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The Global Interdisciplinary Green Cities Conference 2022

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Table of Contents

The Global Interdisciplinary Green Cities Conference 2022

Best Paper Award in Contribution to Theory

Sustainability & CSR: The Relationship with Hofstede Cultural Dimensions

Minoo Tehrani, Roger Williams University, USA
Andreas Rathgeber, Augsburg University, Germany
Lawrence Fulton, Texas State University, USA
Bryan Schmutz, Western New England University, USA

Best Paper Award in Application of Theory

Deep Vision for Breast Cancer classification segmentation

Lawrence Fulton, Texas State University, USA
Alex McLeod, Texas State University, USA
Diane Dolezel, Texas State University, USA
Nathaniel Bastian, United States Military Academy West Point
Christopher Fulton, United States Air Force

Richard Briotta Best Paper Award in Knowledge Management & Strategy

Theory of Fields and Perspectives on Sustainability: A Case-based Approach

George Joseph, University of Massachusetts,-Lowell, USA
Richard Trubey, Mesoamerican Development Institute, USA

Best Paper Award in Innovative Education

Assessing the Effectiveness of an Intergenerational Virtual Service Learning Project on Perceived Loneliness among Senior Adults

Zo Ramamonjiarivelo, Texas State University
Randall Osborne, Texas State University
Cecil Oren Renick, Texas State University
Keya Sen, Texas State University

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Manpower Planning for Primary Healthcare (Puskesmas) During Covid-19 Outbreak: A Case Study at Puskesmas Garuda Bandung City

Tria Giri Ramdani, Bandung Institute of Technology, Indonesia, Indonesia
Aurik Gustomo, Bandung Institute of Technology, Indonesia, Indonesia

Abstract

The global outbreak of COVID-19 with the first case found in Wuhan, China in December 2019 was one of the second worst global crises of the second world war with a direct impact on human health and the global economy, affected the mobility of more than 4 billion people worldwide, including Indonesia. This condition affects the health service mechanism in various health care facilities, including the Puskesmas, as a primary healthcare which is the spearhead of the prevention and spread of COVID-19 infection in Indonesia. Various changes in the way health workers work require adaptation, which even cause psychological changes for officers, unable to work well, and staff fatigue, not because of the number of patients, but changes in service patterns. The service performance of the UPT Puskesmas Garuda in 2020 decreased from the previous year by 1.52 points and management performance which decreased in 2020 compared to the previous year of 0.67 points. This study aimed to analyze the workload, calculate the number of employees for each qualification needed at the Puskesmas and seek special support for manpower planning at the Puskesmas during the COVID-19 outbreak. This study used a mixed method with exploratory design. Quantitative method was conducted using NASA TLX through questionnaire. Samples were obtained by using stratified random sampling technique and totaling 46 samples. Qualitative method by interviewing 11 samples which were determined purposively. Manpower planning stages analysis is used to find out the gaps occurred in order to support the planning of employee needs at the puskesmas during the COVID-19 outbreak. The results showed that the workload was obtained from 13 qualifying samples with a value range of 73 to 97 or were in the category of high and very high mental workload. The mean score was 85.85 (very high) with a median of 86 and the most frequent score was 81 (very high). Concerning its results, some suggestions can be offered regarding the number of employees and specific strategy. First, the addition of 14 employees from 12 qualifications and 1 type of qualification that has not been fulfilled, namely health promotion officer. While the specific strategy recommendations are budget and policy support, employee fulfillment by using mental workload analysis to adjust needs during the outbreak.

Keywords: Manpower planning, Primary Healthcare (Puskesmas), Mental Workload, NASA TLX, COVID-19 outbreak

Best Paper Award in Application of Theory

Deep Vision for Breast Cancer Classification and Segmentation

Lawrence Fulton, Texas State University, USA
Alex McLeod, Texas State University, USA
Diane Dolezel, Texas State University, USA
Nathaniel Bastian, United States Military Academy West Point
Christopher Fulton, United States Air Force

Simple Summary: Breast cancer misdiagnoses increase individual and system stressors as well as costs and result in increased morbidity and mortality. Digital mammography studies are typically about 80% sensitive and 90% specific. Improvement in classification of breast cancer imagery is possible using deep vision methods, and these methods may be further used to identify autonomously regions of interest most closely associated with anomalies to support clinician analysis. This research explores deep vision techniques for improving mammography classification and for identifying associated regions of interest. The findings from this research contribute to the future of automated assistive diagnoses of breast cancer and the isolation of regions of interest.

Abstract: 1) Background: Female breast cancer diagnoses odds have increased from 11:1 in 1975 to 8:1 today. Mammography false positive rates (FPR) are associated with overdiagnoses and overtreatment, while false negative rates (FNR) increase morbidity and mortality. (2) Methods: Deep vision supervised learning classifies 299 × 299-pixel de-noised mammography images as negative or non-negative using models built on 55,890 pre-processed training images and applied to 15,364 unseen test images. A small image representation from the fitted training model is returned to evaluate the portion of the loss function gradient with respect to the image that maximizes the classification probability. This gradient is then re-mapped back to the original images, highlighting the areas of the original image that are most influential for classification (perhaps masses or boundary areas). Results: initial classification results were 97% accurate, 99% specific, and 83% sensitive. Gradient techniques for unsupervised region of interest mapping identified areas most associated with the classification results clearly on positive mammograms and might be used to support clinician analysis. (4) Conclusions: deep vision techniques hold promise for addressing the overdiagnoses and treatment, underdiagnoses, and automated region of interest identification on mammography.

Keywords: deep vision; breast cancer; machine learning; region of interest detection

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1. Introduction

An estimated 2.3 million women were diagnosed with breast cancer globally in 2020, and female breast cancer has surpassed lung cancer as the most commonly diagnosed cancer in the world [1]. The odds of a female being diagnosed with breast cancer have increased from 11:1 in 1975 to 8:1 today [2]. Globally, breast cancer is the most prevalent type of cancer with the most disability-adjusted life years [3] . Age-adjusted rates show growth in breast cancer diagnoses of 0.3% per year [4,5].

In the United States, about 13% of women will be diagnosed with breast cancer over their lifetimes [6]. Although breast cancer fatality rates have declined 1% since 2013 likely due to advancements in treatment, it is still the second most fatal cancer diagnosis [6]. While fatality rates from breast cancer decreased 7% from 2002 to 2003 (possibly due to a evidence-based reduction in

the use of hormone replacement therapy [6,7]), the increased use of breast implants (48% increase from 2000 to 2018, the pre-COVID era [8]) poses some increased risks of breast implant associated anaplastic large cell lymphomas (BIA-ALCL), which are rare and difficult to detect [9], facts associated with a reduced probability of 5-year survival. The Scientific Committee on Health, Environment, and Emerging risks considers there to be moderate evidence of a causal link between textured breast implants and BIA-ALCL [10].

Mammography reduces breast cancer mortality and is thus an important diagnostic tool [11-13]. The implementation of breast cancer screening has resulted in the increase in ductal carcinoma in situ, a pre-invasive form of cancer that may or may not progress [14]. Misdiagnoses of mammography results in increased morbidity, mortality, stress, and costs. False positive rates (FPR), estimated in one study to be 121.2 per 1000 or 12.12% [15], are associated with overdiagnoses and overtreatment and must be addressed while simultaneously improving false negative rates (FNR) to reduce morbidity and mortality. One study estimates that sensitivity and specificity of digital mammography studies is 80% and 90%, respectively [16].

The use of human-computer interaction in mammography studies is becoming increasingly important [17]. Advances in machine learning (ML) have improved both positive predictive validity (PPV) and negative predictive validity (NPV) in breast cancer identification. Application of fast opposite learning weights, an ML technique that may improve classification performance resulted in FNR of 9.9% and FPR of 11.94% in one study [18]. A study by Ertosun and Rubin used Convolutional Neural Network (ConvNet) achieved 0.78 precision in mammography classification [19]. Muramatsu et al. achieved 84% accuracy using ConvNet. ML techniques hold promise for improving PPV and NPV [20]. Salama and Aly were able to achieve impressive classification metrics (98% accuracy, 98% specificity, and 98% sensitivity) on small samples with augmented imagery [21].

Image segmentation attempts to divide an image into non-overlapping areas. Techniques that have been applied to this task include thresholding, watershed-based methods, graph-based methods, clustering, and region-based approaches [22]. Thresholding methods are often exceedingly basic, seeking to enhance grayscale images based on intensity values [23]. Smooth boundaries and unimodal histograms (pixel value) pose problems for this method [22]. Watershed-based methods consider the image is a contour map and seek to find the lowest / highest points [24] but are sensitive to noise and over-segmentation and are computationally expensive as gradient calculation is required [22]. Graph-based methods subset images using nodes and edges where the edges never overlap and have been used for ROI identification in breast cancer [25]. They are, again, computationally problematic for larger image sizes [26]. Clustering methods (K-means, hierarchical, etc.) seek to group like pixels together in order. These algorithms are sensitive to outliers, noises, and initial values [25]. Region-based methods seek to divide an image into homogenous regions but are sensitive to the initial region selected as the ‘seed’ [22].

Recent efforts have sought to use the output of a ConvNet classification model to identify ROIs on photographs without knowing where the actual lesion may exist. Techniques such as ‘guided backpropagation’ [27] and ‘deconv’ [28] have been used to identify image areas that activate the neurons of ML models. The gradient of the loss function with respect to an image representation (convolutional layer) can be used to pinpoint tissue segments that might be of concern even if the initial read of that study was negative without previously classified imagery (unsupervised learning). Recent efforts have shown such methods highly capable of producing bounding boxes for imagery [29]. It is therefore possible to identify regions of interest (ROIs) in medical imagery by simply ‘mining’ the layers of a ConvNet classification algorithm without additional segmentation analysis.

This study addresses the problems of overdiagnoses and overtreatment, as well as underdiagnoses with its associated increases in morbidity and mortality by 1) improving classification of mammography using supervised learning (learning from images where

classification exists) and 2) implementing guided backpropagation to paint gradient contours of the ROIs using unsupervised learning. This research support efforts to reduce morbidity and mortality and addresses overdiagnosis and overtreatment.

2. Materials and Methods

2.1. Data, Software, and Hardware

Data are publicly available from the Digital Database for Screening Mammography (DDSM) *[30]* and the Curated Breast Cancer Imaging Subset of DDSM *[31]* and provided by Google's Kaggle.com *[32]*. This analysis a precursor to follow-on work supported by a National Cancer Institute Data Transfer Use Agreement (PLCOI-742). The data consisted of 71,249 images and labels, 55,885 pre-designated for training and 15,364 reserved for testing. The image data were sized 299×299 (single channel grayscale) but were augmented to three-color ('RGB') for use in models by replicating the channel. The label data included dichotomous classification (0 for true negative, 1 otherwise). All analyses were performed in Anaconda Python 3.7 and are available on Github *[33]*. An in-kind high performance computing grant from Advanced Micro Devices (250 teraflops computing power) provided the computational power for model training. The observations (pixels) used for the image data only was 299 pixels × 299 pixels × 3 channels × 71,249 images = 19.1 billion pixels.

2.2. Training, Validation, and Test Sets

The training set was further randomly subdivided into training and validation sets (80% and 20%, respectively) resulting in the final data sets of size 44,708 (training), 11,177 (validation), and 15364 (test). By further splitting the training data, machine learning algorithms use the retained training data to estimate model performance on the validation set prior to estimation of the test set as a mechanism for preventing overfitting and to compare model hyperparameters. The final tuned model used both the training and validation sets to predict the pristine test set.

2.3. Image and Label Preprocessing

Each of the image intensity values were scaled. Test data remained untransformed other than pixel scaling. Label data were complete.

2.4. Architecture

ConvNet models were built on the training images and performance calculated using the validation set. Then the models were used to classify the unseen but labeled test set. ConvNet is an ML network architecture capable of taking radiological images and making outcome predictions. ConvNets are often used for image denoising [34], as they preserve the important spatial relationships and features. Figure 1 is a basic ConvNet architecture.

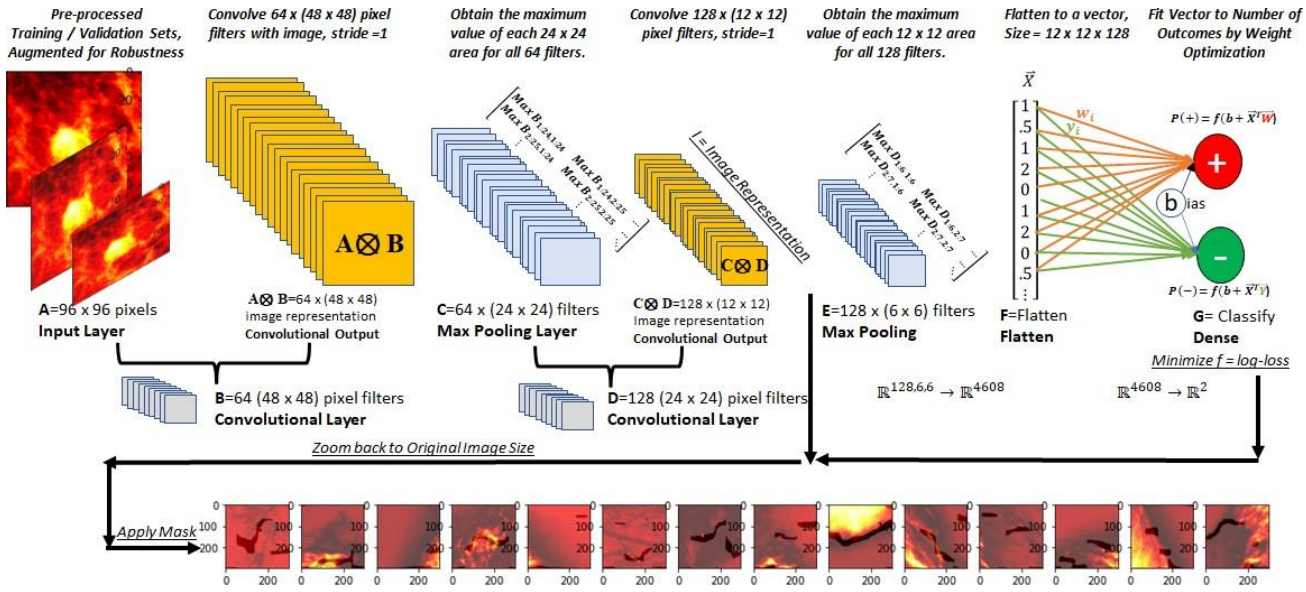


Figure 1. ConvNet architecture and graphical research overview.

2.5. Deep Vision Basics

An image is represented as an *x-y* mapping of pixel color intensity, *z*. For color images, there are three matrices that form an array, one each for red, blue, and green intensities. One could consider ConvNet to be a dimension reduction protocol that reduces the image size while retaining important features and spatial information. The reduced image representations are eventually 'flattened,' where each pixel is then part of a variable vector that might be used to forecast class membership by minimizing a log-loss or 'softmax' function, somewhat analogous to logistic regression for the two-class cases and multinomial regression for the multi-class cases.

2.6. Supervised Classification

Assume that we are evaluating pre-processed images of 96×96 pixels with 1 color channel ('A' in Figure 1). Many image filters of smaller size (e.g., 48×48 pixels, 'B' in Figure 1) are passed over the original image, section by section, one or more pixels at a time. The tensor product, A⊗B, is taken for each of these regions (convolutional output). Moving each of our 48×48 filters over the original 96×96 images 1 pixel at a time generates a new 48×48 matrix. The convolutional layer output, a set of smaller image representations, are additionally processed through a function for classification improvement (a rectifier function that adds additional nonlinearity to images, $f(x) = max(0, x)$. Smaller filters (24×24 pixels in Figure 1, 'C') are applied to convolutional layers. These filters execute 'maximum pooling' (keeping the maximum value in each region) or 'average pooling' (averaging all values). Multiple layers ('D' and 'E' in Figure 1) are then combined in a network structure. The final image representation is flattened into a single vector (dense layer, 'F' in Figure 1). The inner product of this vector and weights (tuned through nonlinear optimization) are added to a constant (bias) and processed through a 'softmax' function ('G' in Figure 1). The softmax function provides the probability of negative (-) or non-negative (+) imagery (Equation 1).

$$\boldsymbol{P}(+) = \frac{e^{-X^T W}}{e^{-X^T W} + e^{-X^T Y}}, \; \boldsymbol{P}(-) = \frac{e^{-X^T Y}}{e^{-X^T W} + e^{-X^T Y}}. \tag{1}$$

Equation 1 estimates the probability that an image will belong in either the negative (-) or non-negative (+) class. In this equation, X^T is the flattened vector produced by the ConvNet ('F' in

Figure 1), and the weights for negative (-) and non-negative (+) conditions are W and Y, respectively. The probability for each class is estimated by dividing the exponent of the weighted

vector for each class by the sum of the weighted vectors for both classes.

For two-category classification, only one equation rather than two is needed. A sigmoid or log-loss equation classifies either negative (-) or non-negative (+) studies (Equation 2).

$$\boldsymbol{P}(+) = \boldsymbol{\sigma}(\boldsymbol{x}) = \frac{\mathbf{1}}{\mathbf{1} + \boldsymbol{e}^{-\boldsymbol{x}}} \tag{2}$$

In Equation 2, we define $\boldsymbol{\sigma}(\boldsymbol{x})$ as the sigmoid function which takes the vector data from the flattened layer and estimates the probability of non-negative (+) results.

ConvNets require tuning of the weights and filter values through nonlinear minimization of a loss function, typically the log-loss (binary cross-entropy, Equation 3).

$$\boldsymbol{L} = -\frac{\mathbf{1}}{\boldsymbol{N}} \sum_{\boldsymbol{i}=\mathbf{1}}^{\boldsymbol{N}} \boldsymbol{y_i log(p_i)} + (\mathbf{1} - \boldsymbol{y_i}) \boldsymbol{log}(\mathbf{1} - \boldsymbol{p_i}) \tag{3}$$

In Equation 3, *L* is the loss function, *N* is the number of items classified, *y* is the true class membership (either negative or non-negative), and *p* is the probability estimate for the group membership. A correctly classified observation (e.g., a true '1' predicted to be such with probability 0.999) results in a value near 0. An incorrectly classified observation (e.g., a true '1' predicted to be '0' with 0.999 probability) results in a value of 4.605. Thus, minimizing binary cross-entropy through nonlinear optimization attempts to improve the classification.

2.6. Specific Architecture, Classification Problem

For this analysis, we evaluated several pre-existing architectures that have shown to perform well on the image classification task. The best-performing architecture of those considered is presented here and is based on the Visual Geometry Group (VGG) of Oxford *[35]*. The architecture, known as VGG-16, includes 13 convolutional layers and 5 maximum pooling layers. Global average pooling was added to this baseline architecture to further reduce dimensionality, and a single neuron with sigmoid activation function provided the final estimate of the probability of a non-negative result. While we started with pre-trained weights for the VGG-16 architecture, we allowed these to be updated during nonlinear optimization.

Images were batched in groups of fed into the architecture. Validation metrics were estimated, and hyperparameter tuning was performed. The final selected image batch size was 32, and the choosen nonlinear optimizer was an adaptive gradient algorithm known as 'AdaGrad' *[36]*. A total of 50 epochs were set with early stopping conditions (which activated after epoch 25).

2.7. Unsupervised Region of Interest (ROI) Identification

Traditional radiological imagery is often devoid of ROI segmentation, which depicts the location of anomalies. Without previously identified ROIs (as is the case with the imagery in this study), it is not possible to train supervised models to isolate ROIs. It is, however, possible to return a small image representation from the closest convolutional layer of a model, evaluate the gradient of the loss function with respect to the image at that layer using computational graphs, find the portion of the gradient that maximizes the classification probability, and re-map that gradient location back to the original image. In doing so, the areas of the original image that are most highly influential for the classification model can be found. Further, an image contour overlay can be built to identify the areas most associated with the classification determination based on important values of the gradient of the loss function with respect to the image. In this study, we avoid guided

backpropagation as well as other non-gradient based methods based on recent experimental findings *[37]*.

Figure 2 represents the last functions of the ConvNet provided the probability prediction for the image. For each filter F in the last convolutional layer, we seek the gradient of the loss function with respect to the image, $\frac{\delta L}{F}$. The forward pass (green arrows) results in a composite function from the filters through the rectifier, global average pooling, the sigmoid function to the forecast. To calculate $\frac{\delta L}{F}$ requires that we 'backpropagate' the gradients (red arrows) using the chain rule until we are able to estimate our loss gradient with respect to the filter. These calculations are supported by TensorFlow and need not be done manually *[38]* .

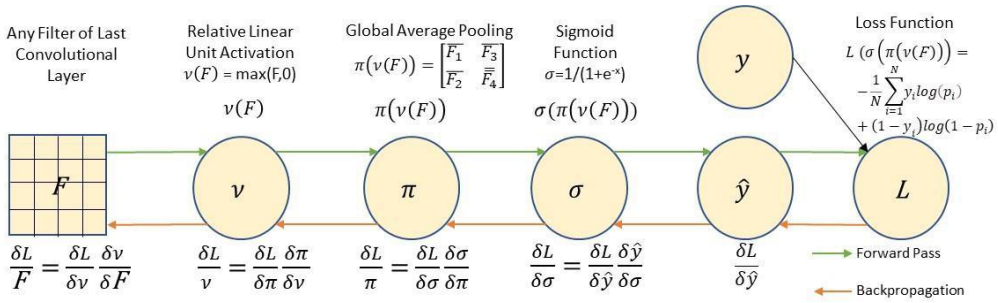


Figure 2. Backpropagation to find $\frac{\delta L}{F}$

3. Results

3.1. Descriptive Statistics

The data were imbalanced, as 86.96% of the images were negative. ConvNets are robust to imbalanced data, so addressing this imbalance by over or undersampling (for example) was unnecessary. We investigated image augmentation using 10 degree random rotation, 20% zoom in and out, 10% height and width shifts, 10% shearing, and horizontal flipping, as augmentation sometimes produces more robust classifiers *[39]*. We saw no improvement with image augmentation possibly due to issues with local optima and thus proceeded with the original images.

Images were saved as three channel ('RGB') color images to support the baseline VGG-16 architecture. Several of the images were plotted using various color enhancements to verify data quality (see Figure 3 for an example). An autoencoder to reduce image noise was implemented but added no observable benefit to the classification.

