize in advising their clients on how to evade tax. Furthermore, paying taxes reduces a company's profits and, therefore, its ability to practice its CSR, such as improving employment opportunities. Also, paying tax connotes a negative emotion compared to paying to practice its CSR. Tax avoidance also signals governments to refrain from acting recklessly in raising statutory tax rates (Dowling, 2014). Companies also may try to add more shareholder value via tax avoidance at the expense of the State (Sikka, 2010), although ironically, the State is also a firm stakeholder. Tax avoidance has also been used to increase director remuneration, as avoiding tax results in greater profits, which will also mean better corporate performance and, consequently, enriching directors (Bender, 2004, cited in Sikka, 2010). On the flip side, this may also increase agency conflict as shareholders may be concerned that directors might become too aggressive in tax avoidance, which might result in illegal tax activities (Sikka, 2010).

A company may avoid tax through offshore tax sheltering, accounting manipulation, and legal obfuscation. Offshore tax sheltering uses artificial transactions to shift revenues to low-tax countries (like tax havens), while expenses occur in high-tax countries. Accounting manipulation involves transfer pricing (Sikka, 2010), royalty and administrative payments, and increasing short-term debts to minimize profits. Legal obfuscation aims to inundate tax authorities with complicated tax filings (Dowling, 2014).

However, there are many reasons why firms should not indulge in tax avoidance. With tax avoidance, the government may need more money to provide public goods and services to its people (Sikka, 2010); government revenue is lost. Tax avoidance goes contrary to Carroll's (1999) pyramid of responsibilities, where it is deemed as not complying with taxation laws and not being ethical. Therefore, a firm is not performing its CSR by tax avoidance. Tax avoidance results in other stakeholders who are less profitable to bear the cost of public goods. This is unfair and

promotes social inequality. Tax havens used to avoid tax can also be used for money laundering and other corrupt practices. In addition, due to tax avoidance, the State may add more regulations, making these tax laws more confusing and increasing compliance costs for organizations and administrative costs for the tax authorities (Dowling, 2014). Tax avoidance, a form of EM, can harm the firm and the stock market reputation (Jouber & Fakhfakh, 2012). Therefore, using CSR but carrying out tax avoidance is not socially responsible, as Carroll (1999) inferred, but rather one of organized hypocrisy (Sikka, 2010).

POTENTIAL CONFLICTS AND RESOLUTION

In the literature review of this paper, the developments of IFRS were laid out. It also discussed the reasons and benefits of adopting IFRS. Also, in the literature review, CSR and sustainability were defined. The benefits of CSR and sustainable development followed it. Subsequently, it was discussed that CSR and sustainable development can also be used to carry out EM, and therefore avoiding tax. This was followed by reasons for tax avoidance, approaches used to carry out tax avoidance, and the consequences of tax avoidance.

This section looks at the crossroads of ensuring financial transparency and integrity through IFRS and using CSR and sustainable development in carrying out tax avoidance. Therefore, this section analyses the conflicts and schisms in trying to balance, on the one hand, transparent quality financial information and, on the other hand, carrying out tax avoidance, a form of EM through CSR and sustainable development. This section will also address ways to resolve this issue.

Firstly, there are mixed results in this area. Hsu and Chen (2020) find that CSR can constrain EM under IFRS and produce higher-quality accounting information in their research on Taiwanese firms. The same results were obtained by Amidu et al. (2016) in their studies for firms in Ghana, where they found a significant negative relationship between IFRS adoption and EM, as well as a negative but insignificant relationship between IFRS adoption and tax avoidance.

However, Salewski and Zulch (2014) concluded that European firms with high CSR scores undertook EM, even though they applied IFRS. They maintain that country-specific characteristics moderate the relationship between CSR and EM despite adopting IFRS. Similarly, Braga (2017) found higher tax avoidance after firms adopted IFRS. A study

by Kim and Im (2017) among small and medium-sized enterprises (SMEs) in Korea also found that tax avoidance is rampant, even after adopting IFRS (K-IFRS). This was also the case in the study done by Lee and Kao (2018) on Taiwanese firms from 2011 to 2014.

From the above, there is sufficient evidence that firms undertake CSR and sustainable development as a means of tax avoidance while simultaneously eulogizing the importance of IFRS; the issue is, what can be done to address tax avoidance while performing its CSR and strictly abiding by IFRS? What can be done to resolve this conflict and dissonance?

One way is to enforce rigid laws backed by the power of the government with specific requirements and penalties (Shaffer & Pollack, 2010, cited in Bird & Davis-Nozemack, 2016). While rigid laws must be included in a tax system, it alone is insufficient and may result in more extraordinary tax avoidance behavior. The limitations of rigid laws can be complemented with soft 'laws,' such as NGO recommendations (for example, the Global Reporting Initiative), private monitoring mechanisms (Sheppard, 2014, cited in Bird & Davis-Nozemack, 2016), allowing taxpayer participation in the formulation of tax laws (Kornhauser, 2007, cited in Bird & Davis-Nozemack, 2016), and instilling a sense of patriotism and nationalism (Torgler & Schneider, 2007, cited in Bird & Davis-Nozemack, 2016).

Another approach to mitigate tax avoidance while diligently undertaking and adopting IFRS and pursuing CSR is incorporating tax avoidance as a metric in sustainability ratings and reporting. The Global Reporting Initiative (GRI) is already considering reporting tax payments and related penalties as a metric in its sustainability framework, while the Dow Jones Sustainability Index (DJSI) has agreed to incorporate "tax strategy" into its assessment criteria (Bird & Davis-Nozemack, 2016). A firm's tax strategy may also be needed in other indices, such as the FTSE4Good Index, in screening good corporate citizenship (Bergin & Cruise, 2013). In addition, organizations may also obtain certification from Fair Tax Mark (FTM), whose standard is based on a fair and transparent system (Bird & Davis-Nozemack, 2016).

Ultimately, the intersections and impasse of tax avoidance via CSR, sustainable development, and serious IFRS adoption are best resolved by having the right organizational culture. Organizational culture is the set of taken-for-granted beliefs and

values shared within a particular group (Johnson et al., 2017). According to Johnson et al. (2017), using the Culture Web will be helpful to analyze and change organizational culture. The elements of the Cultural Web are stories, power structures, rituals and routines, organizational structure, controls systems, symbols, and paradigm. Employees must embrace these elements in letter and spirit for the organizational culture to be effective.

Stories being told by members of an organization may act to embed the right values of avoiding tax avoidance, adhering to IFRS, and practicing CSR. The directors of an organization may implore employees to refrain from unethical and immoral actions like tax avoidance. In addition, an organization should also have the right power structures in the form of leaders who create economically, ethically, and socially sustainable organizations and set the right tone at the top. Such leaders will refrain from tax avoidance and promote a culture of candor and transparency by encouraging truth-telling, liberating information (thus not concealing actual tax strategies), admitting mistakes, and rewarding contrarians (O'Toole & Bennis, 2009). Routines look at 'the way things are done around here,' and rituals are particular activities or special events that emphasize, highlight, and reinforce what is essential in the culture. Routines include training accounting, finance, and taxation staff to strictly adhere to IFRS, adopting GRI metrics, and refraining from tax avoidance to improve profits. Firms can also invite eminent speakers on CSR, IFRS, and tax avoidance to give their insights as part of their rituals. The next element of the cultural web is an organizational structure. Organizational structure is defined as (1) the set of formal tasks assigned to individuals and departments; (2) formal reporting relationships, including lines of authority, decision responsibility, number of hierarchical levels, and span of managers' control; and (3) the design of systems to ensure effective coordination of employees across departments (Daft, 2016, p. 322). The overarching organizational structure is its corporate governance arrangements. The Cadbury Committee (1992, cited in Mintz, 2005, p. 584) defines corporate governance as the system by which companies are directed and controlled. Therefore, good corporate governance is needed for an organization and its structure to perform well. In order to have good corporate governance, the directors must be fair; there must be independence in the board; the directors must practice transparency and probity, must be responsible and accountable, must practice

good judgment and have high integrity, must practice professional skepticism, and be innovative (Kholmi, 2020; Business Roundtable, 2016). Based on the above, good corporate governance will ensure that a firm carries out its duties in a manner that enshrines quality financial reporting to its shareholders, properly pays a fair share of tax to the State, and performs its CSR to its diverse stakeholders. Corporate governance can bring about the convergence of these conflicts to arrive at a proper resolution. However, a firm's corporate governance approach must shift from an agency model to a stakeholder model, including the government as a stakeholder and treating each stakeholder fairly. Adopting the UK Governance Code may be contemplated (Financial Reporting Council, 2018) for such a shift.

The next element of the Cultural Web is control systems. Control systems can occur through policies, procedures, performance appraisal, rewards, and a code of ethics. The code of ethics can be crafted using normative ethical theories, such as Kant's Deontology (Filho & Cottrol, 2014), which will always give an unethical response to tax avoidance. Symbols in the Cultural Web refer to objects, acts, or people that convey, maintain, or create meaning over and above their functional purpose (Johnson et al., 2017). In the context of symbols, an organization can obtain certification such as Fair Tax Mark (FTM) (Bird & Davis-Nozemack, 2016) and ISO 14000 or obtain guidance on ISO 26000 (ISO, n.d.). ISO 14000 concerns environmental issues, while ISO 26000 covers social responsibility guidance. If initiated well, these symbols, working in conjunction with other overlapping elements of Culture Web, will change the paradigm of employees, that is, their fundamental underlying assumptions and their taken-for-granted beliefs. Hence, when taken together, Cultural Web elements will embed the correct values in an organization, ensuring that it refrains from tax avoidance while simultaneously pursuing its CSR and adopting IFRS strictly.

COSMETIC EARNINGS MANAGEMENT – THE CASE OF CAMBODIAN PUBLIC-LISTED COMPANY

As tax avoidance becomes rampant, Cambodian firms can also undertake such a practice through their CSR and sustainability initiatives. The precursor of tax avoidance is EM. While EM can be undertaken to ensure that earnings meet analysts' expectations

so that share price continues a steady growth as well as avoiding debt covenant violations (Jordon & Clark, 2011), EM, as mentioned in the earlier sections, can also be used to reduce profits and therefore avoid paying a fair share of tax to the State. This section analyzes a public-listed firm to examine any form of EM. If the said firm has undertaken EM, then there is the possibility of greater 'innovation' to avoid tax in the future.

This analysis aims to determine any form of cosmetic EM to increase earnings just enough to cross a particular reference point. Although this EM has nothing to do with tax avoidance, this analysis aims to identify any EM being carried out, and if EM can be carried out to raise earnings, then EM in the future can also be used to reduce earnings to avoid paying a fair share of tax to the State.

Research done by Gabrielle and Brenner (1982, cited in Jordon & Clark, 2011) notes that humans (for example, investors) possess only a limited amount of memory and, when remembering numbers, place more emphasis on the first digit and increasingly less significance to the second, third and successive digits. Furthermore, when storing numbers in their memory, humans tend to round down rather than round up (Carslaw, 1988, cited in Jordon & Clark, 2011). In 1881, astronomer and mathematician Simon Newcomb surmised that low numbers occur more frequently in practice than high numbers. Fifty years later, General Electric physicist Fran Benford made the same discovery (Jordon & Clark, 2011). This analysis will make use of Benford's Law to determine potential cosmetic EM (Jordon & Clark, 2011), as shown in Table 1 below.

