The Hang Seng University of Hong Kong
Business Review

Business Review Vol.3, No. 3

香港恒生大學
THE HANG SENG UNIVERSITY OF HONG KONG

School of Business
The Hang Seng University of Hong Kong
A Dynamic School that CARES

Vol. 3, No. 3 (November 2021)

The Hang Seng University of Hong Kong

Business Review

Vol. 3, No. 3 – Special Issue on the 2020 AIBSEAR Hong Kong Conference

The Hang Seng University of Hong Kong Business Review Editorial Team

Editors-in-Chief

Lawrence Hong Weng Lei, *The Hang Seng University of Hong Kong (HSUHK), Hong Kong*
Email: lawrencelei@hsu.edu.hk

Alvin Eng Sui Ang, *HSUHK*
Email: alvinang@hsu.edu.hk

Associate Editors

Accountancy	Kevin Chee Keung Lam, *HSUHK*
Economics and Finance	Ben Ka Ming Cheng, *HSUHK*
Management	Jeanne Ho Ying Fu, *HSUHK*
Marketing	Thomas Kim Ping Leung, *HSUHK*
Supply Chain and Information Management	Ricky Siu Kuen Wong, *HSUHK*

Editorial Reviewer Board

A Note from Incoming Co-Editor-in-Chief

Dear Readers,

In December 2020, the School of Business at HSUHK hosted the Academy of International Business Southeast Asia Regional Conference. A total of 114 papers covering all major topics in business were presented. We have carefully selected six articles for publication in this AIB Special Issue of the HSUHK Business Review. It is my pleasure as incoming Co-editor-in-Chief to briefly introduce them.

The first article is a quantitative finance paper that examines value-at-risk. The second article covers a trending topic in business, namely the social impact of corporations. The third and fourth articles are related to management practices. We also include a law essay on artificial intelligence and intellectual property. We believe this article is timely in our current period of rapid technological and digital transformation. The final article analyzes consumer behavior.

The HSUHK Business Review encourages contributions in all fields of business studies from around the world, with a particular focus on Asia. Going forward, we plan to publish a variety of scholarly work in addition to traditional academic papers. These works could include essays, research notes, policy briefs, book reviews, and case studies. We hope that by expanding the scope of article types, more readers may benefit. If you are interested in submitting your manuscript for consideration, please contact our editorial team at businessreview@hsu.edu.hk.

Lastly, I would like to express my deep gratitude to the referees who have contributed their time and expertise to review the articles and made this special issue publication possible.

Thank you and enjoy reading.

Dr. Alvin Ang
Co-Editor-in-Chief

Table of Contents

Vol.3, No.3 (November 2021)

01 EVOLUTION OF PROBABILITY DISTRIBUTIONS BY CONVOLUTION APPROACH

Yam-wing Siu
ywsiu@hsu.edu.hk
Department of Economics and Finance, The Hang Seng University of Hong Kong

ABSTRACT

Time evolution of probability distributions has been a long-standing research topic. The problem finds many applications in engineering and finance areas. For example, in finance, one might argue whether the values of value-at-risk (VaR) estimation should be interpreted as 1) *exactly on* i^{th} day or 2) *within i* days. These two interpretations give rises to very different probability distributions when they evolve over time. The first distribution relates to the sum of two variables. The second distribution relates to the minimum of successive cumulative sums of independent variables. An efficient Discrete Convolution approach has been successfully developed to inspect the evolution of respective probability distributions. The results match perfectly with either analytical solution or numerical simulation.

Keywords: Discrete convolution, value-at-risk, risk management.

INTRODUCTION

Time evolution of probability distributions has been a long-standing research topic. The problem finds many applications in engineering and finance areas. The original research question is the following: "What is the probability distribution of the sum of the two random variables?" By adding another random variable after getting the first sum and subsequent sums, we can obtain the probability distributions of subsequent distributions – time evolution of probability distributions.

In finance, value-at-risk (VaR) is used by many risk managers to measure and control the level of risk of the portfolio or which the firm undertakes (Hull, 2017). This has significant managerial and policy implications for portfolio managers and regulatory authorities. In VaR, one might argue whether the values of the estimation should be interpreted as 1) *exactly on* i^{th} day or 2) *within i* days. These two interpretations give rise to very different probability distributions when they evolve over time. And these will be our two research questions (denoted as A and B hereafter) respectively.

The aim of this research is to develop an efficient Discrete Convolution approach to inspect the evolution for probability distributions that can be applied to VaR estimation. The remaining part of this paper is organized as follows. First, we will focus on the research question A – VaR estimation *exactly on* i^{th} day in section 2 where we will discuss the problem in more details, provide the analytical solution, describe the proposed convolution approach and present the results. Then in section 3, we will discuss research question B – VaR estimation *within i* days. There we will discuss the problem in more detail, provide the numerical simulation, describe the proposed convolution approach and present the results. Finally, section 4 concludes the paper and recommends for future work.

THE ORIGINAL QUESTION AND RESEARCH QUESTION A – VaR ESTIMATION *EXACTLY* ON i^{th} DAY

The original research question is: "What is the probability distribution of the sum of the two random variables?" This question has an exact analytical solution and several proofs have been provided (Lemons, 2002). Before providing the exact analytical solution, let us describe the problem in more detail here.

Sum of two independent variables

For brevity, let N_1 and N_2 be two normal distributions.

$\varepsilon_1 \sim N_1(\mu_1, \sigma_1^2)$ and $\varepsilon_2 \sim N_2(\mu_2, \sigma_2^2)$ where N_1 and N_2 are independently distributed. Let s_1 and s_2 be defined as $s_1 = \varepsilon_1$ and $s_2 = \varepsilon_1 + \varepsilon_2$. Therefore, the original problem is about getting the probability distribution of s_2. Using alternate symbols of X, Y and Z for ε_1, ε_2 and s_2, $s_2 = \varepsilon_1 + \varepsilon_2$ is equivalent to $Z = X + Y$. Mathematically, the distributions of N_1 and N_2 can be expressed as F_X and F_Y below:

$$F_X(x) = \frac{1}{\sqrt{2\pi}\cdot\sigma_X} exp\,(-\frac{(x-\mu_X)^2}{2\sigma_X^2}) \text{ and } F_Y(y) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Y} exp\,(-\frac{(y-\mu_Y)^2}{2\sigma_Y^2})$$

Defining $\sigma_Z = \sqrt{(\sigma_X^2 + \sigma_Y^2)}$, the exact analytical solution of $F_Z(z)$ can be shown below:

$$F_Z(z) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Z} exp\,(-\frac{(z-(\mu_X+\mu_Y))^2}{2\sigma_Z^2})$$

This distribution function, $F_Z(z)$, is a normal distribution with expected value $\mu_X + \mu_Y$ and variance $\sigma_X^2 + \sigma_Y^2$. It can also be called N_{S2} as it is the probability distribution of s_2.

Knowing the exact solution is fine, however, this may not be the answer for research question A – the distribution of VaR estimation *exactly on* i^{th} day. It is because stock returns may be autocorrelated. It means the two variables are not independent. Therefore, ideally it is necessary to find the exact solution for the sum of two correlated variables.

Sum of two correlated variables

Following the notation of previous section, if the correlation between the two distributions is ρ, exact solution can be found in Fowler (2011). The probability density function F_Z of $Z = X + Y$ equals:

$$F_Z(z) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Z} exp\,(-\frac{(z-(\mu_X+\mu_Y))^2}{2\sigma_Z^2})$$

where $\sigma_Z = \sqrt{(\sigma_X^2 + \sigma_Y^2 + 2\rho\sigma_X\sigma_Y)}$

This distribution function, $F_Z(z)$, is again a normal distribution. But its variance would be different from the one in previous section, that is independent.

Convolution approach

Let us review the original problem. This time we use a slightly different notation to conform to the convolution operation. Let $\varepsilon_1 \sim F_X(\mu_1, \sigma_1^2)$ and $\varepsilon_2 \sim F_Y(\mu_2, \sigma_2^2)$ where F_X and F_Y are independent distributed. Convolution is a mathematical operation on two functions, F_X and F_Y, that produces a third function, F_Z.

$$F_Z(z) = \int_{-\infty}^{\infty} F_X(z-y)F_Y(y)dy$$

It is known that if X and Y are independent, F_Z is equivalent to the distribution of $Z = X + Y$ (i.e., the same as $s_2 = \varepsilon_1 + \varepsilon_2$). It should be noted that, after the convolution operation, the mean of the distribution, F_Z, becomes $\mu_X + \mu_Y$ and the standard deviation becomes $\sigma_Z = \sqrt{(\sigma_X^2 + \sigma_Y^2)}$. They match the below exact solution of the sum of two independent variables.

$$F_Z(z) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Z} exp\,(-\frac{(z-(\mu_X+\mu_Y))^2}{2\sigma_Z^2})$$

That is why convolution is often used to compute the sum of two random variables.

If we apply convolution successively, say for n times, we can compute the distributions for the sum of n independent distributions with mean $\mu_1, \mu_2, \ldots, \mu_N$ and $\sigma_1, \sigma_2, \ldots, \sigma_N$.

$$F_Z(z) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Z} exp\ (-\frac{(z-(\underline{z}))^2}{2\sigma_Z^2})$$

where $\underline{z} = \sum_1^N \mu_i$ and $\sigma_Z = \sqrt{(\sigma_1^2 + \cdots + \sigma_N^2)}$

However, the requirement for the distributions to be independent is too restrictive. The question is whether convolution can be applied to correlated distributions. In the following paragraphs we would like to deduce a modified convolution operation such that when we operate on F_X and F_Y, we get the resultant distribution F_Z.

$$F_X(x) = \frac{1}{\sqrt{2\pi}\cdot\sigma_X} exp\ exp\left(-\frac{(x-\mu_X)^2}{2\sigma_X^2}\right)$$

$$F_Y(y) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Y} exp\ (-\frac{(y-\mu_Y)^2}{2\sigma_Y^2})$$

$$F_Z(z) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Z} exp\ (-\frac{(z-(\mu_X+\mu_Y))^2}{2\sigma_Z^2})$$

where $\sigma_Z = \sqrt{(\sigma_X^2 + \sigma_Y^2 + 2\rho\sigma_X\sigma_Y)}$

It means the following conditions must be met after the convolution operation.

F_Z shall have a mean of $\mu_Z = \mu_X + \mu_Y$ and standard deviation of $\sigma_Z = \sqrt{(\sigma_X^2 + \sigma_Y^2 + 2\rho\sigma_X\sigma_Y)}$. Let us propose here a modified convolution operation by scaling $F_Y(y)$ which should produce the resultant distribution F_Z with exactly the same mean and standard deviation accordingly.

For brevity, let us illustrate with numerical examples. Suppose the mean and standard deviation of F_X and F_Y are $\mu_X = \mu_Y = 0$ and $\sigma_X = \sigma_Y = 1$ respectively while their correlation is, say, $\rho = -0.2$.

Suppose we scale $F_Y(y)$ by $\sqrt{1+2\rho} = \sqrt{0.6}$ times to get $F_{Y'}(y')$ where $\mu_{Y'} = 0$ and $\sigma_{Y'} = \sqrt{0.6}$ and assume $F_X(x)$ and $F_{Y'}(y')$ are independent. Convolution between them will get you $F_{Z'}(z')$ as below:

$$F_{Z'}(z') = \int_{-\infty}^{\infty} F_X(z'-y')F_{Y'}(y')dy'$$

$$F_{Z'}(z') = \frac{1}{\sqrt{2\pi}\cdot\sigma_{Z'}} exp\ (-\frac{(z'-(\mu_X+\mu_{Y'}))^2}{2\sigma_{Z'}^2}) = \frac{1}{\sqrt{2\pi}\cdot\sigma_{Z'}} exp\ (-\frac{(z'-\mu_{Z'})^2}{2\sigma_{Z'}^2})$$

where

$$\mu_{Z'} = \mu_X + \mu_{Y'} = 0 \text{ and } \sigma_{Z'} = \sqrt{(\sigma_X^2 + \sigma_{Y'}^2)} = \sqrt{1+0.6} = \sqrt{1.6}$$

Notice that terms of the mean and standard deviation of $F_Z(z)$ and $F_{Z'}(z')$ are the same. Hence, we can draw the following statement:

The sum of two correlated variables $Z = X + Y$ can be obtained by convolution between X and Y' where Y' is the scaled function of Y with $\mu Y' = \mu Y$ and $\sigma_{Y'} = \sigma_Y \cdot \sqrt{1+2\rho}$

Results

While convolution is a continuous process, it can be computed easily and numerically through discrete convolution.

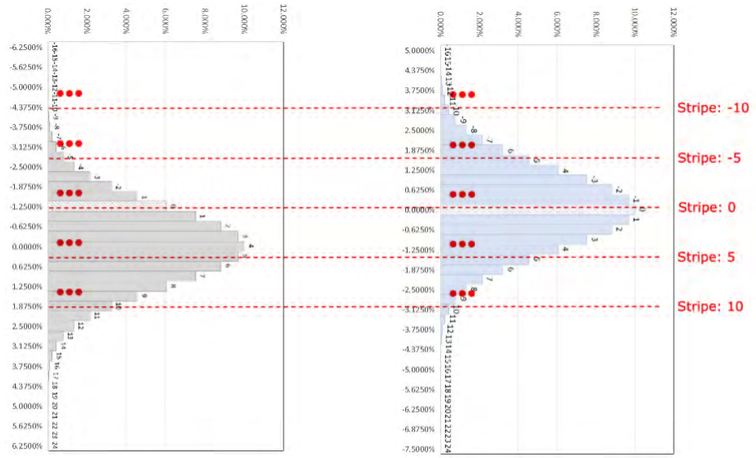
$$F_Z(z) = \sum_{-\infty}^{\infty} F_X(z-y)\cdot F_Y(y)$$

Let us use z = -1.25% as an example. F_Z(-1.25%) can be computed as the total sum of the products of the two distributions with the same stripe number, *i*, as graphically presented in Figures 1a and 1b[1].

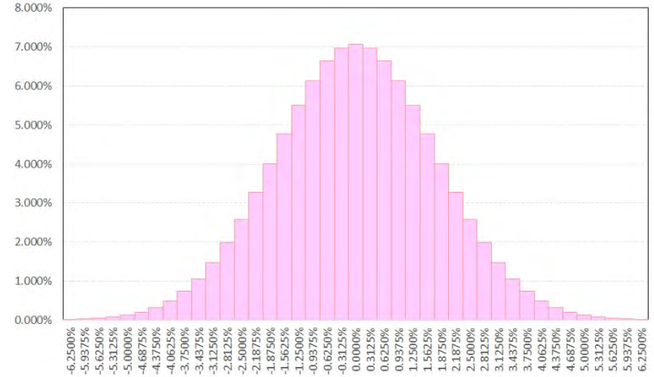
$$F_Z(\text{-}1.25\%) = \sum_{i\to-\infty}^{i\to\infty} (Prob.of\ Stripe\ i\ of\ F_X)\cdot(Prob.of\ Stripe\ i\ of\ F_Y)$$

If we repeat for different values of z, we will get a complete distribution of $F_Z(z)$ as shown in Figure 1c where $\sigma_{S2} = \sqrt{2}$.

Figure 1. Graphical Representation for Discrete Convolution for *i* = 2



a) F_X(-1.25%−y) with σ = 1 b) $F_Y(y)$ shown in reverse order with σ = 1

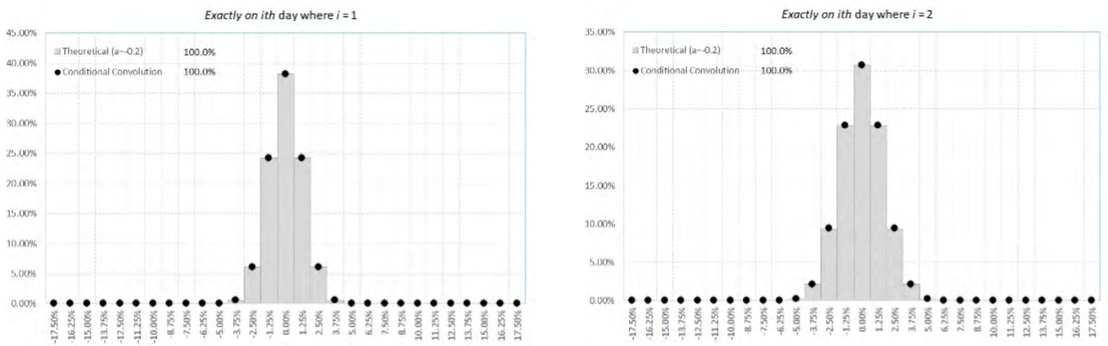


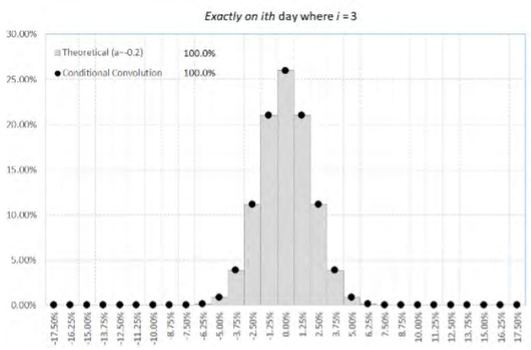
c) $F_Z(z)$

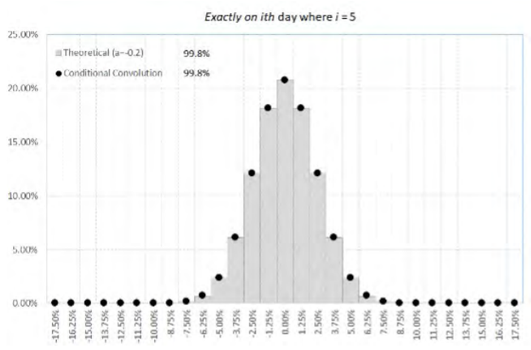
[1] The mean and standard deviation of the first distribution, $N_1(\mu_1,\sigma_1^2)$ or $F_X(x)$ are 0 and $(1.244\%)^2$. This matches the data of S&P 500 Index of US and is used in the histogram charts in this paper.

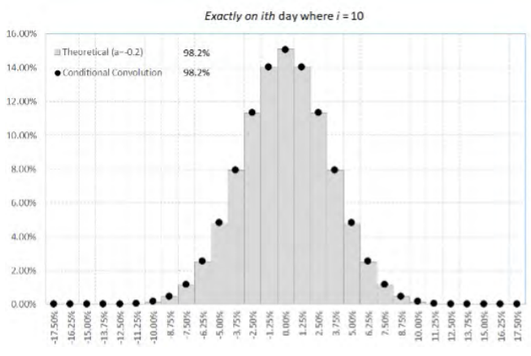
We have performed discrete convolution for successive days where the autocorrelation, ρ = -0.2. The results are shown in Figure 2 below. It can be seen that the results of discrete convolution match perfectly with the analytical results. This provides a proof that by scaling one of the distributions appropriately, we can apply convolution approach to obtain the distribution for the sum of two correlated data.

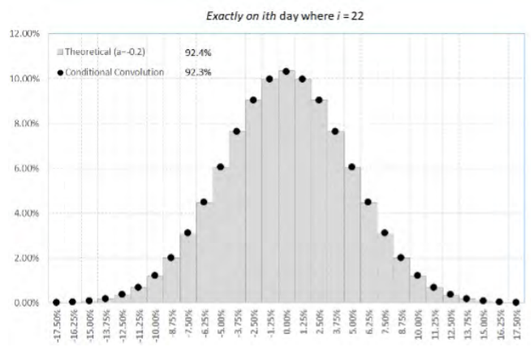
Figure 2. Distributions of $F_Z(z)$ (or N_{Si}) for i = 1, 2, 3, 5, 10 and 22 when ρ = -0.2











RESEARCH QUESTION B – VaR ESTIMATION *WITHIN i* DAYS

Research question B relates to the cumulative sums of random variables similar to Wald (1944, 1947). Wald's research focuses on finding the limits of the maximum and minimum of successive cumulative sums of random variables. Instead of getting the limits of the cumulative sums, we wish to capture the whole probability density function of, say, minimum of successive cumulative returns and where the minimum is located. Before solving the problem, let us describe the problem in more details here. Earlier we have defined $s_1 = \varepsilon_1$, $s_2 = \varepsilon_1 + \varepsilon_2$. Now we extend this to $s_i = \varepsilon_1 + \varepsilon_2 + \ldots + \varepsilon_i$. And for brevity, let N_1, N_2, …, and N_i be normal distributions each with zero mean and standard deviation of 1.

$\varepsilon_1 \sim N_1(\mu_1 = 0, \sigma_1^2 = 1)$, $\varepsilon_2 \sim N_2(\mu_2 = 0, \sigma_2^2 = 1)$, and so on, where N_1, N_2 and N_i are independent distributed. With these s_1, s_2, …, and s_i, we can form new sets of distribution, N_{M1}, N_{M2}, … N_{Mi}. They are the minimum of successive cumulative sums of random variables.

$M_2 = \min \{s_1, s_2\}$
$M_3 = \min \{s_1, s_2, s_3\}$ and so on.

Please note that, by definition, $M_1 = s_1$ and $N_{M1} = N_{S1}$. In this second problem, not only we are interested in the distribution of M_2, M_3 and so on, we are also interested in where (or at which set) the cumulative minimum is located. Let us illustrate it with M_2. Since $M_2 = \min\{s_1, s_2\}$, we can further classify where the cumulative minimum is located as follows:

1) If the cumulative minimum is s_1, it is $M_{2,1}$; and

2) If the cumulative minimum is s_2, it is $M_{2,2}$.

Similarly, M_3 can be divided into $M_{3,1}$, $M_{3,2}$ and $M_{3,3}$ where the cumulative minimum is located in s_1, s_2 and s_3 respectively. In this paper, we are only interested in $M_{1,1}$, $M_{2,2}$, $M_{3,3}$ and so on.

Unlike research question A, this question has no exact analytical solution. Instead, we must resort to performing numerical simulation.

Numerical simulation

Numerical simulation with 1,000,000 independent normally distributed random variables, ε, that matches the standard deviation of actual SPX data, $\varepsilon \sim N(\mu=0, \sigma^2=\sigma^2_{Actual})$ is used to generate daily log returns. The purpose of performing numerical simulation is twofold. On one hand, we can perform simulation to reveal insight about how the distribution of VaR estimation *within i days* would evolve over time. Also, results of numerical simulation can be useful to create a model that is more efficient. One such model that this study is attempting to develop is a convolution approach and it will be described in more detail in the next section.