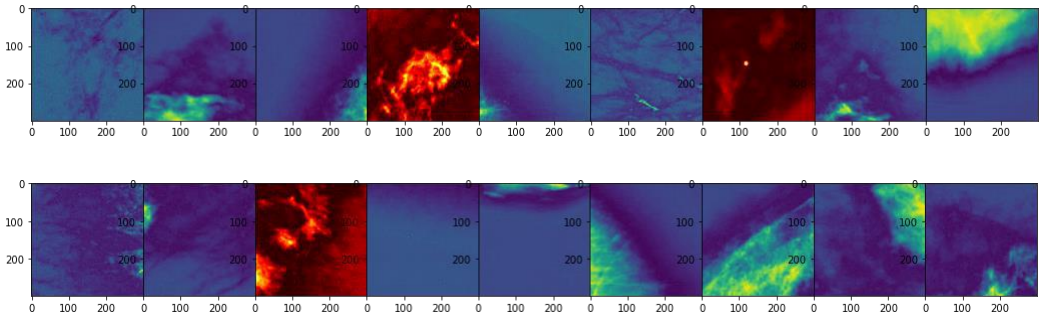


Figure 3. Image plots of slides with non-negative results depicted in red

3.2. Classification Results

The VGG-16 architecture resulted in 98% classification accuracy, 83% sensitivity (recall of positives), and 99% specificity (recall of negatives) on the pristine test set after 25 epochs. These metrics are all improved over previous studies including *[19]* and *[20]*. The positive predictive value (precision for positive cases) is 0.93, indicating that 93% of the patients informed of positive

study results were actually positive, much better than *[19]*. Table 1 provides the complete results of predicting the test result with the trained model, while Table 2 is the confusion matrix (the classification matrix with incorrect and correct predictions labeled.)

Table 1. Metrics for predicted test set data, 97% accuracy.

Metric	Size	Precision	Recall	F1-Score
Negative	13,360	0.98[0]	0.99*	0.98***
Positive	2,004	0.93[1]	0.83**	0.88***
Weighted Average	15,364	0.97	0.97	0.97

[0]Negative Predictive Value, [1]Positive Predictive Value, *Sensitivity, **Specificity, ***Harmonic Mean of Precision & Recall.

Table 1 shows that the classification process worked well. The high recall (99%) on the negative patients suggests that overdiagnosis and over-treatment would be reduced. The sensitivity of 83% might even be improved with additional a priori manipulation as well as larger datasets.

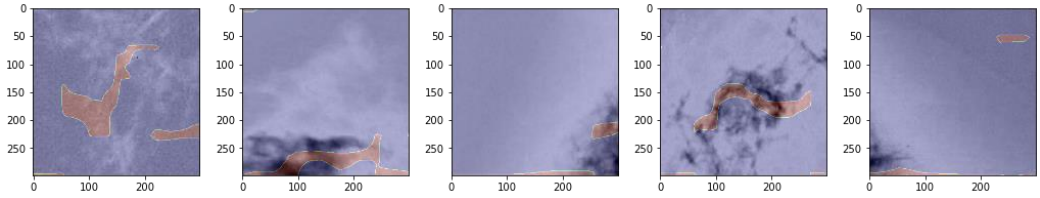
Table 2. Confusion matrix for the classification problem.

	Negative Prediction	Positive Prediction	Total
Negative	13,229	131	13,360
Positive	334	1,670	2,004
Total	13,563	1,801	15,364

In Table 2, the FPR is (131/1801) = 7.3% while the FNR is (334/13,563) = 2.5%. These metrics are much better than those seen in *[18]*.

3.3. Unsupervised Gradient Mapping

We used TensorFlow's 'GradientTape' function to calculate the gradient of the loss function at the last convolutional layer's reconstructed image, which includes 512 filters of size 18×18 pixels. After producing the gradient map, we zoomed the image back to 299×299 to produce contour overlays for the images. To further identify areas of concern, we filtered for the top 10% of the image values. In Figure 4, we show the first 10 positive images in the data set in gray scale with the contour mask of the gradient superimposed (showing as pink).



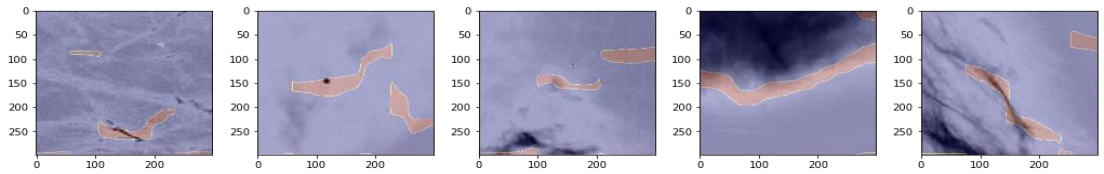


Figure 4. The first 10 positive images in the data set with the gradient loss contour mapped

Figure 4 shows that the unsupervised classification is able to pick up features in the images associated with anamolies. In Row 1 plots 2 through 5 and in Row 2 plots 3 through 5, it is clear that the gradient of the loss with respect to the image considers the darkish areas to be associated with anamolies. In Row 2, plots 1 and 2 appear to identify a high density 'line' and 'point,' respectively. The contour plots appear to capture the boundaries of interesting tissue in the plots, which is to be expected, as the maximum values of the gradient of the loss with respect to the image representation are those areas most closely associated with the algorithm's classification decision.

4. Discussion

Supervised classification of mammography detection is effective in achieving high sensitivity, specificity, precision, and overall accuracy. The model presented here was highly specific (99%) with reasonable sensitivity (83%). This particular model would effective address the problems of overdiagnosis and overtreatment and slightly address the problems of morbidity and mortality associated with breast cancer. Refinements to the architecture, weights, and other elements of the model would be expected to improve its performance; however, a relatively common ConvNet architecture was capable of achieving these results on a sufficiently large dataset with reasonably sized images without significant hyperparameter tuning or image manipulation.

Backpropagation techniques worked well to produce contour maps for the loss gradient with respect to the image representation. Zooming these contour maps from the last convolutional layer back to the original image size provided reasonable visual representation of the areas that are (by definition) most closely associated with the classification process. Thus, it is relatively straightforward to determine regions of interest during the ML classification process without running separate models. Providing pre-marked images to physicians, particularly when ML models and physicians have different 'opinions' regarding the mammography, is an important consideration for improving FPR and FNR rates.

A limitation of this study is that it uses previously curated images of fixed and relatively small size. Larger files (e.g., Aperio ScanScope .svs image sets) require significantly more preprocessing and computational power. Further, the positive mammography lacks confirmed ROIs, so the contour masks may not be interpreted alone. In addition, this study focused on the classification of non-negative imagery. Classification using the BI-RADS classification scheme is also possible but beyond the scope of this initial study.

Future work involving imagery obtained by the National Cancer Institute under a Data Transfer Agreement (PLCOI 742) is ongoing. This work requires significant processing power from a cloud-based high performance computing cluster supported by Advanced Micro Devices under an in-kind grant.

5. Conclusions

Deep vision holds much promise for breast cancer classification, as it is able to find relationships among spatially related pixels that the human eye cannot detect. Thus, it is possible for deep vision to detect cancers missed by clinical professionals under even optimal conditions assuming that properly classified training data are available from which the algorithms can learn.

ML techniques in general hold great promise for both the supervised classification and unsupervised segmentation problems. These techniques are likely to assist radiologists and clinicians in reducing FNR and FPR rates, addressing the issues of overdiagnosis and overtreatment while simultaneously reducing morbidity and mortality. It is clear that the role of the ML in assisting clinicians with diagnoses and ROI identification will increase given its demonstrated potential.

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Data Availability Statement: Data are available online with a free account. The address for access follows: https://www.kaggle.com/skooch/ddsm-mammography.

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Synthesis and Characterization of MSCs-Liposome Hybrid System

Mina Poursharifi, Roger Williams University, USA

Abstract

Nanotherapy provides great improvements in traditional drug deliveries by increasing the bioavailability, solubility, and permeability of many potent therapeutics. However, the lack of specificity and immunogenicity limits the clinical applications of Nanoparticles (NPs). Currently, Stem cell-based drug delivery systems have drawn attention due to their low immunogenicity and homing property. Mesenchymal Stem Cells (MSCs) have been used in preclinical and clinical studies as a delivery system to improve the accumulation of therapeutics at the tumor site. The main challenge in MSCs delivery systems is poor drug loading capacity. This research proposes how to synthesize and characterize a novel hybrid platform of MSCs loaded with liposomal-NP (MSCs-liposome), which may increase the loading capacity without negatively affecting the cell function and improve the specificity of liposomal NPs.

Assessing the Effectiveness of an Intergenerational Virtual Service Learning Project on Perceived Loneliness among Senior Adults

Zo Ramamonjiarivelo, Texas State University, USA
Randall Osborne, Texas State University, USA
Cecil Oren Renick, Texas State University, USA
Keya Sen, Texas State University, USA

Abstract

Background: Loneliness and social isolation are concerning social issues and declared as a "global epidemic" among the world's elderly population. Both loneliness and social isolation may be associated with negative health outcomes.

Purpose: To assess the effectiveness of an intergenerational virtual service learning on loneliness, among the older individuals, as well as ageism, among college students.

Method: This study used a pre-post design. In fall 2020 semester, a group of undergraduate students were randomly assigned to a "service learning" project (n=18). The project consisted of pairing students with seniors (n=22) living in the communities surrounding the university. Students were asked to have at least a 30-minute weekly virtual interaction with a senior individual either via phone, text messages, or face time on Zoom or other platform, for six weeks, then write a half-page diary of each interaction, as well as a one-page reflection after three weeks of interaction. Students not assigned to the service learning project (n=24) were asked to write a 5-page academic paper on ageism manifestation in several countries. There measures were used in the pre-post design: the Ageing Differential Scale, administered to both students and seniors, the UCLA Loneliness Scale, and a one-item researcher generated Likert- rating of loneliness on a 10-point scale, administered to the seniors, and two-item researcher generated Likert-rating of student competence interacting with senior individuals.

Results: The service-learning group shows significantly lower ASD scores at the posttest in comparison to the non-service-learning students, $t(1,40) = -2.027$, $p=.049$. The service-learning group has significantly lower ageism scores on the posttest in comparison to the non-service-learning group, $t(1,40) = -2.102$, $p = .042$. The change in competency scores on the posttest comparing the service-learning to non-service-learning groups is significant, $t(1,40) = 2.165$, $p = .036$). Scores on the differential scale decreased from pre to post assessment but the decrease did not reach significance, $t(1,19) = 1.483$, $p = .154$. Loneliness scores on the UCLA Scale dropped significantly from pre to post interactions with students, $t(1,19) = 2.301$, $p = .033$.
Also, scores on the one-item rating scale of loneliness decreased significantly from pre to post assessment, $t(1,22) = 2.412$, $p = .009$.

Conclusion: Virtual service learning is an effective way to solve social issues such as loneliness and ageism.

Introduction

Humans are social beings who thrive from their relationships with others. Loneliness, described as "the subjective perception of lack of meaningful relationship" and "social isolation" portrayed as an objective evaluation of scarce social engagements and social contacts have been concerning social issues declared as a "global epidemic" among the world's elderly population by the US Surgeon General Vivek Murthy in 2017 (Berg-Weger & Morley, 2020), page 456. In fact, about 24% of non-institutionalized older adults have experienced social isolation and 35% of adults ≥ 45 years old have felt lonely (National Academies of Sciences, 2020). Many older adults without a strong network of friends or family are at a disadvantage with shrunken social network with very limited scope of interaction (Bhatti & ul Haq, 2017).

Both loneliness and social isolation may be associated with negative health outcomes. For instance, the most recent report from the National Academies showed that individuals who are socially isolated are more likely to die younger and develop dementia compared with those who are not socially isolated. Individuals who experience poor social relationships, described as social isolation or loneliness, have a 29% higher risk of coronary heart disease and 39% higher risk of stroke compared with those who have rich social relationships (National Academies of Sciences, 2020).

In addition, the risk of death among lonely individuals who have heart failure is four times higher than those with heart failure but are not lonely. Also, lonely individuals have 68% higher risk of hospitalization and 57 % higher risk of emergency department visits compared with those who are not lonely (National Academies of Sciences, 2020), as well as increased risk of depression, alcoholism, sleep problems, change in immunological system, Alzheimer's disease, poor general health status, decreased wisdom, anxiety, suicide, accelerated cognitive decline, hypertension, diabetes, and death (Bruce, Wu, Lustig, Russell, & Nemecek, 2019; Griffin et al., 2020; Hawkley & Cacioppo, 2010; Heinrich & Gullone, 2006; Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015; E. E. Lee et al., 2019; Rico-Uribe et al., 2018).

Older individuals tend to experience loneliness or social isolations more than younger individuals because they tend to live alone and their poorer health and weaker physical conditions may limit their ability to have some meaningful social interactions (Berg-Weger & Morley, 2020). In fact, many older adults without a strong network of friends or family are at a disadvantage with shrunken social network with very limited scope of interaction (Bhatti & ul Haq, 2017). In addition, the older generation might not be as comfortable speaking to someone 50 years younger than them in comparison to someone the same age, however, this does not mean that the older adults do not crave that interpersonal connection.

Social interaction through a service-learning program has been found to enhance connectivity, and reduce the risk for losing the motivation to maintain an active and healthy lifestyle (Holt-Lunstad et al., 2015). Moreover, intergenerational service learning conversations, fosters the comfortability level of the youth and that of seniors with time and often make the senior feel that he/she is cared for while in conversation (Moinolmolki & Broughton, 2020). Also, such programs are found to improve 54% of the youth social skills (Keller, Perry, & Spencer, 2020).

The purpose of this study is to assess the effectiveness of an intergenerational service learning on loneliness, among the older individuals, as well as ageism, among college students. The World Health Organization define ageism as "the stereotypes, prejudice, and discrimination towards others or oneself based on age" (WHO, 2021).

Literature Review on Interventions to Reduce Loneliness and Social Isolation

A body of interventions have been undertaken to alleviate the burden of loneliness and social isolation among elder adults both at the national and the organizational/community levels. For instance, at the national level, the National Academies created the Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults in 2018. That Committee is responsible for collecting evidence regarding the negative impacts of social isolation and loneliness on quality of life of adults ≥50 years old, as well as recommending strategies, to be implemented by healthcare providers, to reduce the negative health outcomes of social isolation and loneliness (National Academies of Sciences, 2020). On another instance, the British and Japanese governments appointed a Ministry of Loneliness in 2018 and 2021, respectively, to create nationwide programs to reduce loneliness and its side effects, such as suicide, which has increased during COVID19 pandemic (Forbes, 2021; B. Y. Lee, 2018; E. E. Lee et al., 2019).

In addition, several interventions to tackle loneliness and/or social isolation have been implemented at the community or local level. The scoping review and meta-analysis of Masi et al, (2011) suggests that the aims of such interventions may fall into four major categories: to improve social skills (to grow social support, to offer more opportunities for social interaction, and to deal with maladaptive social cognition (Masi, Chen, Hawkley, & Cacioppo, 2011). Direct interventions that specifically address social isolation and loneliness, such as a one-on-one interaction between individuals who experience loneliness and social isolations and volunteers who have accepted to interact with the affected individuals has been deemed more effective than interventions that target a group of lonely individuals (National Academies of Sciences, 2020). An example of one-on one interaction is the Intergenerational social support through service learning that provides individuals a heightened chance of connection with the society (Ortman, Velkoff, & Hogan, 2014). Community driven opportunities for seniors to be socially integrated, can enhance the quality of life (Sen & Prybutok, 2021). Also, targeted measures through service learning program interventions like 30 minutes story telling or sharing of daily life experiences in weekly conversations develops understanding of the complex relationships between the aged and the student that might enhance positive emotions (De Jong Gierveld, van Tilburg, & Dykstra, 2016). Seniors do not feel that students condescend on them, and this often helps to elevate positive experiences. With time this increases the feeling in older adults that they are being listened to and not invisible (Moinolmolki & Broughton, 2020). Service- learning is also a two-edged sword because both parties (students and community residents) can benefit from it. A recently published manuscript used service-learning pairing undergraduate students with seniors residing the communities surrounding the university. Service-learning has reduced perceived level of loneliness among seniors as well as improved students' and seniors' mutual perception (Ramamonjiarivelo, Renick, & Osborne, 2021).

Intergenerational learning benefits both the older and younger generations. First, among the older generation, social interaction through service-learning programs enhances connectivity, reduces the risk of losing the motivation to maintain an active and healthy lifestyle (Holt-Lunstad et al., 2015; Ruiz-Montero, Chiva-Bartoll, Salvador-García, & González-García, 2020), and improves quality of life (Killgore, Cloonan, Taylor, Miller, & Dailey, 2020). It also gives the older adults the opportunity to challenge stereotypes and experience a feeling of successful aging (Ruiz-Montero et al., 2020). Second, among college students, (younger generation), intergenerational service learning improves their academic and professional learning skills, as well as increase their social awareness with respect to the struggles faced by disadvantaged communities (Ramamonjiarivelo et al., 2021; Ruiz-Montero et al., 2020).

Method

This project was designed in the middle of the Novel Coronavirus (Covid-19) pandemic, during fall 2020 semester. Therefore, one very important question centers on whether "virtual" interactions between seniors and students can have a positive impact on student perceptions of seniors (the positivity or negativity of their attitudes toward seniors) and seniors' perceptions of younger persons (again measured as positive or negative attitudes), and senior feelings of social competency and loneliness. During the prior Spring 2020 semester, a service- learning project placed students and seniors together for weekly interactions, but the number of those interactions was cut short (from eight weeks to four weeks) because of the Pandemic . Nonetheless, the researchers were able to show that limited interactions between students and seniors significantly decreased students' scores on a measure of ageism, significantly increased student ratings of the degree to which they Know, Care, and Act on multicultural issues and increase student self-ratings of confidence in interacting with individuals of an older generation (Ramamonjiarivelo et al., 2021). The occurrence of the Pandemic and the subsequent need to switch to 100% virtual service-learning methods led the current researchers to consider whether virtual interactions can have positive impacts like those demonstrated in previous semesters. In a 2020 meta- analysis, Ibarra and colleagues summarized findings on the possible impact of use of technology on senior feelings of social disconnectedness and social isolation. Though most results across studies were modest, the researchers concluded that technology could be effective in reducing senior feelings of social disconnectedness and social isolation, but studies assessing that impact needed to have more rigorous methods employed and that technologies used should also be assessed (Ibarra, Baez, Cernuzzi, & Casati, 2020). The current study attempted to assess the impact of "virtual" interactions between undergraduate college students and seniors, using an experimental and control group design, on senior feelings of loneliness, social competency, and attitudes toward a younger adult, as well as the impact on younger adults' attitudes towards seniors.

During fall 2020 semester, undergraduate students enrolled in a course provided by the School of Health Administration, with a special emphasis on cultural competency and diversity, participated in this study. A group of students were randomly assigned to the "service learning" project (n=18). The project consisted of pairing students with seniors living in the communities surrounding the university. Twenty two seniors participated in this service learning project.

Students were asked to have at least a 30-minute weekly virtual interaction with a senior individual either via phone, text messages, or face time on Zoom or other platform, for six weeks. Students were asked to write a half-page diary of each interaction. In addition, students were asked to write a one-page reflection after three weeks of interaction, for a total of two reflections.

Students not assigned to the service learning project (n=24) were asked to write a 5-page academic paper on ageism manifestation in several countries. The instructor provided non-service learning students with the outline of the ageism paper. Both student diaries and reflections as well as ageism papers were graded at the same scale and grades were included in students' final semester grades.

To measure service learning effectiveness, students were asked to fill out pre and post surveys administered on Qualtrics. In addition, to measure the effectiveness of the service learning on loneliness, senior partners were asked to fill out a pre-post survey (paper-based survey). This study was approved the Institutional Review Board of the authors' institution (IRB # 7046).

Three measures were employed in a pre-post method in this study. The Ageing Differential Scale, administered to both students and seniors, (Cary, Chasteen, & Remedios, 2017), the UCLA Loneliness Scale, administered to seniors (Russell, Peplau, & Ferguson,

1978) a one-item researcher generated Likert-rating of loneliness on a 10-point scale, administered to the seniors (1 = not at all lonely to 10 = very lonely), and two-item researcher generated Likert- rating of student competency interacting with senior individuals. Competency was measured in terms of comfort and confidence levels interacting with individuals of older generation (1 = not all comfortable and/or not at all confident to 10 = very comfortable and/or very confident). The Ageing Differential Scale (ADS) has been found to have high levels of reliability and validity, at least in studies in applied program. Reliability and validity computed in a project with nursing students, for example, comparing scores on Ageing Semantic Differential Scale in comparison to Big 5 Personality dimensions and Positive and Negative Affect Scale. Results showed ASD scale to have a Cronbach alpha of .92 for seniors and .93 for young persons in comparison to the PANAS and roughly .75 for younger participants and .83 for older participants. This differential scale, provides an attitudinal dimension (such as Progressive 1-----2-----3-----4-----5-----6 7 Old Fashioned) that are considered to be opposites.

Researchers have found the UCLA Loneliness Scale to be less amenable to reliability and validity analyses than other scales, predominantly because of a lack of a simple and reliable assessment technique. The development of the UCLA Loneliness Scale, a short, 20-item general measure of loneliness is reported. The measure has high internal consistency (coefficient alpha = .96) and a test-retest correlation over a two-month period of .73. Concurrent and preliminary construct validity are indicated by correlations with self-reports of current loneliness and related emotional states, and by volunteering for a "loneliness clinic."

Results

All measures for students (Ageing Differential Scale, Ageism, and Competency to Work with Older Adults) were administered both pre and post interactions with seniors. Additionally, some students (18) interacted with seniors while the remaining students (24) completed a more traditional research project on ageing rather than interact with the seniors. The basic results for both the pre and the post measures for the service and non-service-learning students are summarized in Table 1.