Table 1: Benford's Law – Position of the Digit in Number

Digit	First	Second
0	-	11.97%
1	30.10%	11.39%
2	17.61%	10.88%
3	12.49%	10.43%
4	9.69%	10.03%
5	7.92%	9.67%
6	6.70%	9.34%
7	5.80%	9.04%
8	5.12%	8.76%
9	4.58%	8.50%

This law states that the number 1 possesses a 30.10 percent chance of appearing in the first digital position within a number. In contrast, a 9 has only a 4.58 percent likelihood of occurring within a number's first digital position. Cosmetic EM is manifested when there is a combination of an unusually small frequency of large numbers in the second digital position and an abnormally large distribution of low numbers in the second digital position.

A public-listed company in Cambodia is arbitrarily chosen to examine any cosmetic EM. At the very onset, it has to be clarified that this analysis is purely academic. Even if cosmetic EM is detected, this paper merely intends to broaden the discourse of EM and does not intend to tarnish any specific firm. It is also best to keep the firm's identity confidential.

Table 2 shows the profit and loss of a public-listed company in Cambodia from 2018 to 2020.

Table 2: Profit and Loss for the Years 2018-2020

Profit/loss	2020	2019	2018
Total revenues (USD '000)	81,092	54,124	66,273
Profit/loss before tax (USD '000)	30,187	12,323	23,877
Profit/loss after tax (USD '000)	22,088	8,323	19,125
Total comprehensive income (USD '000)	22,088	8,323	18,402

For cosmetic EM to occur using Benford's Law, the second digit will have a relatively large distribution of low numbers. Taking the figures above and examining the second digit of the profit/loss, Table 3 is produced.

Table 3: Second Digit of Profit/Loss for the Years 2018-2020

Profit/loss	2020	2019	2018
Total revenues (USD '000)	1	4	6
Profit/loss before tax (USD '000)	0	2	3
Profit/loss after tax (USD '000)	2	3	9
Total comprehensive income (USD '000)	2	3	8

The second digits for the year 2018 have generally more significant numbers than the years 2019 and 2020. Using Benford's Law, cosmetic EM may not have occurred in 2018. However, the second digits for 2019 are much smaller than 2018, and the second digits for 2020 are much smaller than 2019. From 2019 to 2020, the second digit for total revenue changed from 4 to 1, the second digit for profit/loss before tax changed from 2 to 0, the second digit for profit/loss after tax changed from 3 to 2, and finally, the second digit for total comprehensive income had changed from 3 to 2. Hence, there is an increasing

frequency of smaller numbers in the second digit position. As such, cosmetic EM may occur, where the first digit may have been manipulated to increase by 1. This is not saying in the affirmative; the low second digit may have occurred by chance. However, this paper encourages readers to look at EM from the more malignant intentions and cosmetic EM, as was the intention of Benford's Law.

To address cosmetic EM, the government of Cambodia may want to consider developing specific corporate governance laws, as what has been done in the USA with the implementation of the Sarbanes-Oxley Act, where research done by Jordon and Clark (2011) showed that their 2003-2006 data had no cosmetic EM. In addition, as mentioned earlier, an excellent organizational culture will also help to alleviate cosmetic EM.

CONCLUSION

This paper first discussed the literature on the evolution of IFRS and why companies and countries are adopting it. This was followed by the benefits of IFRS and the conditions needed for it to succeed, namely, having proper laws to protect investors, such as those found in countries with common laws.

The literature review then progressed to firms undertaking tax avoidance through their CSR and sustainable development initiatives, a form of EM. Reasons were provided on why firms do so, the approaches to adopting tax avoidance, and the negative repercussions of tax avoidance. Subsequently, it examined the impasse experienced since firms undertake IFRS but simultaneously carry out tax avoidance in the guise of CSR and sustainable development, hence, the dark side of stakeholder management. Various ways to address this intersectional impasse were then recommended, chief among them is to have the right organizational culture and adopt the recommendations based on the Cultural Web. Finally, this paper analyzed cosmetic EM using a public-listed Cambodian firm using Benford's Law. From this elementary analysis, some cosmetic EM may have occurred, or the low numbers in the second digit may have occurred by chance.

This paper hopes to stimulate a broader discourse that, on the one hand, companies are adopting IFRS to ensure better financial reporting quality. On the other hand, the dark side of stakeholder management rears its ugly head when firms use CSR and sustainability development to depress profits to

avoid paying a fair share of tax to another legitimate stakeholder, the State. In addition, the precursor of any tax avoidance is EM, and any company carrying out EM, although it might be cosmetic, may soon elevate to another level, namely tax avoidance. This paper hopes to encourage more excellent reflection in this area.

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The Influence of Intellectual Capital on Earnings Quality: Evidence from Firms Listed on the Cambodia Securities Exchange

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ABSTRACT

This study aims to determine whether the efficiency of intellectual capital (IC) and each of its three constituents—human capital efficiency (HCE), capital employed efficiency (CEE), and structural capital efficiency (SCE)—can generate better earnings quality (EQ) in an emerging market. Drawing on the Pulic (2004) model for measuring the efficiency of IC and the absolute value of discretionary accruals as a proxy for EQ, the study analyzes the data of a sample of Cambodian nonfinancial firms listed on the Cambodian Securities Exchange (CSX) during the period from 2013 to 2021. The empirical results indicated that Cambodian firms active in utilizing IC has more tendency to provide reports of high quality. Besides, it is shown that each of the three elements of IC significantly and positively influences EQ. Meanwhile, SCE has the most significant impact among the three components. Those results offer an enhanced understanding of IC-utilizing and EQ practices that might be in favor of investors, regulatory bodies, and scholars. This study is among the first studies investigating Cambodian firms for IC and EQ topics.

Keywords: : Earnings quality; Value-added intellectual coefficient; Human capital efficiency; Employed capital efficiency; Structural capital efficiency

INTRODUCTION

Globally, the enhancement of information technology and telecommunication has improved the employment of intelligence and data. In this composite and amending work environment, the existence of firms relies upon initiating inventive products, innovation, and following procedures focused on advanced knowledge, which is known as intellectual capital (IC); thus, the efficiency of such resources can be represented as effective employment of organization resources (Chen et al., 2005).

One of the most important fields in which firms ought to efficiently utilize their IC is enhancing the quality of financial reporting. Earnings can also be considered an indicator of the efficient utilization of firms' resources; therefore, different users need accurate and valid data about earnings to make decisions. This indicates that firms' efficiency in utilizing IC and providing high-quality earnings are related.

Regarding the association between these two variables, two opposing perspectives are suggested.

The optimistic viewpoint based on the resource-based view argues that earnings quality (EQ) is higher in firms that effectively employ their IC since they are under less financial pressure and are in a better position to detect and prevent fraud since the effective employment of IC can improve firms' financial performance and increase the effectiveness of their internal control system. Depending on the agency theory, the opposing viewpoint states that controlling effective IC enables managers to prepare their reports in a way that assists them in achieving their objectives.

The impact of IC efficiency on the EQ has been studied by Darabi et al. (2012a; 2012b), Hatane et al. (2019), and Rachmawati (2020), but they generated different results. The review of the preceding investigations that examine the relationship between IC efficiency and EQ emphasizes a significant relationship between those two variables. However, there is a need for more Cambodian investigations into this issue. Therefore, the research examines the role and importance of IC and its components in determining EQ among firms listed on CSX.

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Financial statements provide data for measuring IC efficiency and EQ. Pulic's (2004) value-added intellectual coefficient (VAIC) model is employed as a proxy for IC efficiency. EQ is measured by the absolute value of discretionary accruals calculated through a modified Jones model.

Based upon a sample of 38 firm-year observations from 2013 to 2021 and the governing firms' characteristics, practical findings advocate a positive link between IC efficiency and EQ. This indicates that the efficient use of IC positively impacts enhancing the quality of earnings. In addition, IC components have a significant and positive influence on EQ. However, structural capital (SC) has a more substantial impact on EQ than human capital (HC) and capital employed (CE), indicating that firms that efficiently use SC provide high-quality reports.

Understanding the influence of IC efficiency on earnings quality in different sectors could be very important for policymakers, regulatory bodies, and standard setters. The advanced literature on explaining the relationship between a firm's IC and its EQ sparked extensive debate among scholars globally and nationally. This study could also be considered one of Cambodia's first investigations clarifying the link between IC and EQ.

This paper has four sections. After the introduction, the second portion reviews prior studies on this issue. The third part presents the research methodology, and the findings and conclusion are shown in the last two sections.

LITERATURE REVIEW

The IC literature reveals the significance and intangible character of such resources. The IC's principal efforts are indebted to Machlup's studies in 1962, but Galbraith invented the IC concept in 1969. He considered that IC is beyond rational action and involves an intellectual accomplishment. In the evolution of the IC concept, theorists have offered diverse definitions for IC from numerous perspectives and by empirical and experimental models (Abeysekera, 2008).

Barney (1991) asserts that IC has a concealed character and has been identified as a firm strategic resource. Brooking (1996) also recognizes IC as a mixture of four key elements: market properties, human-based possessions, intellectual resources, and infrastructure assets.

Edvinsson and Sullivan (1996) define IC as knowledge that can be transformed into value. As indicated by Ross et al. (1997), IC comprises an intellectual portion (such as HC) and a non-intellectual portion (such as SC). According to Stewart (1997), the broadest definition of IC is the collection of intelligence, information, intellectual property, and expertise of every person in a firm used to build wealth and competitive advantage.

Sveiby (1997) argues that IC comprises three intangible asset categories: inner structure, exterior structure, and worker capability. Furthermore, Klein (1998) defines IC as knowledge, skills, proficiency, and linked soft resources more readily available than tangible and monetary capital. In operationalizing the concept of IC, Nahapiet and Ghoshal (1998) have emphasized that HC and SC (through knowledge, skills, and capabilities) can enhance organizational development.

According to Bontis et al. (2000), IC includes knowledge, information, intellectual assets, and experience to create wealth. "Intellectual asset" refers to total intellectual capacity or primary knowledge. Marr (2005) identifies IC as an assemblage of knowledge resources that are regarded as the firm's characteristics, and importantly, raising the level of value-added for the main interested parties of the firm results in enhanced effectiveness. Furthermore, Ghosh and Wu (2007) further described IC as the specified and valued knowledge belonging to the firm, for example, know-how, patents, and skilled personnel.

Moreover, IC can be described as a pool of a firm's intangible assets, which allows it to perform numerous functions. It can be employed as a strategic resource for the firm's specific and valued knowledge. More recently, IC is illustrated by organizational assets, such as skilled employees, knowledge, and management's philosophy (Anuonye, 2016).

Although no globally recognized and standard definition of IC is presented, there is relative agreement on its components (Tan et al., 2007). From an accounting perspective, Pulic (2004) divided IC into three components: HC, SC, and CE. This paper applies this accounting viewpoint to IC.