Convolution approach

Numerical simulation is time consuming for performing the evolution of distribution. Convolution approach provides an efficient way to analyze the evolution of the whole data distribution. Similar to Convolution approach section of the ORIGINAL QUESTION AND RESEARCH QUESTION A, an efficient convolution approach has been devised. First of all, by definition, the minimum of 1-day cumulative return is, of course, located at day 1.

$$M_{1,1} = F_X(x) = \frac{1}{\sqrt{2\pi}\cdot\sigma_X} exp\left(-\frac{(y-\mu_X)^2}{2\sigma_X^2}\right)$$

Then the probability distribution for the minimum of such successive cumulative sums of independent variables is deducted as another[2] convolution integral as below:

The distribution of the minimum of successive cumulative sums, $M_{i,i}$, can be obtained by convolution between $F_X(x)$ and $F_Y(y)$,

$$M_{i,i} = F_Z(z) = \int_{-\infty}^{\infty} F_X(z-y)F_Y(y)dy$$

where

$$F_X(x) = \begin{cases} M_{i-1,i-1} & if\ x < 0 \\ 0 & if\ x \geq 0 \end{cases}$$

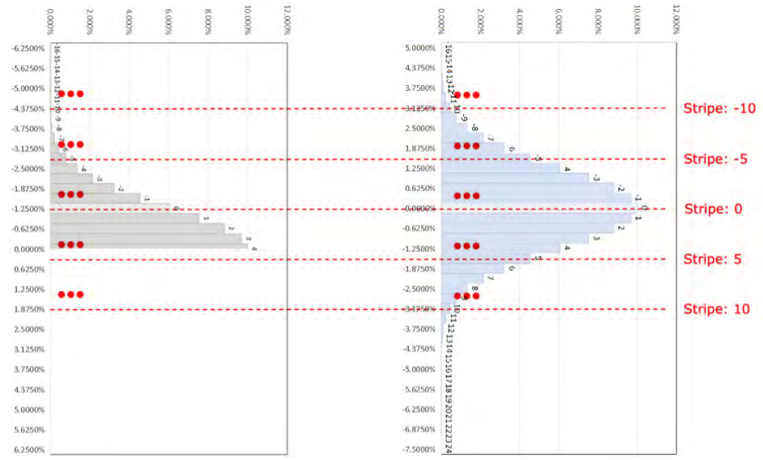
is the left-hand side of the distribution of the minimum of prior successive cumulative sums and

$$F_Y(y) = \frac{1}{\sqrt{2\pi}\cdot\sigma_Y} exp\left(-\frac{(y-\mu_Y)^2}{2\sigma_Y^2}\right)$$

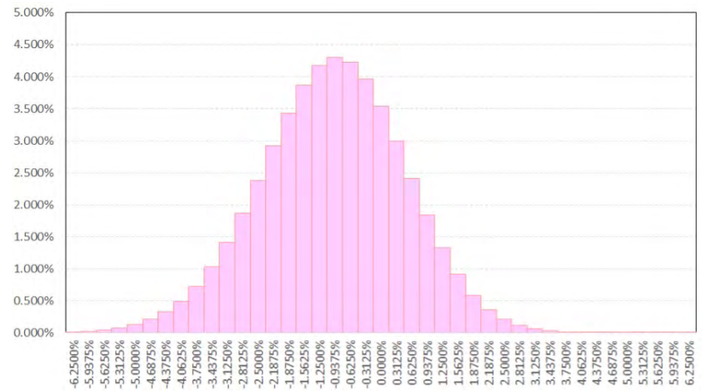
Graphically, the above convolution approach can be presented in discrete convolution form in Figure 3. Notice that only the negative (or left-hand) side of $F_X(x)$ are retained.

[2] It is because this one will be different from the one deduced in Convolution approach section of the ORIGINAL QUESTION AND RESEARCH QUESTION A.

Figure 3. Graphical Representation for Discrete Convolution for $i = 2$



a) F_X(-1.25%−y) with σ = 1 b) $F_Y(y)$ shown in reverse order with σ = 1

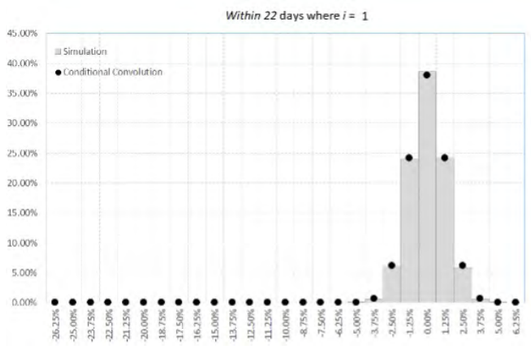


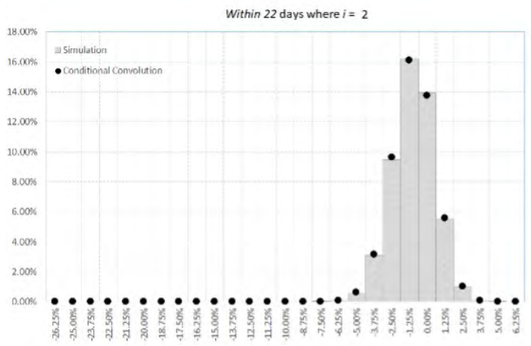
c) $F_Z(z)$

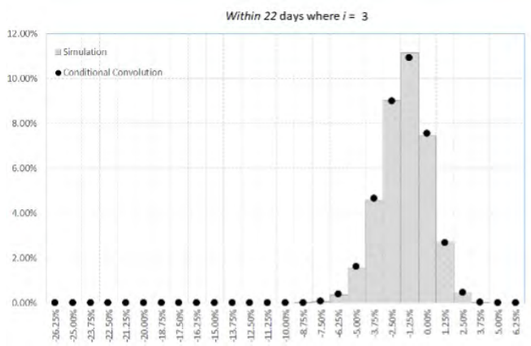
Results

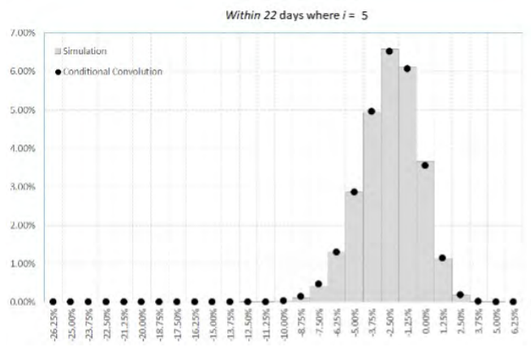
We have performed discrete convolution for successive days. The results, together with those by numerical simulation, are shown in Figure 4 below. It can be seen that the results of discrete convolution match perfectly with the numerical simulation. This provides a proof that by retaining just the left-hand side of the distribution of prior step, $M_{i-1,i-1}$, we can apply a convolution approach successively to obtain the distribution of the minimum of successive cumulative sums.

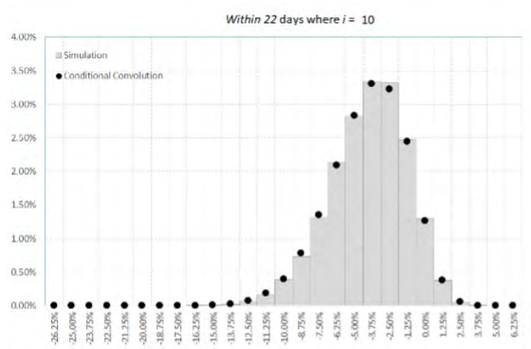
Figure 4. Distributions of $F_Z(z)$ (or $N_{Mi,i}$) for i = 1, 2, 3, 5, 10 and 22

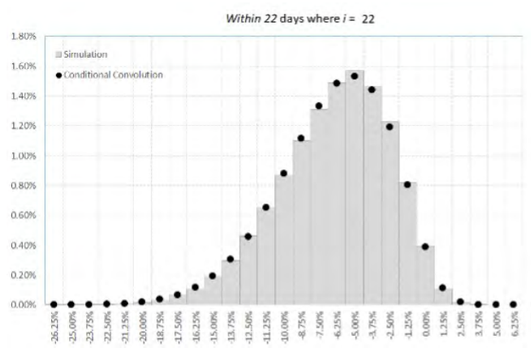












DISCUSSION

The above results are very encouraging as an efficient convolution approach has been devised to inspect the evolution of probability distribution that could be applied to VaR estimation. However, one may say financial data are stochastic in nature. Hence, they do not have time invariant volatility. Prior research tackle this by forecasting volatility using GARCH models or other stochastic models. In this aspect, the present approach could be one of the major limitations and possible extensions of the approach for future work. However, another school of thought is that the volatility forecast, by itself, varies with horizon, and different horizons are relevant in different applications. Hence, if we apply volatility forecasts in a model to predict a risk management measure such as value at risk, existing assessments are plagued by the fact that they are *joint* assessments of volatility forecastability and an assumed model, Christoffersen and Diebold (2000). In the present convolution approach, the aim is to explore the evolution of probability distribution through a predefined set of mathematical operations. In this approach, what is required is the probability distribution at i = 1. Though normal distribution with a certain standard deviation is used in this paper, we do not strictly need a standard deviation (volatility). That is to say a volatility forecast is not necessary. It is because, in place of the normal distribution with a certain standard deviation, we could use the actual distribution of daily return at i = 1. It is akin to the historical method (because it just re-orders returns lowest-to-highest).

CONCLUSION AND DIRECTION FOR FUTURE RESEARCH

Efficient discrete convolution approach to compute the time evolution of probability distribution for VaR estimation for *exactly on* i^{th} day and *within i* days has been devised. The results match perfectly with either analytical solution or numerical simulation. While the proposed convolution approach works well for both independent and correlated data for *exactly on* i^{th} day, it only works for independent data for *within i* days. However, it must be mentioned that the autocorrelations for most indexes of world stock markets are close to zero. For example, the autocorrelation of daily return of S&P 500 index and Hang Seng Index are -0.079 and -0.013 respectively. Thus, convolution approach is still able to match empirical results for *within i* days to a large extent. Having said that, we see two future work could be attempted. The first one is to use the actual distribution of daily return as the input function, $F_X(x)$. The second one is to extend the approach for dependent data for *within i* days. If successful, it means the approach could be applied to those market indexes that their autocorrelations are not close to zero.

References

Christoffersen, P. F. & Diebold, F. X. (2000). How relevant is volatility forecasting for financial risk management? *The Review of Economics and Statistics, 82*(1), 12–22. https://doi.org/10.1162/003465300558597

Fowler, J. W. (2011). Density function for the sum of correlated random variables. *Working paper*. Retrieved October 20, 2021, from http://web.ipac.caltech.edu/staff/fmasci/home/astro_refs/SumOfCorrelatedRVs.pdf

Hull, J. C. (2017). Options, futures, and other derivatives. 10th Edition, Pearson. ISBN: 978-0-13447-208-9

Lemons, D. S. (2002). An introduction to stochastic processes in physics. The Johns Hopkins University Press, p.34, ISBN: 978-0-80186-867-2

Wald, A. (1944). On cumulative sums of random variables. *The Annals of Mathematical Statistics, 15*(3), 283–296. https://doi.org/10.1214/aoms/1177731235

Wald, A. (1947). Limit distribution of the maximum and minimum of successive cumulative sums of random variables. *Bulletin of the American Mathematical Society, 53*(2), 142–153. https://doi.org/10.1090/s0002-9904-1947-08766-8

02 SOCIAL IMPACT : REVIEW AND MEASUREMENT OF SUCH DEVELOPMENT

Fock Kwong Yin, Henry
hfock@hkbu.edu.hk

Chan Wa, Kimmy
kimmychan@hkbu.edu.hk

Cheng Yuet Yee, Shirley
syycheng@hkbu.edu.hk

Zhang Junfeng
junfzh@hkbu.edu.hk

Clara C. K. Kan
clarakan@hkbu.edu.hk

Kee Chi Hing
chihing.kee@gmail.com

Choi Sze Lok, Lawrence
20481519@life.hkbu.edu.hk

Hong Kong Baptist University

ABSTRACT

Valid impact measurement is crucial for investors to ensure that their funds are going to suitable projects and track the project performance. However, to the best of our knowledge, a standard, reliable, and valid social impact measurement is not available yet. Extant impact measurements tend to be unidimensional and single-level, overlooking the multi-level effects or multi-dimensionality. To advance the practice and theory of social impact, a common definition and a valid measurement are essential. The objectives of this paper are thus threefold. First, based on a literature review, we draw a comprehensive definition of social impact that comprises knowledge of prior studies and allows researchers in the field to follow.

Second, we conduct a systematic review on papers about social impacts to understand the extant ground of this field and identify four characteristics for social impacts, namely multi-dimensional, multi-level, dynamic, and not static in form. Lastly, we propose a conceptual model for the social impact measurement and delineate each construct in the model.

Keywords: Social impacts, social enterprises, corporate social performance.

INTRODUCTION

The size of the social investment in the developing world reached USD502 billion in 2019 and analysts predicted that the growth of such investment will increase continuously in the coming years (Mudaliar & Dithrich, April 1, 2019). To ensure investment going to the right projects, a universal, consistent, and accurate social impact measurement is essential because that measurement outcome can directly influence future funding decisions. An invalid measurement can mislead social investors to reject potentially impactful projects and support less impactful projects. Mistakes in social investment decisions then hinder the progress of social development overall worldwide. Furthermore, the measurement can benefit practitioners in social enterprises and non-government organizations. The constructs included in the index can provide insights and criteria for practitioners to design more impactful activities and to evaluate the performance. Meanwhile, those who work in a private firm can leverage the measurement as an indicator to evaluate firms' performance in corporate social responsibility, which is considered an important tool to consolidate the relationship between firms and customers (Korschun et al., 2009). For researchers, constructing a measurement help in conceptualizing social impact as a construct for further investigation. Therefore, a universal social impact measurement that is reliable and valid for accurate social impact evaluation is an essential prerequisite for the success of social investment and sustainable community development.

One of the hurdles when developing such a measurement is an extant inconsistent conceptualization of what the social impact is (see the brief review in Table 1). Although the definitions generally describe social impacts as changes in different aspects of society caused by individuals or institution's actions, the term "social impact" has heterogeneous definitions based on both academic and practitioners' perspectives, which imply there are certain differences in the assumptions, boundaries, and characteristics. As a result, the insights generated by those definitions are difficult to accumulate and then be inherited and utilized by future studies. A universal definition, therefore, is the key to utilize all the knowledge of a field and facilitate researchers when generating new findings for further theoretical development of existing concepts.

This paper thus develops an explicit definition of "social impact" that can both utilize the prior knowledge and allow future researchers to advance social impact theory on common ground. We review the extant literature on social impact already published in the top 50 journals from the Financial Times List in the last two decades to accomplish this task. Using the relevant extant literature, we identify four characteristics of social impact that are important, but not precisely addressed in these prior studies. Those characteristics are multi-dimensional (three dimensions in the Triple-Bottom-Line Concept), multi-level, dynamic, and not at all static in their form. Based on these characteristics, we further develop a conceptual social impact measurement framework for the development of a more precise social impact measurement scale to use for evaluating impacts of social project.

LITERATURE REVIEW

We summarize and review the definition of social impact and all relevant terms used in the prior studies (i.e., corporate social performance and social values) (See Table 1). Although various characteristics of social impact are mentioned, namely, multi-dimensionality, multi-level, and dynamic (Rawhouser et al., 2017), the extant definitions only capture one of these or do not mention any. These features are crucial for the research community and practitioners to have to understand precisely what social impact is and how that impact should be measured. Thus, in this paper, we propose an additional new characteristic (i.e., that social impact needs not to be quantifiable) and a renewed definition that can holistically comprise these characteristics.

First, social impact is a theoretically rich and complex construct that may occur in more than one dimension simultaneously. In the literature review, we found that a few papers defined social impact using the Triple-Bottom-Line concept (Elkington, 1998), thereby identifying impact in terms of its ecological, socio-cultural, and economic aspects (Murali et al., 2015; Romijn & Caniëls, 2011). However, other definitions seldom mentioned the multi-dimensionality characteristic of social impact and only focus on impact in a specific area (i.e., environment, society, culture, and economics), thereby only rendering a single-dimensional, binary measure of social impact (Di Domenico et al., 2010; Goh et al., 2016; Simpson & Kohers, 2002; Casselman et al., 2015). As a result, the evaluation of social projects can be distorted. Instead, our work emphasizes the importance of multi-dimensionality as one of the key features of social impact and determining its outcomes.

Secondly, social impact is a multi-level construct that can simultaneously exist at different levels (Rawhouser et al., 2017). Conventionally, researchers conduct any multi-level analysis by using aggregation or disaggregation, and both methods have serious flaws. The former indicates the loss of unique individual variance; the latter fails to satisfy the very critical statistical assumption of independent observation. To examine the cross-level relationship, researchers need to obtain data at both the macro-level and the micro-level (Hofmann, 1997). However, to the best of our knowledge, no extant social impact measurement has ever comprised indicators at multiple levels. In our literature review,

Rawhouser et al. (2017) found only two papers that examined social impact using a multi-level perspective (Tobias et al., 2013; Utting, 2009). In other words, the multi-level effects of social impact have been overlooked in past studies.

Third, social impact is dynamic, but not static. The strength of any impact varies along with the changes in time. Every social project has a unique time interval during which its outcomes will be manifested (Rawhouser et al., 2017). The impacts of some projects are immediate, but hard to sustain. In contrast, some projects will have impacts that gradually increase over time or impacts that take a longer time to be observed. To account for this time effect and allow researchers to measure social impact over a different time-interval during which outcomes will manifest, we suggest a multi-time point measuring approach. Researchers should trace the changes of social impact along with time in order to capture the full impact of a project. However, time effect elements were not addressed in prior studies, and the outcome effects could have been underestimated for long-term social projects. As a result, social impact measurement should be undertaken on a continuous basis to address the influence of the time effect on those projects.

In addition, we find that social impact needs not to be quantifiable. Social impact is observable in some contexts but may be intangible in other contexts. Social impact can be either observable or intangible depending on the context. Quantifying social project impact is a general approach that many firms and researchers use to evaluate their projects' outcomes because they can configure a ground for comparison and a more objective evaluation. Counting the number of beneficiaries, the number of facilities built, and the dollars saved by a project are some of the more common quantitative impact indicators.

However, in many situations, social projects also generate intangible influences, such as changing social norms, attitudes, and knowledge of individuals involved or the specific community. Merely relying on observable impact indicators is not sufficient to evaluate the social impact precisely. To fully capture social impact, both observable and intangible impact indicators should be included.

The four features of social impact, namely, multi-dimensionality, multi-level, dynamic, and social impact is not static in form, are prevalent in today's social projects. Nevertheless, no existing definition and measurement of social impact currently cover these features comprehensively. Against these noted backdrops, we propose that *social impact is a dynamic magnitude of tangible and latent improvement on stakeholders at the individual, organization, and society levels for the dimensions of ecology, socio-culture, and economy that result from project/program actions.* Our proposed definition sheds further light on the development of a holistic social impact measurement by addressing the limitations found in the current instrument. Based on this definition, we developed a conceptual social impact measurement model.

The Triple-Bottom-Line Concept

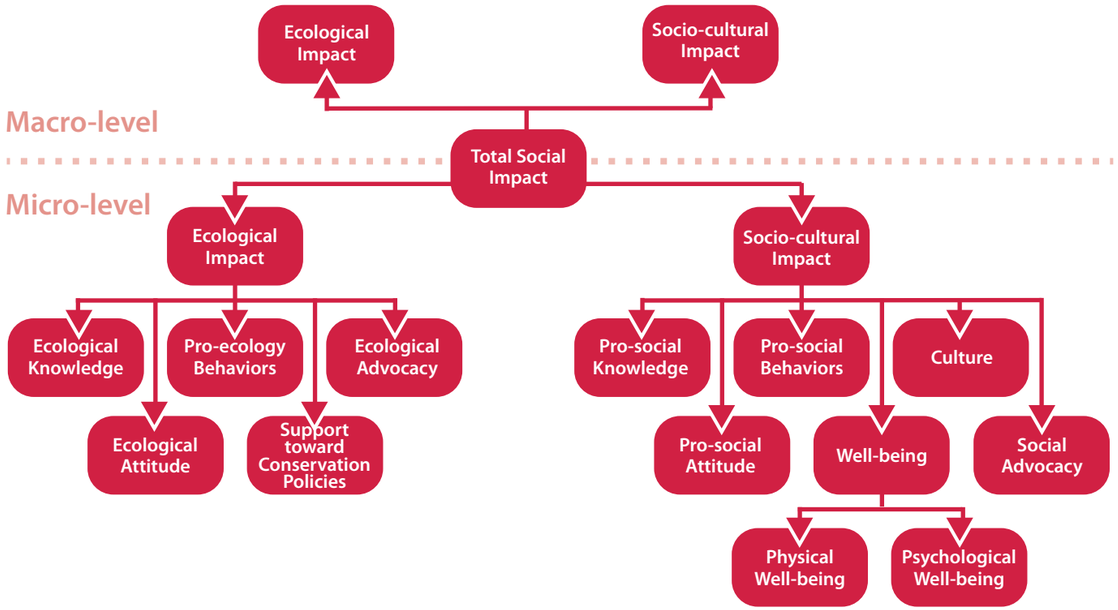
Grounded in Elkington's Triple-Bottom-Line (TBL) concept (Elkington, 1998), our model categorizes social impact into three dimensions initially (ecology, socio-cultural, and economy). The TBL is an accounting reporting framework with three dimensions: environment, society, and finance (Slaper & Hall, 2011). It was once considered a new language that drew business leaders' attention to corporate responsibility aside from economic value (Elkington, 1994). TBL captures the essence of sustainability by measuring the impact of an organization's activities in the world (Savitz, 2006). The generalizability of TBL has results in its being widely used by both practitioners and academia (Esteves et al., 2012; Izzo, June 13, 2013; McLoughlin et al., 2009; Rawhouser et al., 2017; Vanclay, 2003).

The Conceptual Social Impact Measurement Model

The proposed measurement differs from conventional measurement model by including both observable and intangible variables of ecological and socio-cultural dimensions at the micro and the macro level to capture social impacts. The economic dimension is not included in the proposed measurement model because it can be captured accurately by objective indicators. At the micro-level, the present measurement model targets to measure the social impact perceived by individuals. Such impacts are reflected by the different variables related to ecological and socio-cultural sustainability. Meanwhile, indicators that are seldom mentioned in prior studies, such as well-being and culture, are included to enrich the TBL.