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
ASD	1.00	18	109.5556	16.49322	3.88749
	2.00	24	116.4583	17.32798	3.53706
Ageism	1.00	18	46.5000	8.78669	2.07104
	2.00	24	43.5833	10.34583	2.11183
Competency	1.00	18	16.8333	4.27372	1.00733
	2.00	24	17.5417	3.94505	.80528
ASDPost	1.00	18	95.6111	18.17930	4.28490

	2.00	24	109.7917	25.12227	5.12806
AgeiismPost	1.00	18	35.1667	12.21980	2.88023
	2.00	24	42.9167	11.52659	2.35286
CompetencyPost	1.00	18	20.6667	3.46410	.81650
	2.00	24	18.2500	3.66238	.74758

Group 1: Service learning students Group 2: Non-service learning students

As can be seen in the Table, the two groups do NOT differ significantly on any of the variables at the beginning of the project (Pretest data) but the service-learning group shows significantly lower ASD scores (more positive semantic differential ratings) at the posttest in comparison to the non-service-learning students, t (1,40) = -2.027, p=.049. Additionally, the service-learning group has significantly lower ageism scores on the posttest in comparison to the non-service-learning group, t (1,40) = -2.102, p = .042. This means the service-learning group ageism scores dropped from pretest to posttest while the non-service-learning group scores remained relatively the same. Lastly, the change in competency scores on the posttest comparing the service-learning to non-service-learning groups is significant – the service-learning group is rating themselves as more competent working with seniors at the end of the project than at the beginning t (1,40) = 2.165, p = .036).

Twenty-two seniors engaged in virtual interactions with the students for this project for at least 30 minutes per week for six weeks. As a reminder, seniors completed three measures both before and after the six weeks of interactions with students. Seniors were given the Ageing Differential Scale (asking them to rate their attitudes differentially toward younger persons). The UCLA Loneliness Scale and a researcher generated question assessing loneliness on a 10-point Likert scale. Analyses were conducted on twenty seniors as two did not complete both pre and post measures.

Scores on the differential scale (with higher scores reflecting more negative choices on the differentials and higher ratings) decreased from pre to post assessment but the decrease did not reach significance (Means of 100.65 and 90.50 at pre and post, respectively), t (1,19) = 1.483, p = .154. This means the seniors are rating younger persons more positively on the differentials at the end of the six weeks of interaction than they were at the beginning of the project, but the change was not large enough to reach significance.

Seniors were also given the UCLA Loneliness Scale. As a reminder to the reader, this is a 20-item measure that provides statements about loneliness (such as, “I lack companionship” or “I feel completely alone”) and provides a 4-response rating scale for the frequency of those feelings (o = often, S = sometimes, R = rarely and N = Never). As predicted, scores on the UCLA Scale (with higher numbers reflecting more loneliness) dropped significantly from pre to post interactions with students (Means of 73.65 and 68.30 for pre and post interactions, respectively), t (1,19) = 2.301, p = .033.

As predicted, scores on the one-item rating scale of loneliness (with higher scores reflecting more loneliness) decreased significantly from pre to post assessment (Means of 3.80 and 2.40 at pre and post, respectively), t (1,22) = 2.412, p = .009. This means the seniors are rating themselves as less lonely at the end of the six weeks of virtual interaction than they were at the beginning of the project.

Discussion

Engaging undergraduate college students in a virtual service learning project with the aims to reduce perceived loneliness among individuals of older generation, increase college students' competencies in having a social interaction with senior individuals, and reduce mutual age-related bias towards the older and younger generations, this study found that service learning was effective in achieving these aims. The results of this study highlight the success of service learning, even at a virtual setting, in reducing age-related bias and perceived loneliness, as well as college students' competency interacting with senior individuals.

This study has some limitations. First, while the original plan was for students to virtually engage in the service learning project for eight weeks, delay in IRB approval has prevented us to start the project on time, therefore, cutting the number of weeks from eight to six. Regardless, we find that six weeks are enough to achieve our aims. Second, the findings from this study are not generalizable due to the fact that we use a sample of students from a particular course. However, the study design is replicable in other service learning settings.

While this study is purely quantitative, students' diaries and reflections also contain a wealth of information regarding their feelings throughout the project. A qualitative study analyzing student feelings could also be an additional means to assess the effectiveness of this service learning.

Conclusion

Given that the Covid-19 pandemic has exacerbated the social isolation of everyone and especially senior individuals, this kind of pandemic should not deter us from capitalizing on technology and engaging senior individuals in virtual interactions to alleviate their perceived loneliness. Service learning is a two edged sword that can both solve a social issue and train students in social engagement.

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Greenwashing: The Case of Chevron

Minoo Tehrani, Roger Williams University, USA
Noah Van Handel, Roger Williams University, USA

This study concentrates on Chevron Corporation and its operations in Ecuador. The first part of the research explores the declared corporate social responsibility (CSR) and sustainability strategies of Chevron Corporation. Chevron Corporation specifically states strategies in regards to managing risk associated with business operations as well as climate change. In addition, the long-term goal of lowering carbon emission across the company's entire value chain is a major focus of its sustainability strategies. The stated green strategies as far as increasing renewable energy sources includes CO_2 emission reduction by 30 million tons by the year 2028. The emphasis of the company for renewable energy is on hydrogen power as well as producing renewable aviation fuels. Furthermore, to enhance reduction of the greenhouse gasses (GHG) across the activity cost chain of the company, Chevron's plan is to reduce transportation emission, concentrating on shipping/distribution across the globe. The second part of this study investigates implementation of the declared green sustainable strategies of Chevron. The findings of this research establishes that Chevron does not have a net zero carbon emission commitment nor does the company has aligned its strategies to meet the goals of Paris Accord. It appears that instead of reduction of carbon emission from petroleum exploration and production, the company proposes reduction of CO_2 through storage of CO_2. This study further explores the activities of Chevron Corporation in Ecuador. The research discusses how Chevron and Texaco started oil and gas exploration Ecuador in 1995. Such activities have resulted in local Ecuadorian villages to be covered in oil sludge as well as an estimated 20,000 deaths over the past two decades due to the oil and gas exploration pollution. The study discusses in detail the consequences of the presence of Chevron in Ecuador over the past 2 decades and the lasting negative influence.

Time for the Planet, Fund Raisers to Reduce CO2 Emissions

Carine Sonntag, ICN-ARTEM Business School, France

What is the problem or challenge?

Global warming is one of the highest priority in sustainable development goals (Goal 13 *Take urgent action to combat climate change and its impacts*, United Nations; Giec report IPCC 2021). Most people observe that the change in individual, companies or government decisions is not fast enough or at the level needed to significantly impact the global phenomenon. People feel disempowered and that their individual action is too small to make an impact (Adams 2021). In addition, money can be perceived as the corollary of a capitalist system, which development since the 70s is at the origin of the acceleration of CO2 emissions and the Anthropocene (Futurearth 2020). Investment, even if invested in green securities such as green bonds, is expected to generate a positive (and attractive) return on investment. Company creation and development necessitates economic and financial sustainability, which is the foundation of our economic system. Under these conditions, it is not obvious how to address the question of CO2 reduction. It is neither obvious how investment funds would finance the creation or development of companies to reduce CO2 or capture it. If money could help, why and how would people agree to invest? Why and how would people buy shares to fight or reduce CO2 emissions? Which type of shares, which type of investment fund? How could this money be useful, significantly impactful? How would people trust that the money is actually invested for the objective they invest in and believe that these investments will generate the expected Impact ? These economic questions would not necessarily find an answer without a specific focus on human being. We clearly understand that pure economic or business perspective is not enough and that a transdisciplinary approach could better highlight how human actions, mindsets, values would generate « something » different, based on positive energy. Anthropologists believe that creativity emerges through actions and transitional practices.

What did you do and what do you want to do?

We observe that a company called TIME FOR THE PLANET has been created in mars 2020 to raise money in order to fund new companies to capture CO2 or reduce CO2 emissions. In almost two years they raised 6 million euros and declare a number of shareholders of 32958 (October 2021). We spent time to understand how the company is structured, how they communicate and how they are organized. It appears that they act as a “perfect student” in a business school. Their company is exemplary in:

- describing and communicating their vision and objectives:

“Find inventions that can help solve an environmental problem (scientific engineering) Build and train teams to implement and develop these inventions (human engineering) Raise funds to finance business creation and research (financial engineering)”

- share their values : open source, collective intelligence, benevolence, transparency and ethics
- act in transparence on their governance, control mechanism, internal legal status, rules, decision making processes, remuneration, choice of projects to be funded, and selection of CEOs and teams when a project is funded or a new company created

- fund raising : they enable people to buy shares of the company with the intention of not getting any financial dividend, but just to contribute to create new companies for CO2 reduction
- Develop a real network of collective intelligence (whether people are shareholders or not) where people can “serve” TFTP in the contribution they think is the most appropriate for each of us. People can contribute in terms of communication (to increase the reputation of the company), or experts (scientific skills are needed to identify the adequate innovation and select the best projects which should be funded by TFTP)

We would like to go forward our inquiry on the organization to question from a managerial and anthropological view point how people appropriate the proposal of TFTP. Through an in depth netnography following Hine (2004) we will question how they generate trust among their stakeholders and how this trust releases creative energies.

What did you find and what do you want to find?

We find that there is nothing new from a business model point of vue in the sense that they apply strategy, leadership and collective intelligence principles, which already exist in business books. Nevertheless, their organization and their collective intelligence model answers very smartly the tricky question of CO2 reduction or capture as the objectives of investment funds and company creation. The purpose of the company is disrupting in itself as well as the hope, the level of potential impact and creative energies it generates. Another creative aspect of their organization is that they offer the playground for anyone interested to “act with them”. Whether you are a shareholder or not, anyone interested can contribute to their organization through the “galaxy action” which is a collective intelligence model. Their organization can then be understood at two level. The first level is the internal governance constituted of 6 founders who created the fund raising company and all its internal rules. They are the decision makers. Their decisions are influenced by “expert committees” coming from the galaxy action to decide which project is the most promising and impactful and then should be funded. The second level is constituted by all stakeholders inside the galaxy action or even outside (in social networks) who communicate and act with TFTP because they are convinced of the GOOD their action generates. We suppose that people believe (and invest) in TFTP because of the high transparency of information, the preciseness of information and the positive influence stakeholders have in TFTP. Our objective is to find which factors impact this positive circle of influence around TFTP so that people really appropriate the objectives of the company and act with them. To further understand this phenomenon, we will adapt an anthropological perspective to TFTP to discern it as a "field of self-constructed and reproduced representations of actors (a culture)" (Copans, 1996, p.32). Our analysis focuses on the mechanisms that contribute to create "collective cohesion" around the goal of capturing and reducing CO2 at the global level.

This is, as Lebailly and Simon (2007) point out, a matter of cultural foundations (of "wild thinking") that determine the effectiveness of economic foundations. TFTP's corporate culture has adapted its communication codes, rituals (Thursday meetings) and common values. The preliminary analysis is therefore *etic*, focusing on the “concepts” produced and communicated

by the company; the *emic* analysis, the perspective of the people who join T4P (Ladner, 2014), will be addressed later.

What do you recommend?

In October 2021, TFTP has raised 6 million euros and already created one company "carbon neutral" which they fund at a level of 1.5 million euros. People trust the company on the basis of the information they have publicly provided and that we will inquiry in the paper. We still wonder how strong are the control mechanism from a legal point of vue. Would it be possible for the founders to "disappear" from the planet with the money or the transparency and rules are so strong that this could not happen?

This point being cleared we will show how well applied economic and business principles are able to fund economically sustainable companies to address externalities (most SDG are externalities). Our inquiry will help to understand why without dividends or ROI, people trust in TFTP and are keen to invest and act for the planet. It will highlight how this organization generates positive energies, which transform into impactful investments and actions. We will conclude about what we can learn from TFTP so that hopefully other organizations such as this one could emerge.

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Reusable or Disposable PPE? Aspects of Sustainable Economic and Environmental PPE Use in Healthcare

Gary Laustsen, Linfield University, USA
Virlena Crosley, Linfield University, USA

Abstract

The COVID-19 pandemic has illuminated critical aspects of healthcare systems' practices related to personal protective equipment (PPE). This presentation seeks to explore the economic and environmental aspects of reusable PPE to promote the sustainable use of natural and economic resources. Utilizing a review of the literature, evidence was critically examined to identify relevant factors of multi-use versus single-use PPE.

When considering the environmental aspects of reusable PPE three major themes from the literature were identified. Multi-use PPE generates less waste, results in less energy expenditure, and has a reduced climatic impact and environmental footprint. Multi-use PPE was found to generate less waste (Klemes, et al., 2020; Hicks, et al., 2020; Baker, et al., 2020) which resulted in the related benefits of reducing landfill needs (Baker, et al., 2020) and reducing pollution from product degradation (Baker, et al., 2020) or incineration (Baker, et al., 2020). Additionally, multi-use PPE reduced the need to collect, process, and dispose of these products thus lowering healthcare systems' energy expenditures (Baker, et al., 2020; Klemes, et al., 2020).

Not only does multi-use PPE reduce energy expenditures during their use and disposal, but it also reduces energy use across the product's lifecycle. Although the production of reusable PPE is initially more energy intensive, because of repeated use, these types of PPE were found to result in less energy use when considering energy expenditures across the lifetime of the product (McQuerry, et al., 2020; Hicks, et al., 2020; Klemes, et al., 2020).

The third major theme, multi-use PPE having a reduced climatic impact and environmental footprint, was examined through five main areas: 1. Less global warming impact (Baker, et al., 2020), 2. Less potential for water body acidification and eutrophication (Baker, et al., 2020), 3. Less smog generation (Baker, et al., 2020), 4. Water consumption (Hicks, et al., 2020), and 5. Decreased use of raw materials (Baker, et al., 2020); Hicks, et al., 2020; Klemes, et al., 2020).

The worldwide outbreak of COVID 19 put a spotlight on the inadequacies of PPE supply chains. From the beginning of the pandemic demand for PPE exceeded the supply and showed how vulnerable healthcare systems were to both policy and economic decisions affecting trade and production of medical supplies (Cohen & Rogers, 2020; Gereffi, 2020). Due to severe shortages, medical personnel were forced to reuse PPE that were designed for single use as governments, healthcare providers and individuals in the private sector competed for available supplies.

Because of the need for expanding the use of PPE, the pandemic has also raised the importance of creating strategies for environmentally sound use and disposal of PPE. This expanded PPE usage is putting a strain on already stressed global resources for waste management systems and treatment facilities (Adyel, 2020; Kumar et al., 2021). From an economic and budget perspective single use PPE may appear to be initially less costly (Baykasoğlu et al., 2009). However, looking at costs and benefits through a sustainability lens, market approaches may

not be the best mechanism for rationing supplies of PPE or promoting transformative changes needed for PPE disposal. Multidisciplinary technical expertise, e.g., biomedical sciences, environmental sciences, public health, materials science, and circular economic principles focused on reducing, reusing, and recycling should guide the policy development for PPE production and trade, purchase and use decisions and waste management techniques (Singh et al., 2020).

Healthcare organizations need to adopt a multi-domain, ecosystem perspective to operations that consider environmental and economic relationships, as well as local and global impacts. The coronavirus pandemic highlighted the complexities and shortfalls of the current supply chain for PPE. The greatly expanded need and use of PPE throughout the pandemic has also highlighted the inadequacies of policies, coordinated planning and resources for effective, sustainable disposal of PPE. Reusable PPE does not solve these issues; however, it can slow the accumulation of waste and have a decrease energy impact across the product's lifecycle. More studies are needed to identify best practices for solving short-term PPE shortages and budgetary purchase concerns along with longer-term strategies for effective global supply chains for PPE and sustainable waste management of PPE. To promote a long-term efficient, effective, and sustainable healthcare ecosystem, research is needed to inform decision-makers that consider the upstream and downstream aspects across a product's lifecycle, the implications of supply availability and accessibility, and the personnel impacts of product options. Future healthcare disruptions are inevitable and often unknowable, but a movement towards resilient, adaptable, and sustainable systems will ameliorate impacts on healthcare organizations and human health.

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Unilever: A Green Company?

Minoo Tehrani, Roger Williams University, USA
Hannah Clark, Roger Williams University, USA

This study examines the sustainability strategies of the Unilever Company. Unilever Company was established in 1906 in England. The range of the products include beauty and personal care. The company operates in more than 190 countries and presently has more than 2.5 billion customers worldwide. The main ingredient of the products is palm oil that are supplied from plantations and farms across the globe, such as Indonesia and Malaysia. In addition, the company has several manufacturing facilities in different countries, such as South Africa, Canada, Australia, China, England, and the U.S. This research explores the sustainability and corporate social responsibility strategies of the company along supply and manufacturing. The final part of the research concentrates on the company's declared sustainability and CSR strategies and examines if these strategies have created a green company or a greenwashing one.

Establishing ESG in the Management of Student Investment Funds

Austin Hilger, Roger Williams University, USA
Scott Mackey, Roger Williams University, USA
Michael Melton, Roger Williams University, USA

Abstract

Today more business schools are focusing on corporate environmental, social, and governance (ESG) factors understanding that companies face ESG related issues in the workplace. What is missing is how to incorporate such principles into the management of student investment funds at the academic level. Students who manage money at the undergraduate and graduate levels must recognize that socially responsible investing drives better outcomes for investors, communities and the planet. This research outlines the tools needed in the classroom to successfully embed environmental, social, and governance (ESG) factors into investment research, due diligence, portfolio construction and ongoing monitoring, in the effort to improve long-term performance and reduce risk.

Rebalancing of Commodity Indices and Its Impact on Liquidity

Florian Schmid, University of Augsburg, Germany
Andreas Rathgeber, University of Augsburg, Germany

Abstract

Over the past two decades, the invested money in commodities has grown steadily. According to a Futures Industry Association report, the commodity futures volume increased from one to six billion contracts between 2007 and 2016. Commodity futures options volume increased by 100 to 700 million contracts (Acworth 2017; Simon 2014). Therefore, the phenomenon of financialization is at the center of interest concerning politics and research. The 'Masters hypothesis' (Masters 2008) is well known in politics concerning the influence of investors and commodity prices. Many studies like Adams and Glück (2015) and Bianchi et al. (2020) have been published. These studies examine the long-term influence concerning commodity prices and the effects, which might be inferred that the peak of 2008 is a constant situation. We use the Amihud- and Amivest-measurement to determine the effect on commodities by using the rebalancing of commodity indices. The Amihud-measurement follows the idea of Amihud (2002). The Amivest measurement has been used by Amihud et al. (1997) and Berkman and Eleswarapu (1998). Many studies like Shleifer (1986), Harris and Gurel (1986), and Beneish and Whaley (1997) find an index effect concerning the addition to or removal from the S&P 500 related to price, volume, and open interest of the underlying companies. We can detect a significant effect concerning the commodity weightings for cumulative weighting for BCOM and S&P GSCI for positive and negative cases using linear regression. Therefore, we use robust standard errors introduced by Newey and West (1987) in the regression. The results stay constant by using overall 255 weight changes from 2006 to 2020. We substantiated the highly significant results with further analysis concerning subgroups and subperiods for both indices. Table 1 shows the results of the basic analysis.

Panel Weighting, Future, and Production – Basic results					
Measurement	Weighting	Variables	Beta	T-statistic	R2
Amihud, Positive	Cumulative	Weighting Future Production	-0.0023 0.1214 -0.0515	-2.5349** 1.5301 -0.3290	0.3331
Amihud, Negative	Cumulative	Weighting Future Production	0.0067 -0.7735 -0.1719	2.2410** -4.3135*** -0.3118	0.3120
Amivest, Positive	Cumulative	Weighting Future Production	-0.0016 0.1301 0.0919	-1.8785* 1.5961 0.5603	0.3195
Amivest, Negative	Cumulative	Weighting Future Production	0.0073 -0.7155 -0.0501	2.4153** -4.1566*** -0.0913	0.2930
Panel Weighting, Spot, and Production – Basic results					
Measurement	Weighting	Variables	Beta	T-statistic	R2
Amihud, Positive	Cumulative	Weighting Spot Production	-0.0022 0.1100 -0.0681	-2.4537** 1.5582 -0.4122	0.3326
Amihud, Negative	Cumulative	Weighting Spot Production	0.0068 -0.7480 -0.1781	2.4900** -4.4107*** -0.3017	0.3385
Amivest, Positive	Cumulative	Weighting Spot Production	-0.0015 0.1161 0.07185	-1.8113* 1.6029 0.4115	0.3185
Amivest, Negative	Cumulative	Weighting Spot Production	0.0074 -0.7002 -0.0549	2.6533*** -4.3131*** -0.0942	0.3191

Table 1 shows the results for the basic analysis concerning Amihud and Amivest. For both measurements, cumulative weighting is used. The first panel analyzes the variables weighting, future, and production, and the second panel shows the variables weighting, spot, and production results. All results are rounded up to four decimal places. Significance level is *< 10%, ** < 5%, *** < 1%. The number of events N for all cases is 255. The results show significances in all cases for the weightings. In the negative cases, the price variable (future or spot) is also significant.

Data Availability Statement

The data that support the findings of this study are available from Bloomberg (2022) and S&P (2022) for the index data. The market data is available from Barchart (2022), EIA (2022), FAO (2022), Quandl (2020), Thomson Reuters Datastream (2022), and USGS (2022). Restrictions apply to the availability of the datasets, which were used under license for this study.

Keywords: financialization, commodity index, index investors, liquidity
JEL Classification Codes: G11, G23, Q02, Q31

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The U.S. Economy & Inflation

Samuel Wine, Roger Williams University, USA
Carlos Cubides, Roger Williams University, USA
Scott Mackey, Roger Williams University, USA

Abstract

This research explores primary issues related to the current increase in inflation in the U.S. Several underlying factors that boost spending and demand for goods, services, and labor are discussed including monetary and fiscal policies, higher than expected energy prices, consumer demand, disruptions of global supply chain due to Covid-19, and unemployment. The study focuses on when sustained inflation becomes a difficult to solve problem in an economy. In addition, the research examines the best way for an economy to regain stability. Furthermore, the changes that are necessary to occur to offset inflation and reduce the burden on consumers are discussed. The final part of the study proposes strategies along several economic factors that tend to reduce inflation: prioritizing between and within policies, minimizing the cost for maximal benefit, and implementing policies that temper demand, lower prices, or boost labor supply and labor productivity.

What Drives Hydrogen Prices?