The first and most crucial component of IC is HC, which is regarded as a primary driver in generating value for a firm and realizing effectiveness and competitiveness (Chen et al., 2009; Dokko & Rosenkopf, 2010; Nordenflycht, 2011). According to Mayo (2001), HC

components include the employees' capabilities, growth potential, motivation, commitment, and innovativeness. Secondly, SC comprises organizational capital (all the assets strengthening the firm's processes) and relational capital (associations with stakeholders). Such capital is part of the culture, system of knowledge management, effective procedures, and support of the top management of the organization (Yang & Lin, 2009). Finally, CE refers to the entire capital harnessed in a firm's physical and financial assets. From the financing side, it equals total assets less than intangible ones (Bozbura, 2004).

Due to the effect of the financial statements on the decisions of stakeholders, one of the most important fields in which IC can be efficiently utilized is providing reports of high quality. Accounting earnings are regarded as one of the most important financial statement elements that are valuable for shareholders (Hessayri & Saihi, 2015). Since accounting numbers are subject to different accounting policies and estimates, the practice of earnings management (EM) can result in a false presentation of a firm's financial condition, thus lowering the quality of earnings (Peni & Vähämaa, 2010).

There are two opposing views in studying the relationship between IC and EQ. The optimistic perspective based on resource-based theory argues that firms that efficiently utilize their IC are less prone to engage in EM practices. This theory evaluated a firm's competitive advantage, particularly for businesses built on the knowledge-based economy. The theory focuses on the efficient use of strategic assets as a prerequisite for achieving competitive advantage (Zéghal & Maaloul, 2010). According to this argument, firms can efficiently utilize their IC resources to enhance the quality of their financial reports.

The pressure generated by growing financial or nonfinancial difficulties and significant flaws in control systems or the low likelihood of detecting fraud are two key factors driving corporations to commit fraud (Rodgers et al., 2015). As a result, it is presumed that IC helps eliminate firms' opportunistic behavior. Firstly, the financial performance argument asserts that IC boosts firms' profitability. Many studies demonstrate that IC boosts financial performance (e.g., Nadeem et al., 2018; Nawaz, 2017).

The role of HC and CE in this aspect can be observed since managing physical and financial capital aids in achieving the firm's financial performance goal, particularly related to accounting profit. Besides,

managers with a background in managing assets and capital can be more alert to the detrimental influence of EM practices on firms' financial performance, and this competence will constrain engaging in EM practices (Nuryaman et al., 2019). Hence, IC can relieve firms' financial pressure and lower misleading financial reporting.

Secondly, from the perspective of corporate governance, the presence of significant internal controls eliminates fraudulent activity. According to Cressey (1953), IC components like SC may encourage and enhance the effectiveness of corporate governance and internal controls, which may be considered distinct elements for preventing and detecting fraud. SC will aid the firm in generating cautious planning and an active management control system, which can monitor the management to perform proficiently and inhibit management activities that will hurt the firm's value in the long run. Therefore, SC is expected to restrict EM (Nuryaman et al., 2019).

On the other hand, according to agency theory, the pessimistic view states that controlling intellectual resources might assist managers in preparing their reports to achieve their opportunistic objectives. The principal-agent connection is embraced by agency theory (Fama, 1980; Jensen & Meckling, 1976). This theory emphasizes that every person has the freedom to act in his or her own best interests. The party directing the agent to act on their behalf and manage the firm is known as the principal. Managers who work for the principal may be more adaptable and knowledgeable about the firm than the principal. In actuality, the manager will retain the accounting data for his personal advantage. The business owners became suspicious of this, which prompted a conflict. Moreover, this conflict prompts management to use EM and deceives stakeholders about the firm's actual performance. Since the financial statements submitted by the agent to the principal serve as the basis for determining the agent's compensation as well as the assessment of the agent's success in attempting to enhance the principal's welfare (Jensen & Meckling, 1976; Watts & Zimmerman, 1986), the principal's and stakeholders' confidence in these statements is unquestionably put at risk if a manager has a high level of intellectual resources when regulating firm information.

Numerous previous studies have investigated the relationship between IC efficiency and EQ, and all of those investigations depend on the VAIC model

developed by Pulic (2004) to measure IC efficiency. However, they differ in the method of measuring EQ. For example, Darabi et al. (2012a) examined the relationship between firms' IC and EQ across a sample of firms listed in the Iran stock market from 2005 to 2010. The empirical analysis was done depending on the absolute value of discretionary accruals as a measure of EM. The statistical test results showed that the IC and HC components significantly impact EQ. In contrast, SC and CE have no direct influence on EQ.

Additionally, Darabi et al. (2012b) investigated the effect of different IC components on the quality of financial reporting among a sample of firms from different industries listed on the Tehran Stock Exchange between 2004 and 2009. Models developed by Dechow and Dichev (2002) and Francis et al. (2005) were employed to compute the quality index of financial statements. The results demonstrated that human capital efficiency (HCE) and capital employed efficiency (CEE) positively influence the quality of financial reporting. In contrast, SCE has a meaningfully negative influence on the quality of financial reports. Among these three IC ingredients, HCE's impact on the quality of financial reporting was more effective than the other two components.

Depending upon earning stability and earning predictability as indexes of EQ, Zanjirdar and Chogha (2012) found a positive and significant association between the IC efficiency and EQ indexes across a sample of firms listed in the Tehran Exchange Market through five years from 2004 to 2009. Similarly, Asadollahi et al. (2013) tested the correlation between IC and the earnings predictability of firms listed on the Tehran Stock Exchange between 2007 and 2011. They depended on the Francis et al. (2005) model to assess earnings predictability. The findings from testing the study hypotheses illustrated a meaningful positive connection between IC efficiency and earnings predictability. They also realized a positive and meaningful connection between HCE and SCE and earnings predictability, while CEE has no significant relationship with earnings predictability.

Azizi et al. (2013) investigated the association between IC efficiency and EQ through a sample of firms listed on the Tehran stock exchange in 10 years between 2002 and 2011. Eight financial performance indicators in five sets, including receivable accounts, gross profit, cost of sales management, applied capital rate, liquidity realization, operational liquidity, inventory, and profitable reinvested assets ratio, were

employed to measure EQ. The results demonstrated a significant and positive relationship between IC efficiency and EQ. Employing the modified Jones model as an index of EQ, Mojtahedi (2013) demonstrated that IC had a positive and meaningful influence on EQ across a sample of Malaysian firms between 2000 and 2011. Conversely, Galdipour et al. (2014) indicated a significant reverse relationship between IC efficiency and EM through a sample of firms listed on the Tehran stock exchange from 2006 to 2012.

Marzban et al. (2014) examined the association between IC and indicators of earnings quality in evolving firms listed on the Tehran Stock Exchange from 2007 to 2012. Earnings stability, predictability, the profit-to-equity ratio, and changes in operating cash flow with profit were used as indicators of earnings quality (EQ). They showed a meaningful positive correlation between IC and income sustainability and predictability. They also discovered no meaningful relationship between IC and the profit-to-equity ratio or operating cash flow with profit.

Parast et al. (2014) investigated the relationship between IC efficiency and earnings stability in the petrochemical and pharmaceutical firms listed on the Tehran Stock Exchange between 2002 and 2008. They showed a significant positive connection between IC and the stability of earnings. They also showed a significant and positive link between HCE and earnings stability. However, there is no significant relationship between SCE and CEE and earnings stability. Furthermore, Sarea and Alansari (2016) investigated the correlation between IC efficiency and EQ for the firms listed in the Bahrain Bourse. They applied the modified Jones model to measure EQ. The findings showed a positive association between the IC and its three elements with EQ. In comparing firms in the consumer goods sector listed on Indonesia's and Malaysia's stock exchanges for six years from 2011 to 2015, Hatane et al. (2019) concluded that IC positively impacts EQ in Indonesia. However, the influence is shown to be negative in Malaysian firms.

By employing the Roychowdhury (2006) model to measure real earnings management (REM), Nuryaman et al. (2019) examined the effect of IC on REM in Indonesian manufacturing firms listed on the Indonesia Stock Exchange in 2016. They showed that the combination of IC elements can decrease EM behavior through the manipulation of sales operations. Additionally, Rachmawati (2020) examined the effect of IC and its ingredients on REM

among a sample of 80 firms listed on the Indonesia Stock Exchange from 2015 to 2017. The research findings showed that neither IC nor its components affect REM.

Arnas et al. (2021) sought to identify the factors influencing EM across 14 Indonesian transportation-listed firms, such as IC, institutional and managerial ownership, and audit quality. They depended on the modified Jones model to determine EM. Only IC among the studied variables was found to influence EM positively. Throughout the eleven years from 2008 to 2018, Jaya et al. (2021) investigated whether the management of a sample of 70 Indonesian listed firms used their IC to commit fraud by misrepresenting earnings in financial statements. They depended on the absolute value of discretionary accruals calculated using the modified Jones model as a measurement of EM, and they showed that HC had a negative impact on EM behaviors in contrast to SC and CE, which positively affect such fraudulent activity.

To explain how IC affects EQ, Mutuc (2021) combined the moderating impact of industry competitiveness with the mediating influence of financial performance. This study's sample consisted of 259 nonfinancial listed firms from seven countries—China, India, Malaysia, South Korea, the Philippines, Taiwan, and Thailand—from 2011 to 2017. The modified cross-sectional Jones model served as a proxy for EQ. The significant conclusions showed that IC investments are crucial for improving EQ and adding value to the organization. IC causes better EQ, although the effect is somewhat mediated by financial performance across firms in China, the Philippines, Taiwan, and Thailand. Moreover, industry competition supports a change in how IC affects EQ. It is demonstrated that industry competitiveness moderates the IC-EQ association positively in firms with higher industry competition while negatively moderating this relationship in Thailand and the Philippines' enterprises.

In a sample of 187 listed firms on the Tehran Stock Exchange between 2011 and 2018, Lotfi et al. (2022) evaluated the effect of IC and its components, namely the effectiveness of human capital, structural capital, relational capital, and customer capital, on fraud in financial statements. The adjusted Beneish (1999) model was employed in this study to detect fraud in the sample firms' financial statements. The results demonstrated a negative and significant correlation between IC and its elements and financial statement fraud, meaning that by investing in IC and its elements, the amount of fraud in the financial statements of

commercial firms is reduced. Furthermore, Sowaity (2022) examined the impact of IC on EM across a sample of Jordanian-listed firms and found a significant negative relationship between these two variables. Regarding the IC component, they realized that EM is negatively and significantly related to SCE but not significantly associated with HCE.

More recently, Romadhoni and Achyani (2023) investigated the impact of IC on the quality of earnings across a sample of Indonesian manufacturing listed firms during two years from 2019 to 2020. They found that the quality of earnings is positively affected by CEE, but HCE or SCE does not influence it. Across a sample of firms listed on the Iraqi Stock Exchange between 2012 and 2018, Salehi et al. (2023) examined the influence of IC on financial statement fraud. They found that IC negatively affects such a practice.

The review revealed that none of these studies focused on investigating this issue among Cambodian firms. There is a research gap in investigating the impact of IC efficiency on EQ in such a country, and this research tries to fill this gap by examining whether Cambodian-listed firms that efficiently utilize their IC engage in EM practices, especially with the mixed results of previous research.

Cambodian firms pay great attention to IC resources. Cambodia's Human Development Index, a composite measure published by the United Nations that includes life expectancy, educational attainment, and income level, increased from a 0.44 score in 2001 to a 0.6 score in 2020, growing at an average annual rate of 1.64%. Since 1989, when it returned to a market-oriented economy, Cambodia has introduced policies and reforms to develop its private sector and business environment and boost economic growth through investment and trade. According to the World Bank's Doing Business 2018 report, Cambodia ranks 131 out of 189 economies on the Protecting Minority Investors Index.