At the macro-level, our measurement captures the social impact on society, which is measured by the general items that reflect how different aspects of a community change after implementing the social projects. Similarly, both observable and intangible constructs can be included. By combining the micro- and macro-level impacts, the present model will capture the overall social impact more precisely (See Figure 1).

Figure 1. The Conceptual Model for Social Impact Measurement (Source: Own)



The Environmental Dimension of the Measurement Model

The environmental dimension of this model corresponds to the environmental-bottom-line of the TBL concept. Former studies have measured this dimension using variables like sulfur dioxide concentration, the concentration of nitrogen oxides, and selected priority pollutants (Slaper & Hall, 2011). However, many social projects demonstrate environmental influences, and they are not limited to those that are observable and quantifiable. A project can contribute to environmental sustainability by enhancing its participants' ecological knowledge, thereby building a pro-environmental attitude and increasing their awareness of conservative policies. All these attributes are associated with sustainability, and yet no measurement has addressed these constructs. Therefore, we include the intangible indicators (i.e., ecological knowledge, ecological attitude, support toward conservation, and ecological advocacy) and an observable indicator (i.e., ecological behaviors) to enrich the measurement of the environmental dimension.

Five constructs are included to capture the different facets of the environmental dimension. These include ecological knowledge, ecological attitude, pro-environment behaviors, support of conservation policies, and social advocacy. The inclusion of knowledge, attitude, and behaviors is inspired by the knowledge-attitude-behaviors (KAB) model. It suggests how behaviors change via the information obtained and attitudes (Bettinghaus, 1986). Prior studies have shown that ecological knowledge can predict the performance of pro-environment behavior (Brosdahl & Carpenter, 2010; Frick et al., 2004; Otto & Pensini, 2017; Pothitou et al., 2016), while ecological attitude can moderate that relationship (Laroche et al., 2001). Since these three constructs do contribute to a more sustainable society, they are chosen as indicators of the model to reflect the different aspects of social impact. Support of conservation is also included to reflect people's attitudes toward conservative policies.

Conservation is defined as the management of human uses of the biosphere that will yield the greatest sustainable benefit for the present generation and maintain the needs of the future generation (IUCN, 1980). Former studies show that conservation is relevant and important for the sustainability achievement (Jacobs et al., 1987). Therefore, conservation is included as an indicator to reflect a particular type of social impact. Lastly, ecological advocacy is included as a construct in this measurement model. It refers to altruistic actions (cognitive, emotional, and behavioral strategies that influence others' attitudes, behaviors, and decisions for the benefits of those others that can ensure the fair treatment of others (London, 2010). Unlike other ecological behaviors, advocacy is more proactive and requires more engagement and a higher level of commitment to the environmental cause. Such actions accelerate sustainable development by pressuring different organizations to evaluate their impact on the ecosystem and society. An index can measure the social impacts of proactive action by measuring their ecological advocacy.

The Socio-Cultural Dimension of the Measurement Model

This dimension corresponds to the social-bottom-line of the Triple-Bottom-Line concept. Failing to achieve the social-bottom-line can deter sustainability because that issue is a crucial dimension of the transition to sustainability (Elkington, 1994). Former studies measured the impact of this dimension using observable and quantifiable indicators related to social problems. However, the social dimension should go beyond the current boundary. To achieve social sustainability, only resolving social problems is not sufficient. A sustainable society should also emphasize people's well-being and their acceptance of diverse cultures. Therefore, we include a series of intangible social impact indicators in our model, namely, pro-social knowledge, pro-social attitude, pro-social behaviors, social advocacy, culture, and well-being to extend the social dimension coverage. Since the interaction between society, culture, and people is accounted for in this model, the term "socio-cultural dimension" seems more appropriate.

The reason for including knowledge, attitude, and behaviors in the social cultural dimension, is similar to the reason for having those constructs in the environmental dimension. The KAB model should be applicable in the socio-cultural dimension as well. Next, social advocacy is included. It refers to proactive actions that energize and create social pressure for supporting a social cause, such as social justice and human rights (London, 2010). This construct is a more proactive way to promote sustainability. Therefore, social interventions for social advocacy should be regarded as delivering a type of social impact. Further still, cultural impact is measured in this dimension. It emphasizes measurements of two criteria, locality, and cultural diversity. A sustainable society should preserve not only its local culture, but also accept and preserve foreign cultures (Soini & Birkeland, 2014). The acceptance of diverse cultures is necessary in order to enhance life quality and achieve overall cultural sustainability (Schaich, 2009).

Lastly, well-being is included in the extant model. This category can be sub-divided into psychological well-being and physical well-being. The former focuses on strives that relate to soul and virtue. Psychological well-being is vital. First, it also connects with physical well-being. Prior studies revealed that mentally healthy adults are less likely to suffer from chronic conditions and have greater productivity than adults who lack well-being (Keyes, 2005a; Keyes, 2005b).

Psychological well-being contributes to a better self. A person who has a high level of psychological well-being should feel and act positively toward life and look forward to the future. Such a mentality is crucial for people to continue sustainable behaviors and spread that message to others. Simultaneously, physical well-being focuses on one's perceived self-health condition. This construct has both a subjective and an objective measurement.

A growing amount of the literature has suggested that society shapes human health. The direct relationship between physical health and society has revealed how social factors influence physical well-being (Aytaç & Rankin, 2008; Aytaç & Rankin, 2009; Berkman & Glass, 2000; Kawachi & Berkman, 2000). This condition is critical for citizens to be able to offer sufficient effort when participating in a social project. Since these two constructs are related to sustainability, they were chosen as key indicators of the socio-cultural dimension here.

DISCUSSION

The current study agrees on the three common characteristics of social impact (i.e., multi-dimensions, multi-level, and dynamic) proposed by Rawhouser et al. (2017). Besides these three characteristics that have been advocated by prior researchers, we further suggest that social impact need not to be quantifiable. It can be observable or intangible depending on the context. The importance of including intangible social impact indicator is introduced and explained in this study. Based on these four characteristics, both a holistic definition and a conceptual framework are drawn for social impact measurement. The new framework proposes several latent constructs that should be included in any social impact measurement, and further, it indicates how they should be measured. The framework can effectively serve as an avenue for even better development of social impact measurement in the future.

Overall, this study sheds new insights on both the managerial and theoretical aspects of social impacts. First, practitioners can increase the quality of their funding decisions by addressing the four characteristics we identify. This approach can reduce the possibility of biased funding decision-making wherein the more funding is too often allocated to less impactful projects, and less funding thus goes to promising projects. Secondly, non-governmental-organizations (NGOs) or companies can optimize the impacts of existing projects or design more impactful projects by referring to our definition and proposed model. Practitioners can also target the constructs we propose and design a program and leverage the characteristics of social impact in a manner that maximizes the influences created by those programs.

From a theoretical aspect, our study proposes a conceptual measurement framework that both researchers and practitioners can follow to design the best and most effective social impact measurement. In summary, our work will aid companies when designing better social projects and create greater social impact with their program and achieve a more accurate evaluation of those social projects.

CONCLUSION

This study provides researchers with a clear discussion of what social impact is. To construct a holistic definition, we review a wide range of papers in the top journals not only to affirm the key characteristics of social impacts already identified in prior studies, but also to discover new characteristics to understand and apply effectively. Based on these findings, we develop a more comprehensive definition and a conceptual measurement model with four newly identified characteristics. Our study can thus serve as a more solid foundation for future social impact research.

In terms of limitations, first, future studies may need to include a broader range of papers to extend the boundaries of social impact further. Second, the current measurement is designed for diverse contexts because we expect the measurements to be applicable for different projects. As a result, our model may be seen as less applicable for specific projects. Future research can refer to the construct of our model and use it to develop more context-specific measurements, which will benefit the evaluation of the influences of specific projects. In short, this study inherits the past findings of social impacts and build up a new novel definition and a measuring conceptual framework.

Table 1. Definition of Social Impacts and Relevant Terms

Definition of Social Impacts and Relevant Terms

Code	Terms	Article	Definition (Direct quotations from the authors)	C1	C2	C3	C4
SI1	Social Impact	Murali et al. (2015)	"The Triple Bottom Line (3BL) concept is one such framework for assessing the impacts of business practices using context-specific measures of environmental impact, social equity, and similar constructs with the ultimate goal of balancing societal and environmental concerns with economic objectives (Elkington, 1998)."	√			
SI2	Social Impact	Burdge & Vanclay (1996)	"Social impacts include all social and cultural consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society."				
SI3	Social Impact	Latané (1981)	"By social impact, I mean any of the great variety of changes in physiological states and subjective feelings, motives and emotions, cognitions and beliefs, values and behavior, that occur in an individual, human or animal, as a result of the real, implied, or imagined presence or actions of other individuals."				√
SI4	Social Impact	Freudenburg (1986)	"In general, however, social impact assessment refers to assessing (as in measuring or summarizing) a broad range of impacts (or effects, or consequences) that are likely to be experienced by an equally broad range of social groups as a result of some course of action."				
SI5	Social Impact	Vanclay (2003)	"The SIA community of practitioners considers that all issues that affect people, directly or indirectly, are pertinent to social impact assessment"				
SI6	Social Impact and Value	Zahra & Wright (2016)	"In this paper we develop five pillars on which the evolving social role of entrepreneurship can rest and have its impact: (1) connecting entrepreneurial activities to other societal efforts aimed at improving the quality of life, achieving progress, and enriching human existence, (2) identifying ways to reduce the dysfunctional effects of entrepreneurial activities on stakeholders, (3) redefining the scope of entrepreneurial activities as a scholarly arena, (4) recognizing entrepreneurship's social multiplier, and (5) pursuing blended value at the organizational level, centring on balancing the creation of financial, social and environmental wealth."	√	√		
SI7	Social Impact	Stephan et al. (2016)	"We define PSC as the process of transforming patterns of thought, behavior, social relationships, institutions, and social structure to generate beneficial outcomes for individuals, communities, organizations, society, and/or the environment beyond the benefits for the instigators of such transformations. The "beneficial outcomes" of this process are often referred to as (positive) social impact."	√	√		√

* **C1**=Multi-dimensions; **C2**=Multi-level; **C3**=Dynamic; **C4**=Not static in form

Definition of Social Impacts and Relevant Terms

Code	Terms	Article	Definition (Direct quotations from the authors)	C1	C2	C3	C4
CSP1	Corporate Social Performance	Boulouta (2013)	"Corporate Social Performance (CSP) refers to a business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs and observable outcomes as they relate to the firm's societal relationships" (Wood, 1991)."				
CSP2	Corporate Social Performance	Brammer & Pavelin (2006)	"A variety of definitions of CSR proposed both in the literature and by a variety of institutions, emphasize a voluntary involvement in the solution of a variety of social issues (e.g., European Commission, July 18, 2001; McWilliams & Siegel, 2001)." "To summarize, our measures of the three dimensions of social performance are: Community performance, environmental performance, and employee performance."	√	√		
CSP3	Corporate Social Performance	Chen & Delmas (2011)	"CSP can be defined as "a construct that emphasizes a company's responsibilities to multiple stakeholders, such as employees and the community at large, in addition to its traditional responsibilities to economic shareholders" (Turban & Greening, 1996)."	√	√		
CSP4	Corporate Social Performance	Crilly et al. (2015)	"Social performance – firms' value creation for actors in their social, political, and natural environments (Clarkson, 1995) – is inherently perceptual (Wood, 1991)."	√			
CSP5	Corporate Social Performance	Kang (2013)	"Corporate social performance (CSP) is used as a measure of firm response to stakeholder demands and social issues (Kacperczyk, 2009). I calculate the CSP of a firm as the sum of all strength items minus the sum of all concern items (Choi & Wang, 2009; Hull & Rothenberg, 2008)."				
CSP6	Corporate Social Performance	Manner (2010)	"Actions that appear to further some social good, beyond the interests of the firm and that which is required by law (McWilliams & Siegel, 2001)."				
CSP7	Corporate Social Performance	Renouard (2011)	"Windsor (2006) defends the idea that there are three main moral and political perspectives on CSR: the first two are opposed, one called "ethical" and the other "economic"; the third, "corporate citizenship" (Moon et al., 2003) falls between the two.	√	√		
CSP8	Corporate Social Performance	Soleimani et al. (2014)	"Corporate social performance refers to the extent to which a firm's actions attend to the needs and interests of stakeholders beyond simply its investors (Waddock & Graves, 1997). Examples include community spending; voluntary community engagement; transparency in both financial and social behavior; enactment of employee safety, health, and training policies; and adopting environmental standards. As countless observers have noted, firms are confronted with growing normative pressures to act in a socially responsible manner (Campbell, 2007)."	√			
CSP9	Corporate Social Performance	Schreck (2011)	"Given the descriptive research aim of this article and in line with earlier studies, a company's corporate social performance (CSP) is defined as the configuration of principals, processes and outcomes that allow it to handle successfully moral conflicts, as perceived by that company's various stakeholders (Berman et al., 1999; Hillman & Keim, 2001; Wood, 1991)."	√			

Definition of Social Impacts and Relevant Terms

Code	Terms	Article	Definition (Direct quotations from the authors)	C1	C2	C3	C4
CSP10	Corporate Social Performance	Wagner (2010)	"Wood (1991) defined CSP as "a business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relationships."				
CSP11	Corporate Social Performance	Schuler & Cording (2006)	"We define CSP as representing a voluntary (i.e., not directly mandated by government regulation) business action that has social or third-party effects. The definition contains three elements: (1) social outcomes, (2) market and social behaviors, and (3) voluntary behaviors."				
CSP12	Corporate Social Performance	Wood (1991)	"A business organization's configuration of principles of social responsibility, processes of social responsiveness, and policies, programs, and observable outcomes as they relate to the firm's societal relationships."				

* **C1**=Multi-dimensions; **C2**=Multi-level; **C3**=Dynamic; **C4**=Not static in form

Definition of Social Impacts and Relevant Terms

Code	Terms	Article	Definition (Direct quotations from the authors)	C1	C2	C3	C4
SV1	Social Value	Kroeger & Weber (2014)	"Accordingly, we define the effectiveness of a social intervention as the degree to which an organization reduces a treatment group's social need. This degree can then be meaningfully compared to the degree of an entirely different social intervention that also reduces a treatment group's social need."				
SV2	Social Value	Certo & Miller (2008)	"Social value has little to do with profits but instead involves the fulfilment of basic and long-standing needs such as providing food, water, shelter, education, and medical services to those members of society who are in need."	√			
SV3	Social Value	Brickson (2007)	"Unlike most instrumental stakeholder accounts, it (the framework) highlights noneconomic outcomes, particularly those that create social value, defined broadly as that which enhances well-being for the earth and its living organisms."				√
SV4	Social Value	Di Domenico et al. (2010)	"The aim of creating social value is a defining characteristic of social enterprises (Dees, 1998; Dees & Anderson, 2003; Peredo & McLean, 2006; Zahra et al., 2009) and is espoused in their articles of association, policies, and procedures and enacted in their business model and operating strategies."				
SV5	Social Value	Hall et al. (2015)	"The calculation of SROI seeks to identify benefits accruing to a set of stakeholders of the organization and then to assign a monetary value to them. For example, a social purpose organization providing employment for released juvenile offenders can specify the monetary value of benefits that may arise, such as reduced expenditure on the justice and prison systems, greater income tax from employment, and/or the monetary value of the beneficiaries' increased life quality."				

* **C1**=Multi-dimensions; **C2**=Multi-level; **C3**=Dynamic; **C4**=Not static in form

References

Aytaç, I.A., & Rankin, B.H. (2008). Unemployment, economic strain and family distress: The impact of the 2001 economic crisis. *New Perspectives on Turkey*, *38*, 181–203. https://doi.org/10.1017/s0896634600004970

Aytaç, I.A., & Rankin, B.H. (2009). Economic crisis and marital problems in Turkey: Testing the family stress model. *Journal of Marriage and Family*, *71*(3), 756–767. https://doi.org/10.1111/j.1741-3737.2009.00631.x

Berkman, L.F., & Glass, T.A. (2000). Social integration, social networks, social support, and health. In L.F. Berkman, & I. Kawachi (Eds.), Social epidemiology (pp. 137–173). New York, NY: Oxford University Press.

Berman, S.L., Wicks, A.C., Kotha, S., & Jones, T.M. (1999). Does stakeholder orientation matter? The relationship between stakeholder management models and firm financial performance. *Academy of Management Journal*, *42*(5), 488–506. https://doi.org/10.5465/256972

Bettinghaus, E.P. (1986). Health promotion and the knowledge-attitude-behavior continuum. *Preventive Medicine*, *15*(5), 475–491. https://doi.org/10.1016/0091-7435(86)90025-3

Boulouta, I. (2013). Hidden connections: The link between board gender diversity and corporate social performance. *Journal of Business Ethics*, *113*(2), 185–197. https://doi.org/10.1007/s10551-012-1293-7

Brammer, S.J., & Pavelin, S. (2006). Corporate reputation and social performance: The importance of fit. *Journal of Management Studies*, *43*(3), 435–455. https://doi.org/10.1111/j.1467-6486.2006.00597.x

Brickson, S.L. (2007). Organizational identity orientation: The genesis of the role of the firm and distinct forms of social value. *Academy of Management Review*, *32*(3), 864–888. https://doi.org/10.5465/amr.2007.25275679

Brosdahl, D.J.C., & Carpenter, J.M. (2010). Consumer knowledge of the environmental impacts of textile and apparel production, concern for the environment, and environmentally friendly consumption behavior. *Journal of Textile and Apparel, Technology and Management*, *6*(4), 1–9.

Burdge, R.J., & Vanclay, F. (1996). Social impact assessment: A contribution to the state of the art series. *Impact Assessment*, *14*(1), 59–86. https://doi.org/10.1080/07349165.1996.9725886

Campbell, J.L. (2007). Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. *Academy of Management Review*, *32*(3), 946–967. https://doi.org/10.5465/amr.2007.25275684

Casselman, R.M., Sama, L.M., & Stefanidis, A. (2015). Differential social performance of religiously-affiliated microfinance institutions (MFIs) in base of pyramid (BoP) markets. *Journal of Business Ethics*, *132*(3), 539–552. https://doi.org/10.1007/s10551-014-2360-z

Certo, S.T., & Miller, T. (2008). Social entrepreneurship: Key issues and concepts. *Business Horizons*, *51*(4), 267–271. https://doi.org/10.1016/j.bushor.2008.02.009

Chen, C.M., & Delmas, M. (2011). Measuring corporate social performance: An efficiency perspective. *Production and Operations Management*, *20*(6), 789–804. https://doi.org/10.1111/j.1937-5956.2010.01202.x

Choi, J., & Wang, H. (2009). Stakeholder relations and the persistence of corporate financial performance. *Strategic Management Journal, 30*(8), 895–907. https://doi.org/10.1002/smj.759

Clarkson, M.B.E. (1995). A stakeholder framework for analyzing and evaluating corporate social performance. *Academy of Management Review, 20*(1), 92–117. https://doi.org/10.2307/258888

Crilly, D., Ni, N., & Jiang, Y. (2015). Do-no-harm versus do-good social responsibility: Attributional thinking and the liability of foreignness. *Strategic Management Journal, 37*(7), 1316–1329. https://doi.org/10.1002/smj.2388

Dees, J.G. (1998). Enterprising non-profits. *Harvard Business Review*, *76*(1), 55–67. Retrieved March 2, 2021 from https://www.authenticityconsulting.com/npod/toolbox.pdf

Dees, J.G. & Anderson, B.B. (2003). For-profit social ventures. *International Journal of Entrepreneurship Education (special issue on social entrepreneurship)*, *2*(1), 1–26. Retrieved March 2, 2021, from http://catcher.sandiego.edu/items/soles/DeesAndersonCase.pdf

Di Domenico, M.L., Haugh, H., & Tracey, P. (2010). Social bricolage: Theorizing social value creation in social enterprises. *Entrepreneurship Theory and Practice*, *34*(4), 681–703. https://doi.org/10.1111/j.1540-6520.2010.00370.x

Elkington, J. (1994). Towards the sustainable corporation: Win-win-win business strategies for sustainable development. *California Management Review*, *36*(2), 90–100. https://doi.org/10.2307/41165746

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management, 8*(1), 37–51. https://doi.org/10.1002/tqem.3310080106

Esteves, A.M., Franks, D., & Vanclay, F. (2012). Social impact assessment: The state of the art. *Impact Assessment and Project Appraisal*, *30*(1), 34–42. https://doi.org/10.1080/14615517.2012.660356

European Commission (July 18, 2001). Green paper: Promoting a European framework for corporate social responsibility. Retrieved March 11, 2021, from https://ec.europa.eu/commission/presscorner/detail/en/DOC_01_9

Freudenburg, W.R. (1986). Social impact assessment. *Annual Review of Sociology*, *12*(1), 451–478. https://doi.org/10.1146/annurev.so.12.080186.002315

Frick, J., Kaiser, F.G., & Wilson, M. (2004). Environmental knowledge and conservation behavior: Exploring prevalence and structure in a representative sample. *Personality and Individual Differences*, *37*(8), 1597–1613. https://doi.org/10.1016/j.paid.2004.02.015

Goh, J.M., Gao, G.G., & Agarwal, R. (2016). The creation of social value: Can an online health community reduce rural-urban health disparities? *MIS Quarterly, 40*(1), 247–263. https://doi.org/10.25300/misq/2016/40.1.11

Hall, M., Millo, Y., & Barman, E. (2015). Who and what really counts? Stakeholder prioritization and accounting for social value. *Journal of Management Studies*, *52*(7), 907–934. https://doi.org/10.1111/joms.12146

Hillman, A.J., & Keim, G.D. (2001). Shareholder value, stakeholder management, and social issues: What's the bottom line? *Strategic Management Journal*, *22*(2), 125–139. https://doi.org/10.1002/1097-0266(200101)22:2<125::aid-smj150>3.0.co;2-h

Hofmann, D.A. (1997). An overview of the logic and rationale of hierarchical linear models. *Journal of Management, 23*(6), 723–744. https://doi.org/10.1177/014920639702300602

Hull, C.E., & Rothenberg, S. (2008). Firm performance: The interactions of corporate social performance with innovation and industry differentiation. *Strategic Management Journal*, *29*(7), 781–789. https://doi.org/10.1002/smj.675

IUCN. (1980). Introduction: Living resource conservation for sustainable development. In IUCN (Eds.), World conservation strategy: Living resource conservation for sustainable development. Gland: IUCN. https://doi.org/10.2305/iucn.ch.1980.9.en

Izzo, D. (June 13, 2013). Aligning interests in impact investing. *Stanford Social Innovation Review*. Retrieved January 15, 2021, from http://www.ssireview.org/blog/entry/aligning_interests_in_impact_investing

Jacobs, P., Gardner, J., & Munro, D.A. (1987) Sustainable and equitable development: An emerging paradigm. In P. Jacobs & D.A. Munro (Eds.). Conservation with equity: strategies for sustainable development (pp. 17–29). Gland: IUCN. Retrieved January 15, 2021 from https://portals.iucn.org/library/node/5866

Kacperczyk, A. (2009). With greater power comes greater responsibility? Takeover protection and corporate attention to stakeholders. *Strategic Management Journal, 30*(3), 261–285. https://doi.org/10.1002/smj.733

Kang, J. (2013). The relationship between corporate diversification and corporate social performance. *Strategic Management Journal, 34*(1), 94–109. https://doi.org/10.1002/smj.2005

Kawachi, I., & Berkman, L.F. (2000). Social cohesion, social capital, and health. In L.F. Berkman, & I. Kawachi (Eds.), Social epidemiology (pp. 174–190). New York, NY: Oxford University Press.