Andreas Herb, University of Augsburg, Germany
Markus Ulze, University of Augsburg, Germany
Andreas Rathgeber, University of Augsburg, Germany

Introduction

The role of hydrogen in the economy will inevitably become more important as the energy transition progresses. The use of hydrogen offers great potential for protecting the climate and supporting the energy transition. Surplus of electricity from renewable energy sources can be stored long-term as chemical energy in the form of hydrogen. In the mobility sector, vehicles powered by hydrogen and fuel cells are an essential addition to electric vehicles. As a substitute for natural gas, hydrogen is suitable for reducing industrial emissions. The entire industry can thus benefit from energy systems with hydrogen. Despite all these advantages, the introduction of hydrogen in the areas mentioned is significantly influenced by its price. Hence, the analysis of hydrogen prices becomes increasingly important as it provides information about properties and influencing factors, which enables comprehensive assessments of future market developments as well as the analysis of price risks. To the best of our knowledge this is the first study to analyze hydrogen prices indices. This paper wants to fill the research gap by providing a data-driven analysis of the influencing factors of hydrogen prices to lay the foundation for further studies.

Methodology

This study is based on the autoregressive distributed lag (ARDL) approach by Pesaran et al. (2001). The advantages of the ARDL approach are, among others, that it performs well for small sample sizes, the lag structure of each regressor can be controlled, and both the short-run effect and long-run relationships can be examined simultaneously. First, the ARDL bounds test is applied to check the potential existence of cointegration. Second, depending on the outcome, the unrestricted error correction form of the ARDL model is used to analyze the short-run and long-run effects on the price spread of hydrogen. Third, the error correction term (ECT) is estimated from the restricted error correction model to conclude on the speed of adjustment back to the equilibrium state. This ARDL approach has been widely used for other energy commodities. To mention a few, Buyuksahin et al. (2012) and Geyer-Klingeberg and Rathgeber (2020) use the ARDL approach to analyze the WTI-Brent price spread drivers. Other studies using an ARDL model consider the influencing factors on gas prices, such as Matthew Schmidt (2018), who analyzes the influence on the European gas price, and Chai et al. (2019), who examine the potential relationship between the Chinese and other global gas markets. This short excerpt demonstrates that it is reasonable to apply the ARDL approach to other energy commodities such as hydrogen to study the drivers of the prices.

Data

To determine the drivers of the hydrogen spread, we consider three different cases. The spread between the carbon-reduced “green hydrogen” price and the environmentally damaging “gray hydrogen” offers clues to the costs of a "net-zero" future and is analyzed based on data for

Germany between January and November 2021. The second aspect considers the price spreadbetween countries based on the PEM (proton exchange membrane) electrolysis and uses data from the US (California) and Europe (Netherlands) from July to November 2021. Finally, the technology-specific price spread for hydrogen produced by steam methane reforming (SMR) is analyzed in an intra-US comparison from April to December 2020.

As determinants of the price spread, we use production-specific factors such as prices for electricity and gas, which are required for the PEM electrolysis and SMR. Furthermore, prices of other energy carriers such as coal and crude oil are included, which have an enormous influence on the economic situation of the considered countries and simultaneously are a source for electricity. Furthermore, the economic situation of each market can have an impact on the demand, which in turn affects prices. For this purpose, stock indices of relevant sectors are included as a proxy for economic performance. Additionally, the potential influence of prices for CO_2 emission certificates is also taken into account for the European market.

Findings

The results show that there is cointegration for all three spread models, and hence a long-term relationship can be concluded. Therefore, the unrestricted error correction form of the ARDL model is used to analyze the short-run and long-run effects.

For the German market, the spread between green and gray hydrogen is significantly influenced by the electricity price (+) and the coal price (-) in the long term. In addition, the electricity price (+) and the prices of CO_2 certificates (-) show a significant short-term influence on the spread.
The ECT is negative and highly significant, whereby it can be concluded that deviations from the equilibrium state are corrected by 46.9% per day. The analysis of the spread between green and gray hydrogen for Germany shows conclusive results, also concerning the direction of the influence. To illustrate this, a rising electricity price affects in particular the production of green hydrogen (Jørgensen and Ropenus, 2008), which means that the price rises quicker than for gray hydrogen, which leads to an increased spread.

The spread of the hydrogen prices produced by PEM electrolysis is negatively influenced in the long-term by the electricity prices in the Netherlands (-), the electricity price in California (-), and the economic situation (-) of the considered markets. In the short term, the electricity prices of the Netherlands (+) and of California (-) have a significant impact on the PEM spread. The ECT is negative, highly significant, and shows a 14.2% correction per day. The results of the analysis of the PEM price spread can also be verified by research on production costs. Electricity is one of the main drivers of PEM and, therefore, influences the hydrogen price, which matches the results of Jørgensen and Ropenus (2008) and the theory on the production process (Bareiß et al., 2019).

For the intra-US comparison of SMR hydrogen prices, it can be shown that the electricity price of California (+), the electricity price of the US Gulf Coast (-), the gas price (-) and the economic situation (-) have a long-term influence on the spread. Additionally, the gas price (-) and the electricity price of California (+) have a short-term influence on the spread. The ECT indicates that deviations are corrected by 33.3% per day. These results are consistent with the manufacturing process and research on the generation costs of hydrogen produced by SMR. In

particular, the significant impact of the gas prices on hydrogen prices matches the theory as in the production process natural gas is converted to elementary hydrogen (Bareiß et al., 2019).

The results of the estimated ECTs show evidence that the closer the places of data acquisition are located, the faster the correction back to equilibrium state occurs. Geographical distances can thus be seen as a measure of the interconnectedness of the markets, especially since hydrogen is a very volatile gas and transport over long distances can be challenging (Ball and Wietschel, 2009).

Conclusion

This study is an important starting point in understanding the drivers of hydrogen prices. It further provides a methodological foundation on how hydrogen prices can be analyzed. We show that informative results about the influence of different hydrogen prices can be achieved even with relatively sparse data. The results are in line with the theory and there is evidence that the speed of adjustment, displayed as the ECTs, depends on the geographical distance between the considered markets. Future studies should focus on the energy transition progresses and if it alters the determinants of the spread and cointegration.

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Exploring Precipitation Variability Risk Impacts on Small and Medium Sized Business Enterprises (SMEs): Implications for Sustainable Economic Development

Bernard Moeketsi Hlalele, Central University of Technology, Free State, South Africa
Tlou Raphela, University of the Free State, South Africa

Abstract

Deviations from expected weather conditions significantly impact on any business entity's revenues, costs and profits especially those based in the rural areas. Although most businesses are exposed to weather-induced risks, many are still failing to adequately identify, characterize and manage the impacts imposed by these weather volatilities. Of the most vulnerable business categories, is small and medium sized business enterprises (SMEs) which are particularly dependent on water for their daily operations. The current study analyzed precipitation variability from 1981 to 2019 in order to explore the inherent characteristics of the study area's potential weather risks that impact adversely on SMEs. The BBC vulnerability framework was adopted in this paper. Dataset used was obtained from the National Aeronautics and Space Administration's open-source online database. Prior to the final statistical data analysis, homogeneity and stationarity tests were deployed for data quality control purposes. Major results revealed the precipitation time series non-homogeneous, where a significant change occurred in 2011. Levenes' test for equal means showed the two time-series sets statistically different with a two-tailed p-value < 0.001. Non-parametric Mann Kendall trend test depicted a statistically significant decreasing trend in the post-2011 precipitation series with p-value < 0.0001. The results from this paper imply a serious potential weather risk attributed to abrupt changes in precipitation patterns that are yet to decrease and cause water scarcities and thereby adversely impact on all forms of businesses, particularly SMEs. It is therefore recommended that SMEs diversify their services and products as well as play various defensive strategies for their economic sustainability.

Keywords: Business external risk: SMEs; sustainable economic development; precipitation; variability.

Beyond Meat: Sustainability & CSR Strategies

Minoo Tehrani, Roger Williams University, USA
David McArdle, Roger Williams University, USA

Abstract

Beyond Meat: Sustainability & CSR Strategies Beyond Meat was established as a private company in 2009 in Segundo, California as a plant based meat company. The company that went public in 2019 prides itself in producing plant based and non-GMO food items and contributing to reduction of the negative impact of food production on the climate change and also enhancing the health and the welfare of the population. According to the research, the younger generations comprise the highest percentage of the consumers interested in plant-based meat. Several CSR strategies of the company include programs with schools across the U.S. to educate students with healthy food and climate change information. The products of the company are sold in more than 50 countries, such as Germany, Canada, Australia, and UAE. Some of the major partners of the company include fast food restaurants such as, McDonald's, Pizza Hut, and Taco Bell. This study explores sustainability and CSR strategies of the company along supply chain, customers, and waste management. The results of the study examines the extent of the success of the green strategies of Beyond Meat Company and the impacts on GHG emission and contribution to healthier communities.

High Fashion Industry: LVMH

Minoo Tehrani, Roger Williams University, USA
Jade Sanchez, Roger Williams University, USA

The leading supply sources and exports of textile, leather, and jewelry industries are mostly emerging countries, such as China, India, Turkey, and Vietnam. The fashion industry supply sources are mostly located in emerging countries. Considering that the fashion industry is one of the most polluting industries, this study explores the largest high fashion luxury multinational corporation, Moët Hennessy Louis Vuitton (LVMH). The research examines the history of the company, the products, and the supply sources. The study discusses the declared sustainability and CSR strategies of the company along several dimensions, labor practices, impacts on physical environment and animals, and CO2 emission. Furthermore, the research contrasts the declared green and suitability strategies of the company with the greenwashing reality of treatment of the labor, supply sources, carbon emission, and other negative impacts on the physical environment.

Talent Development in Resilience Art Business

Shirley Yeung, Gratia Christian College, UNPRME, Hong Kong

The purpose of this paper is to explore the key elements of resilience art business and talent development from literature search (2012-2021) on articles related to resilience art and talent development. 10 papers were found in the qualitative key words search using N'Vivo. After reviewing the papers, several related factors were found - Engagement with Visual Arts, Simulation Skills, Engagement with Well Being, High Level of Coordination Skills, Management of Anxiety, Engagement with Culture, Awareness of Change in Ergonomics, and Hygiene Operations Management.

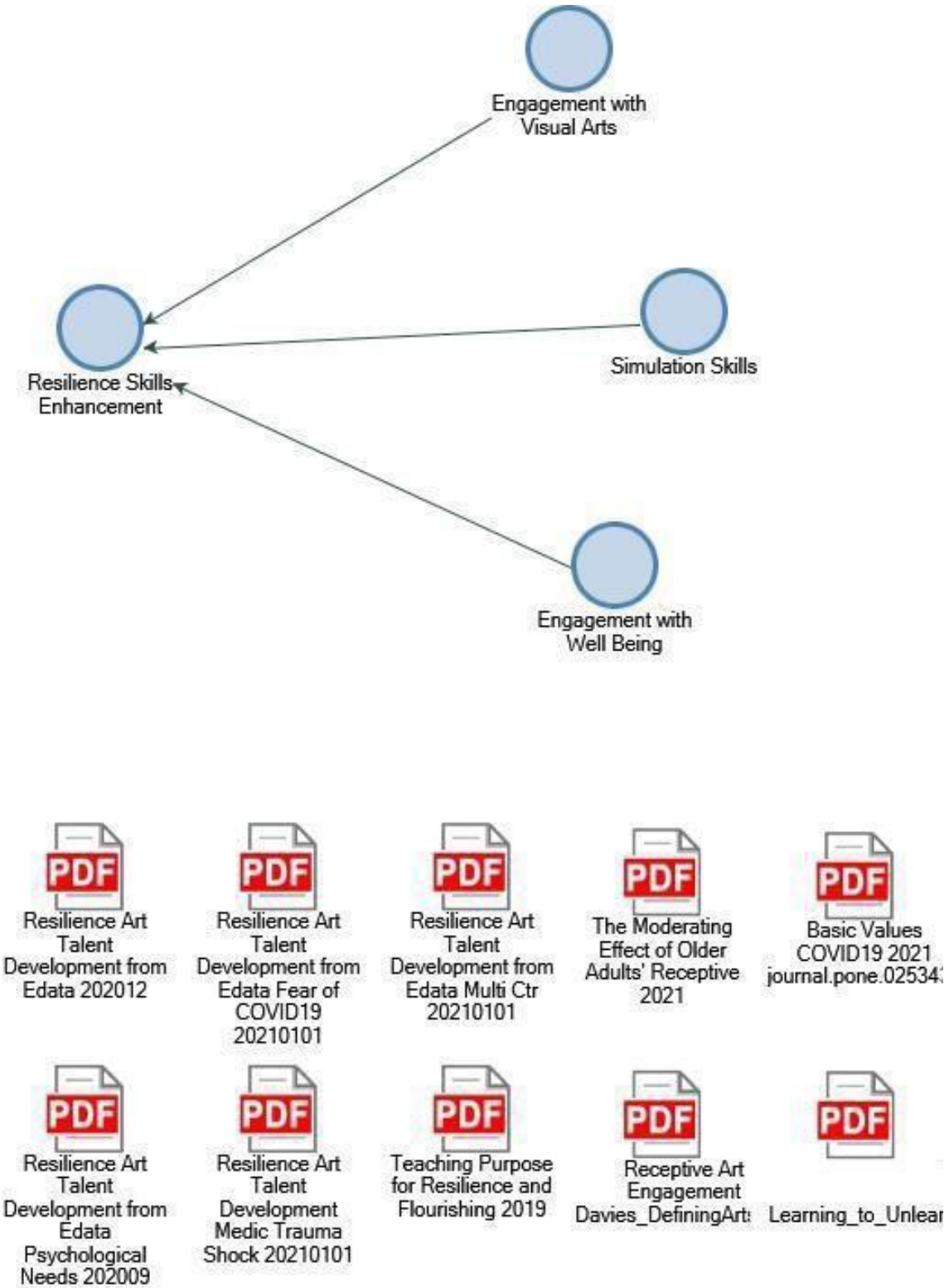
To further estimate their relationship to the topic, by using Nvivo, a text search process was carried out for the mentioned keywords. The result showed that a few of the factors such as Engagement with Visual Arts and Simulation Skills were cited relatively more frequently with 523 and 325 times correspondingly, while Hygiene Operations Management were cited less frequently. (Table 1).

Table 1. Findings of the keywords search

Factors	Sources	References
Engagement with Visual Arts	9	523
Simulation Skills	5	325
Engagement with Well Being	10	272
Management of Anxiety	6	170
Engagement with Culture	9	167
High Level of Coordination Skills	9	141
Awareness of Change in Ergonomics	9	61
Hygiene Operations Management	3	60

Diving deeper into the relationship among the factors, it was apparent that Engagement with Visual Arts, Simulation Skills and Engagement with Well Being contribute to the topic of Resilience Skills Enhancement more than the rest of the factors. Based on the result, a graphical model was generated with the data. (Figure 1).

Figure 1. Model on the factors



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Modelling External Risk to Agricultural Development Projects Using a Reconnaissance Drought (RDI) and Standardized Precipitation Indices (SPI)

Tlou Raphela, University of the Free State, South Africa
Bernard Moeketsi Hlalele, Central University of Technology, Free State, South Africa

Abstract

Drought is defined as a recurrent feature of climate that involve deficiency of precipitation over an extended period resulting in water shortages that have adverse effects on economy, environment and humans and their health. The probability of drought impacts varies widely depending upon drought duration, frequency and severity, baseline population vulnerability, existing health and sanitation infrastructure, and available resources with which to mitigate impacts as they occur. This natural climate feature adversely leads to poor crop yields. The current study aims at charactering drought for proactive management and mitigation strategies to be applied. The study used standardized precipitation (SPI) and reconnaissance drought (RDI) indices to model the behavior of drought in the study area. The key findings revealed the study area under frequent, severe to extreme drought events. The study recommends that water users and all other relevant stakeholders adopt mitigation strategies such as use of water sparingly, use of drought-resistant crop cultivars and others.

Keywords: Project risk, risk modelling, RDI, SPI

2030 EU Emission Goals & Sustainability Directives: Germany & Latvia

Minoo Tehrani, Roger Williams University, USA
Phillip Call, Roger Williams University, USA
Luke Hosek, Roger Williams University, USA

This research concentrates on the European Union 2030 goals of improving energy efficiency and achievement of "net zero" carbon emission economy by the year 2050. The study discusses strategies to deal with the reduction of Greenhouse Gas (GHG), increasing the share of renewable energy, and moving towards increase in energy efficiency. The research concentrates on two European Union (EU) countries, Germany, one of the most technologically advanced EU countries, and Latvia. Both Germany and Latvia depend upon imported fossil fuel energy. The strategies that are implemented to enhance sustainability and reduce dependence on the fossil fuel energy in these two countries are examined. In addition, Germany's and Latvia's progress towards achieving the EU 2030 emission goals and adopting non-fossil fuel energy sources are examined.

Individuals' Perceptions on the Environmental Concerns of Drone Usage

Carol Lee, Northeastern University, USA
Bhawesh Sah, Northeastern University, USA

Abstract

Drone technology has improved in the last few years for various purposes, including agricultural, logistics and delivery needs. For example, drones were used to deliver blood in the last mile of a supply chain (Rashidzadeh et al., 2021) and to deliver food during the COVID-19 pandemic (Hwang et al., 2021). However, the concerns of drone usage and adoption have not been fully explored, particularly regarding the impact from environmental factors, such as stresses from weather-related abnormalities. This study investigates individuals' perceptions on the environmental concerns and their relationship to the actual usage of drones for delivery. We will adapt the theoretical lens from theory of planned behavior (Ajzen, 1991), environmental costs (Borghetti et al., 2022), and drone technology (Raj et al., 2019). Drones are expected to make a positive impact on the environment and may have the potential to reduce climate change (Schall, 2019). Sensors, which measure a variety of air pollution and natural components, such as temperature, humidity, air pressure, CO, CO2, and O2, can be placed on drones to produce real-time geography-based air quality information. For example, micro-drones have been employed to monitor air pollution at a large scale since 2013 in China (Gallacher, 2016). For logistical purposes, drones can provide an advantage over trucks regarding CO2 emissions, especially when a delivery is either closer to the truck depot or has a smaller number of recipients. A package delivered using a truck in the United States results in 2.2 lbs. of gas emissions. In contrast, delivering a package using drone delivery results in about 0.92 lbs. of greenhouse gas emissions. As drones have been found to contribute positively to the environment, we aim to assess individuals' perceptions on their environmental concerns regarding drones. We plan to conduct a voluntary offline pilot survey in 2022 with individuals who adapt delivery services. Our target population is people who have access to delivery applications and in locations where drone usage for deliveries may become available, according to local legislative discussions. Our survey focuses on the concerns of environmental factors and costs in urban areas on drone usage. We will use structured equation modeling (Chin, 1998) and the bootstrapping algorithm to analysis our measurement and structural models. We plan to obtain a sample size of 100 individuals and validate our model in this preliminary study. This research will provide an exploratory analysis in understanding the perception of the environmental costs, such as climate risks, and sustainability impact of drone usage in the context of delivery services. Data will be collected from a survey to answer the following the research question: What are the individuals' perceptions on drone usage for delivery services and the impact from environmental factors? The potential contribution of this study is to understand users' perceptions and actions in facilitating or combating sustainability concerns for drones. Practically, this study may provide understanding of the concerns and impact of drones for drone manufacturers and environmental advocates. For future directions, we plan to extend our survey and integrate social media data to understand drone usage in additional contexts. Keywords: Sustainability, drones, structured equational modeling, theory of planned behavior

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Mathematical Evidence of Climate Change with R Simulation

Andrew Perry, Springfield College, USA

Abstract

This research will present a compelling mathematical argument that recent climate change is significant and has been caused by human activity. Gradual climate change on Earth is natural and even predates the homo sapiens species. However, we will consider the strong evidence that recently observed climate data is inconsistent with the hypothesis of natural change. Monte Carlo (stochastic) simulations using the R language will be utilized. Global surface temperature, greenhouse gas emission, sea ice and other data will be considered.

Implementation of Deep Learning Models in Predicting ESG Index Volatility

Hum Nath Bhandari, Roger Williams University, USA

Abstract

Artificial intelligence and machine learning techniques have been used widely in recent days in predicting stock market's returns, portfolio optimization, and risks assessment. In the meantime, consideration of environmental, social, and governance (ESG) aspects has become an integral part of investment decision for both individual and institutional investors during the construction of investment portfolio. Although ESG data is increasingly integrated into investment decision process, it is still not entirely exploited and accepted by the mainstream investment community. There could be several reasons, including the complexity of developing a uniform and transparent ESG scoring methodology and relatively high volatility involved in these kinds of portfolios compared to broad market indices. In this study, we implement deep learning models —LSTM, CNN, and GRU —to analyze and predict the returns, money inflow/outflow pattern, and volatility of some of the major ESG indices. Prediction accuracy and efficiency are compared within the models and also with that obtained while implementing in the broad market index such as S&P 500. A balanced combination of features are used to train these models and their performances are evaluated using standard assessment metrics —Root Mean Square Error (RMSE), Mean Absolute Percentage Error (MAPE), and Correlation Coefficient (R).

A New Information Bottleneck Theory and Its Application

Shervin Parsi, City University of New York, USA

Abstract

This research introduces a new information bottleneck framework to unify the supervised and unsupervised Machine Learning. This framework provides a new insight regarding the underlying mechanism of discriminative models. More specifically, this study explores the two phases of empirical error minimization and representation compression directly from the definition of loss function. Taking advantage of this new insight, the research introduces a modified classifier model to improve generalization error in the case of data scarcity. Finally, the study investigates applications of this new information bottleneck framework in reducing computational cost of training for generative models, such as energy-based models.

An Experiential Approach to Thermal Literacy

Patrick Charles, Roger Williams University, USA

Abstract

The paper discusses a semester-long assignment aimed at developing a basic thermal literacy in undergraduate architecture students. [Strand and Fisher, 2000] coined the term "thermal intuition" to describe how the use of thermal simulation software tools in coursework can improve students' understanding of how a space's thermal state changes over time under the influence of exterior and interior factors. The assignment discussed here is arguably a necessary prior step to that of the use of energy simulation software as proposed by Strand and Fisher. The advent of two very cheap tools, non-contact infrared thermometers, and anemometers, has made it easier than ever before for students to engage with that basic thermal literacy level.

The assignment consists of a journal with near-daily entries in which students input temperature, relative humidity and airflow velocity data using their own set of tools. In the assignment setup, the students have first to feel-and-predict, and, second, follow-up with an actual measurement. This two-step process is aimed to help the students relate their bodily sensation with the measurement data. The goal is for students to both gain an awareness of thermal phenomena, and, to train their body to better sense the thermal environment around them. The paper offers some insights on the students' reaction to the assignment, its strengths and limitations, as well as the experiential learning students gain from it. Finally, in light of the well-documented impact of occupants' behavior on the energy consumption of buildings, the paper advocates for the need of greater thermal literacy amongst the citizenry. A few potential ideas on how to make progress along that path are outlined.