Regarding CE in Cambodia, the country's environment provides natural resources, such as forests, waterways, plants, and wildlife. Natural resources also include minerals, energy, and extractives. The environment is also varied, covering at least seven distinct landscapes nationwide. Depending upon the explanation above, the following hypothesis is formulated:

H₁: IC efficiency affects the level of engagement in accrual-based earnings management (AEM) of Cambodian listed firms.

Since HC, CE, and SC are the three components that constitute IC, separate hypotheses are established for each of these components:

- H_2 : HCE affects the level of engagement in AEM of Cambodian listed firms.
- H_3 : SCE affects the level of engagement in AEM of Cambodian listed firms.
- H_4 : CEE affects the level of engagement in AEM of Cambodian listed firms.

METHODOLOGY

Data and Sample

Accounting data for study variables are retrieved from firms' financial reports. The study's sample involves the nonfinancial Cambodian firms listed on CSX from 2013 to 2021. In line with preceding research, financial firms are omitted due to their exceptional disclosure practices since they are subjected to diverse reporting requirements that make evaluating discretionary accruals problematic (Hong & Anderson, 2011; Kim et al., 2012). There are seven nonfinancial firms listed on CSX during the study period. Table 1 illustrates the name of these firms, the year of listing on CSX, and the number of available reports for each firm since the year of the listing.

Table 1: Details of Firms Listed on the Cambodia Securities Exchange

Firm name	Year of listing	Number of available reports
DBD Engineering Plc.	2021	1
Pestech (Cambodia) Plc.	2020	2
Sihanoukville Autonomous Port	2017	5
Phnom Penh SEZ Plc.	2016	6
Phnom Penh Autonomous Port	2015	7
Grand Twins International (Cambodia) Plc.	2014	8
Phnom Penh Water Supply Authority	2012	9
Total		38

This table illustrates that the final sample of the seven Cambodian nonfinancial listed firms encompasses 38 firm-year observations. Table 2 shows all observations allocated by industry and year.

Table 2: Sample Distribution by Industry and Year

Industry	Complete sample	
	N	%
Apparel Clothing	8	21.05
Construction and Engineering	1	2.63
Port Services	12	31.58
Power	2	5.26
SEZ Developer	6	15.79
Water Utility	9	23.68
Total	38	100

Year	Complete sample	
	N	%
2013	1	2.63
2014	2	5.26
2015	3	7.89
2016	4	10.53
2017	5	13.16
2018	5	13.16
2019	5	13.16
2020	6	15.79
2021	7	18.42
Total	38	100

Variables Measurement

The research model consists of three variables, and here is how to measure each.

Independent Variables

Intellectual Capital (IC) Efficiency

IC efficiency is measured using the VAIC method developed by Pulic (2004). Despite different methods of measuring IC, the VAIC model developed by Pulic (2004) is the most widely accepted and widely used means to measure IC efficiency. Pulic (2004) claimed that the firms' market value is generated by CE and IC comprising SC and HC. In this approach, information about the efficiency of value generation is computed using a firm's intangible (HC and SC) and tangible resources (CE). This approach ultimately evaluates IC through HCE, SCE, and CEE.

This approach's main advantage is its simplicity. The numerals are relatively easy to acquire from firms' annual reports and can be utilized for comparisons between or within firms once calculated for a year. Conversely, this straightforwardness has various shortcomings. Comparing a firm's labor expenditures to its IC might underestimate IC compared to other market-based methodologies. Furthermore, a firm might utilize its workforce resources ineffectively (Starovic & Marr, 2003).

The computation of VAIC takes many steps. First, value added (VA) is calculated as the sum of operating profit (OP), employee costs (EC), depreciation expenses (DP), and amortization expenses (AE).

$$VA = OP + EC + DP + AE \quad (1)$$

Secondly, HCE is computed as the computed VA coefficient over HC, where HC is computed by drawing from employees' salaries and benefits. HCE is measured as follows:

$$HCE = VA/HC \quad (2)$$

Thirdly, structural capital (SC) is calculated as the ratio of VA to HC because SC and HC are negatively associated with generating value for businesses (Lin et al., 2015). Structural capital efficiency (SCE) is calculated as the fraction of SC to VA.

$$SCE = SC/VA \quad (3)$$

Fourthly, the influence of CE utilized in generating value for firms is measured by net asset book value. CEE offers information concerning the proportion of VA over the CE. CEE is calculated as follows:

$$CEE = VA/CA \quad (4)$$

HCE, SCE, and CEE exemplify the value generated from the firm's whole resources. The value of VAIC equals the aggregate amount of the three elements of VA efficiency indicators.

$$VAIC = HCE + SCE + CEE \quad (5)$$

Dependent Variable

Earnings Quality (EQ)

The absolute value of discretionary accruals (ABDA), calculated through the modified Jones model (1995), was used as a proxy for EQ. Although numerous methods of measuring EQ exist, the modified John model is considered the most effective. It has also been mentioned as a powerful model that can detect EM by measuring unexpected accruals better than other models. A higher value of absolute discretionary indicates a higher EM effort, implying a lower EQ (Mojtahedi, 2013). Although the sample is small, this study depends on this model for measuring the extent of EQ, as it has been widely employed in previous research with small samples (e.g., Romadhoni & Achyani, 2023; Sowaity, 2022).

When assessing the current discretionary accruals, the total current accrual for a firm i in year t (TCA_{it}) is initially computed as follows:

$$TCA_{it} = \Delta CA_{it} - \Delta cash_{it} - \Delta CL_{it} + \Delta STDebt_{it} - DEP_{it} \quad (1)$$

Where:

ΔCA_{it} = change in current assets

$\Delta Cash_{it}$ = change in cash and cash equivalent

ΔCL_{it} = change in current liabilities

$\Delta STDebt_{it}$ = change in short-term debt

DEP_{it} = Depreciation and amortization expense for firm i in year t .

Secondly, an ordinary least squares method was employed for running the following regression for all firms in the sample:

$$\frac{TCA_{it}}{TA_{it-1}} = \alpha_0 + \alpha_1 \left(\frac{1}{TA_{it-1}} \right) + \beta_1 \left(\frac{\Delta REV_{it}}{TA_{it-1}} \right) + \beta_2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) + \varepsilon_{it} \quad (2)$$

Where:

TA_{it-1} = Lagged value of total assets for firm i .

ΔREV_{it} = change in net revenues

ΔREC_{it} = change in net receivables

PPE_{it} = Property, plant, and equipment for firm i in year t .

Thirdly, the non-discretionary accruals ($NDAC_{i,t}$) value for each firm was computed through valuations of α_0 , α_1 , β_1 , and β_2 as follows:

$$NDAC_{it} = \hat{\alpha}_0 + \hat{\alpha}_1 \left(\frac{1}{TA_{it-1}} \right) + \hat{\beta}_1 \left(\frac{\Delta REV_{it} - \Delta REC_{it}}{TA_{it-1}} \right) + \hat{\beta}_2 \left(\frac{PPE_{it}}{TA_{it-1}} \right) \quad (3)$$

Fourthly, the discretionary accruals ($DAC_{i,t}$) value was estimated as the residuals of the previous regression as follows:

$$DAC_{it} = \frac{TCA_{it}}{TA_{it-1}} - NDAC_{it} \quad (4)$$

Finally, ABDA was evaluated by the absolute value of DAC_{it} .

Control Variables

According to the prior literature (Dechow et al., 1995; Klein, 2002; Pincus & Rajgopal, 2002; Roychowdhury, 2006; Skinner & Sloan, 2002), four control variables, which have been realized to affect EQ, have been included in research regression. Mainly, the chosen control variables are firm size (SIZE), return on equity (ROE), firm leverage (LEV), and firm growth (GROWTH). Table 3 shows the measurement of the research's independent, dependent, and control variables.

Table 3: Measurement of the Study Variables

Variable	Measurement
Independent variables	
VAIC	IC efficiency is measured according to the VAIC model.
HCE	HCE coefficient.
SCE	SCE coefficient.
CEE	CEE coefficient.
Dependent variable	
ABDA	The absolute value of discretionary accruals (calculated through the modified Jones model).
Control variables	
SIZE	Natural log of total assets.
ROE	Net income / total equity.
LEV	Total debt / total equity.
GROWTH	The asset growth rate is calculated through the following equation: $\frac{\text{Assets}_{it} - \text{Assets}_{it-1}}{\text{Assets}_{it-1}}$

Empirical Model

After gathering data, a regression equation is assessed to examine the first hypothesis of the research as follows:

$$ABDA_{it} = \alpha_0 + \alpha_1 VAIC_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROE_{it} + \alpha_4 LEV_{it} + \alpha_5 GROWTH_{it} + \varepsilon_{it} \quad (1)$$

Where:

$ABDA_{it}$ = The absolute value of discretionary accruals (calculated through the modified Jones model)

$VAIC_{it}$ = The efficiency of IC

$SIZE_{it}$ = The natural logarithm of total assets

ROE_{it} = The ratio of net income to total equity

LEV_{it} = The ratio of total debt to total assets

$GROWTH_{it}$ = Assets growth rate

To avoid the problem of multicollinearity, a separate regression equation is addressed for each VAIC component as follows:

$$ABDA_{it} = \alpha_0 + \alpha_1 HCE_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROE_{it} + \alpha_4 LEV_{it} + \alpha_5 GROWTH_{it} + \varepsilon_{it} \quad (2)$$

$$ABDA_{it} = \alpha_0 + \alpha_1 SCE_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROE_{it} + \alpha_4 LEV_{it} + \alpha_5 GROWTH_{it} + \varepsilon_{it} \quad (3)$$

$$ABDA_{it} = \alpha_0 + \alpha_1 CEE_{it} + \alpha_2 SIZE_{it} + \alpha_3 ROE_{it} + \alpha_4 LEV_{it} + \alpha_5 GROWTH_{it} + \varepsilon_{it} \quad (4)$$

Where:

HCE_{it} = The coefficient of HCE

SCE_{it} = The coefficient of SCE

CEE_{it} = The coefficient of CEE

RESULTS

This section is divided into three parts. The first part presents the descriptive statistics of the study variables, while the second section shows the correlation matrix among research variables. The final part discusses the implications of the relationship between EQ and VAIC and its components regarding the clarified projected hypotheses.

Descriptive Statistics

Table 4 shows the descriptive statistics of the complete sample. The table shows that ABDA ranges between 0.00001 and 0.018, with a mean of 0.008 and a standard deviation of 0.005, indicating that the difference between EM engagement levels is high between firms listed on CSX. Meanwhile, the minimum value of 1.384, the maximum value of 8.109, the mean value of 3.517, and the standard deviation of 1.817 of VAIC illustrate that the difference between the levels of utilizing IC between Cambodian listed firms is slightly dispersed.

A comparison of the means and standard deviations of HCE (2.7, 1.55), SCE (0.519, 0.274), and CEE (0.112, 0.056) suggests that the sample firms were commonly more active in creating value from their HC rather than from their CE and SC since the significant share of the VAIC consists of the HCE. This indicates that most of the generated value results from how the firms employ their HC.