Keyes, C.L.M. (2005a). Chronic physical conditions and aging: Is mental health a potential protective factor? *Ageing International, 30*(1), 88–104. https://doi.org/10.1007/bf02681008

Keyes, C.L.M. (2005b). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*(3), 539–548. https://doi.org/10.1037/0022-006x.73.3.539

Korschun, D., Bhattacharya, C.B., & Sen, S. (2009). Using corporate social responsibility to strengthen employee and customer relationships. *Advances in Consumer Research*, *8*, 64–66.

Kroeger, A., & Weber, C. (2014). Developing a conceptual framework for comparing social value creation. *Academy of Management Review, 39*(4), 513–540. https://doi.org/10.5465/amr.2012.0344

Laroche, M., Bergeron, J., & Barbaro-Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing, 18*(6), 503–520. https://doi.org/10.1108/eum0000000006155

Latané, B. (1981). The psychology of social impact. *American Psychologist, 36*(4), 343–356. https://doi.org/10.1037/0003-066x.36.4.343

London, M. (2010). Understanding social advocacy: An integrative model of motivation, strategy, and persistence in support of corporate social responsibility and social entrepreneurship. *Journal of Management Development, 29*(3), 224–245. https://doi.org/10.1108/02621711011025768

Manner, M.H. (2010). The impact of CEO characteristics on corporate social performance. *Journal of Business Ethics, 93*(Supplement 1), 53–72. https://doi.org/10.1007/s10551-010-0626-7

McLoughlin, J., Kaminski, J., Sodagar, B., Khan, S., Harris, R., Arnaudo, G., & Mc Brearty, S. (2009). A strategic approach to social impact measurement of social enterprises: The SIMPLE methodology. *Social Enterprise Journal, 5*(2), 154–178. https://doi.org/10.1108/17508610910981734

McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of Management Review, 26*(1), 117–127. https://doi.org/10.5465/amr.2001.4011987

Moon, J., Crane, A., & Matten, D. (2003). Can corporations be citizens? Corporate citizenship as a metaphor for business participation in society. *Business Ethics Quarterly, 15*(3), 429–453. https://doi.org/10.5840/beq200515329

Murali, K., Lim, M.K., & Petruzzi, N.C. (2015). Municipal groundwater management: Optimal allocation and control of a renewable natural resource. *Production and Operations Management, 24*(9), 1453–1472. https://doi.org/10.1111/poms.12389

Mudaliar, A., & Dithrich, H. (April 1, 2019). Sizing the impact investing market. *Global Impact Investing Network*. Retrieved January 15, 2021, from https://thegiin.org/research/publication/impinv-market-size

Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature, together, are related to ecological behavior. *Global Environmental Change*, *47*, 88–94. http://dx.doi.org/10.1016/j.gloenvcha.2017.09.009

Peredo, A.M., & McLean, M. (2006). Social entrepreneurship: A critical review of the concept. *Journal of World Business, 41*(1), 56–65. https://doi.org/10.1016/j.jwb.2005.10.007

Pothitou, M., Hanna, R.F., & Chalvatzis, K.J. (2016). Environmental knowledge, pro-environmental behavior and energy savings in households: An empirical study. *Applied Energy, 184*, 1217–1229. https://doi.org/10.1016/j.apenergy.2016.06.017

Rawhouser, H., Cummings, M., & Newbert, S.L. (2017). Social impact measurement: Current approaches and future directions for social entrepreneurship research. *Entrepreneurship Theory and Practice, 43*(1), 82–115. https://doi.org/10.1177/1042258717727718

Renouard, C. (2011). Corporate social responsibility, utilitarianism, and the capabilities approach. *Journal of Business Ethics, 98*(1), 85–97. https://doi.org/10.1007/s10551-010-0536-8

Romijn, H.A., & Caniëls, M.C.J. (2011). The jatropha biofuels sector in Tanzania 2005-2009: Evolution towards sustainability? *Research Policy, 40*(4), 618–636. https://doi.org/10.1016/j.respol.2011.01.005

Savitz, A. (2006). The triple bottom line: How today's best-run companies are achieving economic, social, and environmental success – and how you can too. Jossey-Bass Inc., San Francisco, CA. ISBN: 978-0-78797-907-2.

Schaich, H. (2009). Local residents' perceptions of floodplain restoration measures in Luxembourg's Syr Valley. *Landscape and Urban Planning, 93*(1), 20–30. https://doi.org/10.1016/j.landurbplan.2009.05.020

Schreck, P. (2011). Reviewing the business case for corporate social responsibility: New evidence and analysis. *Journal of Business Ethics, 103*(2), 167–188. https://doi.org/10.1007/s10551-011-0867-0

Schuler, D.A., & Cording, M. (2006). A corporate social performance – corporate financial performance behavioral model for consumers. *Academy of Management Review, 31*(3), 540–558. https://doi.org/10.5465/amr.2006.21318916

Simpson, W.G., & Kohers, T. (2002). The link between corporate social and financial performance: Evidence from the banking industry. *Journal of Business Ethics, 35*(2), 97–109. https://doi.org/10.1023/a:1013082525900

Slaper, T.F., & Hall, T.J. (2011). The triple bottom line: What is it and how does it work? *Indiana Business Review*, 4–8. Retrieved January 15, 2021, from http://www.ibrc.indiana.edu/ibr/2011/spring/pdfs/article2.pdf

Soini, K., & Birkeland, I. (2014). Exploring the scientific discourse on cultural sustainability. *Geoforum, 51*, 213–223. https://doi.org/10.1016/j.geoforum.2013.12.001

Soleimani, A., Schneper, W.D., & Newburry, W. (2014). The impact of stakeholder power on corporate reputation: A cross-country corporate governance perspective. *Organization Science, 25*(4), 991–1008. https://doi.org/10.1287/orsc.2013.0889

Stephan, U., Patterson, M., Kelly, C., & Mair, J. (2016). Organizations driving positive social change: A review and an integrative framework of change processes. *Journal of Management, 42*(5), 1250–1281. https://doi.org/10.1177/0149206316633268

Tobias, J.M., Mair, J., & Barbosa-Leiker, C. (2013). Toward a theory of transformative entrepreneuring: Poverty reduction and conflict resolution in Rwanda's entrepreneurial coffee sector. *Journal of Business Venturing, 28*(6), 728–742. https://doi.org/10.1016/j.jbusvent.2013.03.003

Turban, D.B., & Greening, D.W. (1996). Corporate social performance and organizational attractiveness to prospective employees. *Academy of Management Journal, 40*(3), 658–672. https://doi.org/10.5465/257057

Utting, K. (2009). Assessing the impact of fair trade coffee: Towards an integrative framework. *Journal of Business Ethics, 86*(Supplement 1), 127–149. https://doi.org/10.1007/s10551-008-9761-9

Vanclay, F. (2003). International principles for social impact assessment. *Impact Assessment and Project Appraisal, 21*(1), 5–12. https://doi.org/10.3152/147154603781766491

Waddock, S.A., & Graves, S.B. (1997). The corporate social performance-financial performance link. *Strategic Management Journal, 18*(4), 303–319. https://doi.org/10.1002/(sici)1097-0266(199704)18:4<303::aid-smj869>3.0.co;2-g

Wagner, M. (2010). Corporate social performance and innovation with high social benefits: A quantitative analysis. *Journal of Business Ethics, 94*(4), 581–594. https://doi.org/10.1007/s10551-009-0339-y

Windsor, D. (2006). Corporate social responsibility: Three key approaches. *Journal of Management Studies, 43*(1), 93–114. https://doi.org/10.1111/j.1467-6486.2006.00584.x

Wood, D.J. (1991). Corporate social performance revisited. *Academy of Management Review, 16*(4), 691–718. https://doi.org/10.2307/258977

Zahra, S.A., Gedajlovic, E., Neubaum, D.O., & Shulman, J.M. (2009). A typology of social entrepreneurs: Motives, search processes and ethical challenges. *Journal of Business Venturing, 24*(5), 519–532. https://doi.org/10.1016/j.jbusvent.2008.04.007

Zahra, S.A., & Wright, M. (2016). Understanding the social role of entrepreneurship. *Journal of Management Studies, 53*(4), 610–629. https://doi.org/10.1111/joms.12149

03 EMBODIED KNOWLEDGE FOR MANAGERS IN TURBULENT TIMES

Adam Potter
Adam.e.potter@gmail.com

Universiti Sains Malaysia

ABSTRACT

How can managers lead amidst turbulent times facing an uncertain future? We must recognize and apply appropriate methods of teaching and learning to address the challenges of the modern era. This paper introduces the perspectives of Cartesian Dualism and embodied, integral cognition, and applies them to different challenges faced by managers. Teaching tools and practical application for managers are presented as an aid for incorporating this knowledge into business practices such as mentoring, sales training, and the evaluation of goals and performance metrics.

Keywords: Embodied knowledge, phenomenology, pedagogy, international business, international management.

INTRODUCTION

2020 and 2021 have been years filled with unexpected challenges. Pandemic and political upheaval directly affect global markets, supply chains, and business practices. These turbulent times make leading and managing across borders increasingly complex. Established management best practices and situational leadership norms seem hard to apply in the face of novel challenges like the COVID-19 pandemic, disruptive technologies, digital currencies, the internet of things, and advances in artificial intelligence. The dynamic nature of the world economy necessitates more effective methods of leadership development within organizations. Managers should consider if their methods of teaching within their organizations are effectively preparing leaders for current professional demands. Our sense of how the mind works is shaped by our culture, education, and life experience. What we believe about knowledge and cognition are deeply embedded into our worldviews. Leading theories of cognition do not have to be viewed as right or wrong but rather as different perspectives of what we as a human race do not fully understand. Two leading perspectives of cognition are often blended in practice. This can lead to incorrect teaching applications within organizations. A more thorough introduction to theories of cognition and a discussion of practical managerial application, which guide managers in applying embodied learning within organization is needed. This perspective holds great promise for developing leaders capable of making wise, ethical, and strategic decisions in turbulent times.

ON THINKING, KNOWING, AND DECIDING

One prevalent view of knowing and deciding is Cartesian Dualism. In this philosophy of cognition, the mind is the knowing subject to which all knowledge belongs (Baker & Morris, 2005). This understanding closely aligns with a natural science perspective on reality (Alsop, 2005). Those who hold to this perspective tend to speak of knowledge by saying "I think" or "I know" this or that (Tanaka, 2013). In this kind of knowing, knowledge is often represented by propositions. A proposition is a category, theme, or simplification of a body of data into a form that is easy to conceptualize and share. Typical teaching styles aligned with this view of knowing include simplifying research or personal experience into codifiable or propositional knowledge that can be easily shared. Examples of propositional knowledge could be a blog titled "Five keys to good decision-making in a crisis" or an acronym explaining "The ABCs of being a great boss". This view of the mind and knowing is not highly effective in training people with appropriate behavior in complex social situations or preparing leaders to make choices in novel scenarios.

Phenomenological embodiment, a different philosophical prospective on cognition, has great potential to show us things about ourselves that we might know intuitively but struggle to integrate into management, leadership, and decision-making processes. Phenomenological embodiment stems from the advanced phenomenological perspective of the philosopher Maurice Merleau-Ponty (Reynolds, 2004; Weiss & Haber, 2002). This view rejects the idea that the mind is like a "ghost in the machine" with the body being the machine (Hoswell, 2016). Those following this perspective believe that, at least in some circumstances, the body knows how to act and decide and is itself able to store knowledge. Individuals speaking from this perspective are more likely to say of knowledge and knowing, "I know how" or "I can do." Embodied knowledge is not simply intellectual but integral (Küpers & Pauleen, 2015), meaning that the holder of such knowledge both understands cognitively and knows how to act morally, ethically, tactfully, and practically. To teach and learn in an embodied manner requires the avoidance of presenting truth and knowledge in purely propositional forms that "disembody" the knowing, removing what is known from the knowing body.

In practice, we combine these two views without realizing it. Education systems, especially from the West or those heavily influenced by the West, often handle knowledge and knowing in ways that are more closely aligned with Cartesian Dualism. Knowledge that can be codified and easily disseminated is preferred (Küpers & Pauleen, 2015). At the same time, practices like apprenticeships for vocational training, teaching with Harvard Business School case studies, and professional coaching and mentoring teach knowledge, knowing, and deciding in an embodied way. The proper application of these principles of teaching, learning, knowing, and deciding can help business leaders develop practical wisdom for complex novel decision-making in turbulent times (Küpers & Pauleen, 2016).

APPLICATION OF KNOWING FOR DIFFERENT SITUATIONS

Propositional presentations of knowledge are most useful in describing stable, simple, reoccurring phenomena. For example, within a certain culture, five helpful questions for customer service representatives to ask unhappy customers may be repeatedly helpful as the same problems are regularly addressed. Managers may find that simple sales metrics (i.e., KPIs) aid decisions to promote sales staff to more critical regions or client groups. This type of knowledge can be quickly disseminated and applied throughout an organization, and will likely be helpful in many applications.

There are, however, many scenarios in which propositional knowledge transfer is not likely to meet desired outcomes. Embodied knowledge is more effective than propositional knowledge in shaping appropriate behavior in situations related to skill acquisition, understanding space and place, and complex social understandings (Tanaka, 2013). Organizations face many situations that necessitate acquisition of skills and appropriate behavior in complex social situations. Training individuals for situations like this can prove to be hard to do and challenging to replicate. How does a salesperson

close a high stakes negotiation in an unfamiliar culture? How can firefighters attack a rare type of chemical fire that is difficult and dangerous to simulate in a training scenario? How can a new CEO be identified and how will he or she lead an organization through a crisis like a novel pandemic where there are no best practices, textbooks, college classes, or past experience to show the way?

Teaching in an embodied and integrated way takes the learner from "I think" or "I know about" to the "I know how to" and "I can" depth of understanding necessary for demonstration of skills acquired, appropriate behavior in complex social situations, or novel decision-making scenarios (Küpers & Pauleen, 2015, Tanaka, 2013). Embodied learning is also vital for leaders to have practical wisdom that integrates feelings, morality, ethics, and emotion along with cognitive aspects of decision making (Küpers & Pauleen, 2016) Table 1.1 gives examples of embodied teaching methods and their positive potential effects on learning outcomes. Only this type of learning is likely to yield wise choices in complex and turbulent scenarios.

Table 1.1. Examples of Embodied Teaching Methods

Harvard Business School case studies	Students not only become familiar with the facts of the problem, but they get to know the characters due to the narrative format. Learners can put themselves in the place of the decision-maker, feeling the stresses and pressures. These guided experiences help students grow as decision-makers even though they will never face an identical scenario. The learning has been embodied when students feel the weight of the decision and how the family business might be affected. The case study is a success when the experience goes beyond an intellectual exercise and engages the emotions (Tiwari et al., 2014).
Professional mentoring	Mentors spend significant time experiencing life on life with mentees, and the mentorship content is delivered relationally in a manner unique to the pair's relationship and the mentees needs. The mentee goes beyond simply knowing about the mentor to becoming more like the mentor (Ghosh, 2013). The fruit of a successful mentorship are wise choices, morally sound conduct, and character growth.
Virtual reality simulations for medical professionals	Doctors, nurses, and EMTs use VR simulations to be exposed to life-like scenarios in an embodied manner. They can try, fail, and learn without lives being lost by mistakes so that they already have an appropriate skillset before ever facing the real situation. This embodied learning tool is successful when a healthcare professional performs a task well in a critical situation despite having never actually experienced the scenario in the real world (Ruthenbeck & Reynolds, 2015).
Sage wisdom from an elder delivered orally	Instead of giving a child the answer to a problem, a wise elder shares a story that could be from personal experience or a creatively crafted fable. The child intuitively knows what choices should be made related to community values after hearing the story. Success of this teaching tool is related to measures in how well children conform to community standards of behavior and moral excellence as well as leadership and work ethics (Cunsolo et al., 2013).
Modeling for sales force training	New sales professionals shadow effective salespeople watching every aspect of how they generate leads, build relationships, close deals, and maintain trust. Trainees never go to a classroom or read a manual, but they gradually can effectively do the same sort of work due to modelling. This tool is successful when trainees begin to walk in the proverbial footsteps of top performers, though in their own way (Bradford et al., 2017).

DECISION-MAKING

A decision maker trained with propositional knowledge might ask himself or herself, "Did I have a unit covering this in school?", "What's the company policy on this HR issue?", or "How do I apply what I know to make a well-reasoned choice given the information available?". Questions of this nature are ideal for common, simple problems, but are less helpful when novelty and complexity increase.

Drawing from embodied learning may spark questions like "What would my mentor have done in this situation?", "What is my gut saying?", "What seems intuitively right here?", or even "If I were in my subordinate's situation, what type of leadership would I desire?". In intense situations like emergency medical situations or firefighting, embodied knowledge must be applied instantly and intuitively. This would look like a gut reaction to a casual observer, but the embodied perspective would argue that the body already knows how to act without any need of further reasoning or thinking through propositional truths (Tanaka, 2013). Both styles of reasoning are valid but should be applied appropriately given differing problems and desired learning outcomes.

EAST, WEST, AND EVERYTHING IN BETWEEN

All individuals and organizations are embedded in cultures. Multinational organizations can often be impressively diverse and remarkably decentralized. The diversity of human capital comes from diversity of culture, language, worldview, education, and views of knowledge, knowing, and how decisions should be made. Identifying underlying assumptions about knowledge and knowing is not an exercise reserved for philosophers and academics, rather it is becoming a necessity for leaders participating in the global

economy. Leaders should assess their own understandings, and armed with these differing perspectives of the mind and knowledge, realize the unquestioned choices that are being made throughout their organizations. Only then can appropriate perspectives be intentionally applied to the challenges they face and the needs of the organizations they serve in these turbulent times.

CONCLUSION AND PRACTICAL APPLICATIONS FOR MANAGERS

Practical Applications for Managers and Leaders in Organizations

There are seven suggestions, which encourage mangers to consider how an embodied cognitive perspective may shape management activity and positively affect learning outcomes within organizations.

1. Look in the mirror.

What have you always believed about the mind, how things are known, and how teaching and training should occur? Socrates said, "to know thyself is the beginning of wisdom." Explore differing perspectives and ponder how they affect you and your organization.

2. Understand that leaders who have a variety of experiences, mentoring, and have learned from modeling may be more effective when facing novel challenges requiring outside-the-box thinking.

Consider asking about personal and professional mentoring relationships in an interview even if the candidate's mentoring did not occur in a closely related job. Have they ever become more like a role model? Do they have any heroes?

3. Consider who in your organization receives training involving complex and dynamic work, a specific skill set that must be reproduced, or complex social interactions.

Avoid overdependence on manuals and classroom style trainings when the desired outcomes are specific skill sets or successful social interactions like managing people, leading in crisis, managing sales relationships, or maintaining trust with clients. Instead, consider informal mentoring, modeling, role-play, or hands on training of desired skills.

4. Do not apply overly simple solutions to complex problems.

Creating a sales manual is much easier to do and share throughout an organization than developing a mentorship program, but do not trick yourself into thinking that a manual of propositional knowledge will effectively train a sales force to act appropriately in complex social situations. Your organization can make a manual for everything, but manuals will only be effective for certain things.

5. Cultivate curiosity about the worldviews of coworkers, customers, and suppliers from different cultures.

You may begin to understand why communication can be frustrating despite fluency in same language. Have conversations about decision-making styles, education background, and cultural values.

6. Never apologize for learning outcomes that are not quantifiable.

Albert Einstein once said, "Not everything that counts can be counted, and not everything that can be counted counts." A supervisor might ask you to improve the performance of your mentoring program by 45%. Managers should have intentional conversations about how they are applying embodied knowledge in the workplace. Then, measure in a way that is appropriate given the situation. For example, a manager might try to increase the number of participants in the mentoring program rather than trying to measure its effectiveness quantitatively.

7. Explore how technologies like augmented reality, virtual reality, and mixed reality can be used to train skills and teach in an embodied manner and redefine the experience of presence and togetherness despite physical distance.

Consider having a program or experience designed for your organization to train specific skills. Virtual teams can experience a very real sense of togetherness by doing team building games in virtual reality. The promise of telepresence video conferencing is a misnomer in that it does not actually offer a sense of presence. The exploration of virtual reality could bring people in your organization together both personally and professionally.

References

Alsop, S. (2005). *Beyond Cartesian Dualism: Encountering Affect in the Teaching and Learning of Science*. Springer Science & Business Media. ISBN: 978-1-40203-807-5.

Baker, G., & Morris, K.J. (2005). *Descartes' Dualism*. Routledge. ISBN: 978-1-13485-424-0.

Bradford, S. K., Rutherford, B. N., & Friend, S. B. (2017). The impact of training, mentoring and coaching on personal learning in the sales environment. *International Journal of Evidence Based Coaching and Mentoring*, *15*(1), 133–151. https://doi.org/10.3316/informit.645854493977325

Cunsolo Willox, A., Harper, S. L., & Edge, V. L. (2013). Storytelling in a digital age: Digital storytelling as an emerging narrative method for preserving and promoting indigenous oral wisdom. *Qualitative Research*, *13*(2), 127–147. https://doi.org/10.1177/1468794112446105

Ghosh, R. (2013). Mentors providing challenge and support: Integrating concepts from teacher mentoring in education and organizational mentoring in business. *Human Resource Development Review*, *12*(2), 144–176. https://doi.org/10.1177/1534484312465608

Hoswell, T. (2016). *Phenomenology and the ghost in the machine: An investigation into Wilfrid Sellars, Jean--Paul Sartre, Gilbert Ryle and the concept of mind*. The 7th House of Cult Literature, Strathfield, Sydney, Australia. ISBN: 978-1-36560-331-0.