The Influence of Economic Sanctions on the Russian Economy

Luis Eduardo Rivera Solis, Capella University

Abstract

Russia has made several controversial decisions in recent history. In an article published by the Economist titled "How new Sanctions Could Cripple Russia's Economy" it says, "Ever since Russia seized Crimea in 2014 Western sanctions have failed to bite or act as a credible deterrent against Russian aggression." Any major sanctions that Countries could have placed on Russia could have led to situations similar to what is happening in Ukraine today. Since 2014, many countries in the EU have vocalized the mistake they made in the past. On February 26th of this year, The United States and other allies came together to make sure that never happens again. The purpose of this paper is to examine the influence of economic sanctions on the Russian Economy.

Best Paper Award in Contribution to Theory

Sustainability & CSR: The Relationship with Hofstede Cultural Dimensions

Minoo Tehrani, Roger Williams University, USA
Andreas Rathgeber, University of Augsburg, Germany
Lawrence Fulton, Texas State University, USA
Bryan Schmutz, Western New England University, USA

Abstract

This research explores the relationship between Hofstede's femininity cultural dimension of quality of life and the masculinity cultural dimension of drive for success manifested by materialistic wealth by investigating the market value of the publicly traded firms appearing on the Dow Jones Sustainability Indices (DJSIs). The firms added to the DJSIs between the years 2010–2019 in countries with the femininity cultural dimension indicated by scores of ≤42, were selected for the first part of this study. In addition, France, with a masculinity score of 43 and Japan, with the highest masculinity score of 92, were chosen for comparison with the results from the countries with the femininity cultural dimension. The findings of this study indicate that companies in developed and emerging countries with the femininity cultural dimension show significant positive impact on their market values when added to the DJSIs. The publicly traded firms in France show a significant negative impact on their market values when added to the DJSIs. On the other hand, Japanese companies on the addition lists of DJSIs show a significant positive impact on their market values, despite Japan having the highest Hofstede masculinity score, a potential sign of cultural change in Japan.

Keywords: sustainability, CSR, DJSIs firm's market value, Hofstede's cultural dimensions, event study

Introduction

Numerous studies have utilized Hofstede's cultural dimensions [1,2] to examine different nations [3–7]. These studies have investigated different aspects of Hofstede's cultural dimensions, such as the individualistic versus collectivist dimensions [4,7], and uncertainty avoidance [8]. Meanwhile, other studies [9] have researched the relationship between culture, corporate social responsibility (CSR), and impact on a firm's performance.

Investigating the relationship between the impact on the market values of the firms that adopt sustainability strategies to achieve a net-zero carbon emission economy and enhancing the health and the welfare of communities has been the focus of several studies [10–15]. The Dow Jones sustainability indices (DJSIs) that report the engagement of corporations in sustainability practices along the social, economic, and environmental dimensions started more than twenty years ago. These indices have been used in different studies to explore the extent of engagement in socially responsible sustainability practices [16–19]. Our research is novel in this area by utilizing Hofstede's femininity and masculinity cultural dimensions to explore the relationship between the market values of the publicly traded firms when adopting socially responsible sustainability strategies manifested by appearance on the Dow Jones Sustainability Indices.

Literature Review and Research Goals

1.1. Studies on Hofstede Cultural Dimensions

Different studies have examined the relationship between culture and CSR [9] or the relationship between CSR among different groups of investors [18] and their impact on a firm's performance. According to Shi and Veenstra [9], there is a strong relationship between the cultural aspects of a country (e.g., individualism), CSR, and performance of the firms in that country [9]. The findings of their study indicate that in countries with Hofstede's collectivist cultural dimension, the shareholders value the engagement of the firms in socially responsible strategies indicated by positive impact on the financial performance of such companies. However, such an impact was not found in the countries that indicated Hofstede's individualistic cultural dimension [9].

Meanwhile, Lee et al. [18] studied different groups of investors and their reactions when the firms appeared on the DJSI in South Korea. The findings of their study indicate that governmental campaigns regarding CSR and appearance on the DSJI did not increase the market value of the firms [18].

This research explores the relationship between appearance of the firms on the DJSIs, the impact of the market value of the firms, and Hofstede's femininity and masculinity cultural dimensions. Based on Hofstede's cultural theories, countries with low masculinity scores of ≤42 are considered cultures associated with attention to the quality of life [20]. The adoption of sustainability strategies by different companies can enhance the health and the welfare and subsequently the quality of life in the communities around them. As a result, firms that adopt socially responsible strategies and contribute to enhancing the quality of life, as demonstrated by appearing on the Dow Jones Sustainability Indices, should be rewarded by increased stock prices upon the release of such news in the countries with the femininity cultural dimension.

On the other hand, in the countries with masculinity scores of 43 and above, materialistic wealth is appreciated [20]. According to research exploring the relationship between the appearance of the firms on the DJSIs and the market value of such firms, investors may perceive the implementation of sustainability strategies to be costly to these companies [14,21].
Consequently, companies in countries with the masculinity cultural dimension and appreciation for materialistic wealth [22] should experience negative impacts on their market value when added to the DJSIs due to the stockholders' assumption that such strategies would be costly to the firm.

1.2. Research Goals

To investigate the relationship between the appearance of firms on the DJSIs and market value, this research selected companies that were added to the DJSIs between the years 2010 to 2019 in countries with Hofstede's masculinity scores of ≤ 42, indicative of the femininity cultural dimension. The first proposal to be examined is delineated below:

1. There is a significant positive relationship between the market value of publicly traded companies and appearance on the DJSIs in countries characterized with the femininity cultural dimension (Hofstede's masculinity score of ≤ 42).

This study investigated this proposal by examining the list of countries with the femininity cultural dimension whose companies have been added to the Dow Jones Sustainability Indices between the years 2010–2019 include European and also emerging countries.

The second proposal of this research considers the strict sustainability rules and regulations delineated by Paris Accord [23] and the European Union's net-zero carbon emission goals [24]. As a result, the second proposal compares the addition of the European publicly traded firms to the DJSIs and the impact on their market values versus other listed companies from emerging countries. This proposal is presented below:

2. Publicly traded companies added to the DJSIs between the years 2010–2019 from the corresponding European countries with the femininity cultural dimension are expected to see a higher significant positive impact on their market value compared to listed companies from the corresponding emerging countries.

To further explore the differences between countries with the femininity cultural dimension and the countries with the masculinity cultural dimension, firms in two more countries were added to this research, France and Japan. France, with a masculinity score of 43, is considered halfway between the masculinity and femininity cultural dimensions. Japan, with the highest masculinity score of 92 is assumed to have the highest appreciation for material wealth. The proposals to be explored in this part of the research include:

3. There is a mixed significant negative or positive relationship between the market value of publicly traded French companies and their appearance on the DJSIs in France, a country with a Hofstede's masculinity score of 43, halfway between the femininity and masculinity cultural dimensions.

4. There is a significant negative relationship between the market value of publicly traded Japanese companies and appearance on the DJSIs in Japan, a country with the highest Hofstede's masculinity score of 92.

Methodology

3.1. Selected Countries

Hofstede Insights web site [25] was used to identify countries with a masculinity score of 42 and below, which comprise the countries with the femininity cultural dimension. During the years 2010–2019, the Dow Jones Sustainability Indices for the World, Europe, Asia Pacific, Korea, Emerging Markets, and MILA (Mercado Integrado Latinamericano) Pacific Alliance, were used to identify the companies that appeared on these lists in countries with the masculinity score of ≤42. As a result, we identified ten countries. Table 1 presents the list of these countries.

Table 1. Countries with masculinity score of ≤42, indicating femininity cultural dimension, 2010–2019.

Country	Masculinity Cultural Score
Sweden	5
Norway	8
Netherlands	14
Denmark	16
Finland	26
Chile	28
Portugal	31
Thailand	34
South Korea	39
Spain	42

As indicated in Table 1, there are ten countries on the DJSIs that fit the definition of countries with the femininity cultural dimension. Seven of these countries are located in Europe, with the northern European countries indicating the lowest masculinity scores (5-26). Portugal (31) and Spain (42) are the other European countries on the list. All the European countries on the above list have signed the Paris Accord and, with the exception of Norway, all of them are members of the European Union. The rest of the countries on this list are from Latin America and Asia and are considered emerging countries. They include Chile (28), South Korea (39), and Thailand (34).

Table 2 presents the companies in the European countries on Table 1 that appeared on the DJSI World and DJSI Europe during the years 2010–2019.

Table 2. List of the companies on the Dow Jones Sustainability addition lists and their corresponding European countries with the femininity cultural dimension (scores of ≤42), 2010–2019.

Year	Index	Company	Country
2010	DJSI World	Aegon N.V.	Netherlands
2010	DJSI Europe	Aegon N.V.	Netherlands
2010	DJSI Europe	Royal KPN N.V.	Netherlands
2010	DJSI Europe	Portugal Telecom SGPS S/A	Portugal
2010	DJSI World	Gamesa Corporacion Tecnologica S.A.	Spain
2010	DJSI World	Red Electrica Corp. S.A	Spain
2011	DJSI Europe	Orkla ASA	Norway
2011	DJSI Europe	Atlas Copco AB	Sweden
2011	DJSI Europe	Svenska Cellulosa AB	Sweden
2012	DJSI Europe	UPM-Kymmene OYJ	Finland
2012	DJSI Europe	Aegon NV	Netherlands
2012	DJSI Europe	Koninklijke Ahold NV	Netherlands
2012	DJSI Europe	Telenor ASA	Norway
2012	DJSI Europe	Amadeus IT Holding SA	Spain
2012	DJSI World	Hennes & Mauritz AB	Sweden
2013	DJSI World	ING Groep NV	Netherlands
2013	DJSI Europe	ASML Holding NV	Netherlands
2013	DJSI Europe	ING Groep NV	Netherlands
2013	DJSI World	Telefonica SA	Spain
2014	DJSI World	Telefonica SA	Spain
2015	DJSI World	Telefonica SA	Spain
2016	DJSI Europe	Novo Nordisk A/S	Denmark
2016	DJSI Europe	Iberdrola SA	Spain
2017	DJSI World	ASML Holding NV	Netherlands
2018	DJSI World	Banco Bilbao Vizcaya Argentaria SA	Spain
2018	DJSI Europe	Banco Bilbao Vizcaya Argentaria SA	Spain
2018	DJSI Europe	Essity AB	Sweden
2019	DJSI Europe	Telfonaktiebolaget LM Ericsson	Sweden

Table 3 presents the list of the companies from the emerging countries with the femininity cultural dimension (scores of ≤42) on the Dow Jones Sustainability addition lists during the years 2010–2019. The indices included DJSI World, DJSI Korea, DJSI Asia Pacific, DJSI MILA Pacific Alliance, and DJSI Emerging Markets.

Table 3. The list of the companies on the Dow Jones Sustainability addition lists and their associated emerging countries with the femininity cultural dimension (scores of ≤42), 2010– 2019.

Year	Index	Company	Country
2010	DJSI World	KT&G Corp	S. Korea
2011	DJSI World	Hyundai Mobis Co. Ltd.	S. Korea
2011	DJSI Korea	Hynix Semiconductor Inc	S. Korea
2011	DJSI Korea	Samsung Engineering Co. Ltd.	S. Korea
2011	DJSI Korea	Samsung Heavy Industries Co. Ltd.	S. Korea
2012	DJSI Korea	Hanjin Shipping Co Ltd	S. Korea
2012	DJSI Korea	KCC Corp	S. Korea
2012	DJSI Korea	Samsung Life Insurance Co Ltd	S. Korea
2012	DJSI Asia Pacific	Samsung Life Insurance Co Ltd	S. Korea
2013	DJSI World	Shinhan Financial Group Co Ltd	S. Korea
2013	DJSI Korea	Hanwha Chemical Corp	S. Korea
2013	DJSI Korea	LG Household & Health Care Ltd	S. Korea
2013	DJSI Korea	Samsung C&T Corp	S. Korea
2013	DJSI Asia Pacific	Samsung Fire & marine Insurance Co Ltd	S. Korea
2015	DJSI Emerging Markets	SACI Falabella	Chile
2015	DJSI Emerging Markets	Advanced Info Service PCL	Thailand
2016	DJSI Emerging Markets	Kasikornbank PCL	Thailand
2016	DJSI Emerging Markets	Thai Beverage PCL	Thailand
2017	DJSI World	Samsung Electronics Co Ltd	S. Korea
2017	DJSI Asia Pacific	Samsung Electronics Co Ltd	S. Korea
2017	DJSI Emerging Markets	CP ALL PCL	Thailand
2018	DJSI MILA Pacific Alliance	Enel Americas SA	Chile
2018	DJSI MILA Pacific Alliance	Enel Chile SA	Chile
2018	DJSI MILA Pacific Alliance	Inversiones La Construccion SA	Chile
2018	DJSI Emerging Markets	Enel Americas SA	Chile

Table 4 presents the French companies on the Dow Jones Sustainability addition lists collected from DJSI Europe and DJSI World during the years 2010–2019.

Table 4. French companies on the Dow Jones Sustainability addition lists, 2010–2019.

Year.	Index	Company	Country
2010	DJSI Europe	Klepierre S.A.	France
2011	DJSI World	Schneider Electric S.A	France
2011	DJSI World	Societe Generale S.A	France
2011	DJSI Europe	Alcatel-Lucent	France
2011	DJSI Europe	Alstom S.A	France
2011	DJSI Europe	Societe Generale S.A.	France
2013	DJSI Europe	Kering	France
2013	DJSI Europe	LVMH-Moët Hennessy Louis Vuitton SA	France
2013	DJSI Europe	Societe Generale SA	France
2015	DJSI World	GDF Suez	France
2015	DJSI World	Societe Generale SA	France
2015	DJSI World	Vinci SA	France
2015	DJSI Europe	BNP Paribas SA	France
2015	DJSI Europe	Sanofi	France
2015	DJSI Europe	Societe Generale SA	France
2016	DJSI World	Essilor International SA	France
2016	DJSI Europe	Essilor International SA	France
2016	DJSI Europe	TOTAL SA	France
2017	DJSI Europe	CapgeminiSA	France
2019	DJSI Europe	BNP Paribas SA	France
2019	DJSI Europe	Sanofi	France

Table 5 presents the Japanese companies on the Dow Jones Sustainability lists, DJSI World, and DJSI Asia Pacific, during the years 2010–2019.

Table 5. Japanese companies on the Dow Jones Sustainability addition lists, 2010–2019.

YearIndex	Company	Country
2010DJSI World	Nippon Yusen K.K	Japan
2010DJSI Asia Pacific	Seiko Epson Corp	Japan
2010DJSI Asia Pacific	Yokogawa Electric Corp.	Japan
2011DJSI Asia Pacific	Asahi Glass Co. Ltd.	Japan
2011DJSI Asia Pacific	Astellas Pharma Inc.	Japan
2011DJSI Asia Pacific	Itochu Corp.	Japan
2011DJSI Asia Pacific	Mitsubishi Corp.	Japan
2011DJSI Asia Pacific	Mitsubishi Estate Co. Ltd	Japan
2011DJSI Asia Pacific	Mitsubishi UFJ Financial Group Inc.	Japan
2011DJSI Asia Pacific	NTT DoCoMo Inc	Japan
2011DJSI Asia Pacific	Sumitomo Mitsui Trust Holdings Inc.	Japan

2012	DJSI Asia Pacific	JSR Corp	Japan
2012	DJSI Asia Pacific	Kirin Holdings Co Ltd	Japan
2012	DJSI Asia Pacific	Nitto Denko Corp	Japan
2012	DJSI Asia Pacific	Sysmex Corp	Japan
2012	DJSI Asia Pacific	Tokyu Land Corp	Japan
2013	DJSI World	ITOCHU Corp	Japan
2013	DJSI Asia/Pacific	Daiwa House Industry Co Ltd	Japan
2013	DJSI Asia/Pacific	Eisai Co Ltd	Japan
2013	DJSI Asia/Pacific	Inpex Corp	Japan
2013	DJSI Asia/Pacific	ITOCHU Corp	Japan
2013	DJSI Asia/Pacific	Sumitomo Electric Industries Ltd	Japan
2015	DJSI World	Mitsubishi Corp	Japan
2015	DJSI World	Nomura Holdings Inc	Japan
2015	DJSI Asia Pacific	Honda Motor Co Ltd	Japan
2015	DJSI Asia Pacific	Mizuho Financial Group	Japan
2015	DJSI Asia Pacific	Terumo Corp	Japan
2016	DJSI World	Bridgestone Corp	Japan
2016	DJSI World	Nissan Motor Co Ltd	Japan
2016	DJSI Asia Pacific	Fast Retailing Co Ltd	Japan
2016	DJSI Asia Pacific	Mitsui & Co Ltd	Japan
2016	DJSI Asia Pacific	MS&AD Insurance Group Japan Holdings Inc	Japan
2016	DJSI Asia Pacific	NTT DOCOMO Inc	Japan
2016	DJSI Asia Pacific	Tokyo Electron Ltd	Japan
2017	DJSI World	Honda Motor Co Ltd	Japan
2017	DJSI World	NTT Docomo Inc	Japan
2017	DJSI Asia Pacific	Kubota Corp	Japan
2017	DJSI Asia Pacific	Mitsubishi Heavy Industries Ltd	Japan
2017	DJSI Asia Pacific	Sekisui House Ltd	Japan
2018	DJSI World	Nippon Telegraph & Telephone Corp	Japan
2018	DJSI Asia Pacific	Chugai Pharmaceutical Co Ltd	Japan
2018	DJSI Asia Pacific	Ricoh Co Ltd	Japan
2018	DJSI Asia Pacific	Tokio Marine Holdings Inc	Japan
2019	DJSI World	Takeda Pharmaceutical Co Ltd	Japan
2019	DJSI Asia Pacific	Eisai Co Ltd	Japan
2019	DJSI Asia Pacific	Meiji Holdings Co Ltd	Japan
2019	DJSI Asia Pacific	Olympus Corp	Japan
2019	DJSI Asia Pacific	Recruit Holdings Co Ltd	Japan

3.2 Statistical Analyses

Studies on the information released in the capital markets and the impacts on the stock prices of the companies have often utilized event study methods [26–29]. According to these studies, a firm's value can be examined based on the new available information in the capital markets. Utilizing event study, one can investigate the impact on a firms' stock price of the release of such information within short windows of time [29]. As a result, event study can indicate the positive impact on the abnormal rate of returns (ARRs) when the released information is considered beneficial, or it can show negative abnormal rate of returns when the market assumes that the released information is harmful [30]. The market model is often utilized to estimate ARRs [31,32]. The market model allows for the calculation of the correlation between stock price and expected or normal return on or around a window of time when specific information (the event) is released to capital markets [31,32]. The market model uses a short window before the event and assesses the abnormal returns (AR) on the stock. In addition, a short window is used after the event to allow for the calculation of the abnormal rate of returns (ARRs), which is the return due to the new information about the company (i.e. event), the cumulative abnormal returns (CAR), and cumulative average abnormal returns (CAARs) [31,32].

This research utilizes event study to explore the impact of addition to the Dow Jones Sustainability Indices on the companies' stock prices in the European countries presented in Table 2 and in the emerging countries presented in Table 3. Since France is halfway between the femininity and masculinity cultural dimensions with a score of 43, the French companies presented in Table 4 are also examined. Furthermore, the Japanese companies that were added to the DJSIs during the years 2010–2019 (Table 5) are also examined, and the results are compared with the companies in the countries with the femininity cultural dimension (Table 2–3).

All stock prices of the companies under the study were taken from the corresponding country's stock market exchanges and currency within the years 2010–2019. The stock market exchanges for collecting the European stock prices included DJSI World and DJSI Europe. The currencies for the European countries included Norwegian Krone, Danish Krone, Swedish Krona, and for the rest, Euro. For South Korea, the currency used for the statistical analyses was the Won, and for Chile, the Chilean Peso. This information was collected from the corresponding stock market exchanges: DJSI Korea, DJSI Asia Pacific, DJSI MILA Pacific Alliance, DJSI World, and DJSI Emerging Markets. For Thailand, we had to use the Singapore dollar for one company (Thai Beverage), but the rest of the Thai companies' stock prices were evaluated with Thai Baht. For France, DJSI World and DJSI Europe with Euro as the currency comprised the data. For Japan, DJSI World and DJSI Asia Pacific were used to collect the data with Japanese Yen as the currency.

Results

In order to investigate the impact of the addition to the DJSI lists for the countries with the femininity cultural dimensions, event study was utilized. Stock prices, within windows starting at most 10 days before and ending at most 10 days after the event, were investigated to evaluate the cumulative abnormal returns (CARs) for firms in the countries with Hofstede masculinity score of ≤ 42. Table 6 and Figure 1 present the results of this part of the study.

Table 6. Daily cumulative abnormal returns (CARs) around the announcement dates for companies added to the DJSI in countries with Hofstede masculinity scores of ≤ 42, 2010–2019.

The DJSIs 2010–2019, N=49			
Day	CAR	Day	CAR
-10	-0.0003	1	0.0268
-9	0.0083	2	0.0316
-8	0.0098	3	0.0434
-7	0.0170	4	0.0455
-6	0.0211	5	0.0428
-5	0.0206	6	0.0394
-4	0.0111	7	0.0394
-3	0.0076	8	0.0246
-2	0.0188	9	0.0137
-1	0.0248	10	0.0148
0	0.0271		

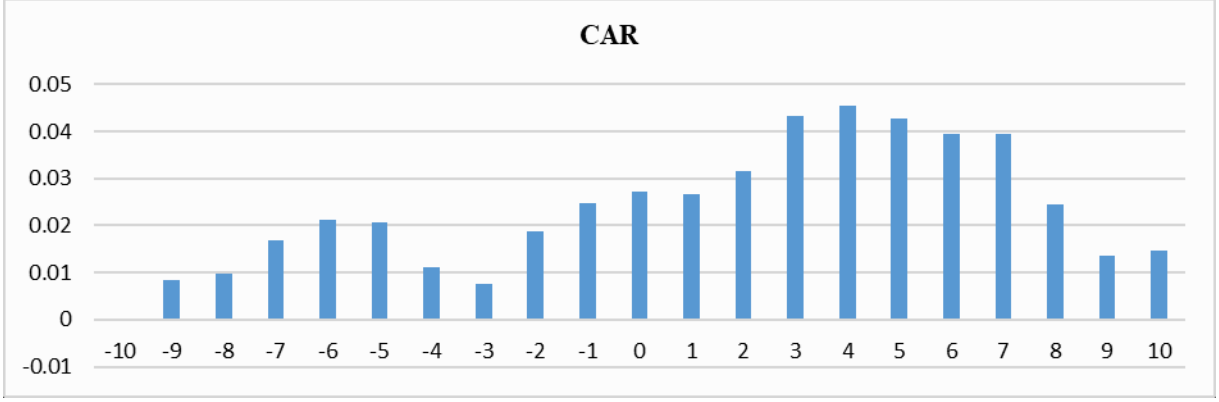

Figure 1. Daily cumulative abnormal returns (CARs) around the announcement date [- 10,10] for the companies added to the DJSIs for countries with Hofstede masculinity scores of ≤ 42.