Firm size (SIZE) has an average value of 18.793. This variable ranges between 16.247 and 20.346; its standard deviation was 0.948. This demonstrates that there is no significant difference in the size of the sampled firms. Financial performance measured by the return on equity (ROE) has an average value of 0.068 and a standard deviation of 0.041. While the maximum value of ROE amounted to 0.155, the minimum value amounted to -0.02. This illustrates that the ROE figures of Cambodian firms listed on CSX differ somewhat.

The range of leverage (LEV) is between 0.114 and 1.549. The mean value of LEV is 0.603, and the standard deviation is 0.348, which shows that the difference between the leverage levels of the sampled firms is not large. Finally, firm growth represented by asset growth (GROWTH) has an average value of 0.084 and a standard deviation of 0.073. This variable's lowest and highest values are -0.07 and 0.225, respectively, which indicates a slight difference in the growth of Cambodian-listed firms.

Table 4: Descriptive Statistics

	N	MEAN	SD	MIN	MAX
ABDA	38	0.0083	0.0049	0.00001	0.0175
VAIC	38	3.5174	1.8173	1.3842	8.1091
HCE	38	2.6984	1.554	1.1296	7.016
SCE	38	0.5192	0.274	0.1147	0.877
CEE	38	0.1117	0.0562	0.0348	0.2238
SIZE	38	18.7932	0.9484	16.2465	20.3461
ROE	38	0.0683	0.0408	-0.0197	0.1552
LEV	38	0.6033	0.3477	0.1139	1.5491
GROWTH	38	0.0841	0.0733	-0.0695	0.2246

The Correlation Matrix

Table 5 exhibits Pearson's correlation coefficients for the study variables. Pairwise correlation is performed to check whether there is a multicollinearity problem and to observe the direction of the relationship between variables. The multicollinearity problem can be observed if the coefficient value exceeds 0.70 (Gujarati, 1995). It can be noticed that the whole coefficient value is less than 0.70, where the maximum coefficient is 0.585, which is between the LEV and ROE. Accordingly, there is no problem of multicollinearity in this research. Because all variables

are reflected in separate regression analyses, the coefficients between VAIC and all of its components and the coefficients between VAIC components are not considered in detecting multicollinearity.

VAIC is significantly and negatively correlated with ABDA, suggesting that sample firms' value-generating undertakings positively influence earnings quality. The analysis also illustrates that both HCE and SCE have a negative and significant correlation with ABDA, while CEE is not significantly correlated with ABDA. This suggests that firms with better utilization of HC and SC engage less in EM practices. Meanwhile, LEV is positively and significantly correlated with ABDA. This indicates that firms with higher leverage levels engage more in EM activities.

Besides, SIZE has a positive and significant association with VAIC. This illustrates that the bigger the firm size, the more efficient the utilization of IC. Regarding IC components, SIZE has a positive and significant relationship with HCE and SCE. This shows that Cambodian firms with bigger sizes pay more attention to HC and SC utilization. Additionally, ROE and LEV are negatively correlated with CEE, illustrating that highly leveraged or profitable firms make less effective use of tangible capital.

Table 5: Correlation Matrix

	ABDA	VAIC	HCE	SCE	CEE	SIZE	ROE	LEV	GROWTH
ABDA	1								
VAIC	-0.3821**	1							
	0.0179								
HCE	-0.3651**	0.9982***	1						
	0.0242	0.0000							
SCE	-0.4479***	0.9457***	0.9259***	1					
	0.0048	0.0000	0.0000						
CEE	-0.0969	-0.2923*	-0.3144*	-0.2628	1				
	0.5627	0.0749	0.0546	0.1109					
SIZE	-0.1257	0.458***	0.4437***	0.4857***	0.0473	1			
	0.4519	0.0038	0.0053	0.002	0.7778				
ROE	0.2578	0.1645	0.1719	0.1027	-0.3913**	0.1341	1		
	0.1181	0.3236	0.302	0.5396	0.0151	0.4222			
LEV	0.386**	-0.1261	-0.1301	-0.0651	-0.4328***	-0.1184	0.5853***	1	
	0.0167	0.4506	0.4364	0.6978	0.0066	0.4788	0.0001		
GROWTH	0.024	0.0398	0.0406	0.0195	-0.1625	-0.2638	0.4568***	0.4022**	1
	0.8863	0.8126	0.8089	0.9074	0.3296	0.1095	0.0039	0.0123	

Note: *, **, and *** indicate the significance levels at 0.1, 0.05, and 0.01, respectively.

Multivariate Results

The Effect of VAIC on the Quality of Earnings

Table 6 demonstrates the regression outcomes of VAIC on both ABDA and EA. Three regression models are developed to support the regression findings further. Model 1 presents the OLS regression between the VAIC and ABDA, along with the control variables. Model 2 runs a robust regression estimation of Model 1. Further tests are conducted using the random effect regression model shown in Model 3.

Multicollinearity is again assessed by the variance inflation factor (VIF). Collinearity is only concerning when VIF is higher than 10 (Netter et al., 1983). Table 6 demonstrates that all independent variables' VIFs are lower than 2. These results provide additional evidence that the regression model does not exhibit multicollinearity.

The heteroscedasticity test is also assessed to indicate whether the variance of the regression errors is dependent on the values of the independent variables. Table 6 shows no heteroscedasticity problem since the p-value of this test is insignificant ($P > 0.1$).

It is shown that the assessed VAIC coefficients are negative and significant across the three models, demonstrating that H1 is verified. This means that firms with efficient IC management provide high-quality reports. This finding is consistent with previous practical results recognized by Darabi et al. (2012a; 2012b), Zanjirdar and Chogha (2012), Asadollahi et al. (2013), Azizi et al. (2013), Mojtahedi (2013), Marzban et al. (2014), Parast et al. (2014), Sarea and Alansari (2016), Nuryaman et al. (2019), and Mutuc (2021).

Concerning control variables, the results show that none of these variables is significantly associated with ABDA.

Table 6: The Relationship between VAIC and EQ

	Absolute value of discretionary accruals (ABDA)		
	Model 1	Model 2	Model 3
	Pooled OLS	Robust	Random Effect
	Coeff.	Coeff.	Coeff.
	(t-stat)	(t-stat)	(z-stat)
VAIC	-0.0012554**	-0.0012554**	-0.001297*
P-value	0.034	0.038	0.071
VIF	1.38	1.38	
SIZE	-0.00000147	-0.00000147	0.0003475
P-value	0.999	0.998	0.788

VIF	1.51	1.51	
ROE	0.0299658	0.0299658	0.0293186
P-value	0.234	0.125	0.208
VIF	1.94	1.94	
LEV	0.0037553	0.0037553	0.007134*
P-value	0.178	0.153	0.052
VIF	1.72	1.72	
GROWTH	-0.0121394	-0.0121394	-0.0151327
P-value	0.327	0.153	0.191
VIF	1.53	1.53	
Cons	0.0092395	0.0092395	0.0003718
	0.615	0.529	0.989
N	38	38	38
F/Wald Chi2	2.85	6.93	14.22
Prob > F	0.0308	0.0002	0.0143
R	0.3081	0.3081	0.2921
Heteroscedasticity test (chi2, p-value)	(0.35, 0.5525)		

Note: *, **, and *** indicate significance levels at 0.1, 0.05, and 0.01, respectively.

The Effect of VAIC Components on the Quality of Earnings

Table 7 presents multivariate regression results of each VAIC component on ABDA. Like previous regression analysis, three regression models are run to show the effect of each VAIC component on ABDA. The first three models are related to HCE, the following three models are associated with SCE, and the last final models are connected to CEE. Multicollinearity assessment by VIF is also conducted in this regression analysis. It is concluded that this problem is not evident in this regression analysis since the VIFs of all regression variables are lower than 2, as shown in Table 7.

The heteroscedasticity test, as shown in Table 7, demonstrates no heteroscedasticity problem in all regression analyses since the p-value of this test in each regression analysis is insignificant ($P > 0.1$).

Concerning the influence of HCE on ABDA, the coefficients of HCE are negative and significant across the three models, indicating the significant effect of the efficient utilization of HC in eliminating Cambodian firms' tendency to engage in EM behavior. This finding supports H2, which states that HCE has a negative relationship with EM. This implies that employees' knowledge, abilities, and competency have a positive impact on constraining the firm's engagement in AEM practices. This result is consistent with Darabi et al. (2012 a, b), Asadollahi et al. (2013), Parast et al.

(2014), Jaya et al. (2021), and Mutuc (2021).

In support of H3, the coefficients of SCE across all related models are negative and significant, illustrating that SCE positively influences enhancing the quality of earnings of Cambodian listed firms. In other words, Cambodian firms that efficiently utilize their systems, processes, and culture provide higher-quality earnings. This finding is consistent with Asadollahi et al. (2013) and Mutuc (2021). On the contrary, the coefficients of CEE are insignificant

across the three models, demonstrating that firms' tangible capital has no significant effect on limiting their engagement in AEM practices. Therefore, the study rejects H4.

Regarding the control variables, only LEV has a significant and positive relationship with ABDA across the nine models except the first two, indicating that firms with higher leverage levels have a higher tendency to engage in EM practices.

Table 7: The Relationship between VAIC Components and ABDA

	ABDA			ABDA			ABDA		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	Pooled OLS	Robust	Random Effect	Pooled OLS	Robust	Random Effect	Pooled OLS	Robust	Random Effect
	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
	(t-stat)	(t-stat)	(z-stat)	(t-stat)	(t-stat)	(z-stat)	(t-stat)	(t-stat)	(z-stat)
HCE	-0.0013644**	-0.0013644**	-0.0014415*						
P-value	0.047	0.049	0.088						
VIF	1.36	1.36							
SCE				-0.0093628***	-0.0093628**	-0.0093179***			
P-value				0.006	0.013	0.009			
VIF				1.36	1.36				
CEE							0.0121136	0.0121136	0.0121136
P-value							0.482	0.545	0.477
VIF							1.29	1.29	
SIZE	-0.0000992	-0.0000992	0.0003553	0.0004168	0.0004168	0.0003633	-0.0009493	-0.0009493	-0.0009493
P-value	0.916	0.895	0.789	0.652	0.518	0.721	0.297	0.249	0.289
VIF	1.48	1.48		1.61	1.61		1.23	1.23	
ROE	0.0305714	0.0305714	0.0304905	0.0216747	0.0216747	0.0199736	0.026701	0.026701	0.026701
P-value	0.23	0.116	0.191	0.36	0.275	0.391	0.325	0.131	0.318
VIF	1.95	1.95		1.9	1.9		1.99	1.99	
LEV	0.0037495	0.0037495	0.0074958**	0.0045618*	0.0045618*	0.0054317*	0.0056036*	0.0056036**	0.0056036*
P-value	0.184	0.157	0.047	0.082	0.058	0.053	0.066	0.02	0.057
VIF	1.73	1.73		1.64	1.64		1.76	1.76	
GROWTH	-0.0126628	-0.0126628	-0.015808	-0.0105251	-0.0105251	-0.0116738	-0.0177295	-0.0177295	-0.0177295
P-value	0.31	0.325	0.171	0.372	0.354	0.311	0.177	0.192	0.168
VIF	1.52	1.52		1.53	1.53		1.49	1.49	
Cons	0.0106993	0.0106993	-0.0004967	0.0014325	0.0014325	0.0021037	0.0223356	0.0223356	0.0223356
	0.561	0.479	0.985	0.937	0.909	0.916	0.229	0.185	0.22
N	38	38	38	38	38	38	38	38	38
F/Wald Chi2	2.69	6.35	13.8	3.8	12.41	18.11	1.75	4.13	8.73
Prob > F	0.0386	0.0003	0.0169	0.0082	0.0000	0.0028	0.1526	0.0052	0.1204
R	0.2961	0.2961	0.2776	0.3724	0.3724	0.3708	0.2143	0.2143	0.2143
Heteroscedasticity test (chi2, p-value)	(0.31, 0.5768)			(0.91, 0.3405)			(0.14, 0.7063)		

Note: *, **, and *** indicate significance levels at 0.1, 0.05, and 0.01, respectively.