Küpers, W., & Pauleen, D.J. (2016). *A Handbook of Practical Wisdom: Leadership, Organization and Integral Business Practice*. Routledge. eBook ISBN: 978-1-31556-481-4.

Küpers, W. M., & Pauleen, D. (2015). Learning wisdom: Embodied and artful approaches to management education. *Scandinavian Journal of Management*, *31*(4), 493–500. https://doi.org/10.1016/j.scaman.2015.08.003

Reynolds, J. (2004). *Merleau-Ponty and Derrida: Intertwining Embodiment and Alterity*. Ohio University Press. ISBN: 978-0-82141-592-4.

Ruthenbeck, G. S., & Reynolds, K. J. (2015). Virtual reality for medical training: The state-of-the-art. *Journal of Simulation*, *9*(1), 16–26. https://doi.org/10.1057/jos.2014.14

Tanaka, S. (2013). The notion of embodied knowledge and its range. *Encyclopaideia, 17*(37), 47–66. https://doi.org/10.4442/ency_37_13_03

Tiwari, S. R., Nafees, L., & Krishnan, O. (2014). Simulation as a pedagogical tool: Measurement of impact on perceived effective learning. *The International Journal of Management Education*, *12*(3), 260–270. https://doi.org/10.1016/j.ijme.2014.06.006

Weiss, G., & Haber, H. F. (2002). Perspectives on Embodiment: *The Intersections of Nature and Culture.* Routledge. ISBN: 978-0-41591-586-1.

04 STRATEGIC VALUE CHAIN FOR GLOBAL HOTEL INDUSTRY

Narentheren Kaliappen
narentheren@uum.edu.my

Ahmad Bashawir Abdul Ghani
bashawir@uum.edu.my

Universiti Utara Malaysia, Malaysia

ABSTRACT

Rapid shifts in customer preference, the pressure from environment, and the advent of new technologies are forcing hoteliers to rethink their strategies. The authors revise the Porter's value chain framework and incorporated technology to generate the strategic value chain model for the hotel industry, which can help hoteliers to reduce costs and add value as well as achieve competitive advantage. This conceptual paper is prepared based on the viewpoints of experts who have added their own impartial comments on this subject matter. The authors highlight the importance of value chain activities such as infrastructure, human resource management, procurement and finance, online/offline hotel promotion and after-sales service mainly for marketing and sales, inbound logistics (front office quality), operations and service (food and beverage, housekeeping, engineering, and security), which give

values for hoteliers. Overall, the authors recommend transforming the traditional hotels to smart hotels in line with industrial revolution 4.0. This strategic value chain provides a guideline to hoteliers to translate the Porter's value chain into their strategic process by incorporating technological innovations. This will be helpful to develop smart hotels to ensure the survival and sustainability in the post pandemic period. This model can be applied in any hotel industry globally.

Keywords: Strategic value chain, technology, competitiveness, global hotel industry.

INTRODUCTION

The hotel industry is fiercely competitive worldwide, particularly in countries where tourism thrives like Mexico, Spain, Italy, Turkey, China, Australia, Saudi Arabia, Germany, United Kingdom, United States, France, Brazil, Japan, India, Canada, Russia, and South Korea (Richter, July 27, 2020). Globally, 44 nations rely on the travel and tourism industry for more than 15 percent of their total share of employment (Neufeld, May 22, 2020). The industry has expanded and drawn more visitors with higher standards from the hospitality services due to technological advancements. Every year, the hotel industry brings in changes, and as a result, the industry's obstacles will change as well. It is crucial for companies and businesses directly involved in the hospitality industry to keep their pace on track to avoid being left behind.

Nevertheless, the COVID-19 pandemic has destroyed the entire global hotel industry. The pandemic has affected every sector globally, and the hotel industry is among the hardest hit, and forcing even long-established businesses to shut their doors. For example, hotels in Europe were closed by about 76 percent due to the outbreak (OECD, June 2, 2020). The Federation of Hotel & Restaurant Association of India (FHRAI) mentioned that 40 percent of hotels and restaurants had closed permanently (Sinha, June 28, 2021). Meanwhile, The Malaysian Association of Hotels (MAH) estimated that roughly 120 hotels had closed either temporarily or permanently, and the industry lost over Malaysian Ringgit (MYR) 6.5 billion in revenues for the year 2020, and likely another MYR 9 billion in the seven or eight months of the year 2021 (Adam, June 25, 2021).

In 2020, almost all sectors in hospitality, were transformed in some ways by new waves of digital innovation. Recent trends in the hotel industry indicate that the industry intends to turn its attention to different settings to meet the growing customer interest – tailoring digital content at their fingertips (Current trends in the hospitality industry 2020, 2020). Our mobile devices have transformed the means of how we use mass media forever. As we move into an unpredictable future, we can see some innovations evolving and crashing with hotel industry developments (Ganesan, October 14, 2020). We should expect to see more advancements in hospitality technologies using a range of intelligent technologies to minimize operating costs and boost guest experience, while also exploiting new income sources. The most successful business enterprises of the future are most likely to be invested in data systems that collect, analyse, and market data.

This medium can be achieved separately or at its particular moment. With hospitality being a high-tech and high-touch business, it is also expected that the guest experience moves simultaneously within the area. As customers become more tech-savvy than before, hotels risk losing money when they do not adopt the latest technologies to provide innovative services to their guests (Saratchandran, December 31, 2018). Digitalization in the hotel industry is needed in general to handle the loss of control over consumption, growing competition, and the likelihood of commercialization and interacting digitally with suppliers, partners, employees, and customers. The balance of power has changed in favour of customers, and hotels have no choice but to work harder to fulfil their needs.

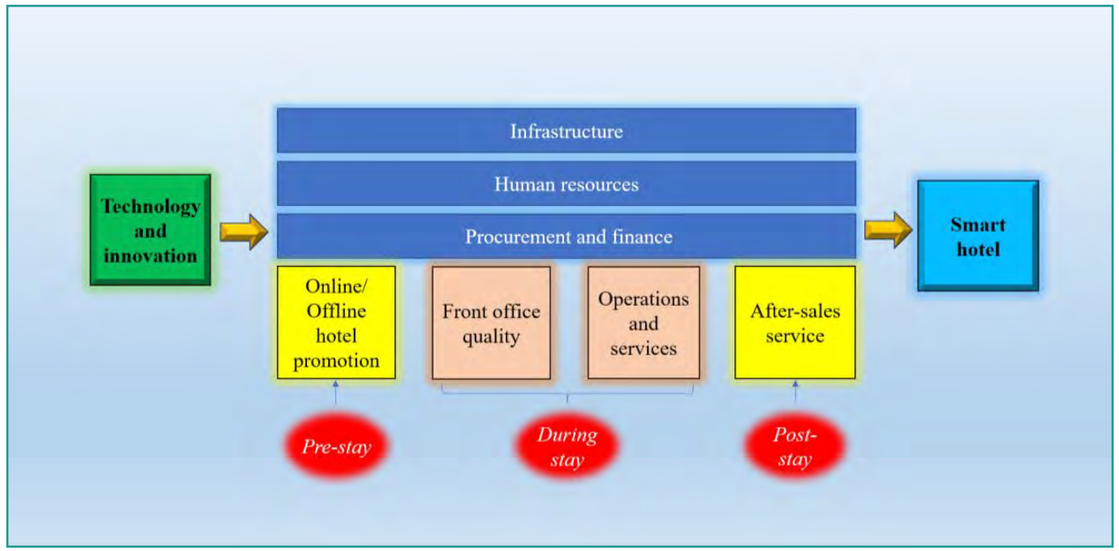
Rapid shifts in customer preference, the pressure from the environment, and the advent of new technologies are forcing hoteliers to rethink their strategies. The authors have revised Porter's value chain framework. They incorporated technology and innovation to generate the hotel industry's strategic value chain model, helping hoteliers reduce costs and add value.

DISCUSSION – INCORPORATING TECHNOLOGY AND INNOVATION IN PORTER'S VALUE CHAIN

Since its inception, the hotel industry has been evolving and has become more competitive in response to the changing tourist demands. As a result, tourism stakeholders should keep a close watch on the value chain to see how they can add value to their businesses in new ways to attract more customers and generate more revenue. The selection of hospitality services and their ability to improve competitive advantage in the market is the focus of the value chain.

The incorporation of technology on every aspect of the Porter's value chain process would be the answer to help the creativity hoteliers seek. As we are all aware, the hospitality industry in developed countries has been making its way towards the industrial revolution with the technological advancement in serving its customers. Furthermore, it is just about time for every nation to follow in their footsteps, considering the pandemic that demands nothing but more revolutionary transformation. If not explicitly, digital trends have been implicitly implanted throughout the operations in the hotel industry. Technology provides an organisation with a better way of doing things, benefiting the firms, its employees, and customers (Lee et al., 2003).

Figure 1. Revisited Porter's Value Chain (Source: Own)



Technology and Innovation

The hospitality businesses will undoubtedly benefit from the most recent technological advancements to better serve their customers. Digital technology is expected to win over and provide customers with better experiences in the future. As technology is constantly evolving, and new opportunities to increase customer loyalty and internal productivity are emerging continuously, hotels can face many challenges in leveraging technology to stay ahead of the competition. We can see the expansion of the industry power as it invests in digital technology. It is crucial, as the industry is highly competitive, and those who do not adapt will be left behind, not only to track recent technological trends within the hospitality industry, but also, they must move with the times. It is imperative to keep track of the customers' pulse, as customers' expectations and requirements constantly change (Kaliappen et al., 2019).

Academic research highlighted that technology improves firms' value chain, service quality, efficiency, effectiveness, productivity, convenience, quality value loyalty that creates a competitive advantage (Porter, 1985, 2001; Kasavana & Knutson, 2000; van Birgelen, 2004; Parasuraman & Grewal, 2000).

Infrastructure

To ease and develop the infrastructure like room maintenance, in-room controls, conserving energy and water, and strengthening the security system, the enhancement of technology, hotels need to have smoother and more modernized processes. Technology like smart Internet of Things (IoT) sensors and Artificial Intelligence (AI) enable dashboard, smart building, and facilities management system where each innovation caters to the processes involved in the infrastructure for the hospitality industry.

Human Resources

The enhancement of technology can also be seen at the human resources (HR) level. The training and development activity, payroll and scheduling, and employee engagement can be achieved by using cloud-based HR systems, Machine Learning (ML), and chatbot. Moreover, some of the systems mentioned can be customized to suit hotels' HR management needs, bringing convenience for the employees and more secure proceedings in management. These mediums have been proven to make management easy and efficient for processes that require perfect touch and handling.

Procurement and Finances

For this level, the functions such as purchasing, accounting and reporting can be done more tactically and securely with technological advancement. For instance, analytics dashboards can trace all the website traffic visits, page views, and online conversions. The availability of software like Autocount would make accounting better due to its role and provide better and more accessible tracking. Like the procurement management information system (PMIS), a smart system that gathers, stores, and synthesises procurement-related data from across the country. These information systems are great invention that help business owners to have better management of their financial track and record.

Online/Offline Hotel Promotion

Pre-stay

Hoteliers need to have an excellent reputation these days as customers are highly knowledgeable. They are relying on social media increasingly to get feedback and information from real travellers. Hotels are constantly investing in improving their social media presence through brand ambassadors, brand supporters, influencers, and other means.

Therefore, there is a need to adapt to new forms of technology and innovation manifold. Pricing strategy, event and group bookings, and upselling can all be made with the aid of AI revenue management, smart chatbot, location-based marketing, beacons, and online travel agency (OTA). Several well-known and popular OTAs include Booking.com, Expedia, Hotels.com, Agoda, Trip.com and Travelocity. OTAs have made great efforts in usability, security, and quality of service (Martin-Fuentes et al., 2021). Moreover, OTAs' reviews allow users to understand the offered services before purchasing (Kim et al., 2007). These platforms offer spectacular use with proven reliability, just like how the internet proves its priceless worth.

Front office quality

Moreover, the check-in and check-out processes were made easy with digitalization. For instance, facial recognition and mobile-key use with RFID reader instead of the regular key-in-the-hole access and digital kiosks are used for smooth deliverance. Besides, face-recognition check-ins for frequent travellers have also been practiced providing convenient services to the customers. These innovations speed up the check-in and check-out processes by allowing customers to skip the queues at the front desk, especially under the pandemic.

Operations and services

During the stay, the operations and services level is

one of the most vital processes. The technology and innovation enhancement on the value chain will make e-menu, in-room dining robots, IoT sensors, and e-housekeeping apps possible for customers to order food and beverage, request for housekeeping services, and plan for leisure activities. Along with improving hotels' operation and services, this innovation is ideal for manual labor work like housekeeping and food and beverages to reduce error and increase efficiency with appropriate and precise handling.

After-Sales Service

Post-stay

Every hotelier will appreciate their guests returning. It is just as much how guests are being remembered and treated as more than just visitors. Maintaining customers can be achieved with loyalty programs, taking their feedback into account, and personalized marketing. Incorporating technological advancement means inventing an automated loyalty program that benefits hotel operators and customers, sending personalized emails that cater to customers' feedback, and offering handsome promotions to customers. Loyalty programs are marketing activities that help build loyalty between the company and its profitable customers, and increase customers repurchase behaviour by achieving customers' satisfaction and providing added values activities (Hua et al., 2018). For instance, Hilton hotels offer the Hilton loyalty program with silver, gold, and diamond status. Likewise, Marriot also offers Marriot Bonvoy loyalty program with silver, gold, platinum, titanium, and ambassador elite statuses. Some hotels partner with different airlines and have adjusted their elite status and upgrading suite for top tier elite members during this pandemic (Stawski, January 15, 2021). Hua et al. (2018) showed that loyalty programs significantly improved operational and financial performance. After-sales service marketing is very important because it plays a significant role in customer retention, which might guarantee the revenue of the hospitality industry.

Smart Hotels

According to Dr James Canton, CEO and Chairman of the Institute for Global Futures, in his recent interview with Hospitality Net, the hotel rooms that most people have stayed today would cease to exist by the year 2060. It will be replaced by a so-called smart hotel that uses sensors to be attuned to guests, room keys that use facial recognition, interactive television, touch screen surfaces everywhere, a bathroom with smart toilet and automatic wireless temperature control (Tophotelprojects, January 11, 2017). As the enhancement of technology and innovation is imposed throughout the value chain of the hospitality industry, smart hotels will be the competitive advantage that acts as a pull factor for hotels. This incorporation will help develop smart hotel features, enabling guests to practice more efficient energy use and sustainability. Each hotelier's goal should be transforming traditional hotels into smart hotels in line with industrial revolution 4.0.

DISCUSSION – PRACTICAL IMPLICATIONS

Technology and innovation provide hotels with an opportunity to offer services far beyond the hotel operator's basic business concept (Lee et al., 2003). Hoteliers must realise that technology or innovation by itself will not be the differentiator, instead creative and innovative use of technology will enhance the value of service offerings, which will be the differentiator that creates superior value in the customer-driven marketplace (Lee et al., 2003; Kandampully, 2002). Therefore, hoteliers must adopt new technologies that assist hotel employees to serve guests at an optimal level. Consequently, this strategic value chain provides a guideline to hoteliers to translate the Porter's value chain into their strategic process by incorporating technology and innovation. This model will be helpful to develop smart hotels to ensure survival and sustainability in the post-pandemic era.

CONCLUSION

The trend in hotel industry is changing very fast and is rapidly evolving. The hotel industry is evolving in response to technological advances and the need to use information and communication technology (ICT) to enhance communication and peripheral services. The use of internet services to improve staff-to-guest contact through more efficient applications is becoming a required trend among hoteliers. This study revisits the Porter's value chain by incorporating the technology pertinent to the hotel industry. The impact of COVID-19 has revealed the vulnerability of the modern value chain. The hospitality and hotel industry will undoubtedly benefit from the most recent technological advances to serve their customers better. Technology and innovation are supposed to win over and provide customers with improved services in the future. By including a strategic value chain in the business plan, hoteliers can benefit by incorporating technology and innovation in a small yet impactful manner, emphasising customer service and convenience. A baby step is just a courageous move towards a giant's leap.

References

Adam, A. (June 25, 2021). Report: At least 120 hotels in Malaysia have shut due to Covid-19 impact, says association. *Malay Mail*. Retrieved August 19, 2021, from https://rb.gy/4gcjkj

Current trends in the hospitality industry 2020. (2020). *Nevron Blog*. Retrieved May 26, 2021, from https://www.nevron.eu/blog/current-trends-in-the-hospitality-industry-2020-take-on-digital-future/

Ganesan, V. (October 14, 2020). Tech: Preparing the hospitality industry for recovery through digital transformation. *The Edge Markets*. Retrieved May 26, 2021, from https://www.theedgemarkets.com/article/tech-preparing-hospitality-industry-recovery-through-digital-transformation

Hua, N., Wei, W., L. DeFranco, A.L., & Wang, D. (2018). Do loyalty programs really matter for hotel operational and financial performance? *International Journal of Contemporary Hospitality Management*, 30(5), 2195–2213. https://doi.org/10.1108/ijchm-12-2016-0643

Kaliappen, N., Suan, C. L., Almutairi, S. S., & Almutairi, M. A. (2019). Strategic management role in boosting hotel performance. *Polish Journal of Management Studies*, *20*(1), 233–242. https://doi.org/10.17512/pjms.2019.20.1.21

Kandampully, J. (2002). Innovation as the core competency of a service organisation: The role of technology, knowledge and networks. *European Journal of Innovation Management*, *5*(1), 18–26. https://doi.org/10.1108/14601060210415144

Kasavana, M. L., & Knutson, B. J. (2000). Investing in customer equity: Using technology to build your frequent diner programs. *Journal of Hospitality & Leisure Marketing*, 7(1), 63–74. https://doi.org/10.1300/J150v07n01_05

Kim, D.J., Kim, W.G., & Han, J.S. (2007). A perceptual mapping of online travel agencies and preference attributes. *Tourism Management*, *28*(2), 591–603. https://doi.org/10.1016/j.tourman.2006.04.022

Lee, S. C., Barker, S., & Kandampully, J. (2003). Technology, service quality, and customer loyalty in hotels: Australian managerial perspectives. *Managing Service Quality: An International Journal*, *13*(5), 423–432. https://doi.org/10.1108/09604520310495886

Martin-Fuentes, E., Mellinas, J. P., & Parra-Lopez, E. (2021). Online travel review rating scales and effects on hotel scoring and competitiveness. *Tourism Review*, *76*(3), 654–668. https://doi.org/10.1108/TR-01-2019-0024

Neufeld, D. (May 22, 2020). Visualizing the countries most reliant on tourism. *Visual Capitalist*. Retrieved August 19, 2021, from https://www.visualcapitalist.com/countries-reliant-tourism/

OECD (June 2, 2020). Tourism policy responses to the coronavirus (COVID-19). *OECD*. Retrieved May 26, 2021, from https://www.oecd.org/coronavirus/policy-responses/tourism-policy-responses-tothe-coronavirus-covid-19-6466aa20/#endnotea0z14

Parasuraman, A., & Grewal, D. (2000). The impact of technology on the quality-value-loyalty chain: A research agenda. *Journal of the Academy of Marketing Science*, *28*(1), 168–174. https://doi.org/10.1177/0092070300281015

Porter, M.E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York: Free Press.

Porter, M.E. (2001). Strategy and the Internet. *Harvard Business Review*, *79*(3), 62–78.

Richter, F. (July 27, 2020). COVID-19: These countries are most at risk from falling tourism. *World Economic Forum*. Retrieved May 26, 2021, from https://www.weforum.org/agenda/2020/07/coronavirus-covid19-travel-tourism-gdp-economics/

Saratchandran, V. (December 31, 2018). How hotels are using technology for competitive advantage. *Fingent Technology*. Retrieved May 26, 2021, from https://www.fingent.com/blog/how-hotels-are-using-technology-for-competitive-advantage/

Sinha, S. (June 28, 2021) Distressed hotels pin hopes on travel revival - Times of India. *The Times of India*. Retrieved August 19, 2021, from https://timesofindia.indiatimes.com/business/india-business/distressed-hotels-pin-hopes-on-travel-revival/articleshow/83908922.cms

Stawski, B. (January 15, 2021). 6 hotel loyalty program changes I want to see in 2021. *The Points Guy*. Retrieved August 19, 2021, from https://thepointsguy.com/news/hotel-changes-wish-list/

Tophotelprojects. (January 11, 2017). Meet the smart hotels of the future. *Hospitality Net*. Retrieved August 19, 2021, from https://www.hospitalitynet.org/news/4080315.html

van Birgelen, M. (2004). E-service: 24 ways to keep your customers – When the competition is just a click away. *International Journal of Service Industry Management*. *15*(3), 327–328. https://doi.org/10.1108/09564230410540962

05 ARTIFICIAL INTELLIGENCE AND INTELLECTUAL PROPERTY AND ACCOUNTABILITY FOR INFRINGEMENT: "WHO" IS LIABLE AND "WHO" SHOULD PAY?

Gregory Gerard Greer, LLM/CPE
ggreer72@law.gwu.edu

University of Wolverhampton Law School
Wolverhampton, United Kingdom
(Currently pursuing The George Washington University Law School LLM/IP, Washington, DC, United States of America)

ABSTRACT

This article is based on the author's law dissertation at University of Wolverhampton, UK, titled "Artificial Intelligence and Intellectual Property". This condensed version of that dissertation discusses liability issues for artificial intelligence (AI) infringement and suggests a resolution for that issue. AI is clearly a current and dominant force operating openly and freely on a worldwide basis, opening a Pandora's box of potential liability issues every time AI infringes intellectual property (IP) rights, intentionally or unintentionally. The issue remains, "who" or "what" will pay when AI IP infringement occurs? This is a highly nebulous issue because more and more AI is becoming totally independent of human involvement.

Is it possible to sue or make the infringing AI *per se* liable? This article suggests that yes, it is possible to make independently operating AI liable and hence duty-bound to pay for any infringement it incurs.

Keywords: Intellectual property, artificial intelligence, legal liability.