As presented in Table 6 and Figure 1, the event study using a symmetric 10-day event window [-10,10] shows that addition to the DJSIs result in a positive impact on the cumulative abnormal returns (CARs) after the announcement for the companies in countries with the femininity cultural dimension. As indicated in Table 6 and Figure 1, this impact is more pronounced from 1–7 days after the announcement date.

In the event study, CAARs were compared to the expected market model and then evaluated for statistically significant indicators. Simple t-tests were conducted to evaluate the significance of the findings. Table 7 is the event study analysis for four different windows: [-10,10], [-2,2], [-5,5], and [-1,1].

Table 7. Cumulative average abnormal returns (CAARs) around the announcement date [-10,10] for the companies added (N= 49) to the DJSIs in the countries with femininity cultural dimension, Hofstede's score of ≤ 42, 2010–2019.

Days	CAAR	t-test *p*-value
[-10, 10]	1.480%	0.1974
[-2, 2]	2.404%***	**0.0031**
[-5, 5]	2.166%**	**0.0445**
[-1, 1]	0.799%	0.1129

As indicated in Table 7, the announcement of the addition to the DJSIs has a significant positive impact on the cumulative average abnormal returns (CAARs) of the companies in countries with femininity cultural dimension for [-2,2] and [-5,5] windows.

The results of this part of the research indicate support for Proposal 1 of this study. There was a significant positive relationship between the market values of the publicly traded companies and their appearance on the Dow Jones Sustainability Indices in the countries characterized with the femininity cultural dimension by having the masculinity score of ≤ 42. Based on these results, there was a significant increase in the stock prices of the companies when they were added to the Dow Jones Sustainability Indices in the countries with femininity cultural dimension. These results provide further support for Hofstede's concept that the countries with low masculinity scores value quality of life that is manifested in this study by rewarding the companies that adopt socially responsible strategies with the potential of enhancing the health and the welfare of the communities.

In the following event study analysis, the impact of the addition of the companies to the DJSIs on the cumulative abnormal returns (CARs) for the developed countries (Netherlands, Spain, Sweden, Norway, Denmark, Finland) were compared with those in emerging countries (South Korea, Chile, Thailand). Table 8–Table 9 and Figure 2–Figure 3 present the results of this part of the study. There was only one company from Portugal during the years 2010–2019 that was added to the DJSI, but the company was privately held and thus excluded from further analysis.

Table 8. Daily cumulative abnormal returns (CARs) around the announcement date [-10,10] for the companies added to the DJSIs in the developed countries with Hofstede's masculinity score of ≤ 42, 2010–2019.

10–2019—Developed Countries N=24			
Day	CAR	Day	CAR
-10	-0.0012	1	0.0347
-9	0.0081	2	0.0395
-8	0.0070	3	0.0487
-7	0.0256	4	0.0578
-6	0.0339	5	0.0537
-5	0.0304	6	0.0453
-4	0.0233	7	0.0539
-3	0.0212	8	0.0106
-2	0.0286	9	0.0044
-1	0.0355	10	0.0143
0	0.0331		

Table 9. Daily cumulative abnormal returns (CARs) around the announcement date [-10,10] for companies added to the DJSIs in the emerging countries with Hofstede's masculinity score of ≤ 42, 2010–2019.

10–2019—Emerging Countries N=25			
Day	CAR	Day	CAR
-10	0.0005	1	0.0193
-9	0.0085	2	0.0241
-8	0.0124	3	0.0384
-7	0.0087	4	0.0337
-6	0.0089	5	0.0323
-5	0.0112	6	0.0337
-4	-0.0006	7	0.0255
-3	-0.0055	8	0.0106
-2	0.0095	9	0.0044
-1	0.0145	10	0.0143
0	0.0214		

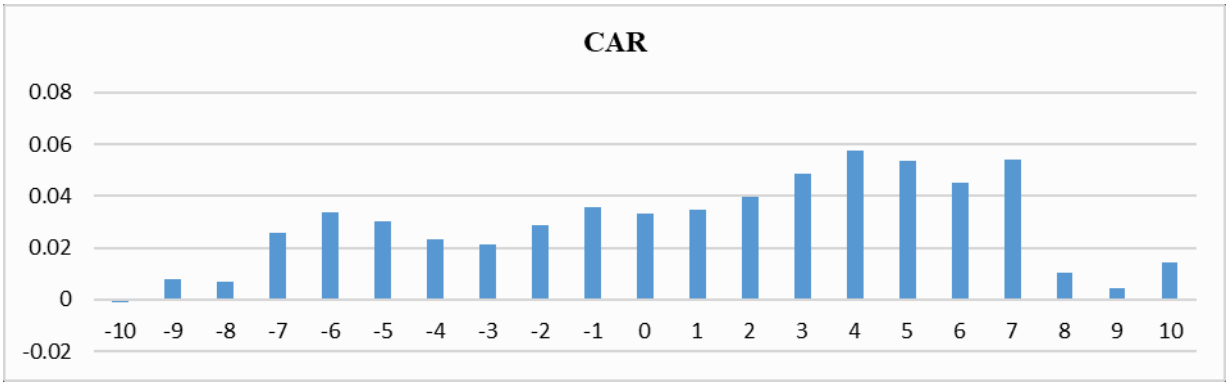

Figure 2. Daily cumulative abnormal returns (CARs) around the announcement date [- 10,10] for the companies added to the DJSI in the developed countries with Hofstede's masculinity score of ≤ 42, 2010–2019.

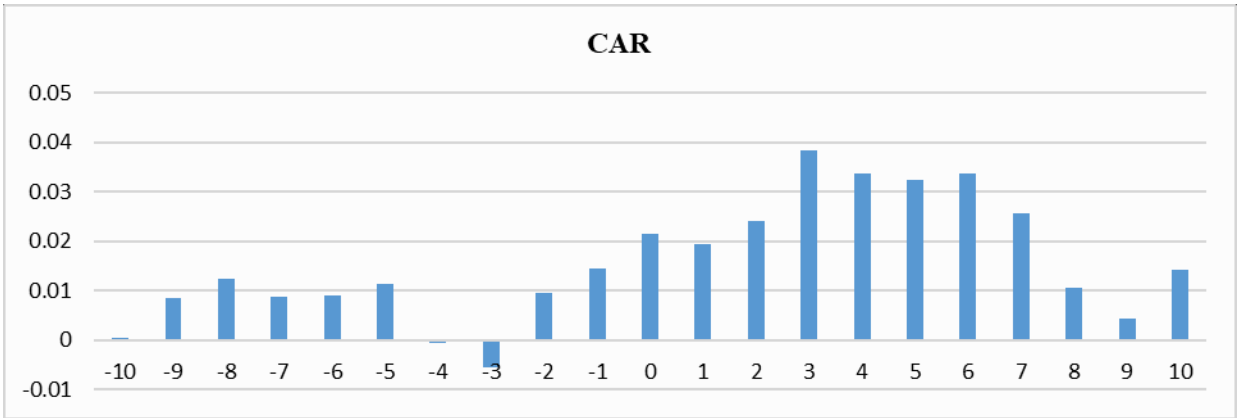

Figure 3. Daily cumulative abnormal returns (CARs) around the announcement date [- 10,10] for companies added to the DJSIs in the emerging countries with Hofstede's masculinity score of ≤ 42, 2010–2019.

As presented in Table 8–Table 9 and Figure 2-Figure –Figure 3, the event study using a symmetric 10-day event window [-10,10] shows that addition to the DJSIs for the companies in developed countries with the femininity cultural dimension results in a positive impact on cumulative abnormal returns on day 1 after the announcement date. However, for companies added to the DJSIs in emerging countries with the femininity cultural dimension, this impact was more pronounced on day 2 after the announcement date. In both instances, the positive impact continued through day 7 after the announcement date.

To provide support for the results of the event study presented in Tables 8–Table 9, a market model analysis was conducted. The results are presented in Table 10 and Table 11.

Table 10. Cumulative average abnormal returns (CAARs) around the announcement date [-10,10] for companies added (N=24) to the DJSIs in developed countries with Hofstede masculinity score of ≤ 42, 2010–2019.

Event Window	CAAR	t-test *p*-value
[-10, 10]	1.534%	0.1214
[-2, 2]	1.826%**	**0.0038**
[-5, 5]	1.978%**	**0.0217**
[-1, 1]	0.611%	0.1095

Table 11. Cumulative average abnormal returns (CAARs) around the announcement date [-10,10] for companies added (N=25) to the DJSIs in emerging countries with Hofstede masculinity scores of ≤ 42, 2010–2019.

Event Window	CAAR	t-test *p*-value
[-10, 10]	1.429%	0.3270
[-2 , 2]	2.959%**	**0.0330**
[-5, 5]	2.346%	0.1567
[-1, 1]	0.980%	0.2091

As indicated in Table 10, the results of the model market study for companies added to the DJSIs in the developed countries support the event study results shown in Table 8. The announcement of addition to the DJSIs has a significant positive impact on the cumulative abnormal returns of companies (CAARs) in the developed countries with masculinity score of ≤ 42 for the windows [-2,2] and [-5,5] as indicated by (**) in Table 10. However, as presented in Table 11, the results of the market model analysis for the companies added to the DJSIs in emerging countries indicate that addition to the DJSIs creates a significant positive impact on the cumulative average abnormal return for a shorter period of time of up to 2 days after the announcement date as indicated by (**). Proposal 2 of this study investigated if the studied firms in European countries with the femininity cultural dimension would show a higher significant positive impact on their market values than the listed companies from corresponding emerging countries. The results of this part of the study indicate that the companies on the Dow Jones Sustainability Indices from the listed developed countries show a significant positive impact on their market values when they appear on the DJSIs. The companies on the DJSIs from the listed emerging countries also show a significant positive impact on their market values, but for a shorter period of time. Again, these results provide support for Hofstede's concept regarding countries with the femininity cultural dimension appreciating quality of life. Based on the above results, stockholders in such countries appear to reward the adoption of socially responsible practices by their home companies that have the potential of enhancing quality of life, as indicated by higher stock prices when added to the DJSIs.

The next part of the study concentrates on Proposal 3 to investigate if there is a mixed significant negative or positive relationship between the market value of publicly traded French companies and appearance on the DJSIs in France. France, with its Hofstede's masculinity score of 43, is considered halfway between the femininity and masculinity cultural dimensions. Table 12 and Figure 4 present the daily cumulative abnormal returns (CARs) for French companies that were added to the Dow Jones Sustainability Indices during the years 2010–2019.

Table 12. Results of the daily abnormal returns around the announcement date [-10,10] for the French companies added to the Dow Jones Sustainability Indices, 2010–2019.

010–2019—French Companies N=14

Day	CAR	Day	CAR
-10	-0.0281	1	-0.0430
-9	-0.0094	2	-0.0272
-8	0.0089	3	-0.0309
-7	0.0248	4	-0.0010
-6	0.0348	5	-0.0193
-5	0.0284	6	-0.0372
-4	0.0054	7	-0.0385
-3	-0.0135	8	-0.0337
-2	-0.0078	9	-0.0900
-1	-0.0061	10	-0.0959
0	-0.0265		

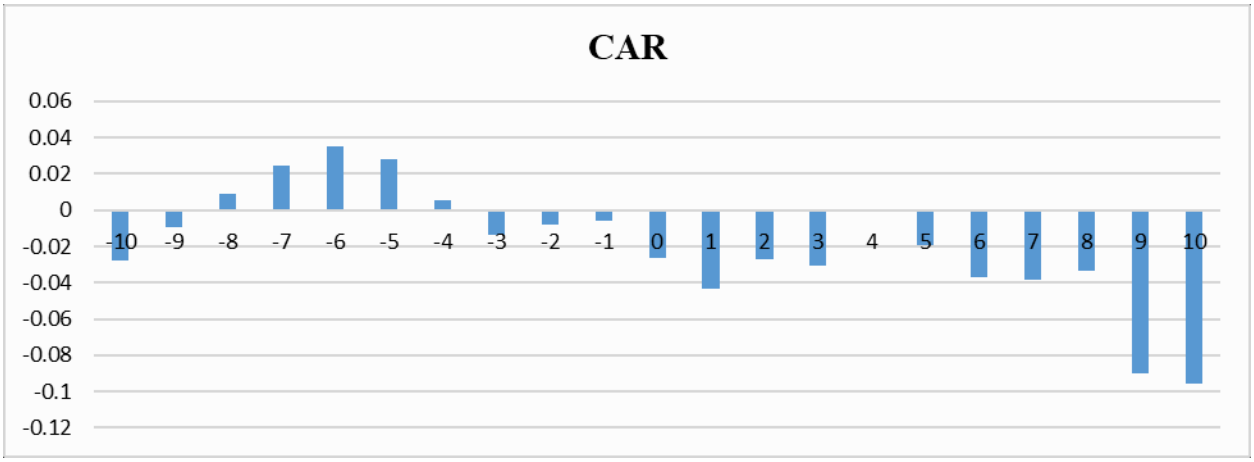

Figure 4. Results of the daily abnormal returns around the announcement date [-10,10] for the French companies added to the Dow Jones Sustainability Indices, 2010–2019.

As indicated in Table 12 and Figure 4, the daily cumulative abnormal returns (CARs) indicate that the French companies that are added to the Dow Jones Sustainability Indices experience negative impacts on their stock prices. In order to strengthen the above findings, market model analysis was also conducted on these data. Table 13 indicates the results of this part of the research.

Table 13. Cumulative average abnormal returns (CAARs) around the announcement date [-10,10] for the French companies added (N=14) to the DJSIs, 2010–2019.

Event Window	**CAAR**	**t-test *p*-value**
[-10, 10]	-9.589%***	**0.0001**
[-2, 2]	-1.367%*	**0.0818**
[-5, 5]	-5.419%***	**0.0008**
[-1, 1]	-3.524%***	**0.0001**

As presented in Table 13, the results of the model market analysis for the French companies that were added to the Dow Jones Sustainability Indices during the years 2010–2019 show a prolonged significant negative impact on their market value within the [-1,1] to [-10,10] windows indicated by (*, ***).

Proposal 3 of this study was to explore the notion that France, being half-way between the femininity and masculinity cultural dimensions with a score of 43, shows a mixed reaction to companies that adopt the sustainability practices. However, the results of the statistical analyses do not support this proposal. The appearance of the French companies on the Dow Jones Sustainability Indices shows a significant negative and prolonged impact on the market value of such firms. These results are interesting, considering that France is a member of the European Union and it is where the Paris Accord was signed.

The following part of the study concentrated on the Japanese companies and Proposal 4 of this research. This proposal investigated whether there was a significant negative relationship between the market value of the publicly traded Japanese companies and appearance on the DJSIs in Japan, with the highest Hofstede's masculinity score of 92. Table 14 shows the results of the event study for the daily cumulative abnormal returns (CARs) for the Japanese companies that were added to the Dow Jones Sustainability Indices from 2010 through 2019.

Table 14. Results of the daily abnormal returns around the announcement date [-10,10] for Japanese companies added to the Dow Jones Sustainability Indices, 2010–2019.

10–2019—Japanese Companies N=49			
Day	CAR	Day	CAR
-10	-0.0116	1	0.0241
-9	-0.0063	2	0.0295
-8	0.0049	3	0.0273
-7	0.0087	4	0.0312
-6	0.0149	5	0.0521
-5	0.0144	6	0.0474
-4	0.0249	7	0.0329
-3	0.0185	8	0.0356
-2	0.0203	9	0.0252
-1	0.0230	10	0.0332
0	0.0264		

As indicated in Table 14 and Figure 5, Japanese companies show positive impacts on their market value when added to the Dow Jones Sustainability Indices. To further investigate these results, a market model analysis was again conducted. The results are presented in Table 15.

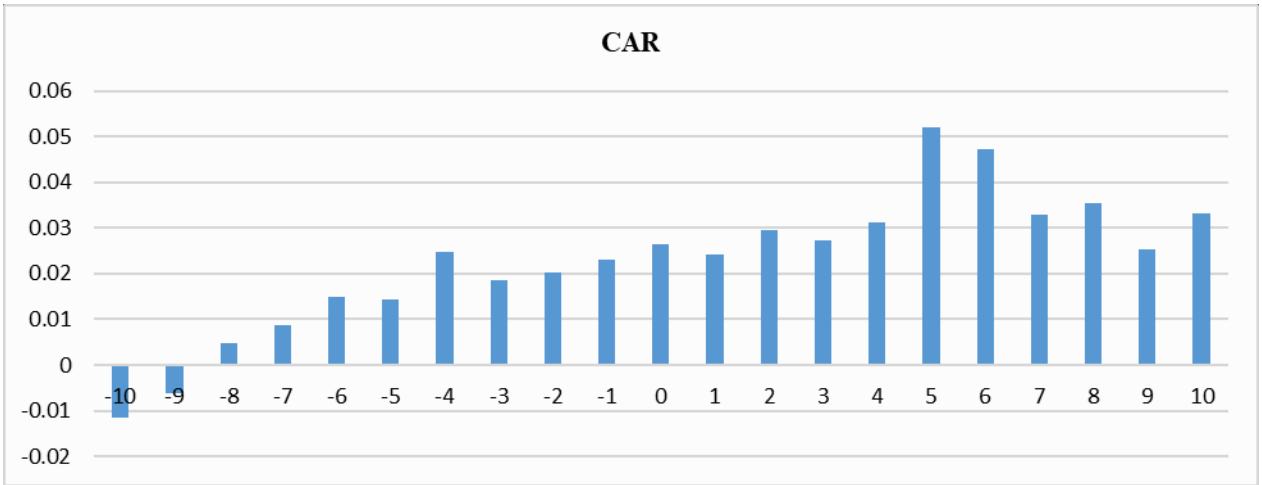

Figure 5. Results of the daily abnormal returns around the announcement date [-10,10] for Japanese companies added to the Dow Jones Sustainability Indices, 2010–2019.

Table 15. Cumulative average abnormal returns (CAARs) around the announcement date [-10,10] for Japanese companies added (N = 49) to the DJSIs, 2010–2019.

Event Window	**CAAR**	**t-test *p*-value**
[-10, 10]	3.322%***	**0.0015**
[-2, -2]	1.100%**	**0.0198**
[-5, 5]	3.716%***	**0.0000**
[-1, 1]	0.376%	0.1778

The results presented in Table 15 support the findings indicated in Table 14 and Figure 5. Japanese companies indicate higher and longer significant positive impacts on their market value when they are added to the Dow Jones Sustainability Indices, as indicated by (*, **, ***). The results of the above statistical analyses do not support Proposal 4 of this study. Japan, with the highest masculinity score of 92 should show a significant negative relationship between the market value of the publicly traded companies and appearance on the DJSIs. However, the results do not support such relationship. It is interesting to note that there are more Japanese companies (49) on the DJSI lists during the years 2010–2019 than any country with the femininity cultural dimension. In addition, the impact on the market value of the Japanese companies is significantly positive and more prolonged than in the other studied companies on the DJSI lists in the countries with the femininity cultural dimension.

To create a visualization of the findings of this study, we plotted the calculated CARs. These calculated CARs depict companies in the sample data in the European, emerging countries, France, and Japan. Figure 6 shows the results.

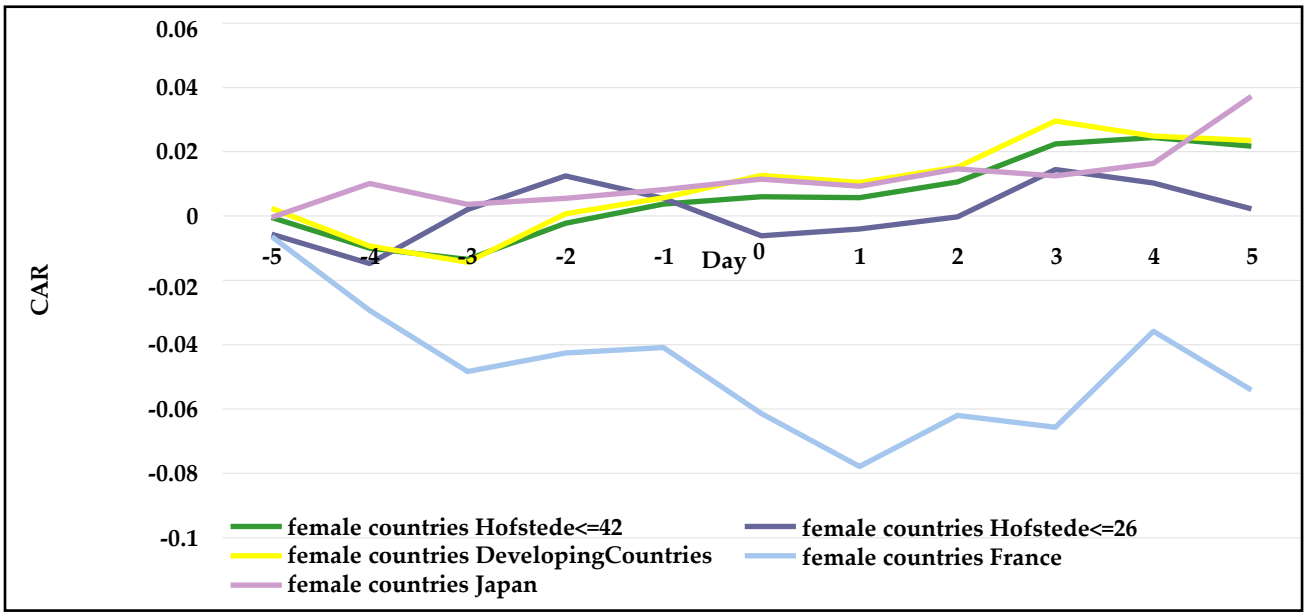

Figure 6. CARs representing the companies on the DJSIs in the sample data [-1,1] to [-,5], 2010–2019.