The research illustrates that a firm has to integrate all IC components as an efficient instrument to minimize the practice of EM. Consistent with a resource-based view, firms in Cambodia are aware that hiring skilled staff, developing an effective internal control system, and enhancing physical capital may all help curb managers' opportunism.

Among the three components of IC, the SC of Cambodian-listed firms has a greater effect on enhancing their EQ. This suggests that Cambodian-listed firms' systems, processes, and culture must effectively function to restrain EM practice. It further suggests that employees in Cambodian-listed firms possess relevant expertise, knowledge, and capability to enhance their background about IC's significance in enhancing the quality of financial reports. Finally, it is suggested that Cambodian-listed firms need to deploy their financial and physical capital more efficiently to add firm value.

CONCLUSION

In today's competitive environment, Cambodian firms must produce high-quality reports. On the other hand, since the significance and recognition of IC in firms are increasingly growing, we attempt to investigate the impact of IC and its three components, HCE, SCE, and CEE, on the quality of earnings for nonfinancial Cambodian firms listed on CSX for a 9-year-period between 2013 and 2021. While the VAIC method developed by Pulic (2004) is used as a proxy of IC efficiency, the quality of earnings is represented by the absolute value of discretionary accruals computed through the modified Jones model.

It is found that earnings are high-quality in firms with efficient IC employment. The impact of each of HCE and SCE is positive and significant on the quality of earnings. However, CEE has no significant effect on mitigating firms from engaging in earnings management practices. Therefore, efficient employment of human resources, systems, processes, and culture can prevent management from conducting unhealthy business practices, including earnings management.

This study has various theoretical and practical implications. It provides the foundation for a theoretic comprehension of the significant association between IC and the quality of earnings in the Cambodian environment. It also opens novel doors

for organizations and scholars who intend to reinforce this relationship in countries with different conditions. Based on the consequences of the recent study and the significant effect of IC as an intangible asset on the financial reporting quality among Cambodian listed firms, this investigation would be helpful for users of financial reports in making their decisions. Efficient employment of IC resources might play an important role in gasping international investors' attention to the national markets, particularly in an emerging nation like Cambodia. This study also recommends that Cambodian firms consider both HC and SC since they are vital in enhancing their business value and increasing the quality of their financial reports. It also urges policymakers to encourage Cambodian firms to efficiently utilize their intellectual resources to generate high-quality financial reports, which can enhance capital markets' efficiency.

Regarding the study's limitations, this investigation only analyses nonfinancial Cambodian firms that are publicly traded. Researchers would be encouraged to undertake further studies regarding the relationship between IC and EQ of listed firms in other Asian countries. This study also focuses only on the absolute value of discretionary accruals in measuring the quality of earnings. It is proposed that researchers investigate the association between IC and other indicators of the quality of earnings. Besides, the current research depends upon Pulic's (2004) model in measuring the efficiency of IC and its three components, and future research can consider other models having different elements of IC.

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Coping with Mental Health When Teaching Online during the COVID-19 Pandemic

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ABSTRACT

The COVID-19 pandemic keeps taking hold of our daily lives in 2021. This study aims to analyze the effect of the pandemic on teachers from CamEd Business School. A literature review examined how levels of psychological distress are elevated during the pandemic. Teachers were highlighted as an at-risk group through various factors, and the paper discusses the effect of coping styles and resilience on psychological distress. The study measured psychological distress and deployed coping strategies of 17 respondents using the Perceived Stress Scale and Brief COPE, respectively. Statistical analysis showed similar levels of psychological distress in this sample as the pre-pandemic norm group of the PSS ($M=14.23$). Positive and Emotional Coping were used most often in this population and pre-pandemic norm groups ($M=2.40$, $M=2.05$). A significant positive correlation was found between Problem Solving and Psychological Distress, $r(13) = .76$, $p = 0.01$. There was no higher use of Avoidant coping styles than the pre-pandemic norm group ($M=1.45$). The study suggests that this population found resilience over time, helping to manage psychological distress during the COVID-19 pandemic.

Keywords: COVID-19; Psychological distress; Coping; Teachers; Online teaching

INTRODUCTION

The COVID-19 pandemic was quickly recognized as threatening mental health and well-being (Pfefferbaum, 2020). Early meta-studies from 2020 show that the pandemic has an apparent adverse effect on mental health (Rajkumar, 2020) and is correlated with increased psychological distress (Xiong et al., 2020), especially in people who stopped working during the outbreak (Zhang et al., 2020). Some groups are affected more than others. Young adults, females, and people with physical or mental diseases show more significant increases in psychological distress during COVID-19 (Asmundson et al., 2020; Klaiber et al., 2020; Losada-Baltar et al., 2020; Mazza et al., 2020). The long-term effects of the pandemic on mental health remain to be studied, although research from Riehm et al. (2021) found that for some groups, stress levels return to pre-pandemic levels four months into the pandemic. Key important factors in psychological distress among the population are (social) isolation and lockdown periods (Kim & Jung, 2020; Losada-Baltar et al., 2020; Asmundson et al., 2020). Lockdowns can increase feelings of loneliness, increasing psychological

distress (González-Sanguino, 2020). In 2020, over 1/3 of the global population has been in lockdown for considerable periods (AFP, 2020). The field of education is especially hit hard. According to UNESCO (2021), the pandemic caused the most significant educational disruption in human history. Education providers in many countries were (partially) closed during the majority of 2020 and remained so during the first half of 2021 (Figure 1). Students are more likely to be affected by quarantine measures (Brooks et al., 2020) and experiencing more considerable changes in their daily lives than the general population (Chen et al., 2020). Research from Fruehwirth et al. (2021) suggests that distant learning and isolation are essential variables in the increase in psychological distress in students. This could explain why students are at a higher risk for symptoms of Depression, Anxiety, and PTSD during the COVID-19 pandemic (Brooks et al., 2020; Lei et al., 2020; Lin et al., 2020).

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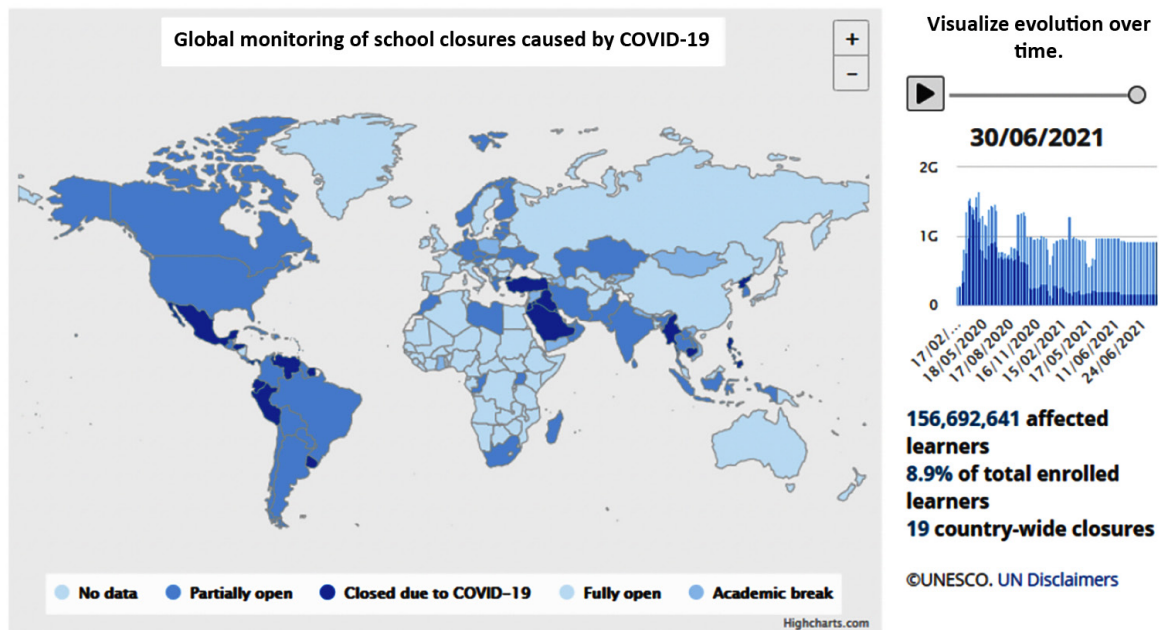


Figure 1: School closures and affected learners by COVID-19

Source: unesco.org

Teachers are at a similar higher risk for lockdown measures as students. Teaching was already the profession with one of the highest levels of burnout before the pandemic (Carlotto & Câmara, 2015), and taking the increased complexity of managing online learning into account (NG, 2007), teachers' levels of distress during the pandemic are likely to be high. The first studies on the effect of COVID-19 on teachers' psychological distress confirm this assumption. A study by Besser et al. (2020) shows increased psychological distress in university teachers during their transition to online teaching. Teachers also report problems in work-life balance and mental health during online teaching (Asha et al., 2021). This aligns with findings from a quantitative study by Ferdous and Shifat (2020) that found high amounts of depressive and anxiety symptoms in ELT and EFL teachers teaching online. A meta-study by Santos et al. (2021) found similar increases in psychological distress. Moreover, teachers reported changes in daily routine, technological complexity, lack of specific training, and increased workloads as essential reasons for reduced mental well-being when teaching online. Research from Ozamiz-Etxebarria et al. (2021) found a higher link between the variables of young age, Job insecurity, parenthood, and psychological distress when teaching online.

Psychological distress can be expected to increase further when returning to face-to-face learning. Research by Ozamiz-Etxebarria et al. (2021) found increased symptoms of stress and depression in 1622 teachers during their first weeks of returning to face-to-face teaching. Therefore, teachers are an at-risk group for decreasing mental health during the pandemic, emphasizing the need for extra support. Supporting teacher's mental health would also bring benefits in these areas. Professional performance from university teachers is directly influenced by psychological distress (Ortega-Jiménez et al., 2021), and there is a direct link between teachers' mental health and the mental health, and therefore, academic performance, of students (Harding et al., 2019).

Coping mechanisms play an essential role in managing levels of distress; together with other factors, such as stressors and general protective character traits, hope plays a vital role in coping with pandemic-related psychological distress (Figure 2).