INTRODUCTION

What is artificial intelligence (AI)? The first serious work on AI was begun by Alan Turing in 1950, and the use of the term "AI" is credited to John McCarthy in 1956.[1] Since then, there has been no agreement as to a single definition of AI.[2] Some define AI broadly as "a computerized system that exhibits behavior that is commonly thought of as requiring intelligence",[3] whereas others define AI as "a system capable of rationally solving complex problems or taking appropriate actions to achieve its goals in whatever real-world circumstances it encounters".[4]

More specific defining qualities have also been proffered. AI has been described as a system incorporating mastery of a combination of specific skills, such as logical reasoning, natural language processing, the ability to perceive, knowledge representation, and planning.[5] Similarly, it has been defined as the successful integration of subfields, for example, artificial neural networks, machine learning, deep learning, and robotics.[6] AI may be further classified based on the environments and situations in which it is designed to function. The common systems that currently incorporate AI are designed to undertake very specific tasks and are known as *narrow* AI; AI with the capacity to display a wide-ranging level of intelligence approaching the abilities of the human brain is called artificial *general* intelligence.[7]

The number of legal questions that must be posed in this new era of AI is enormous. An excellent starting point for an introduction to the future of AI and intellectual property (IP) in the 21st century may be found in a September 2018 interview with World Intellectual Property Organization Director General Francis Gurry.[8] In that interview, the Director General stated that "AI is a new digital frontier that will have a profound impact on the world. It will have enormous technological, economic, and social consequences and is going to transform the way we produce and distribute goods and services, as well as the way we work and live".[9]

The issue facing the courts with respect to self-performing AI is: can AI creations be protected by copyrights and patents?[10] Notwithstanding today's instant global environment, many countries have their own set of copyright and patent laws. At present, French copyright law has no room for AI copyrights because copyright under French law is based on the author's personality and AI has no personality.[11] The United States (US) patent system "only recognizes *individuals* as inventors".[12] Under United Kingdom (UK) copyright law, the same rule exists; only humans and companies can own copyrights. No allowances have been made for AI *per se* being the owner of any copyright.[13]

Under the UK *Copyright, Designs and Patents Act 1988* (CDPA), "the author shall be taken to be the *person* by whom the arrangements necessary for the creation of the work are undertaken".[14] The same rules apply under patent law: inventors must "be *individuals* who created to the conception or conversion of a concept to a practicality".[15] If there is no human intervention somewhere in the creation of the object, no copyright or patent is possible. This is the status quo in copyright and patent law in 2019: AI *per se* cannot own a copyright or a patent.

Following the famous "Monkey-Selfie" case,[16] the US Copyright Office clarified that "[t]o qualify as a work of 'authorship' a work must be created by a human being",[17] and went so far as to specifically state that "a photograph taken by a monkey" is not copyrightable.[18] AI and monkeys are comparable in the context of IP: neither is human. With respect to the European Union (EU) and Asia, "the European Parliament and the Chinese State Council have issued a resolution and reports, respectively, that discuss the interplay between AI and their intellectual property systems, [although] no such document has been issued by the United States".[19] "AI [was] expected to grow from

[1] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf, p. 5.
[2] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf, p. 5.
[3] Committee on Technology, National and Technology Council, Executive Office of the President. (2016). *Preparing for the future of artificial intelligence*. https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf
[4] Sarkar, P. K., & Jain, A. K. (2018). *Intelligent transport systems*. PHI Learning Private Limited, p. 278, ISBN: 978-9-38747-206-8.
[5] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf
[6] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf
[7] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf
[8] World Intellectual Property Organization. (2018, September). Artificial intelligence and intellectual property: An interview with Francis Gurry. *WIPO Magazine*. www.wipo.int/wipo_magazine/en/2018/05/article_0001.html
[9] World Intellectual Property Organization. (2018, September). Artificial intelligence and intellectual property: An interview with Francis Gurry. *WIPO Magazine*. www.wipo.int/wipo_magazine/en/2018/05/article_0001.html, para. 1.
[10] (1) Protecting artificial intelligence IP: Patents, trade secrets, or copyrights? (2018, January). *Jones Day*. https://www.jonesday.com/en/insights/2018/01/protecting-artificial-intelligence-ip-patents-trad?_prclt=0jNimTeB;
(2) Lavagnini, S. (2019, June 21). Artificial intelligence and copyright protection. *Lexology*. https://www.lexology.com/library/detail.aspx?g=4f5fb5fa-b968-4049-8297-0cff617917b5;
(3) Hristov, K. (2020). Artificial intelligence and the copyright survey. *Journal of Science Policy & Governance, 16*(1),1–18. http://dx.doi.org/10.15779/Z38TM7213Z
[11] Liard, B. (2017, November 24). The legal quagmire of creativity in artificial intelligence. *Computer Weekly*. https://www.computerweekly.com/opinion/The-legal-quagmire-of-creativity-in-artificial-intelligence
[12] Rizzolo, M. J., Penti, R. S., & Spencer, L. M. (2018, December 19). *Artificial intelligence and intellectual property considerations* [Podcast]. https://www.ropesgray.com/en/newsroom/podcasts/2018/December/Podcast-Artificial-Intelligence-and-Intellectual-Property-Considerations (emphasis added).
[13] Liard, B. (2017, November 24). The legal quagmire of creativity in artificial intelligence. *Computer Weekly*. https://www.computerweekly.com/opinion/The-legal-quagmire-of-creativity-in-artificial-intelligence
[14] CDPA, section 9(3) (emphasis added).
[15] Ismail, N. (2018, August 13). Artificial intelligence in the legal industry: AI's broader role in law – Part 2. *Information Age*. https://www.information-age.com/ai-in-the-legal-industry-2-123474118/, para. 5 (emphasis added).
[16] Naruto v. Slater, 888 F.3d 418 (9th Cir. 2018), upheld in *Naruto, a Crested Macaque, by and through his Next Friends, People for the Ethical Treatment of Animals Inc. v. David John Slater; et al.*, No. 16-15469, D.C. No. 3:15-cv-04324-WHO.
[17] *Compendium of US Copyright Office Practices* (3rd ed., 2017), § 313.2.
[18] *Compendium of US Copyright Office Practices* (3rd ed., 2017), § 313.2.

nearly $8 billion in 2016 to more than $47 billion in 2020";[20] therefore, it is safe to say that AI is here to stay. US law limits patentable subject matter to "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof", but patent claims that are directed to abstract ideas are not eligible for patent protection.[21] A lower court in the US wrote that "abstract ideas are the basic tools of scientific and technological work",[22] and the US Supreme Court further explained that "[w]e have long held that this provision contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable".[23] Furthermore, "granting monopolies … through patent rights might impede innovation".[24]

Since *Alice*,[25] securing patents on software or computer-implemented inventions has become more difficult.[26] It has been accepted by the US courts that the inclusion of abstract concepts in information technology (IT) does not transform such technologies into patentable items.[27]

Alice has been interpreted and applied by the US Federal, Circuit, and District Courts generally to exclude patent claims directed to "subject matter that could be performed through an 'ordinary mental process', 'in the human mind' or by 'a human using a pen and paper'",[28] though there are limited exceptions for claims specifically providing ways to achieve technological improvements to tasks previously performed by people (e.g., containing an "inventive concept"[29]). Furthermore, "The United States Patent Act does not require a particular threshold of human control or input in the invention process for granting patent rights, but it frames the questions of inventorship and patentability in terms of human creation".[30] Patents are awarded for creativity, and conception by the human mind is required. A US Federal Circuit Court explained that "[t]o perform this mental act, inventors must be natural persons and cannot be corporations or sovereigns".[31]

[19] (1) World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf, p. 4;
(2) *European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics* (2015/2103(INL)), section 18;
(3) China's State Council. (2017, July 20). A next generation artificial intelligence development plan. *New America*. https://www.newamerica.org/documents/1959/translation-fulltext-8.1.17.pdf
[20] Artificial Intelligence (AI) in marketing. (2020). *Demodia*. https://www.demodia.com/discovering-demand/artificial-intelligence-marketing
[21] United States Patent Act, 35 U.S.C. § 101 (2015).
[22] *Alice Corp Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208 (2014) 216.
[23] *Alice Corp Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347 (2014) 2354.
[24] *Mayo Collaborative Services v. Prometheus Laboratories, Inc*., 566 U.S. 66 (2012) 71.
[25] *Mayo Collaborative Services v. Prometheus Laboratories, Inc*., 566 U.S. 66 (2012), footnote 10.
[26] Sachs, R. P. (2016, June 16). Two years after Alice: A survey of the impact of a "minor case" (Part 1). *Fenwick & West*. https://www.bilskiblog.com/2016/06/two-years-after-alice-a-survey-of-the-impact-of-a-minor-case/
[27] Sachs, R. P. (2016, June 16). Two years after Alice: A survey of the impact of a "minor case" (Part 1). *Fenwick & West*. https://www.bilskiblog.com/2016/06/two-years-after-alice-a-survey-of-the-impact-of-a-minor-case/
[28] Firth-Butterfield, K., & Chae, Y. (2018, April 20). Robot inventors are on the rise. But are they welcomed by the patent system? *World Economic Forum*. https://www.weforum.org/agenda/2018/04/robot-inventors-on-rise-patent-system-US, para. 6.
[29] Usman, N. K. (2018, April 25). "Inventive concept" can be a key factor in patentable subject matter determination. *AIPPI*. https://aippi.org/no-show/inventive-concept-can-be-a-key-factor-in-patentable-subject-matter-determination/
[30] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf, p.9 (citation omitted, emphasis added).
[31] *University of Utah v. Max-Planck-Gesellschaft Zur Forderung Der Wissenschaften e.V., Max-Planck-Innovation Gmbh v. Whitehead Institute for Biomedical Research, Massachusetts Institute of Technology, and Alnylam Pharmaceuticals, Inc*., No. 12-1540, -1541, -1661 (Fed. Cir. 2013), https://cafc.uscourts.gov/opinions-orders/12-1540.Opinion.8-15-2013.1.pdf, Opinion of Circuit Judge Reyna.

The US Patent Act clearly favors human actions. Section 101 of the Patent Act includes the phrase "*whoever* invents",[32] and Section 102, relating to conditions for patentability, delineates that "A *person* shall be entitled to a patent".[33] In keeping with US patent, trademark, and copyright law, the patent application process requires an oath or a declaration from the inventor[34] (i.e., a person). Therefore, US patent law seems, by and large, to parallel US copyright law.

Notwithstanding the problems with AI patentability and copyrightability, trade secret protection is a highly attractive alternative to patent protection,[35] particularly since the *Alice* case was decided. Patents require public disclosure of the invention in order to secure protection, and securing patent protection is very expensive and time consuming. Trade secret protection, in contrast, can be acquired without public disclosure. Furthermore, the US Defend Trade Secrets Act[36] (DTSA) allows a federal cause of action for misappropriation of trade secrets.[37]

The integral elements of trade secrets are secrecy and ensuring that all parties with knowledge of trade secrets are made to sign non-disclosure agreements and control visibility/access to trade secrets. However, software algorithms (integral to AI) can be reverse-engineered and leaked by unscrupulous employees. Therefore, patent law might be the better alternative for protecting software algorithms. Perhaps a feasible workaround to secure trade secret viability for AI would be to create an add-on to those software algorithms protecting the algorithm's discovery. This is an inherent problem with raw trade secret data. Nonetheless, trade secrets exist and the recipes for both the original Coca-Cola[38] and Kentucky Fried Chicken[39] have survived reverse-engineering attempts. Beverages and chicken are obviously not computer software, but they reveal an aspect of doing business. As with any kind of protection, trade secret protection has intrinsic risks. There are no guarantees.

Concerning copyrights and software, although IP protection is not available via copyright for the functionality of a proprietary software such as that used in an autonomous vehicle, copyrights can be used to protect the underlying source code of the software.[40] Some companies are going to use open-source software; therefore, users must exercise caution to ensure compliance with open-source licenses including, but not limited to, notification procedures. "Other forms of IP, such as design rights and trademarks, can also play important roles in

[32] United States Patent Act, 35 U.S.C. § 101 (2015) (emphasis added).
[33] United States Patent Act, 35 U.S.C. § 102 (2015) (emphasis added).
[34] Patents, Trademarks, and Copyrights, 37 CFR § 1.63 (2012).
[35] Lobel, O. (2013, November 21). Filing for a patent versus keeping your invention a trade secret. *Harvard Business Review*. https://hbr.org/2013/11/filing-for-a-patent-versus-keeping-your-invention-a-trade-secret
[36] United States Defend Trade Secrets Act of 2016, Pub. L. 114–153, 130 Stat. 376.
[37] American Bar Association. (2016, September 20). Explaining the Defend Trade Secrets Act. *ABA Business Law Today*. https://www.americanbar.org/groups/business_law/publications/blt/2016/09/03_cohen/
[38] Eplett, L. (2015, July 27). I'd like to make the world a coke: Attempting the "original" Coca-Cola formula. *Scientific American*. https://blogs.scientificamerican.com/food-matters/i-d-like-to-make-the-world-a-coke-attempting-the-original-coca-cola-formula/
[39] McManus, M. R. (2011, November 15). 10 trade secrets we wish we knew. *HowStuffWorks.com*. https://money.howstuffworks.com/10-trade-secrets9.htm

differentiating the designs and branding of different autonomous driving technologies".[41]

In respect of copyrights in the US, it was declared in *Feist Publications, Inc. v. Rural Telephone Service Company, Inc*. 499 U.S. 340 (1991) that copyright law only protects originality and "originality requires independent creation plus a modicum of creativity … founded in the creative powers of the mind".[42] In Australia, it was declared in *Acohs Pty Ltd v Ucorp Pty Ltd* that "a work generated with the intervention of a computer could not be protected by copyright because it was not produced by a human".[43] In the EU, the Court of Justice of the European Union declared in *Infopaq International A/S v Danske Dagblades Forening* that copyright only applies to original works and must reflect the "author's own intellectual creation".[44] The works of humans, but not machines, are eligible for copyright protection.

Human or company ownership (i.e., legal ownership) is clearly required for patents and copyright. Therefore, the question remains: who (i.e., which human[s] associated with the AI in question) will be attributed with the related patent or copyright protection for works generated by AI? One option is granting authorship to programmers. Hong Kong, India, Ireland, and New Zealand grant authorship to the individual who writes the programs for AI.[45] This option has been captured in the UK CDPA: "In the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken".[46] Note that this is not limited to programmers.

Additionally, the CDPA defines a computer-generated work as that which "is generated by computer in circumstances such that there is no human author of the work",[47] thereby creating an exception to human authorship and allowing for machine creation. English case law on this topic includes *Nova Productions v Mazooma Games*, in which the Court of Appeals decided on computer game authorship, declaring that a player's mere input "is not artistic in nature and he has contributed no skill or labour of an artistic kind".[48]

Furthermore, section 16(1) of CDPA lays out the acts restricted by copyright in a work, including reproducing a copyright work, particularly making temporary electronic files, a pivotal feature of AI in action. While the US follows the doctrine of *fair use*, the UK follows the doctrine of *fair dealing*. Fair dealing under UK copyright law focuses on commercial use, as opposed to an educational or non-profit use.[49] It is implied, but not explicitly stated, in section 16(2) of the CDPA that AI cannot commit copyright infringement: "Copyright in a work is infringed by a *person*".[50] However, section 16(2) of the CDPA does not appear to empower the creators or users of AI free use with impunity. The integral element appears to be the human closest to the infringing act.

Obtaining a US patent, trademark, or copyright does not secure protection in another country. AI infringement issues often arise in freedom to operate and violating third-party rights.[51] "Big data" has created both the availability of robust training sets used to develop AI technology and a need for technology that can process and filter large volumes of data for business applications.[52]

In the US, inventorship is the determining factor in IP ownership, and "inventor" is duly defined in the Patent Act, 35 U.S.C. § 100(f). Section 101 of the Patent Act states that the subject matter of a patent claim must be a "process, machine, manufacture or composition of matter", which was broadly interpreted by the court in *Diamond v. Chakrabarty* to include "anything under the sun that is made by man".[53] *In Diamond v. Diehr*,[54] it was determined that abstract claims (e.g., mathematical algorithms, natural phenomena, or laws of nature) are not eligible for patent protection. Therefore, AI, which is most often based on computer programming or hardware using mathematical models, deep learning algorithms, or neural networks, might not receive patent protection.

The *Alice* case delineated the framework for determining "whether the claims at issue are directed to a patent-ineligible concept".[55] This framework was applied by the court in *Thales Visionix, Inc. v. United States*,[56] which concerned the use of physics and a novel configuration in Thale's motion tracking system. Despite the use of mathematical equations in the system, it was upheld as containing patent-eligible subject matter. In *Vehicle Intelligence and Safety LLC v. Mercedes-Benz USA, LLC*,[57] a different conclusion was reached. In that case, the patent was found to be lacking inventiveness, in part due to a failure to provide enough details. However, this case does not necessarily imply that providing specific details avoids abstraction. In *Bascom Global Internet Services Inc. v. AT&T Mobility LLC*,[58] it was stressed that providing too many details can narrow the scope of protection.

[40] (1) United States Copyright Act, 17 U.S.C. § 101 (2018);
(2) Bell S., Dossa, A., & Smith, T. M. (2011, July 12). To protect your source code, treat it like intellectual property. *Software Development Times*. https://sdtimes.com/intellectual-property/to-protect-your-source-code-treat-it-like-intellectual-property/;
(3) Kelly, B., & Chae, Y. (2018, October 1). Insight: Autonomous vehicles in the world of intellectual property rights. *Bloomberg Law*. https://news.bloomberglaw.com/ip-law/insight-autonomous-vehicles-in-the-world-of-intellectual-property-rights
[41] Kelly, B., & Chae, Y. (2018, October 1). Insight: Autonomous vehicles in the world of intellectual property rights. *Bloomberg Law*. https://news.bloomberglaw.com/ip-law/insight-autonomous-vehicles-in-the-world-of-intellectual-property-rights
[42] *Feist Publications, Inc. v. Rural Telephone Service Company, Inc*., 111 S. Ct. (1991) 1282, 113 L.Ed.2d 358, No. 89-1909, Opinion O'Connor SCJ.
[43] *Acohs Pty Ltd v Ucorp Pty Ltd* [2012] FCAFC 16 (Australia).
[44] *Infopaq International A/S v Danske Dagblades Forening*, Case-5/08 [2009] ECR I-6569, para. 1.
[45] Ford, A. K., Persaud, D., & Hasan, N. (2018, November 26). The development of artificial intelligence in the fashion industry: An opportunity or a threat. *DLA Piper*. https://www.dlapiper.com/en/us/insights/publications/2018/11/law-a-la-mode-27th-edition-november-2018/3artificial-intelligence-in-the-fashion-industry/
[46] CDPA, section 9(3).
[47] CDPA, section 178.
[48] *Nova Productions v Mazooma Games* [2007] EWCA Civ. 219.
[49] See CDPA, sections 28-76 for a complete list of actions that do not qualify as infringement.
[50] CDPA, section 16(2) (emphasis added).
[51] DeCosta, F. A., & Carrano, A. G. (2017, August 30). Intellectual property protection for artificial intelligence. *Westlaw Journal Intellectual Property*. https://www.finnegan.com/en/insights/intellectual-property-protection-for-artificial-intelligence.html
[52] DeCosta, F. A., & Carrano, A. G. (2017, August 30). Intellectual property protection for artificial intelligence. *Westlaw Journal Intellectual Property*. https://www.finnegan.com/en/ins ights/intellectual-property-protection-for-artificial-intelligence.html
[53] *Diamond v. Chakrabarty*, 447 U.S. 303 (1980) 310.
[54] *Diamond v. Diehr*, 450 U.S. 175 (1981).
[55] *Alice Corp Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208 (2014) 2.
[56] *Thales Visionix, Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017).
[57] *Vehicle Intelligence and Safety LLC v. Mercedes-Benz USA, LLC*, 636 Fed. App. 914 (Fed. Cir. 2015).
[58] *Bascom Global Internet Services Inc. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016).

Currently, trade secret laws provide a method of protecting AI in the US.[59] An exhaustive online search using the search terms *artificial intelligence and Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)* revealed virtually nothing. TRIPS is regarded as the most comprehensive international agreement setting minimum standards for IP rights. While IP remains territorial (i.e., IP laws, rules, and regulations are determined and enforced locally), all members must adhere to certain standards. Nowhere within TRIPS is AI *per se* discussed. TRIPS was not designed to fit AI, rather, AI will have to fit to TRIPS, or perhaps the time has come for an international treaty in respect of AI. AI is not regulated by TRIPS, only IP elements existing within AI are regulated by TRIPS. It appears that now is the time to establish an international treaty on AI and the basis is set for it.[60]

Although patents have been regarded as the "currency of innovation" in the US,[61] the enactment of the DTSA[62] has enabled owners of trade secrets to file suit in federal court when their trade secrets have been misappropriated. Therefore, it appears that trade secret law is one area of IP law that protects owners of AI; however, reverse-engineering might be a potential issue for owners of AI. Any human owner of AI would be wise to learn trade secret law because at present this is apparently the only area of IP law offering protection for AI.

The UK equivalent of the DTSA appears to be the *Trade Secrets (Enforcement, etc.) Regulation 2018*. This Regulation implements Directive 2016/943/EU of the European Parliament and of the Council of June 8, 2016, on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use, and disclosure.[63] With the completion of Brexit, the EU law provisions no longer apply to the UK.

Challenging copyright law, particularly for AI that is implemented based on software, is another potential avenue to acquiring protection for IP created by AI. Although federal registration of copyright only occurs after registration at the US Copyright Office in Washington, DC, common law copyright exists the moment something is created. The only difference in court would be that federal registration allows for statutory damages while for common law damages, plaintiffs must prove actual damages (i.e., actual financial losses).

After the question of who (or what) is awarded copyright-protected authorship, or ownership of a patent, for something created has been answered, the issue of IP infringement arises – what entity is responsible when AI infringes a copyright or patent? Today, humans are becoming increasingly redundant vis-à-vis AI. In the past, human intervention was needed to guide AI in the correct direction. Today, AI is self-learning and self-adapting. AI can modify its own coding and develop workarounds for most obstacles it encounters. Under these circumstances, AI is surely capable of infringing IP rights.

Under current US copyright law, "the owner, developer, programmer, or manufacturer of the AI is likely to be held ultimately responsible for its actions".[64] In 2019, AI is still limited to the arena of "soft AI" (non-sentient AI focused on one task), but may well progress to "hard AI" (AI general intelligence with consciousness, sentience, and mind).[65] The US Copyright Act does not contain an explicit definition of the term *author*, and protection under the Copyright Act does not commence until the author's original work is "fixed" in a "tangible medium of expression".[66] Once the protection of AI's IP has been addressed (i.e., what IP rights, if any, does AI *per se* possess), the next issue is accountability of AI for infringing IP or other rights. Who is to blame when a self-driving car kills someone and the AI is at fault? Who is held legally responsible if AI illegally captures and uses IP-protected data? Whom would the infringed sue?