Figure 6 provides a visual representation of the calculated CARs in this study. French CARs, represented by the blue line, show a negative impact on their market value when appearing on the DJSIs. The green line indicates calculated CARs for the companies in countries with the femininity cultural dimension (masculinity score of ≤42). The green line shows that these companies experience positive impacts on their market value within the [-5,5] announcement window. The purple line represents the calculated CARs for companies in the northern European countries with a very low masculinity score (≤26). The purple line shows a positive impact on their market value when added to the DJSIs within the [-5,5] announcement window. As discussed before, companies in emerging markets with the femininity cultural dimension also show positive impact on their market value when added to the DJSIs, as represented by the yellow line, similar to the Northern European countries. The results of this study for the Northern European countries are supported by other studies [33] that Scandinavian countries and their companies are at forefront in CSR and sustainability practices.

To further investigate the results indicated in Figure 6, France was compared with countries having Hofstede's masculinity scores close to 43, but within the femininity cultural dimension, Spain (42) and South Korea (39). In addition, Sweden, with the lowest masculinity score (5), and Japan, with highest masculinity score (92), were included. Figure 7 shows a visualization of this comparison.

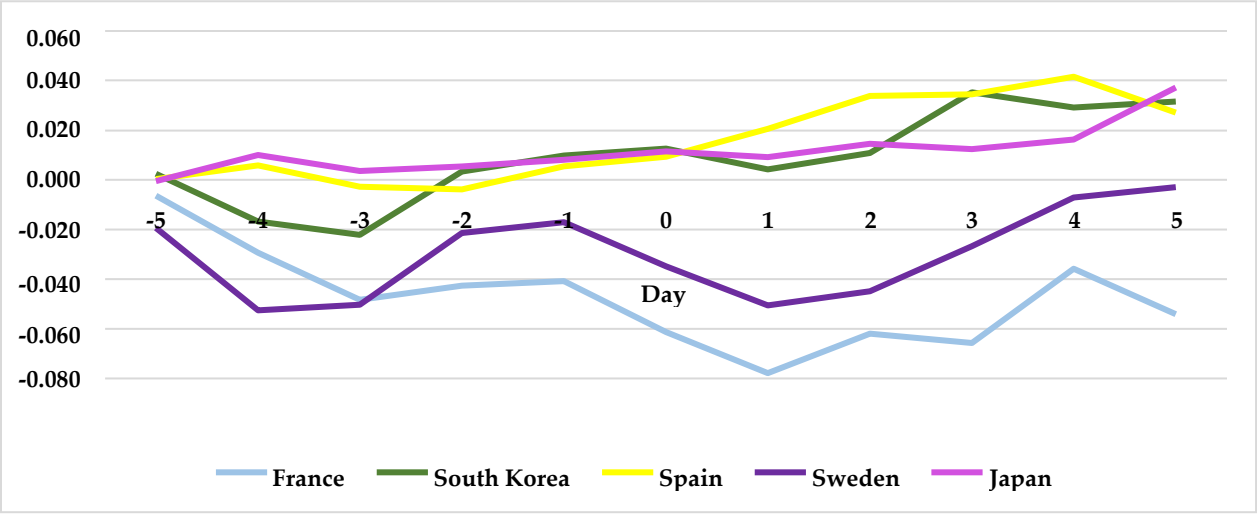

Figure 7. CARs representing the French, Swedish, South Korean, and Japanese companies on the DJSIs in the sample data [-1,1] to [-5,5], 2010–2019.

In Figure 7, the blue line, representing French companies' CARs, shows a negative impact on market value when appearing on the DJSIs, while companies in Spain (yellow line) and South Korea (green line) show a positive impact on their market value when added to the DJSIs. The same is true for Swedish companies, with Sweden having the lowest masculinity score. Meanwhile, Japanese companies, with Japan having the highest masculinity score, indicate a positive impact on their market value when added to the DJSIs. Figure 7 supports the visualization presented in Figure 6.

As mentioned before, the interesting finding of the study is that Japanese companies, as indicated by the pinkish line in Figure 6 and Figure 7, show a positive impact on their market value when added to the DJSIs. This is an indication that the Japanese cultural dimension has shifted. Based on research [34], investors need to be more involved and engaged in interactive relationships with firms in order to value and understand their CSR and sustainability strategies.

Conclusions

The global attention to the sustainability practices is evident by UNESCO's sustainability goals [35] and also the Paris Accord, which has been signed by 197 countries to date [23]. These goals emphasize enhancing the health and the welfare of living species, the physical environment, reduction of greenhouse gases (GHG), and the implementation of socially responsible and sustainability strategies across the activity cost chain of companies. As a result, getting the involvement of the companies in implementation of CSR and sustainability strategies is essential to enhancing the quality of life across the globe.

In this study, we selected Hofstede's femininity cultural dimension and explored the notion that countries with a low masculinity cultural dimension care for quality of life more than materialistic wealth. The results of the statistical analyses of this research indicate that countries with the femininity cultural dimension do reward the companies that invest in socially responsible strategies that can enhance the quality of life. These findings support of Hofstede's concept regarding a positive relationship between countries with the femininity cultural dimension and respect for quality of life.

An interesting finding is the impact on the market value of the French companies when they

appear on the Dow Jones Sustainability Indices. France, with a Hofstede masculinity score of 43, is considered to be halfway between the masculinity and femininity cultural dimensions. However, based on our findings, when French companies are added to the DJSIs, their market value is significantly and negatively affected, indicative of a fully masculine cultural dimension. As a result, the concern for materialistic wealth associated with Hofstede's masculinity cultural dimension manifests itself strongly in France. Considering that France is a member of the European Union and that the net-zero carbon emission economy goal is to be achieved by the year 2050 [24], it is interesting that, based on these findings, stockholders do not appreciate the adoption of sustainability strategies by the French companies.

Another interesting finding of this study is the attitude of stockholders of Japanese companies that appear on the DJSI lists. Based on Hofstede's masculinity score, Japan, with the highest masculinity score, should demonstrate more preference for materialistic wealth than quality of life. However, it appears that Japanese stockholders appreciate the adoption of socially responsible strategies by Japanese companies as manifested by the most significant, positive, and prolonged impact on their stock prices among all the studied companies and countries in this research.

Future research in this area can include exploring the cultural changes in different countries, the impact of global agreements on appreciation of CSR and enhancing quality of life, and education of stakeholders and the populations of different countries concerning corporate social responsibility and the implementation of sustainability practices by different companies. In addition, we included the highest masculinity cultural dimension country, Japan, in our research and the results of the study indicated cultural change. Future research should include other countries with masculinity cultural dimension to examine any changes in the cultural aspects of such countries.

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Is the Negative Impact of Interest Rate Changes on Mineral Commodity Prices Still Valid? Evidence from a Meta Regression Analysis

Victoria Zender, University of Augsburg

Abstract

Managing storm water runoff in cities is a major concern for both citizens and municipalities. Increased urbanization continues to expand impervious surface areas such as roads, parking lots and plazas, and limit infiltration and uptake of surface runoff. Catastrophic floods, landslides, and mudslides continue taking lives, while economies, ecologies, and human health are being seriously affected by untreated storm water discharge into the world's precious water bodies.

Many municipalities across the globe have made financial commitments in integrating green infrastructure into their urban landscapes to better capture, treat, and reuse storm water runoff. Recent research indicates that municipal officials often perceive green infrastructure as performing inconsistently across its lifecycle and requiring labor-intensive maintenance. These officials hold positive views about green infrastructure but want more information on performance and costs to reduce runoff (Meng, Hsu, & Wadzuk 2017). This research aims to introduce three case studies from the United States where the performance of urban parks, plazas, and streetscapes in reducing runoff is empirically measured and documented. By generating and disseminating quantified data, the research aims to provide guidance on better-informed green storm water infrastructure investment in cities. The research also looks at ways and means to reduce labor and maintenance costs of green storm water infrastructure. Data collection and analysis processes were performed according to the Landscape Architecture Foundation's *case study investigation (CSI)* methodologies. The study sequence included identifying possible performance indicators by reviewing each studied project's challenges and solutions, determining appropriate metrics for each performance indicator, gathering primary and secondary data, and calculating performance, and comparing findings from each case studies.

Primary and secondary data collection methods included user counts, user observations, temperature comparison studies, and review of design and construction documents obtained from the designers, stakeholders, and different public databases. Quantifying green storm water infrastructure's contribution to urban resiliency and sustainability is not only important in supporting the development of better design and engineering standards for such systems in our cities but also provides municipal leaders with much needed datasets to make informed decisions during the fund allocation phases.

Meng, Hsu, & Wadzuk. 2017. Green and Smart: Perspectives of City and Water Agency Officials in Pennsylvania toward Adopting New Infrastructure Technologies for Storm water Management. Journal of Sustainable Water in the Built Environment.

Keywords: *landscape performance, post-occupancy evaluation, empirical data analysis*

Free Trade Agreement: AANZFTA

Minoo Tehrani, Roger Williams University, USA
Izaiah Farr, Roger Williams University, USA
Kiernan Freeman, Roger Williams University, USA
Nicholas Harper, Roger Williams University, USA M
Matthew Wilson, Roger Williams University, USA

This study examines ASEAN Australia-New Zealand Free Trade Agreement (AANZFTA) with a population of more than 630 million [1]. In addition to Australia and New Zealand, there are ten southeast Asian countries that are part of this trade agreement, which was signed by all the member countries by 2012 [1]. This research concentrates on the rules and regulations of AANZFTA, experts, imports, and the trade barriers that have been reduced or eliminated among the member countries. In addition, the accomplishments of this trade pact are discussed. Furthermore, the study explores the issues and problems, such as tariffs and non-tariff barriers. The last part of the study discusses the sustainability issues along several dimensions, GHG emission, growing population, political issues, and natural resources. In 2019, Australia's CO2 emission was around 526 million metric tons [2]. Also, the vulnerability of the SEAN courtiers and their exports and the impacts on their agriculture, natural resources, and forestry are explored. The research concludes with recommendations as to the future sustainability areas that need more attention for AANZFTA to be of true economic value to the ASEAN countries in addition to Australia and New Zealand.

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2. https://www.statista.com/statistics/1014951/australia-yearly-greenhouse-gas-emissions/

International Trade Pacts: COMESA

Minoo Tehrani, Roger Williams University, USA
Bryanna Bay, Roger Williams University, USA
Allison Bradley, Roger Williams University, USA
Novian Rivera, Roger Williams University, USA

Abstract

This study explores the Common Market of Eastern and Southern Africa (COMESA) trade pact. The research examines the goals and objectives of the trade pact and its function since COMESA was enacted in the year 2000. The rules and regulations regarding the trade pact are presented and the exports and imports of the twenty-one member countries in the free trade and customs union areas are discussed. In addition, the study examines the accomplishments of the trade pact along transportation, health care, advancement in technology, and the attempt to establish a single currency across member countries. Furthermore, and the issues and problems of the trade pact, poor infrastructure and technology, cross membership, limitation of exports from member countries, and political concerns are discussed. The research also concentrates on sustainability and the potential of economic growth of the member countries. The last part of the study discusses the new European Union human rights policy, Responsible Business Conduct (RBC), and Due Diligence (DD), in regards to trade with some of the COMESA countries.

ESG Disclosure and Employee Turnover: New Evidence from European Listed Firms

Aziza Garsaa, ICN-ARTEM Business School, France
Elizabeth Paulet, ICN-ARTEM Business School, France

This paper aims to analyze the link between ESG (Environmental, Social and Governance) transparency and employee turnover for 212 multinational firms listed in the European capital market during the 2010-2017 period. The estimation results of a panel data quantile regression model show that firm transparency, measured by the Bloomberg ESG disclosure score, is negatively associated with employee turnover rate. Nevertheless, the determinants of employee turnover and the extent to which it is affected by ESG disclosure are strongly dependent on the conditional distribution of turnover rate, the sectoral characteristics, and the corporate sustainability reporting regime in place. A robustness analysis clearly confirms these findings.

Keywords: ESG disclosure, employee psychological needs, job satisfaction, employee turnover, panel data fixed effect quantile regression

To Include or Not to Include: That Is the Question

Wendy Sagers, Linfield University, USA
Gayatree Siddhanta, Linfield University, USA

Abstract

The Provost of a small liberal arts university in Arizona is pondering over the two options of approving Service Learning as a requirement for graduation in two years' time or simply adding it as an elective course for all majors. Her first option of positioning the new course as a requirement for graduation will require no segmentation in the student body. She has seen the impacts similar required courses have made in the community. She is also aware how faculty from different schools within the university joined hands to create this proposal in spite of initial differences in how best to ensure the alignment of the service part of Service Learning with broader graduation requirements. Now the buck stops with her. She realizes that in a pandemic-ridden world, this is going to be a challenge. On one hand, this proposal falls in line with the strategic vision of the university to revamp the liberal arts curriculum. On the other hand, it appeared as though the key stakeholders of this project have their constraints stemming from a variety of sources. Surely, a broader positioning of Service Learning as a required course is poised to attract resistance from overburdened faculty. If it is offered as a campus-wide elective, students might consider it as a low–stake course and it might defeat the purpose of connecting the students to the community and teaching them the value of serving. With a community that is increasingly hurting from economic downturn, businesses and non-profit organizations alike would welcome an opportunity of student help. Should the Provost make Service Learning a requirement or let it be an elective? Learning objectives: 1. Learn how to build interdisciplinary service learning courses that meet community needs. 2. Learn how to assess efficiency and effectiveness of decision-making in leadership positions. 3. Learn how to do a SWOT analysis of a new product offering in a non-profit setting. 4. Learn how to do product positioning in a non-profit/academic setting.

Towards a Model of Sustainable Negotiation

Guy Deloffre, ICN-ARTEM Business School, France

Abstract

This paper deals with some aspects of business negotiations and proposes a model useful to understand tactical elements of business strategies and to anticipate the behavior of business negotiators. In this study, we start from the qualities of a successful and sustainable negotiation:

- It proposes a final result which brings more than the status quo, - It satisfies minimally the interests and needs of all parties involved, - It allows to keep a long lasting relationship between the participants. Traditional approaches of negotiation concentrate on the result of the negotiation: gain more or less. When we observe the strategies developed by business negotiators by considering the content of talks as the main variable, these strategies can be sorted out as: (1) Win-Win; (2) Win-Lose, and (3) Lose-Lose, considering at least two sides involved in the situation

n this presentation, we propose a different approach: we study the tactics and behavior of the negotiators, and we analyze how they prepare and develop their tactical behavior through two sets of variables:

- A legal dimension (based on law) which results in:
  (1) legal, or (2) not legal behaviors, -

  (2) A moral dimension (based on moral and ethical values) which results in (1) honest, or (2) not honest behaviors.

  By crossing the two dimensions, we can observe four types of tactical behaviors:

  - Legal and Honest: this is the « white » business, and these negotiations are sustainable,

  - Not legal and honest: this is a « grey » type of behavior, not sustainable on the long term,

  - Legal and bot honest: this is a more « dark grey » type of behavior, not sustainable on the long term:

  - Not legal and Not honest: this is the « dark » or « black » business, the space of dirty tricks and tricky strategies, of course not sustainable, neither on short term nor on long term.

  We conclude with some hints on how to prevent and react to these types of potential misbehavior, in order to promote and secure sustainable business situations.

Sustainability, Capitalism, and Governance: A Comparative Approach

Gerlinde Berger-Walliser, University of Connecticut, USA

This article identifies unique features of American capitalism as they relate to sustainability and contrasts them with what we will call European capitalism. Why Europe? According to the 2020 Environmental Performance Index (EPI), a worldwide ranking of countries on their environmental health and vitality of their ecosystems, European countries occupy the top 11 spots, followed by Japan, while the United States ranks at number 24 out of 180 countries surveyed in the bi-annual report established by a team of researchers at Yale and Columbia University (EPI, 2020). While the EPI ranks countries, European companies, especially those in Northern Europe, also top the list in so-called ESG (Environmental, Social, and Governance) performance, featuring the Netherlands as the world's most sustainable stock market, followed by France, Sweden and Finland. The United States ranks 13th out of 48 on ESG practices in a 2021 ranking by Morningstar (Valerio, 2021). Rankings like these, suggest that the economies of Europe and Japan, while arguably growth-oriented modern capitalist economies, are more sustainable than their U.S. counterpart. This begs the question if institutional variance in capitalism may be to blame. This article examines differences in the socio-economic systems of the United States, (Continental) Europe, and (though only marginally) Japan. We discuss how legal, political, and societal structures have supported the development of more sustainable capitalist economies in these regions, while the United States has been lagging. The corporate governance paradigm is approached from a distinctively comparative perspective. As we analyze the interdependency between stakeholder thinking, governance, and sustainability, we include other aspects of the political and regulatory business environment that may explain why, even in an era of international convergence of corporate governance regimes, sustainability is more developed in European capitalist countries than it is in the United States.

The Peak Storytelling Method: An Examination of an Integral Approach to Crafting Career Driven Narratives

Dennis Rebelo, Roger Williams University, USA

Abstract

This talk integrates two distinct types of motivation theory into a proven model for personalized career inspired storytelling. Designed to build and sustain relationships, the framework revealed in this talk - the PeakStorytelling Model - guides individuals in examining key formative lived experiences, the motivational nature of those life moments and the competencies linked to those experiences en route to fashioning a story that helps a storyteller illustrate an their true value and worth. This talk-study examines personalized career relevant storytelling and is grounded in practice despite having roots in theory. This talk-study shares how an integrative model for personalized storytelling has been: (1) designed for use across varied generations, (2) applied by students, new leaders and organizations, and (3) can be adopted to sustain individual, team and organizational objectives. Highlighted outcomes from using the model will be revealed and include: increased confidence, leadership development, communication skill building and career discernment. Lastly, new possible speculative possibilities to integrating the Peak Storytelling Model into career development and transition programs, leadership development programs and alternative learning programs will be shared. In a complex world driven by instantaneous communications, a deeper bond is often lacking. The model presented illustrates how any individual seeking to build an effective storytelling moment (interviews, team-building or for promotion) can achieve crafting a meaningful narrative that enhances relationship building possibilities. This talk also seeks to shed light on the need for multigenerational workplaces to enhance communication efforts in a world where we tend to be overcorrected (digitally) and underrelational (personally). Storytelling can become a more effective rhetorical way to bridge the generational divides and promote relationship building.

Using the Cluster Analysis Method to do a Competitive Strategy Analysis in Higher Education

Bahadir Ackam, Western New England University, USA

Purpose

This research aims to describe an application of the cluster analysis method as a competitive strategy analysis tool. This research discusses the process and results of an application to a case in higher education.

Methodology

The cluster analysis is an unsupervised learning method, where the goal is to group similar observations. Segmenting universities based on competitive factors such as tuition amount, room and board fees, institution size, institution ranking, acceptance rate, and student-faculty ratio can lead to multiple clusters. Analyzing these clusters can help the administrators in higher education to identify similarities and differences between institutions. Such analysis can reveal the weaknesses and strengths of institutions in a competitive environment.

This research discusses methodological issues such as data collection, factor selection, normalization of numerical values, treatment of categorical variables, hierarchical and non-hierarchical modeling, and distance measurement methods.

The case is a higher education case in the New England region of the United States. Data, covering nine factors, were collected for seventeen universities in this region. The cluster analysis model used in this case is a hierarchical clustering model using Euclidean distance and single linkage.

Results

The model resulted in several meaningful clusters. Describing these clusters reveals valuable information about the nature of each group. Administrators in higher education can use this cluster information in competitive strategy analysis and development.

The research concludes with an evaluation of the case study results and a discussion of the strengths and limitations of the cluster analysis method as a competitive strategy analysis tool.

Keywords: Competitive Strategy, Competitive Analysis, Higher Education, Cluster Analysis

The Effect of Academic Motivations on Online Course Perceptions

Amiee Shelton, Roger Williams University, USA
Angela Ferguson-Martins, Roger Williams University, USA

Abstract

As online education continues to rise in popularity at the collegiate level, questions about the quality of academic education being provided and the practical skills being refined by online students are also rising. Using a 2x2 factorial design, this study set out to explore the effect that modality, online or in-person, has on the perceived value of an academic course as a function o of academic motivation as measured by the AMS-C 28 Academic Motivation. The results of this study suggest that while online courses are viewed as being equally or more valuable than in-person courses, motivation type has a direct influence on what course factors are most positively perceived.

Keywords: *Online education, online courses, traditional education, academic motivation*

The recent increase in popularity of online education may be attributed to the overwhelming necessity of a college degree in this century's job market. The amount of undergraduate students taking some online courses jumped from 3% in 2000 to 23% in 2012 (Ortagus, 2017). Additionally, the number of undergraduate students taking all courses online rose from 2% in 2000 to 9% in 2012 (Ortagus, 2017). In total, in 2000, 6% of students were enrolled in one or more courses online, and in 2012, 32% of students were involved in one or more courses (Ortagus, 2017). Although online enrollment rates are on the rise, online retention rates have been found to be lower than that of in-person courses, as Carr (1999) reported that retention rates in online distance learning courses ranged from 50% to 80%, while the rates for face-to-face courses typically range from 80%-90%.

Certain factors play into the popularity of online courses. For many students, online courses are completed because of schedule, location, or other limitations (Carnoy, Rabling, Castano-Munoz, Duart Montoliu, & Sancho-Vinuesa, 2012). The personal sacrifices needed to complete a traditional classroom education successfully are not seen as being cost effective to many online students (Berry, 2018). Face-to-face learning with specific class times and physical classroom locations do not meet their efficiency, effectiveness, or overall life balance needs (Berry 2018). The personal costs attached to travel and other time spent just to attend traditional classes are another major concern for many online students, leading to some choosing blended, or half online and half in-person, programs (Berry, 2018). Other advantages for online students include flexibility, opportunity for self-motivation, and the ability to work independently (Davis, Gough, & Taylor, 2019).