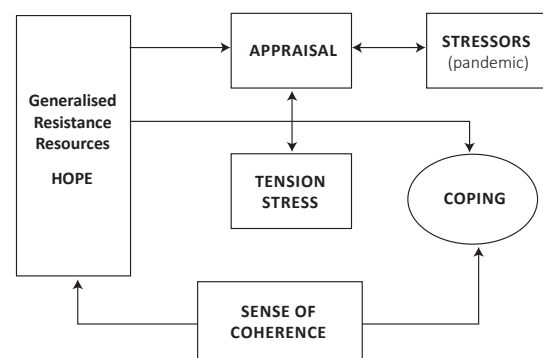


Figure 2: Studied Variables in the Model of Salutogenesis (Antonovsky, 1979)

There are different models describing coping mechanisms. A more commonly used model is the COPE. COPE defines different categories of coping mechanisms, some considered more effective as others. In the remainder of the literature review, these definitions will be used to further analyze coping mechanisms and distress during the pandemic (Table 1).

Table 1: Definitions of Coping Strategies from the COPE

Coping category	Definition
Problem-focused coping	
Active coping	“process of taking active steps to remove or circumvent the stressors or to ameliorate its effects. Active coping includes initiating direct action, increasing one's efforts, and executing a coping attempt in stepwise fashion.”
Planning	“thinking about how to cope with a stressor. Planning involves developing action strategies, thinking about what steps to take and how best to handle the problem.”
Suppression of competing activities	“putting other projects aside, trying to avoid becoming distracted by other events, even letting other things slide, if necessary, to deal with the stressors.”
Restraint coping	“waiting until an appropriate opportunity to act presents itself, holding oneself back, and not acting prematurely.”
Seeking social support for instrumental reasons	“seeking advice, assistance, or information.”
Emotion-focused coping	
Seeking social support for emotional reasons	“getting moral support, sympathy, or understanding.”
Positive reinterpretation and growth	“construing a stressful transaction in positive terms.”
Acceptance	Learning to accept the reality of a stressful situation*
Denial	“reports of refusal to believe that the stressors exist or of trying to act as though the stressors is not real.”
Turning to religion	“tendency to turn to religion in times of stress.”

Avoidant coping	
Focus on and venting of emotions	“the tendency to focus on whatever distress or upset one is experiencing and to ventilate those feelings.”
Behavioral disengagement	“reducing one's effort to deal with the stressors, even giving up the attempt to attain goals with which the stressors is interfering.”
Mental disengagement	“wide variety of activities that serve to distract the person from thinking about the behavioral dimension or goal with which the stressors is interfering,” e.g., daydreaming, watching TV, escaping through sleep.

Early research suggests specific dynamics regarding coping mechanisms and their effect on distress during the pandemic. Research by Ortega-Jiménez et al. (2021) found that positive coping styles, problem and emotional-focused, can lower feelings of loneliness as often experienced during lockdown times. Active coping styles focused on problem-solving reduced psychological distress during the SARS outbreak in 2003 (Main et al., 2011). Negative coping styles, such as avoidance, are related to increased levels of PTSS in Chinese adults during the COVID-19 pandemic (Fu et al., 2021). Research by Garbóczy et al. (2021) found a similar effect of problem-solving and positive coping styles lowering distress in students during the COVID-19 pandemic. Research by Amaral-Prado (2020) suggests that changing ways of coping with stress can improve resilience and lower psychological distress in university teachers. However, research from Copeland et al. (2021) found that healthy coping behaviors are used less during the pandemic, likely because of the event's uncontrollable nature, making avoidant coping more prevalent.

Aim of the study: Schools in Cambodia remained fully closed during the first half of 2021. Since the COVID-19 outbreak in Q1 2020 until April 2021, schools in Cambodia have been closed for 35 weeks and partially open for 12 weeks. Many educational providers kept offering their programs online during this period, impacting the daily lives of around 3.3 million students and almost 99,000 teachers (Figure 3).

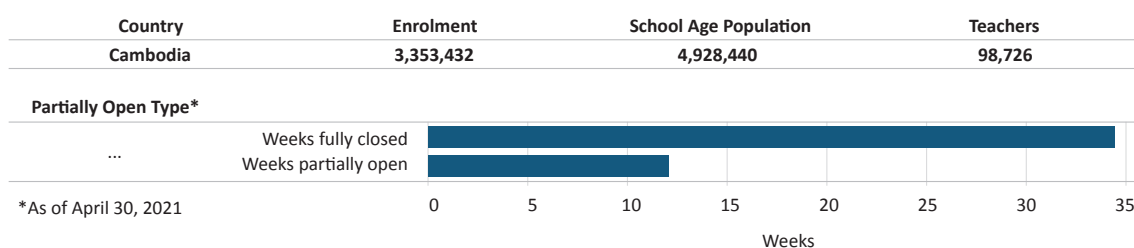


Figure 3: School Closures and Affected Students and Teachers in Cambodia

Source: unesco.org

Psychological distress in Southeast Asia was already at high levels before the COVID-19 outbreak, according to the global health estimates of WHO (2017). Psychological distress was also found above the global average in the Cambodian student population (Pan, 2017; Cornet, 2018). Combined with the teachers being an at-risk group, this strengthens the necessity of further research into the mental health of university teachers in Cambodia. Therefore, this study aimed to study the levels of psychological distress and used coping mechanisms of teachers from the CamEd Business School. The aim is to get more insight into experience levels of distress and which coping mechanisms are used. This data can be used to implement further ways of providing support to improve the mental well-being of these teachers and thereby, at the same time, improve the mental well-being and academic performance of students from CamEd Business School.

Research question 1: Are the levels of psychological distress in this population elevated compared to those in the general population?

- H_0 : Psychological distress will not be significantly different from the norm group
- H_1 : Psychological distress will be significantly higher than the norm group

Research question 2: Are avoidant coping styles more used during the pandemic?

- H_0 : Brief COPE subcategories will not be significantly different from the norm group
- H_1 : Avoidant coping is significantly higher than the norm group

Research question 3: Are problem-focused coping mechanisms related to lower psychological distress levels?

- H_0 : Problem-focused coping mechanisms are not correlated with lower levels of psychological distress
- H_1 : Problem-focused coping mechanisms are correlated with lower levels of psychological distress

METHODOLOGY

Data collection

Data was collected by an online survey presented to the participants through Google Forms. The survey included a short questionnaire measuring social demographic variables, the Perceived Stress Scale (PSS), and the Brief COPE. A link to the survey was sent to all teachers from CamEd Business School.

Participants

Participants of this study are all teachers at CamEd Business School. The school is located in Phnom Penh, Cambodia. Since teachers at CamEd Business School have been teaching online since the pandemic outbreak, all of them do not currently reside in Cambodia. Seventeen participants completed the survey out of around 45 teachers (Table 2).

Table 2: Social-demographic characteristics of participants

	Frequency (n = 17)	Percentage
Gender		
Female	2	11.8%
Male	15	88.2%
Age		
Below 20	0	0%
21- 30	0	0%
31- 40	6	35.3%
41- 50	5	29.4%
Above 50	6	35.3%
Perceived Health		
Very poor	0	0%
Poor	0	0%
Regular	2	11.8%
Good	10	58.8%
Very good	5	29.4%

Measures

Social-demographic variables: These variables were collected at the start of the survey. Gender, age, and perceived health were collected to measure the social-demographics of participants.

Psychological distress: This study used the Perceived Stress Scale (PSS) to measure psychological distress. This instrument is most widely used to measure levels of psychological distress. There is sufficient evidence for validity. Norm groups are gathered from 2,387 respondents (Table 3). Scoring of items takes place on a 5-point Likert scale: 0: Never, 1: Almost Never, 2: Sometimes, 3: Fairly Often, 4: Very Often. Questions 4, 5, 7, and 8 are positive and scored reversely.

Table 3: Norm Table for PSS

Category	N	Mean	SD
Gender			
Male	926	12.1	5.9
Female	1406	13.7	6.6
Age			
18-29	645	14.2	6.2
30-44	750	13.0	6.2
45-54	285	12.6	6.1
55-64	282	11.9	6.9
65 & Older	296	12.0	6.3
Race			
White	1924	12.8	6.2
Hispanic	98	14.0	6.9
Black	176	14.7	7.2
Other minority	50	14.1	5.0

Coping mechanisms: The Brief COPE was used to measure Coping Mechanisms. The Brief-COPE is a 28-item self-report questionnaire designed to measure effective and ineffective ways to cope with a stressful life event. The Brief Coping was developed as a short version of the original 60-item COPE scale (Carver et al., 1989). Scores are collected on a 4-point Likert scale: 1: I have not been doing this at all, 2: I have been doing this a little bit, 3: I have been doing this a medium amount, 4: I have been doing this a lot.

Primary Coping styles are determined on three sub-scales, such as Problem-Focused, Emotion-Focused, and Avoidant Coping. In addition, this questionnaire measures the following factors of Coping: Self-distraction, Denial, Substance Use, Behavioral disengagement, Emotional Support, Venting, Humor, Acceptance, Self-Blame, Religion, Active Coping, Use of Instrumental Support, Positive Re-framing and Planning. For non-clinical respondents, norm scores validated by research from Poulus et al. (2020) are used most often (Table 4).

Table 4: Norm Scores Sub-scales Brief COPE

	Mean	SD
Problem-Focused	2.47	0.63
Emotional-Focused	2.23	0.49
Avoidant Coping	1.64	0.45

The three sub-scales are defined as:

1. Problem-Focused Coping (Items 2, 7, 10, 12, 14, 17, 23, 25)

It is characterized by the facets of active coping, use of informational support, planning,

and positive re-framing. A high score indicates coping strategies to change the stressful situation. High scores indicate psychological strength, grit, and a practical problem-solving approach and predict positive outcomes.

2. Emotion-Focused Coping (Items 5, 9, 13, 15, 18, 20, 21, 22, 24, 26, 27, 28)

It is characterized by venting, emotional support, humor, acceptance, self-blame, and religion. A high score indicates coping strategies that aim to regulate emotions associated with the stressful situation. High or low scores are not uniformly associated with psychological or ill health but can inform a broader formulation of the respondent's coping styles.

3. Avoidant Coping (Items 1, 3, 4, 6, 8, 11, 16, 19)

It is characterized by self-distraction, denial, substance use, and behavioral disengagement. A high score indicates physical or cognitive efforts to disengage from the stressors. Low scores are typically indicative of adaptive coping.

DATA ANALYSIS

All the data in this study was collected through Google Forms and transferred into IBM SPSS Statistics version 25 for Windows for further analysis. All variables were dummy-coded in SPSS, whereby 'Gender' was converted to a Dichotomous variable.

First, descriptive statistics were formed to analyze the overall experience of psychological distress and COVID-19-related distress. To further analyze potential gender differences in psychological distress and potential gender differences in COVID-19-related trauma symptoms, the study used independent samples t-tests. Scatter plots were made to analyze assumptions of linearity, and simple linear regression analysis was used to analyze the correlation between psychological distress and COVID-19-related trauma symptoms and the correlation between psychological distress and levels of (self)-isolation.

RESULTS

Reliability Tests

The Cronbach's Alpha of both the PSS and Brief COPE were calculated to test internal validity. Both the PSS ($\alpha = .804$) and the Brief COPE ($\alpha = .931$) showed an excellent reliability in this study (Table 5).