Scholars have proposed that AI systems should be held liable for any criminal offenses committed by the systems.[67] There is also a strong movement arguing that robots should pay taxes.[68] "If assessed through the lens of copyright laws, [these] approach[es] would result in AI systems' ownership of the IP products and processes they generate".[69]

Under US copyright law, a work is not considered fixed until "its embodiment in a copy … by or under the authority of the author, is sufficiently permanent or stable to permit it to be reproduced".[70] Until the requirements for originality and tangibility are met, there is no "author". An original idea that has not been made tangible is not protected by the US Copyright Act.[71] Similarly, expressing another's original work in a tangible form does not qualify one as an author if no original contributions were made. In *Community for Creative Non-Violence v. Reid*, it was stated that "[a]s a general rule, the author is the party who actually creates the work, that is, the person who translates an idea into a fixed, tangible expression entitled to copyright protection".[72] The critical language in the determination of authorship is "by or under the authority of the author".[73]

[59] United States Defend Trade Secrets Act of 2016, Pub. L. 114–153, 130 Stat. 376, § 2.
[60] Etzioni, O., & Decario, N. (2019, July 17). We have the basis for an international AI treaty. *The Hill*. https://thehill.com/opinion/technology/452809-we-have-the-basis-for-an-international-ai-treaty
[61] Chien, C. V. (2017). Software patents as a currency, not tax, on innovation. *Berkeley Technology Law Journal, 31*(4), 1680. https://doi.org/10.15779/Z38TM7213Z
[62] United States Defend Trade Secrets Act of 2016, Pub. L. 114–153, 130 Stat. 376.
[63] *Trade Secrets (Enforcement, etc.) Regulation 2018 Implementing Directive 2016/943/EU of the European Parliament and of the Council of 8 June 2016* [2016] OJ L157/1.
[64] Liard, B. (2017, November 24). The legal quagmire of creativity in artificial intelligence. *Computer Weekly*. https://www.computerweekly.com/opinion/The-legal-quagmire-of-creativity-in-artificial-intelligence, para. 14.
[65] Liard, B. (2017, November 24). The legal quagmire of creativity in artificial intelligence. *Computer Weekly*. https://www.computerweekly.com/opinion/The-legal-quagmire-of-creativity-in-artificial-intelligence, para. 18.
[66] United States Copyright Act, 17 U.S.C. § 102 (2018).
[67] King, T. C., Aggarwal, N., Taddeo, M., & Floridi, L. (2020). Artificial intelligence crime: An interdisciplinary analysis of foreseeable threats and solutions. *Science and Engineering Ethics, 26*, 89–120. https://doi.10.1007/s11948-018-00081-0
[68] Paul, K. (2017, September 28). Why robots should pay taxes. *MarketWatch Inc.* https://www.marketwatch.com/story/why-robots-should-pay-taxes-2017-09-12
[69] Yanisky-Ravid, S. (2017). Generating Rembrandt: Artificial intelligence, copyright, and accountability in the 3A era – The human-like authors are already here – A new model. *Michigan State Law Review, 659*, 688. https://ir.lawnet.fordham.edu/faculty_scholarship/956/
[70] United States Copyright Act, 17 U.S.C. § 101 (2018).
[71] *Whelan Associates, Inc. v. Jaslow Dental Laboratory, Inc.*, 797 F.2d 1222, 1234 (3d Cir. 1986), cert denied, 479 U.S. 1031, 107 S. Ct. 877, 93 L.Ed.2d 831 (1987).
[72] *Community for Creative Non-Violence v. Reid*, 109 S. Ct. 2166, 2171 (1989).
[73] United States Copyright Act, 17 U.S.C. § 101 (2018).

Combining the concepts expressed in the US Copyright Act and by the US Supreme Court, an author creates the work and, alone or with the help of an authorized party, embodies the work in a tangible form of expression. To ensure sole authorship, however, the author must convey to the authorized party sufficient information to fix the work into a tangible form in a rote or mechanical process. If embodiment requires intellectual modification or significant technical enhancement, authorized parties can be awarded co-authorship, as happened in *MGB Homes, Inc. v. Ameron Homes, Inc.*[74] (architectural drawings) and *Geshwind v. Garrick*[75] (computer-animated film). Therefore, there appears to be room for robot accountability under US copyright law.

The *European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics* suggested that persons, rather than AI, should be held responsible.[76] However, this might be unfair because users might not have malicious intent and might not foresee that AI actions could result in infringement.

Another option is holding AI developers or manufacturers accountable because manufacturer liability is common in patent infringement.[77] This furthers extends to the manufacturers who employed the developers. If manufacturers are held liable, this would be an issue of product liability. However, we are approaching the point of completely autonomous AI because AI will soon be able to write its own code.[78] To prepare for that eventuality, an obligatory insurance scheme such as that for use with automobiles was suggested in a 2019 European Parliament Resolution.[79] Unlike automobiles, however, the spectrum of possibilities of infringement are indeterminable, unlike mere human-to-human automobile accidents; therefore, the European Parliament Resolution recommended supplementing such an insurance system with risk-sharing funds in order to ensure compensation can be made when insurance is absent.[80]

Lastly, a final option is holding AI *per se* liable. The problem with this option is that doing so would first require recognizing AI as a legal person or entity. A European Parliament Resolution recognizes the possible need to grant AI personhood to resolve accountability for damage caused by AI.[81]

In the final analysis, if humans are held responsible for AI infringement, the 2017 European Resolution states that, "their liability should be proportional to the actual level of instructions given to the [AI] and of its degree of autonomy, so that the greater a[n AI's] learning capability or autonomy, and the longer a[n AI's] training, the greater the responsibility of its trainer should be".[82] Finally, the Resolution discusses strict liability or risk management after rigorous evaluation; however, it has been argued that strict liability against human developers might be precarious.[83] Furthermore, if AI *per se* were held liable after being given special legal status, the liability of AI may be treated the same as corporate liability is assessed for patent infringement.

[74] *MGB Homes, Inc. v. Ameron Homes, Inc.*, 903 F.2d 1486 (11th Cir. 1990).
[75] *Geshwind v. Garrick*, 734 F. Supp. 644 (S.D.N.Y. 1990).
[76] *European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics* (2015/2103(INL).
[77] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf
[78] Grothaus, M. (2018, April 27). An AI can now write its own code. *FastCompany*. https://www.fastcompany.com/40564859/an-ai-can-now-write-its-own-code
[79] *European Parliament Resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics* (2018/2088(INI)).
[80] *European Parliament Resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics* (2018/2088(INI)).
[81] Withers, R. (2018, April 17). The EU is trying to decide whether to grant robots personhood. *Slate*. https://slate.com/technology/2018/04/the-eu-is-trying-to-decide-whether-to-grant-robots-personhood.html
[82] World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Ar tificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf, p. 12, citing European Parliament Resolution of 16 February 2017 (2015/2103(INL)), para. 56.
[83] Dheu, O. (2020, January 9). EU report on AI, new technologies and liability: Key take-aways and limitations. *KU Leuven Centre for IT & IP Law*. https://www.law.kuleuven.be/citip/blog/eu-report-on-ai-new-technologies-and-liability-key-take-aways-and-limitations

REFERENCES

Cases

Court of Justice of the European Union

Infopaq International A/S v Danske Dagblades Forening, Case-5/08 [2009] ECR I-6569

UK

Nova Productions v Mazooma Games [2007] EWCA Civ. 219

US

Alice Corp Pty. Ltd. v. CLS Bank Int'l, 134 S. Ct. 2347 (2014)

Alice Corp Pty. Ltd. v. CLS Bank Int'l, 573 U.S. 208 (2014)

Bascom Global Internet Services Inc. v. AT&T Mobility LLC, 827 F.3d 1341 (Fed. Cir. 2016)

Community for Creative Non-Violence v. Reid, 109 S. Ct. 2166 (1989)

Diamond v. Chakrabarty, 447 U.S. 303 (1980)

Diamond v. Diehr, 450 U.S. 175 (1981)

Feist Publications, Inc. v. Rural Telephone Service Company Inc., 111 S. Ct. (1991) 1282, 113 L.Ed.2d 358, No. 89-1909

Feist Publications, Inc. v. Rural Telephone Service Company, Inc., 499 U.S. 340 (1991)

Geshwind v. Garrick, 734 F. Supp. 644 (S.D.N.Y. 1990)

Mayo Collaborative Services v. Prometheus Laboratories, Inc., 566 U.S. 66 (2012)

MGB Homes, Inc. v. Ameron Homes, Inc., 903 F.2d 1486 (11th Cir. 1990)

Naruto v. Slater, 888 F.3d 418 (9th Cir. 2018)

Naruto, a Crested Macaque, by and through his Next Friends, People for the Ethical Treatment of Animals Inc. v. David John Slater; et al, No. 16-15469, D.C. No. 3:15-cv-04324-WHO

Thales Visionix, Inc. v. United States, 850 F.3d 1343 (Fed. Cir. 2017)

University of Utah v. Max-Planck-Gesellschaft Zur Forderung Der Wissenschaften e.V., Max-Planck-Innovation Gmbh, Whitehead Institute for Biomedical Research, Massachusetts Institute of Technology, and Alnylam Pharmaceuticals, Inc., Nos 12-1540, -1541, -1661 (Fed. Cir. 2013), https://cafc.uscourts.gov/opinions-orders/12-1540.Opinion.8-15-2013.1.pdf

Vehicle Intelligence and Safety LLC v. Mercedes-Benz USA, LLC, 636 Fed. App. 914 (Fed. Cir. 2015)

Whelan Associates, Inc. v. Jaslow Dental Laboratory, Inc., 479 U.S. 1031, 107 S. Ct. 877, 93 L.Ed.2d 831 (1987)

Whelan Associates, Inc. v. Jaslow Dental Laboratory, Inc., 797 F.2d 1222 (3d Cir. 1986)

Other

Acohs Pty Ltd v Ucorp Pty Ltd [2012] FCAFC 16 (Australia)

Legislation and Legislative Instruments

EU

European Parliament Resolution of 12 February 2019 on a comprehensive European industrial policy on artificial intelligence and robotics (2018/2088(INI))

European Parliament Resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

Trade Secrets (Enforcement, etc.) Regulation 2018 implementing Directive 2016/943/EU of the European Parliament and of the Council of 8 June 2016 [2016] OJ L157/1

UK

Copyright, Designs and Patents Act 1988

US

Compendium of US Copyright Office Practices (3rd ed., 2017) § 313.2

Patents, Trademarks, and Copyrights, 37 CFR § 1.63 (2012)

United States Copyright Act, 17 U.S.C. §§ 101, 102 (2018)

United States Defend Trade Secrets Act of 2016, Pub. L. 114–153, 130 Stat. 376 (2016)

United States Patent Act, 35 U.S.C. § 101 (2015)

Secondary Sources

Books

Sarkar, P. K., & Jain, A. K. (2018). *Intelligent transport systems*. PHI Learning Private Limited. ISBN: 978-9-38747-206-8.

Articles

Chien, C. V. (2017). Software patents as a currency, not tax, on innovation. *Berkeley Technology Law Journal, 31*(4), 1669–1723. https://doi.org/10.15779/Z38TM7213Z

Hristov, K. (2020). Artificial intelligence and the copyright survey. *Journal of Science Policy & Governance, 16*(1), 1–18. http://dx.doi.org/10.15779/Z38TM7213Z

King, T. C., Aggarwal, N., Taddeo, M., & Floridi, L. (2020). Artificial intelligence crime: An interdisciplinary analysis of foreseeable threats and solutions. *Science and Engineering Ethics, 26*, 89–120. https://doi.10.1007/s11948-018-00081-0

Yanisky-Ravid, S. (2017). Generating Rembrandt: Artificial intelligence, copyright, and accountability in the 3A era – The human-like authors are already here – A new model. *Michigan State Law Review, 659*, 688–726. https://ir.lawnet.fordham.edu/faculty_scholarship/956/

Online Resources

American Bar Association. (2016, September 20). Explaining the Defend Trade Secrets Act. *ABA Business Law Today*. https://www.americanbar.org/groups/business_law/publications/blt/2016/09/03_cohen/

Artificial Intelligence (AI) in marketing. (2020). *Demodia*. https://www.demodia.com/discovering-demand/artificial-intelligence-marketing

Bell, S., Dossa, A., & Smith, T. M. (2011, July 12). To protect your source code, treat it like intellectual property. *Software Development Times*. https://sdtimes.com/intellectual-property/to-protect-your-source-code-treat-it-like-intellectual-property/

China's State Council. (2017, July 20). A next generation artificial intelligence development plan. *New America*. https://www.newamerica.org/documents/1959/translation-fulltext-8.1.17.pdf

Committee on Technology, National and Technology Council, Executive Office of the President. (2016). *Preparing for the future of artificial intelligence*. https://obamawhitehouse.archives.gov/sites/default/files/whitehouse_files/microsites/ostp/NSTC/preparing_for_the_future_of_ai.pdf

DeCosta, F. A., & Carrano, A. G. (2017, August 30). Intellectual property protection for artificial intelligence. *Westlaw Journal Intellectual Property*. https://www.finnegan.com/en/insights/intellectual-property-protection-for-artificial-intelligence.html

Dheu, O. (2020, January 9). EU report on AI, new technologies and liability: Key take-aways and limitations. *KU Leuven Centre for IT & IP Law*. https://www.law.kuleuven.be/citip/blog/eu-report-on-ai-new-technologies-and-liability-key-take-aways-and-limitations/

Eplett, L. (2015, July 27). I'd like to make the world a coke: Attempting the "original" Coca-Cola formula. *Scientific American*. https://blogs.scientificamerican.com/food-matters/i-d-like-to-make-the-world-a-coke-attempting-the-original-coca-cola-formula/

Etzioni, O., & Decario, N. (2019, July 17). We have the basis for an international AI treaty. *The Hill*. https://thehill.com/opinion/technology/452809-we-have-the-basis-for-an-international-ai-treaty

Firth-Butterfield, K., & Chae, Y. (2018, April 20). *Robot inventors are on the rise. But are they welcomed by the patent system?* World Economic Forum. https://www.weforum.org/agenda/2018/04/robot-inventors-on-rise-patent-system-US

Ford, A. K., Persaud, D., & Hasan, N. (2018, November 26). The development of artificial intelligence in the fashion industry: An opportunity or a threat. *DLA Piper*. https://www.dlapiper.com/en/us/insights/publications/2018/11/law-a-la-mode-27th-edition-november-2018/3artificial-intelligence-in-the-fashion-industry/

Grothaus, M. (2018, April 27). An AI can now write its own code. *FastCompany*. https://www.fastcompany.com/40564859/an-ai-can-now-write-its-own-code

Ismail, N. (2018, August 13). Artificial intelligence in the legal industry: AI's broader role in law – Part 2. *Information Age*. https://www.information-age.com/ai-in-the-legal-industry-2-123474118/

Kelly, B., & Chae, Y. (2018, October 1). Insight: Autonomous vehicles in the world of intellectual property rights. *Bloomberg Law*. https://news.bloomberglaw.com/ip-law/insight-autonomous-vehicles-in-the-world-of-intellectual-property-rights

Lavagnini, S. (2019, June 21). Artificial intelligence and copyright protection. *Lexology*. https://www.lexology.com/library/detail.aspx?g=4f5fb5fa-b968-4049-8297-0cff617917b5

Liard, B. (2017, November 24). The legal quagmire of creativity in artificial intelligence. *Computer Weekly*. https://www.computerweekly.com/opinion/The-legal-quagmire-of-creativity-in-artificial-intelligence

Lobel, O. (2013, November 21). Filing for a patent versus keeping your invention a trade secret. *Harvard Business Review*. https://hbr.org/2013/11/filing-for-a-patent-versus-keeping-your-invention-a-trade-secret

McManus, M. R. (2011, November 15). 10 trade secrets we wish we knew. *HowStuffWorks.com*. https://money.howstuffworks.com/10-trade-secrets9.htm

Protecting artificial intelligence IP: Patents, trade secrets, or copyrights? (2018, January). *Jones Day*. https://www.jonesday.com/en/insights/2018/01/protecting-artificial-intelligence-ip-patents-trad?_prclt=0jNimTeB

Paul, K. (2017, September 28). Why robots should pay taxes. *MarketWatch Inc.* https://www.marketwatch.com/story/why-robots-should-pay-taxes-2017-09-12

Rizzolo M. J., Penti, R. S., & Spencer, L. M. (2018, December 19). *Artificial intelligence and intellectual property considerations* [Podcast]. https://www.lexology.com/library/detail.aspx?g=081aa32a-f9bc-4a89-8bce-6e5ea80c80ef

Sachs, R. P. (2016, June 16). Two years after Alice: A survey of the impact of a "minor case" (Part 1). *Fenwick & West*. https://www.bilskiblog.com/2016/06/two-years-after-alice-a-survey-of-the-impact-of-a-minor-case/

Usman, N. K. (2018, April 25). "Inventive concept" can be a key factor in patentable subject matter determination. *AIPPI*. https://aippi.org/no-show/inventive-concept-can-be-a-key-factor-in-patentable-subject-matter-determination/

Withers, R. (2018, April 17). The EU is trying to decide whether to grant robots personhood. *Slate*. https://slate.com/technology/2018/04/the-eu-is-trying-to-decide-whether-to-grant-robots-personhood.html

World Economic Forum, Center for the Fourth Industrial Revolution. (2018, April). *Artificial intelligence collides with patent law* (White Paper, REF 160418 – case 00048540). https://www3.weforum.org/docs/WEF_48540_WP_End_of_Innovation_Protecting_Patent_Law.pdf

World Intellectual Property Organization. (2018, September). Artificial intelligence and intellectual property: An interview with Francis Gurry. *WIPO Magazine*. https://www.wipo.int/wipo_magazine/en/2018/05/article_0001.html

06 THE INFLUENCE OF NUTRITIONAL INFORMATION OF HOT BEVERAGES ON THE CONSUMER'S BEHAVIOR AND PURCHASING DECISIONS

Carlos S. Cristobal Jr
carlos.cristobal.comm@ust.edu.ph

Alyssa Rhose D. Del Prado
alyssarhose.delprado.comm@ust.edu.ph

Sophia Justine L. Floreto
sophiajustine.floreto.comm@ust.edu.ph

Mary Caroline N. Castano
mncastano@ust.edu.ph

Marketing Department, College of Commerce & Business Administration
University of Santo Tomas, Manila, The Philippines

ABSTRACT

Filipinos are wary of the health benefits they consume in hot beverages, as this is their typical breakfast. Thus, they rely on the nutritional labels and the marketed nutritional value presented. This study aims to investigate how this affects Filipino consumers' behaviors towards hot beverages. The researchers distributed a descriptive survey to 304 respondents living in Metro Manila, male and female, ages 18 to 60, through Google Forms. To analyze, a chi-squared test and hypothesis test for two proportions were utilized. It was tabulated that women and the older generation are more meticulous and health-conscious about the purchase of hot beverages. There is a link between how consumers perceive the marketed nutritional

value and how they behave towards these products. It is recommended that the industry should then focus on delivering persuasive yet informative advertisements and nutritional labels for their products.

Keywords: Nutritional information, purchase intention, consumer behavior.

INTRODUCTION

With disease outbreaks worldwide, people can become more health conscious, which directly influences the way companies must conduct their product marketing strategies (Euromonitor International, 2020). The Food and Drug Administration requires companies to put nutritional facts labels at the back of their packaging. Therefore, consumers can know the breakdown of what they consume. Nutritional labels are a must, especially in the breakfast industry, since the food that people drink in the morning provides their body and brain with fuel after an overnight fast, hence the origin of the word breakfast – breaking the fast (Spence, 2017). People's nutritional intakes vary depending on activity levels and life stages. For a consumer to be fit and healthy, it is essential to consider the extra demands placed on the body by these changes (Gibney et al., 2018). Drinking hot beverages at the start of the day is the typical breakfast of Filipinos. Advertisers have taken that chance and promoted their hot beverage product by focusing on their health benefits, such as an energy booster, improving digestion, relieves congestion, or making the consumer more relaxed (Gibney et al., 2018).

To make healthier choices, consumers must distinguish more beneficial products from unhealthier ones (Huang & Lu, 2015). Thus, the producers created the labels at the back of the packaging (i.e., the nutrition information) to help people make healthier choices (Dudeja & Gupta, 2017). However, many Filipinos find these labels confusing, especially the terminology used and the numerical information (Velasco, 2018). Hence, companies applied different marketing strategies to express the health benefits that their product provides. For example, front labels summarize the product's nutritional profile and give an overall presentation of its health to simplify and improve consumers' decision-making (Giehl et al., 2018).

While there have been various studies on how consumers use and understand nutrition labels, there are still few studies regarding food labels in the Philippines. A lot of lessons about nutrition labels already exist in some countries. Therefore, it is valuable to investigate how nutrition labels affect consumers' purchasing decisions, particularly in the Philippines. Hence, this study examines how the nutrition information of beverages under the hot drinks category influences consumers' behaviors and purchase intentions.

Hot beverage

Sales growth for hot drinks packaging remained stable in 2018 and 2019, while malt-based hot drinks also saw sales recover in 2019 (Euromonitor International, 2020). There is a growing trend for hot drink manufacturers to use packaging to emphasize their indulgent flavor and other differentiation points (Dudeja & Gupta, 2017). When companies launch a new variant, they highlight their packaging with their claims, for example, energy booster, creamy, more vitamins, delicious, and different suits. Manufacturers of hot drinks will continue to focus on differentiating factors on packaging to attract consumers (Spence, 2017). The global market is highly competitive, marked by the presence of a large number of players. Key industry participants include Nestlé Philippines Inc, Mayora Indah Tbk PT, AB Food & Beverages Phils Inc, among others (Euromonitor International, 2019). All of them differentiate themselves from one another in different ways. Packaging differentiation uses every available option for calling attention to individual brands, including different sizes, shapes, materials, and brand hallmarks (Huang & Lu, 2015). By associating these unique characteristics with their products, manufacturers create automatic identification and authority within their niches, leading to higher sales as visibility and reliability rise (Euromonitor International, 2020).

Purchasing behavior

Almost every packaged food merchandise includes a Nutrition Facts label posted on the back, providing consumers a sight of what they are consuming. Five (5) out of ten (10) Filipinos do not check food labels before consumption, and only a tiny percentage check nutrition facts before heading to the check-out counter (Department of Science and Technology – Food and Nutrition Research Institute, 2016). Food shoppers have considered nutrition as only one of several factors influencing their purchase (Department of Science and Technology – Food and Nutrition Research Institute, 2016). Using nutritional facts can help compare packaged foods if used by consumers regularly (Giehl et al., 2018). Nowadays, nutrition facts are printed at the back of every product. However, when the food products are stacked in the supermarkets, buyers see the pack's front (Dudeja & Gupta, 2017). That is why companies apply different marketing strategies to improve the renewed interest and heightened awareness of consumers through simple, easy-to-understand, and fact-based declaration of a food product's energy or caloric content (Euromonitor International, 2020). They encourage Filipino consumers to make informed choices towards a healthier lifestyle (Velasco, 2018).

METHODOLOGY

Research instruments and participants

This research utilized a quantitative approach, a descriptive survey (subjected to Cronbach Alpha's mean) conducted in Google Forms to analyze the consumers' attitudes toward nutritional information of hot beverages and know its influence on the consumers' purchasing decisions. The first part of the questionnaire revolves around consumers' knowledge about a product's nutritional information, while the second part consists of items regarding the respondents' profile, such as their demographics. This was distributed to three hundred and four (n=304) male and female respondents aged 18 to 65 years old residing in NCR, with the majority coming from

Manila City and Quezon City. Moreover, it is one of the largest sources of market share under the hot drink category. Table 1 shows the respondents in the study.

Table 1. Demographic Characteristics of the Respondents

	TRAITS	PERCENTAGE %
Gender	Male	29.3
	Female	70.7
Age	18 – 39 years old	58.9
	40 years old and older	41.1
Occupation	Student	49.3
	Employed for Wages	32.6
	Self-Employed	11.5
	Out of Work	4.9
	Retired	1.6

Data gathering procedure

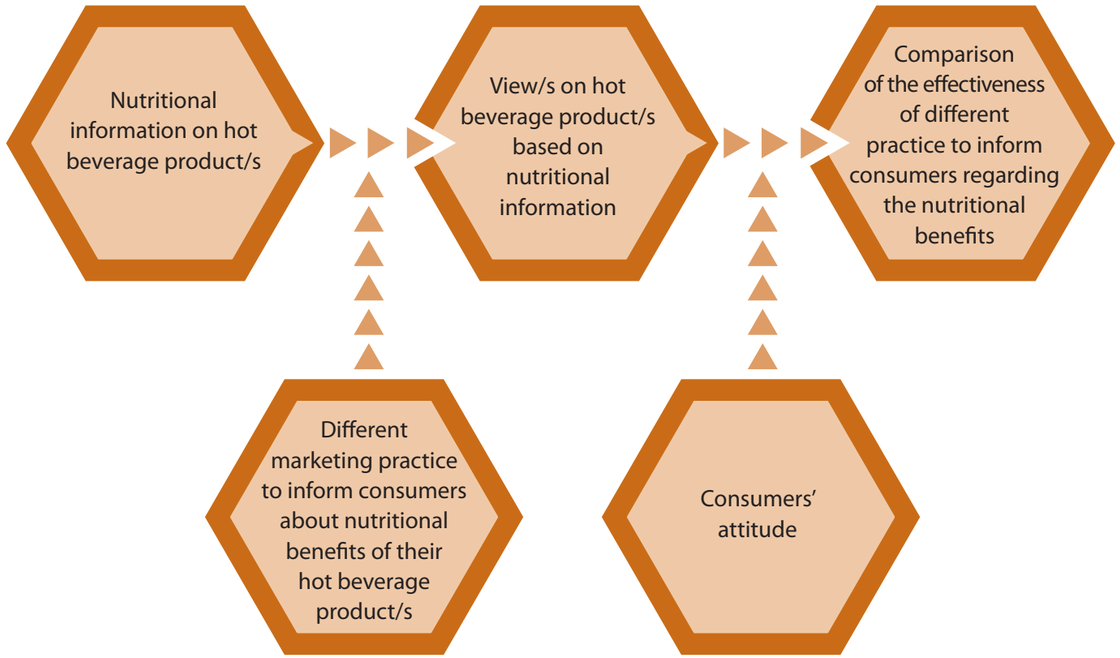
The researchers asked a screening question to ensure that all participants meet the criteria of the researchers' target respondents; they were asked if they have consumed beverages under hot drinks categories, such as tea, coffee, and the like, for the past six months, to which 304 participants answered yes. Moreover, those who have responded to "no" were politely instructed to exit the survey since they were not qualified to participate.

Next, the qualified respondents were asked what time they usually consume hot drink beverages to choose from breakfast, lunch, afternoon snack, dinner, midnight snack, and others. Then, they were instructed to name the product subcategory (e.g., coffee, tea, cereal drink, etc.) or identify the specific brands (Milo, Swiss Miss, Energen, etc.) of beverages under the hot drinks category usually consumed.

The respondents answered the degree to which they are likely to buy a beverage under the hot drinks category on their next trip to the grocery store using a five-point Likert scale, from "extremely likely" to "extremely unlikely." After that, questions regarding the source of their nutrition information, the basis of their nutrition information, their knowledge of a product's health benefits and nutrition aspects, and the frequency of checking nutrition label of products made use of a five-point Likert scale.

Consequently, the respondents were asked if they believe in the credibility of a product's nutritional claims and how it influences their purchase intentions.

Conceptual framework



The diagram above is the self-constructed conceptual framework illustrating each concept's causal relationship about different practices on pointing out nutritional information that can affect consumers' behavior and purchase intention regarding beverages under the hot drink category. The nutritional information found on hot beverage products affects the consumers' views regarding these said products' dietary claims. Therefore, companies place these nutritional labels to inform the consumers about their hot beverages' dietary benefits. Moreover, consumers' view on this nutritional information helps them compare the effectiveness of companies' different practices in informing the consumers regarding dietary services. Companies put their nutritional intake in other ways that affect the purchasing intention, consumer attitude, and knowledge about the product's nutritional benefits. Such information leads to how consumers perceive a product.

RESULTS

Table 2. Hypotheses

HYPOTHESES		α = 0.05 p-value
Likelihood to Purchase a Hot Beverage	$H_0$1: There is no difference between genders with regards to their likeliness to purchase hot beverage on their next trip to the grocery store.	0.887074
	$H_0$2: There is no difference between age groups with regards to their likeliness to purchase hot beverage on their next trip to the grocery store.	2.60414E-24
Source of Nutritional Information	$H_0$3: There is no difference between genders when sourcing nutritional information.	0.743906459
	$H_0$4: There is no difference between age groups when sourcing nutritional information.	2.06255E-19
Consumers' Health Consciousness	$H_0$5: There is no difference in proportion between the male and the female consumers who answered they consider the health benefits of a hot beverage.	0.65272
	$H_0$6: There is no difference in proportion between the male and the female consumers who answered they do not consider the health benefits of a hot beverage.	0.65272
	$H_0$7: There is no difference in proportion between the younger and the older generation who answered they consider the health benefits of a hot beverage.	0.08914
	$H_0$8: There is no difference in proportion between the younger and the older generation who answered they do not consider the health benefits of a hot beverage.	0.08914
Knowledge on Nutrition Aspects	$H_0$9: There is no difference between genders regarding their knowledge on nutritional aspects.	0.466294661
	$H_0$10: There is no difference between age groups regarding their knowledge on nutritional aspects.	0.002476973
Attitude Towards Nutrition Labels	$H_0$11: There is no difference between genders when checking the nutrition labels of hot beverage.	0.16643991
	$H_0$12: There is no difference between age groups when checking the nutrition labels of hot beverage.	4.28531E-08
Credibility of Advertisements	$H_0$13: There is no difference in proportion between the male and the female consumers who answered they believe the credibility of a hot beverage's advertisements.	0.32218
	$H_0$14: There is no difference in proportion between the male and the female consumers who answered they do not believe the credibility of a hot beverage's advertisements.	0.32218
	$H_0$15: There is no difference in proportion between the younger and the older consumers who answered they believe the credibility of a hot beverage's advertisements.	0.00001
	$H_0$16: There is no difference in proportion between the younger and the older consumers who answered they do not believe the credibility of a hot beverage's advertisements.	0.00001
Influence of Nutritional Information	$H_0$17: There is no difference in the influence of nutrition information between male and female.	0.005487442
	$H_0$18: There is no difference in the influence of nutrition information between different age groups.	5.70503E-22

Figure 1. Consumption Habits – Time of the Day

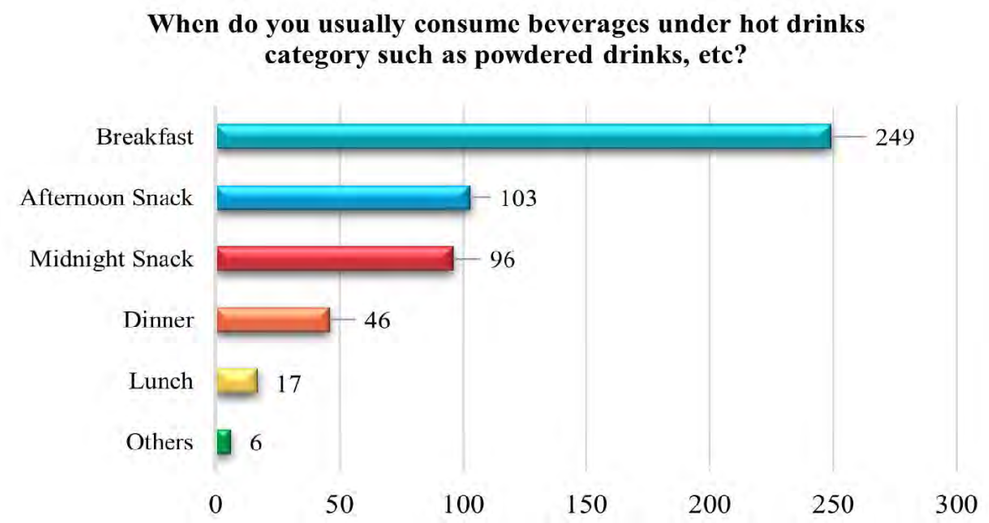


Figure 2. Brand Preference

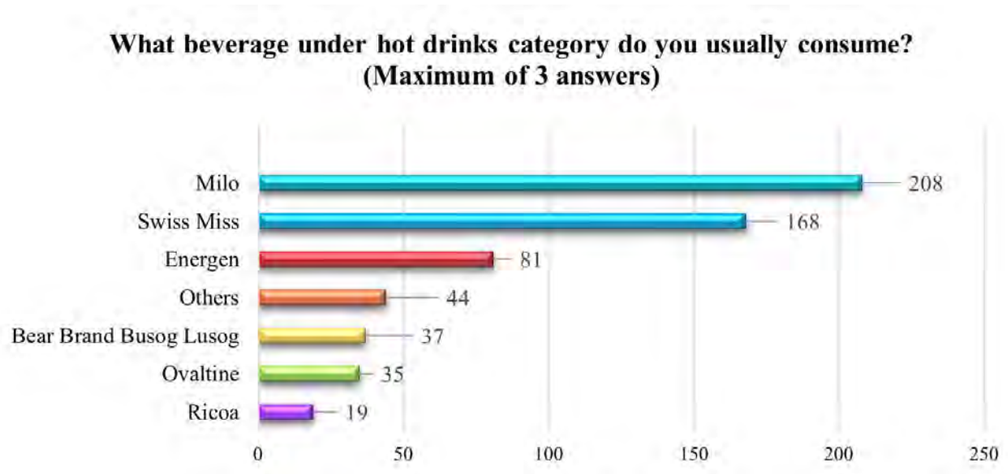


Table 3. Likelihood to Purchase Hot Beverage

Characteristics		Most Likely n (%)	Likely n (%)	Neutral n (%)	Unlikely n (%)	Most Unlikely n (%)
Gender	Male (n=89)	23 (26%)	39 (44%)	17 (19%)	9 (10%)	1 (1%)
	Female (n=215)	57 (27%)	89 (41%)	47 (22%)	17 (8%)	5 (2%)
	Total (n=304)	80 (26%)	128 (42%)	64 (21%)	26 (9%)	6 (2%)
Age	18 – 39 (n=179)	30 (17%)	89 (50%)	42 (23%)	15 (8%)	3 (2%)
	40 or older (n=125)	50 (40%)	39 (31%)	22 (18%)	11 (9%)	3 (2%)
	Total (n=304)	80 (26%)	128 (42%)	64 (21%)	26 (9%)	6 (2%)

The study used a qualitative approach to identify the influence of beverages' nutritional information under the hot drinks category; The respondents were divided into gender and age to investigate the differences among their behavior towards nutritional information. Previous studies have shown a difference in comprehension related to differences in sex and age (Giehl et al., 2018).

Table 4. Primary Source of Nutritional Information

Characteristics		Nutrition Label at the back n (%)	Front of pack highlight label n (%)	TV Advertisements n (%)	Social Media n (%)	Others n (%)
Gener	Male (n=89)	23 (26%)	35 (39%)	18 (20%)	9 (10%)	4 (4%)
	Female (n=215)	72 (33%)	80 (37%)	38 (18%)	18 (8%)	7 (3%)
	Total (n=304)	95 (38%)	115 (38%)	56 (18%)	27 (9%)	11 (4%)
Age	18 – 39 (n=179)	34 (19%)	82 (46%)	34 (19%)	20 (11%)	9 (5%)
	40 or older (n=125)	61 (69%)	33 (49%)	22 (18%)	18 (6%)	2 (2%)
	Total (n=304)	95 (31%)	115 (38%)	56 (18%)	27 (9%)	11 (4%)

Table 5. Consumers' Health Consciousness

Characteristics		Yes n (%)	No n (%)
Gender	Male (n=89)	66 (74%)	23 (26%)
	Female (n=215)	154 (72%)	61 (28%)
	Total (n=304)	220 (72%)	84 (28%)
Age	18 – 39 (n=179)	123 (69%)	56 (31%)
	40 or older (n=125)	97 (78%)	28 (22%)
	Total (n=304)	220 (72%)	84 (28%)

Table 6. Consumers' Knowledge on Nutritional Aspects

Characteristics		Extremely Aware n (%)	Moderately Aware n (%)	Somewhat Aware n (%)	Slightly Aware n (%)	Not at all Aware n (%)
Gender	Male (n=89)	7 (8%)	25 (28%)	37 (42%)	17 (19%)	3 (3%)
	Female (n=215)	18 (8%)	83 (39%)	74 (34%)	32 (15%)	8 (4%)
	Total (n=304)	11 (4%)	49 (16%)	111 (37%)	108 (36%)	25 (8%)
Age	18 – 39 (n=179)	9 (8%)	53 (36%)	75 (37%)	35 (16%)	7 (4%)
	40 or older (n=125)	16 (13%)	55 (44%)	36 (29%)	14 (11%)	4 (3%)
	Total (n=304)	11 (4%)	49 (16%)	111 (37%)	108 (36%)	25 (8%)

The present study examined the consumers' attitude towards nutrition information of beverages under the hot drinks category and how it affects them in their decisions and purchase intentions. The researchers found out that 49% of the respondents have minor to moderate knowledge of the nutritional value found in the powdered hot beverage products they buy. Despite their limited knowledge, 74% of them are still considering the health benefits they can get from their selected hot beverages by frequently checking the front pack highlight label. Since this is the first thing they can see on the shelf in a grocery, it becomes their primary nutritional information.

Table 7. Consumers' Attitude Towards Nutrition Labels

Characteristics		Always n (%)	Frequently n (%)	Occasionally n (%)	Seldom n (%)	Never n (%)
Gender	Male (n=89)	12 (13%)	19 (21%)	36 (40%)	17 (19%)	5 (6%)
	Female (n=215)	23 (11%)	67 (31%)	63 (29%)	54 (25%)	8 (4%)
	Total (n=304)	35 (12%)	86 (28%)	99 (33%)	71 (23%)	13 (4%)
Age	18 – 39 (n=179)	13 (7%)	35 (20%)	80 (45%)	41 (23%)	10 (6%)
	40 or older (n=125)	22 (18%)	51 (41%)	19 (15%)	30 (24%)	3 (2%)
	Total (n=304)	35 (12%)	86 (28%)	99 (33%)	71 (23%)	13 (4%)

Table 8. Consumers' Skepticism on the Advertisements of Hot Beverages

Characteristics		Yes n (%)	No n (%)
Gender	Male (n=89)	40 (45%)	49 (55%)
	Female (n=215)	110 (51%)	105 (49%)
	Total (n=304)	150 (49%)	154 (51%)
Age	18 – 39 (n=179)	71 (40%)	108 (60%)
	40 or older (n=125)	79 (63%)	46 (37%)
	Total (n=304)	150 (49%)	154 (51%)

Moreover, comparing the respondents' different segments, it was found out that there is only a slight difference between men and women when it comes to their attitude towards nutrition information of products except that 39% of the women have more knowledge on nutrition information. Thus, they check the nutrition label more frequently than men. The findings are consistent with a study that found females to have high nutrition knowledge and positive health-seeking behaviors compared to males (Glanz et al. 2015). Traditionally, females are responsible for grocery shopping, making them seek more information about how to read food labels to help them make better food choices (Huang & Lu, 2015). Fifty-five percent (55%) of men do not believe in the credibility of hot drink beverages' nutritional claims. Hence, the marketed nutritional value of a liquid under the hot drink category neutrally affects their purchase intention.

Table 9. Nutritional Information's Effect on Purchase Intent

	Characteristics	Major Effect n (%)	Moderate Effect n (%)	Neutral n (%)	Minor Effect n (%)	No Effect n (%)
Gender	Male (n=89)	15 (17%)	23 (26%)	39 (44%)	9 (10%)	3 (3%)
	Female (n=215)	39 (18%)	95 (44%)	50 (23%)	23 (11%)	8 (4%)
	Total (n=304)	54 (18%)	118 (39%)	89 (29%)	32 (11%)	11 (4%)
Age	18 – 39 (n=179)	11 (6%)	48 (27%)	79 (44%)	30 (17%)	11 (6%)
	40 or older (n=125)	43 (34%)	70 (56%)	10 (8%)	2 (2%)	0 (0%)
	Total (n=304)	54 (18%)	118 (39%)	89 (29%)	32 (11%)	11 (4%)

Furthermore, different age groups exhibit different attitudes. The older ones tend to show more positive attitudes towards nutrition information than the younger ones since 63% tend to have more knowledge of nutrition information. They check it more often before buying the product since they believe in its marketed nutritional value. The aforementioned is the reason why it has a significant effect on their purchase intentions. This finding is congruent with previous studies that older people have more experience in food shopping and are more familiar with reading the nutrition labels (Giehl et al., 2018). On the contrary, 60% of the younger ones do not believe in nutritional claims' credibility. Nevertheless, both of them put into consideration the health benefits that they can get from a product.

DISCUSSION AND CONCLUSION

The present study examined the consumers' attitude toward nutrition information of beverages under the hot drinks category and how it affects them in their decisions and purchase intentions. The study revealed that demographics such as age and gender have different yet significant effects on how the nutrition information of beverages under the hot drink category influences the consumers' behavior and purchase intentions. Women and the older generation tend to be more health-conscious and meticulous about the hot beverage that they buy. The aforementioned is primarily because they are considered the primary person responsible for food and beverage purchases. Throughout, they have shown a positive attitude towards nutritional information. Moreover, there is an excellent link between a consumer's perception of marketed nutritional value and his/her behavior towards purchasing that product. Therefore, the more consumers believe the dietary claims of hot beverages, the more likely it will affect their purchase intentions.

References

Department of Science and Technology – Food and Nutrition Research Institute (DOST-FNRI). (2016). Philippine Nutrition Facts and Figures 2015: Government Program Participation Survey. FNRI Bldg., DOST Compound, Gen. Santos Avenue, Bicutan, Taguig City, Metro Manila, Philippines.

Dudeja, P., & Gupta, R.K. (2017). Nutritional labeling. In R.K. Gupta, D. Minhas, & S. Minhas, Food safety in the 21st century: Public health perspectives (pp. 481–489). Elsevier Inc. https://doi.org/10.1016/b978-0-12-801773-9.00039-x

Euromonitor International. (2019). Other hot drinks in the Philippines. Retrieved May 15, 2020, from Euromonitor Passport database.

Euromonitor International. (2020). The impact of coronavirus on hot drinks. Retrieved May 15, 2020, from Euromonitor Passport database.

Euromonitor International. (2020). Hot drinks packaging in the Philippines. Retrieved May 15, 2020, from Euromonitor Passport database.

Gibney, M.J., Barr, S.I., Bellisle, F., Drewnowski, A., Fagt, S., Livingstone, B., Masset, G., Varela Moreiras, G., Moreno, L.A., Smith, J., Vieux, F., Thielecke, F., & Hopkins, S. (2018). Breakfast in human nutrition: The international breakfast research initiative. *Nutrients, 10*(5), 559. https://doi.org/10.3390/nu10050559

Glanz, K., Hewitt, A. M., & Rudd, J. (2015). Consumer behavior and nutrition education: An integrative review. *Journal of Nutrition Education, 24*(5), 267–277. https://doi.org/10.1016/s0022-3182(12)81244-1

Giehl, R. B., Perin, M. G., Barcellos, M. D., & Sampaio, C. H. (2018). A influência da informação nutricional em alimentos e bebidas na intenção de compra de jovens consumidores. *Revista De Administração IMED, 8*(2), 203. https://doi.org/10.18256/2237-7956.2018.v8i2.2977

Huang, L., & Lu, J. (2015). The impact of package color and the nutrition content labels on the perception of food healthiness and purchase intention. *Journal of Food Products Marketing, 22*(2), 191–218. https://doi.org/10.1080/10454446.2014.1000434

Spence, C. (2017). Breakfast: The most important meal of the day? *International Journal of Gastronomy and Food Science, 8*, 1–6. https://doi.org/10.1016/j.ijgfs.2017.01.003

Velasco, J. (2018, August 20). Food labels can be deceiving. Philstar.com. https://www.philstar.com/business/business-as-usual/2018/08/20/1844020/food-labels-can-be-deceiving

Correction Notice

This is to acknowledge that the correct spelling of one student author in the article entitled *More than a physical sense: Re-definition of environmental sustainability of social-issue-focused social enterprises (SIFSE)* published in Vol. 3, No. (2) in May 2021 should be "Lin Wenjia". We apologize for any inconvenience caused.

Dr Lawrence Lei and Dr Alvin Ang
Editors-in-Chief
HSUHK Business Review