Table 5: Reliability Score PSS and Brief COPE

	Cronbach's Alpha	Items
PSS	.804	10
Brief COPE	.931	28

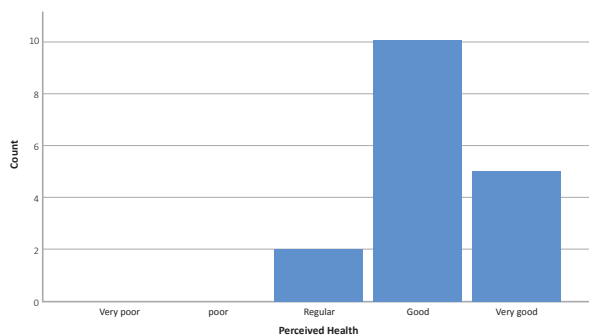
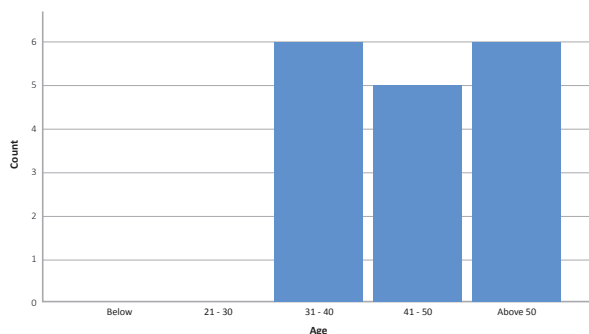
Descriptive statistics

The average score on the PSS is 1.42 (sd=.530) on a scale from 0 to 4 points. The total average score on the Brief COPE is 2.00 (sd=.559). Scores on each subcategory are 2.40 (sd=.884) on Problem-Focused Coping, 2.05 (sd=.658) on Emotional-Focused Coping, and 1.45 (sd=.380) on Avoidant Coping (Table 6).

Table 6: Mean PSS and Brief COPE

	Mean	SD
PSS	1.42	.530
Brief COPE		
Total	2.00	.559
Problem-Focused	2.40	.884
Emotional Focused	2.05	.658
Avoidant	1.45	.380

Regarding self-perceived health, 10 participants perceived their health as Good, and five as Very Good. Six participants are in the age group 31 - 40, five in the range of 41-50, and six are above 50 years (figures 4 and 5).

**Figure 4: Perceived Health****Figure 5: Age Groups**

Responding to research question 1, a one-sample t-test was conducted to compare levels of distress in this population with the norm groups provided with the PSS. There is no significant difference between the levels of distress from this population ($M=14.32$, $SD=5.309$) compared with the norm group ($M = 12.37$), $t(16)= 1.448$, $p = .167$. Thus, H_0 (Psychological distress will not be significantly different from the norm group) can be accepted.

Table 7: One-sample t-test; Comparison between Sample versus Norm PSS

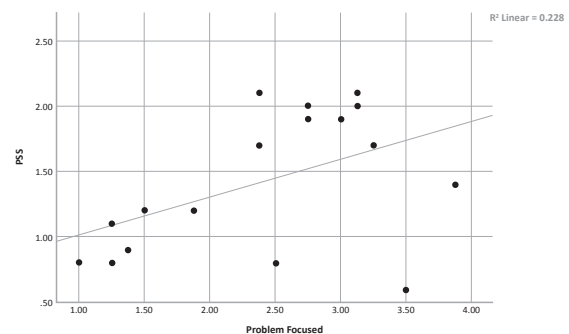
	n	Mean	SD	t	Sig.
PSS	17	14.23	5.309	1.448	.167

Further, in response to research question 2, the study conducts a one-sample t-test for each of the three subcategories of the Brief COPE and compares this population with the provided norm groups. There is no significant difference in the use of problem-focused coping ($M=2.40$, $SD=.884$) compared with the norm group ($M=2.47$), $t(16)=-.306$, $p=.764$. Also, the use of emotional-focused coping in this population ($M=2.05$, $SD=.658$) is not significantly different from the norm group ($M=2.23$), $t(16)=-1.102$, $p=.287$. The use of avoidant coping is also not significantly different in this population ($M=1.45$, $SD=.380$) from the norm group ($M=1.64$), $t(16)=-1.998$, $p=.063$. Thus, H_0 (Brief COPE subcategories will not be significantly different from the norm group) can be accepted.

Table 8: One-sample t-test; Comparison between Sample versus Norm Brief COPE Sub-categories

	n	Mean	SD	t	Sig.
Problem-Focused	17	2.40	.884	-.306	.764
Emotional-Focused	17	2.05	.658	-1.102	.287
Avoidant	17	1.45	.380	-1.998	.063

In response to research question 3, a scatter plot was first created to see if a linear relationship could be assumed (Figure 6). The scatter plot shows a weak linear relationship and two significant outliers.

**Figure 6: Scatter Plot Problem-Focused Coping versus Levels of Distress**

After removing the two outliers from the dataset, Pearson's r was used to calculate the correlation. The variables Problem-Focused Coping and distress levels were strongly correlated, $r(13) = .76$, $p = 0.01$. Thus, H_0 (Problem-focused coping mechanisms are not correlated with lower levels of psychological distress) can be accepted.

Scatter plots were made to analyze further the relationship between distress and the remaining two subcategories. In both cases, a linear relationship could not be assumed, and both scatter plots show a significant amount of outliers, and further analysis is therefore not conducted (Figures 7 and 8).

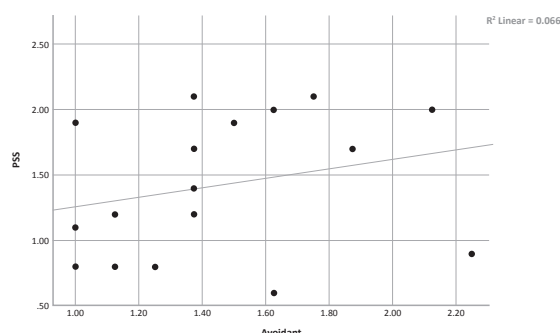


Figure 7: Scatter Plot Avoidant Coping versus Levels of distress

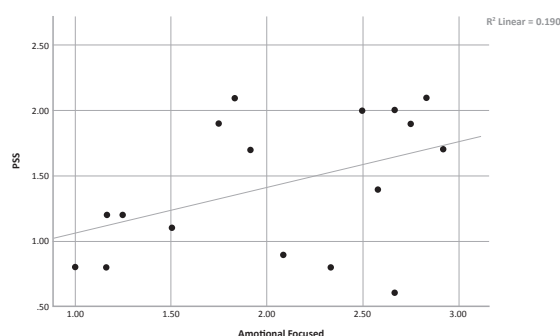


Figure 8: Scatter plot Emotional Coping versus Levels of Distress

DISCUSSION

Outcomes

The teacher population in this study reports similar levels of distress on the PSS as the general population (pre-pandemic). Although higher levels of distress are expected at first, these findings align with recent research on how people adapt to the pandemic. Research by Daly and Robinson (2021) analyzing levels of distress in the same sample over different times during the first months of the pandemic found that the initial sharp rise in experienced mental

distress is diminished after a month or more into the pandemic, even while in the same period COVID-19 was spreading rapidly. These findings suggest that people, over time, find resilience in response to the pandemic. This is also in line with how resilience tends to lower levels of distress to more general stressors (Infurna & Luthar, 2018). The current study focused on levels of distress more than one year after the pandemic's start, which likely resulted in adjustments to this new 'normal.' The relatively lower levels of distress can also result from the coping styles used in this population. Participants in this sample mostly use effective coping styles, including Problem-Solving Coping and Emotional Coping. Amaral-Prado (2020) found lower distress levels in students using problem-solving coping strategies during the pandemic. The same effect of these coping strategies during the COVID-19 pandemic was found in nurses (Lorente et al., 2021). This study's sample also scored low on the Avoidant coping style, which generally correlates with increased negative affect and higher levels of PTSS (Ben-Zur, 2009; Fu et al., 2021).

Higher levels of distress were significantly correlated with higher use of problem-solving coping in this study. These findings can be interpreted in multiple ways. General research on problem-solving coping shows lower levels of distress when this coping strategy is applied (Amaral-Prado, 2020; Lorente et al., 2021; Ortega-Jiménez et al., 2021). It is, therefore, likely in this study that participants with higher levels of distress are making more use of effective coping styles to manage their distress, resulting in overall stress scores that were lower than expected. A second interpretation could be that problem-solving coping is ineffective in managing distress in this population. However, this would not align with the general findings on effective coping. Further research is needed on the exact relationship between problem-solving coping and distress in this population.

Avoidant coping styles were not increased in this population, although the uncontrollable nature of the pandemic as a source of stress could promote more avoidant coping styles, as found in some populations during the COVID-19 pandemic (Tahara et al., 2020; Wang et al., 2020). Thai et al. (2021) found that avoidant coping styles are more often deployed when individuals experience high levels of distress during the pandemic. The lower levels of distress found in this study can be a reason for lower levels of avoidant strategies. Higher levels of impact of COVID-19 tend to be mediating the relationship between avoidant coping and COVID-19-related distress (Pomerantz et

al., 2020). It is possible that the impact of COVID-19 is less more than one year after the initial outbreak and the use of avoidant coping styles therefore too, this would also be fitting with early research on avoidant coping during the pandemic were focused on the first couple of weeks of the pandemic (Tahara et al., 2020; Wang et al., 2020).

These findings suggest high levels of resilience in this population sample, resulting in normal levels of distress when higher levels of psychological distress could be expected.

LIMITATIONS

The current study faces a couple of limitations that should be considered when drawing assumptions and implications from the results. Selection bias may have occurred; this study used less than 50 percent of the total teacher population at CamEd Business School. Teachers with higher levels of distress did not manage to fill in this questionnaire. This effect could even be more substantial regarding avoidant coping strategies. Not doing this survey would be fitting for more avoidant coping strategies. This lowered the overall stress and avoidant coping scores in this study.

The analyzed studies in the introduction/literature review are less than one year old. Some studies have yet to be replicated by other researchers. Psychological distress is often differently defined in psychological research. Although the Perceived Stress Scale is commonly used, many studies use different questionnaires, resulting in potentially different psychological structures being analyzed. Although the studies used in this paper were selected on these limitations, assumptions based on these studies should still be taken with care.

IMPLICATIONS

The findings of this study give a hopeful first look at the mental well-being of the academic staff at CamEd Business School. Healthy coping mechanisms are used primarily on effective coping strategies, and overall levels of psychological distress tend to be at pre-pandemic norms. More research is needed to analyze further the exact relationship between positive coping styles and levels of distress in this population. A bigger sample size would eliminate the risk of selection bias, which could have lowered the levels of distress in this study. Although these findings suggest healthy levels of distress, continued support for academic staff is needed. Levels of psychological distress are short-term states and, therefore, quickly

change over time. When teaching goes back to face-to-face or other hybrid forms, an increase in psychological distress can be expected.

Earlier research on psychological distress in the student population of CamEd Business School showed increased levels. Findings from this study on positive coping styles possibly decreasing general levels of distress can be used to support this student population. Moreover, longitudinal research to analyze possible growth in resilience would be helpful to understand better the dynamics surrounding psychological distress during the pandemic at CamEd Business School.

CONCLUSION

In conclusion, the academic staff at CamEd Business School are resilient and employ effective coping strategies, resulting in relatively low levels of psychological distress. In times of uncertainty, lockdowns, and challenges resulting from online teaching, resilience is most effective in managing mental health. Continued support is essential to ensure the academic staff's mental well-being and, thereby, the students.

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