While students who have experience in online courses may understand the factors that play into the decision to pursue digital education, lack of experience is a prevalent factor in whether or not an individual has a negative opinion towards online education (Bristow, Shepard, Humphreys, & Zeibell, 2014). Students who have experience in online courses believe that enrolling in such courses is mainly due to time or location constraints and students should not be limited to the amount of online courses they are allowed to take, yet students who have never taken an online course before believe that online courses should be limited and that online

students have a far easier time cheating than traditional brick-and-mortar students (Bristow et al., 2014).

As the student academic experience varies between online and traditional courses, the building of important personal skills also changes between the two types of education (Stern, 2004). In the traditional classroom, both hard and soft skills can be refined, including analytical/technical skills, determination, vision, self-awareness, self-regulation, motivation, empathy, and social skills (Goleman, 2000). In the online learning arena, however, it is more difficult to streamline and provide an opportunity for these same skills, as the independent nature of the education style relies on persistence, effort, and self-efficacy (Sitzmann & Ely, 2011). It has been suggested that the hard and soft skills of creating digital text documents, taking online quizzes/tests/exams, watching educational videos, reading on digital devices, online research, and self-teaching are the most common within online course curriculum (Smith, 2019).

Outside of the online-versus-traditional course debate, where factors are primarily tactical and logical decision-based, the factors that play into potential student's decision to pursue education post-high school can be much more psychologically driven. Vallerand, Pelletier, Blais, Brière, Senécal, and Vallières (1993) developed the Academic Motivation Scale to categorize the various types of motivation that potential students possess in terms of academic endeavors. Students were found to have either intrinsic motivation, where satisfaction is found by participating in academics, extrinsic motivation, where academics are seen as a means to a greater end, or amotivation, where no correlation between academic behaviors and success are seen (Vallerand et.al, 1993). Intrinsic and extrinsic motivation can be broken down further into 6 unique motivation possessions (Vallerand et.al, 1993):

A. Intrinsic motivations

    a. *Intrinsic motivation to know*: satisfaction in performing academic behaviors to gain new knowledge.
    b. *Intrinsic motivation towards accomplishments*: satisfaction in performing academic behaviors to achieve or create.
    c. *Intrinsic motivation to experience stimulation*: satisfaction in the stimulating experience brought on by sensory pleasure.

B. Extrinsic motivations

    a. *Extrinsic motivation towards identification*: reassurance in meeting self-determined academic values and characterizations.
    b. *Extrinsic motivation towards introjection*: reassurance in using academic behaviors to create desirable internalized outcomes.
    c. *Extrinsic motivation of external regulation*: reassurance in using academic behaviors to meet desirable societal outcomes.

Research Questions

1. How does the modality of an educational course affect its perceived value?

2. How does education level change the perceived value of a university-level course?

3. What effect does an individual's motivation for pursuing education have on online course perception?

Procedures and Methodology

This survey was created online through Qualtrics and was distributed by Mechanical Turk. The survey was available on Mechanical Turk beginning on March 23, 2020, and survey collection ended on March 30, 2020. Participants in this study included 205 random respondents, all of which voluntarily chose to participate. Each participant was provided $0.20 following successful survey completion.

In considering instrument design, this survey included four sections. The first section of the survey is centered around experience and perception regarding online courses. Survey participants indicated whether or not they have completed a collegiate level online course, followed by indicating their level of agreement to a series of statements about online courses in comparison to traditional courses, including statements about their popularity, how they compare academically to traditional courses, and how they compare communicatively to traditional courses. Participants were asked to indicate their level of agreement to each of the 14 statements on a five-point Likert scale.

The second section of the survey consists of an experimental design, in which participants view a course syllabus as a student in one of four scenarios:

1. A graduate student looking at a traditional in-person course
2. An undergraduate student looking at a traditional in-person course
3. A graduate student looking at an online course
4. An undergraduate student looking at an online course

In all of the possible scenarios, the participant is placed in the role of a student looking to take a public speaking course, where the course flexibility and professor recommendations from other students frame it as a desirable course. Aside from the location of the course, either in-person or online, the syllabi are identical. The syllabi used in this section were provided by study researcher Dr. Amiee Shelton of Roger Williams University. After receiving a scenario and viewing the associated syllabus, participants indicated their level of agreement to a variety of statements about the course's difficulty, educational value, and communicative opportunities. Participants were asked to indicate their level of agreement to each of the 14 statements on a five-point Likert scale.

The third section of this survey used Vallerand, Pelletier, Blais, Brière, Senécal, and Vallières's Academic Motivation Scale - AMS-C 28 (AMS). The AMS consists of a series of statements regarding the motivation to pursue education, categorizing answer groups into three types of intrinsic motivation (intrinsic motivation to know, to accomplish things, and to experience stimulation), three types of extrinsic motivation (external, introjected, and identified regulation), and amotivation. Participants were asked to indicate their level of agreement to each of the 27 statements on a five-point Likert scale. Responses were analyzed to determine the frequency of possession of the seven AMS motivation scales, with the reliability of all groups being acceptable (alpha = .802, .826, .807, .768, .773, .75, .887). Motivation possession levels were grouped on a five-point scale by weak possession, fairly weak possession, neutral possession, fairly strong possession, and strong possession.

The final section of the survey asked a series of demographic questions, including gender identity, age, highest level of education, and whether or not they had ever taken a university-level online course.

The resulting data was analyzed through the Statistical Package for Social Sciences (SPSS) program. Factors in possible data error include outlying subjects in the sample demographically, participant misinterpretation of survey design, human error in online survey creation, and human error in participant survey completion.

It is important to note that this survey was conducted at the beginning of the COVID-19 pandemic defense, in which universities, workplaces, and other social gathering locations nationwide transitioned to online programs in response to federal stay-at-home orders. It is unclear whether or not this widespread modality shift had any significant influence on the collected data.

Findings

The sample for this survey was 61% male and 39% female, with 22% falling in the 18-25 age range, 48% in the 26-33 range, 13% in the 34-41 range, 8% in the 42-49 range, and 9% 50 or older. For education levels, 3% had a high school diploma, 10% had completed some college, 5% had an Associate's degree, 67% had a Bachelor's degree, 12% had a Master's degree, and 2% had a professional degree. 79% of participants indicated that they had taken an university-level online course before.

For Section 1, over 80% of respondents indicated that they were familiar with online education. The majority of respondents were neutral in the idea that online courses are more rigorous and have a heavier workload than in-person courses, with 32% and 30% indicating neutral agreement respectively. 76% of respondents agreed or strongly agreed that online courses were more flexible than in person courses, and 55% agreed or strongly agreed that online courses were also more time-consuming. Over half of the respondents, approximately 55%, agreed or strongly agreed that online courses were more educational than in-person courses, while 60% of respondents strongly disagreed, disagreed, or were neutral with the idea that online courses were more valuable than in-person courses. For written and verbal communication skills, 61% of respondents agreed or strongly agreed that online courses taught written communication skills better than in-person courses, and 62% strongly disagreed, disagreed, or were neutral that online courses taught verbal communication skills better than in-person courses. 61% agreed or strongly agreed that professors of online courses communicate well.

In Section 2, a series of T-Tests revealed no statistically significant difference between responses to the in-person and online syllabi. The average response to all statements from both in-person and online course groups was "agree." Education level had no statistically significant effect on responses either.

In regard to the Academic Motivation Scale statements in Section 3, responses were analyzed to categorize the sample's possession of each motivation type. For the intrinsic motivation to know, 3% of respondents were in weak possession of the motivation, 9% were fairly weak, 19% were neutral, 42% were fairly strong, and 27% were strong (Figure 1).

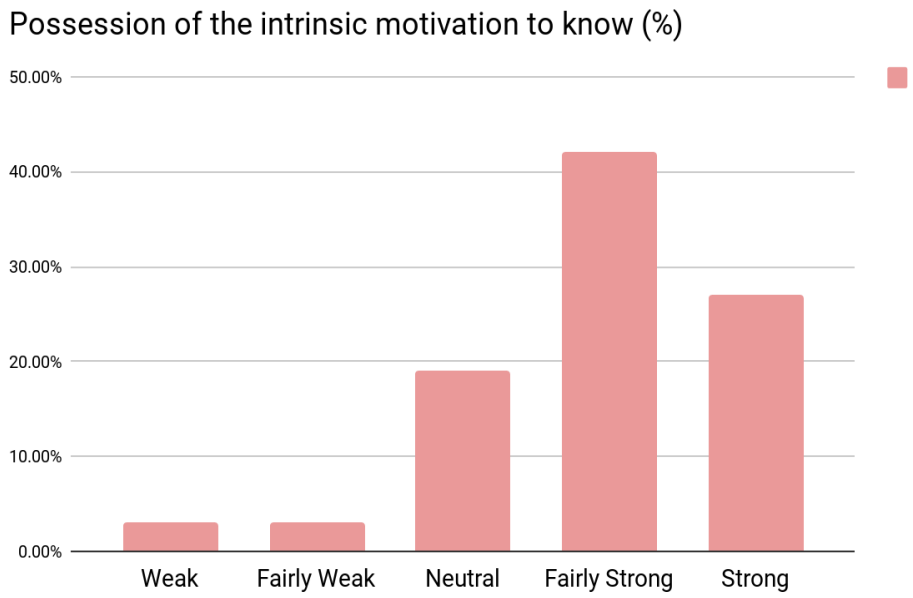

Figure 1

For the intrinsic motivation towards accomplishment, 6% were weak, 10% were fairly weak, 18% were neutral, 38% were fairly strong, and 28% were strong (Figure 2).

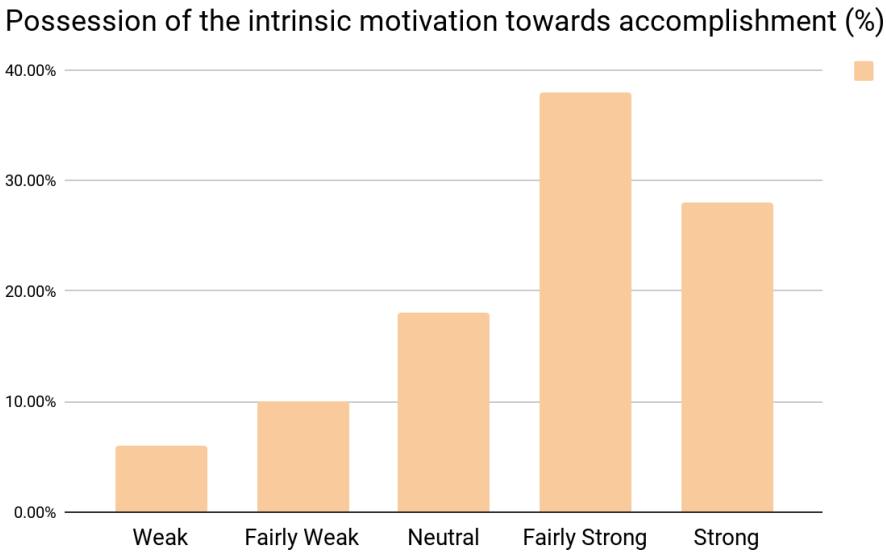

Figure 2

For the intrinsic motivation to experience stimulation, 8% were weak, 13% were fairly weak, 17% were neutral, 42% were fairly strong, and 20% were strong (Figure 3).

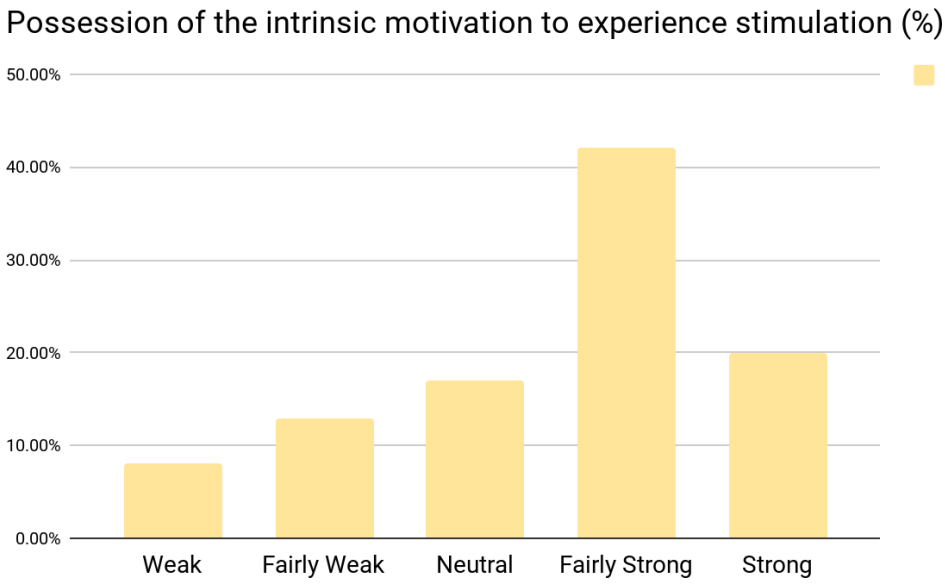

Figure 3

For the extrinsic motivation of identification, 6% were weak, 7% were fairly weak, 19% were neutral, 39% were fairly strong, and 33% were strong (Figure 4).

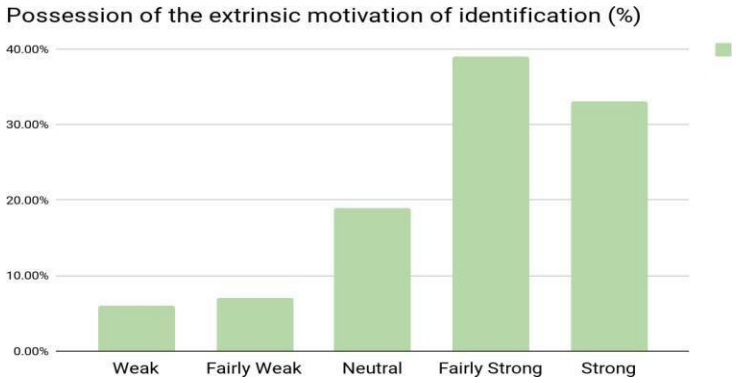

Figure 4

For the extrinsic motivation of introjection, 5% were weak, 8% were fairly weak, 18% were neutral, 40% were fairly strong, and 30% were strong (Figure 5).

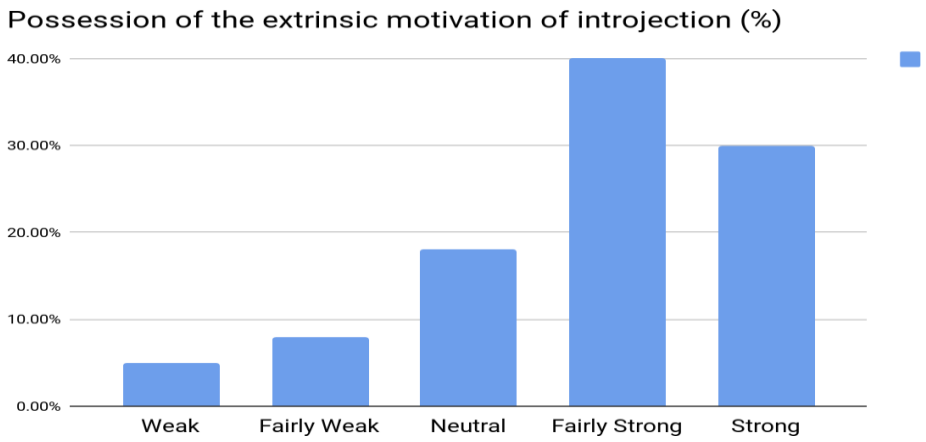

Figure 5

For the extrinsic motivation of external regulation, 3% were weak, 4% were fairly weak, 24% were neutral, 38% were fairly strong, and 31% were strong (Figure 6).

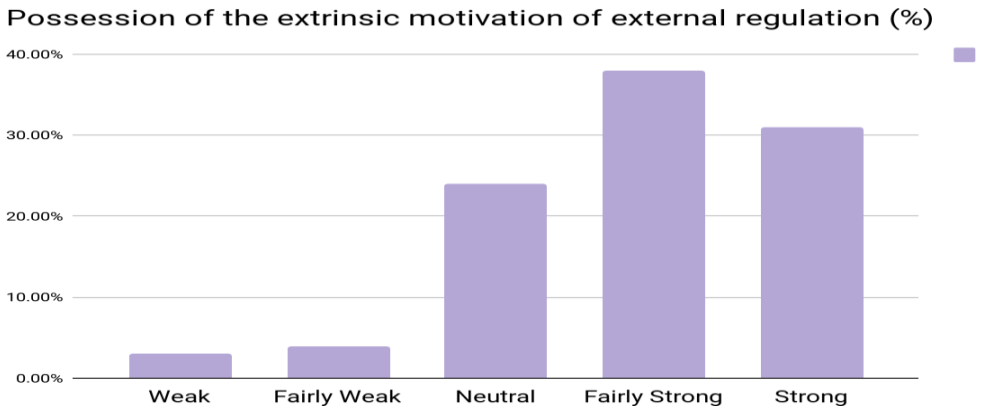

Figure 6

For amotivation, 28% were weak, 10% were fairly weak, 22% were neutral, 29% were fairly strong, and 12% were strong (Figure 7).

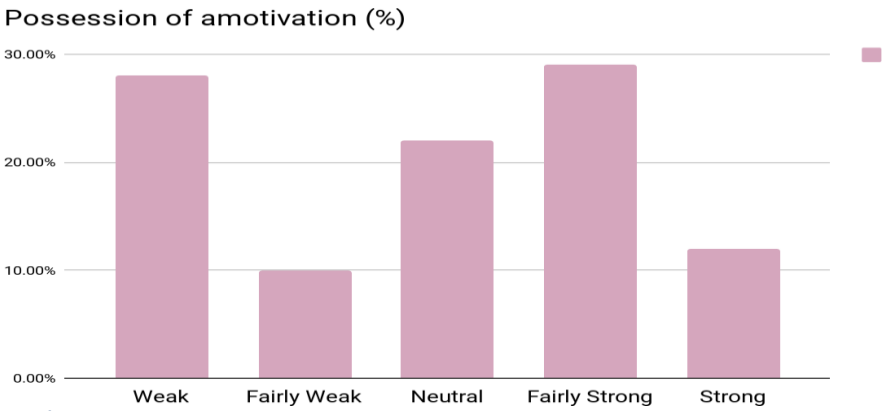

Figure 7

A series of correlations were run between the AMS motivation groups and the Section 1 online course perceptions, where a variety of significant relationships were found. For the intrinsic motivation to know (group 1), a statistically significant positive relationship of weak strength was found with the perceptions that online courses are more rigorous (p=.004, r=.2), have a heavier workload (p=.02, r=.16), are more educational (p=.00, r=.28), are more valuable (p=.02, r=.17), better prepare students for careers (p=.00, r=.24), better teach written communication (p=.01, r=.2), better teach verbal communication (p=.02, r=.16), have more knowledgeable professors (p=.01, r=.17), and have more communicative professors (p=.00, r=.23) than in-person courses.

For the intrinsic motivation towards accomplishment, a statistically significant positive relationship of weak strength was found with the perceptions that online courses have a heavier workload (p=.00, r=.22), are more time-consuming (p=.02, r=.16), and better teach written communication (p=.00, r=.28) than in-person courses. A statistically significant positive relationship of medium strength was found with the perceptions that online courses are more rigorous (p=.00, r=.31), are more educational (p=.00, r=.37), are more valuable (p=.00, r=.32), better prepare students for careers (p=.00, r=.31), better teach verbal communication (p=.00, r=.35), have more knowledgeable professors (p=00, r=.34), and have more communicative professors (p=.00, r=.3) than in-person courses.

For the intrinsic motivation to experience stimulation, a statistically significant positive relationship of medium strength was found with the perceptions that online courses are more rigorous (p=.00, r=.45), have a heavier workload (p=.00, r=.4), are more time-consuming (p=.00, r=.34), are more valuable (p=.00, r=.35), better prepare students for careers (p=.00, r=.45), better teach written communication (p=.00, r=.35), better teach verbal communication (p=.00, r=.48), have more knowledgeable professors (p=.00, r=.45), and have more communicative professors (p=.00, r=.4) than in-person courses. A statistically significant positive relationship of strong strength was found with the perception that online courses are more educational than in-person courses (p=.00, r=.5).

For the extrinsic motivation of identification, a statistically significant positive relationship of weak strength was found with the perception that online courses have more communicative professors (p=.001, r=.24) than in-person courses.

For the extrinsic motivation of introjection, a statistically significant positive relationship of weak strength was found with the perceptions that online courses are more rigorous (p=.00, r=.26), have a heavier workload (p=.00, r=.27), are more time-consuming (p=.01, r=.19), are more educational (p=.00, r=.27), are more valuable (p=.00, r=.29), better teach written communication (p=.001, r=.24), better teach verbal communication (p=.00, r=.26), and have more knowledgeable professors (p=00, r=.29) than in-person courses. A statistically significant positive relationship of medium strength was found with the perceptions that online courses better prepare students for careers (p=.00, r=.31) and have more communicative professors (p=.00, r=.32) than in-person courses.

For the extrinsic motivation of external regulation, a statistically significant positive relationship of weak strength was found with the perception that online courses have more communicative professors (p=.004, r=.2) than in-person courses.

For amotivation, a statistically significant positive relationship of weak strength was found with the perception that online courses have more communicative professors (p=.00, r=.27) than in-person courses. A statistically significant positive relationship of medium strength was found with the perceptions that online courses are more rigorous (p=.00, r=.48), are more time-consuming (p=.00, r=.49), are more valuable (p=.00, r=.36), better prepare students for careers (p=.00, r=.48), and better teach written communication (p=.00, r=.34) than in-person

courses. A statistically significant positive relationship of strong strength was found with the perceptions that online courses have a heavier workload (p=.00, r=.52), are more educational (p=.00, r=.54), better teach verbal communication (p=.00, r=.53), and have more knowledgeable professors (p=00, r=.51) than in-person courses.

Discussion

In looking at the data, the majority of respondents indicated positive perceptions of online courses across the board. Respondents only saw negative differences in quality between online and in-person courses in terms of the overall value and fostering of verbal communication skills, with the rest of the general perceptions being positive in favor of online education. The provided scenario and syllabi were also viewed in a positive light, and neither the modality of the course nor the education level in the scenario had a significant effect on responses.

The Academic Motivation Scale, when looked at in regard to general course modality perceptions, saw those with high possession of intrinsic motivation to experience motivation and amotivation with the strongest relationships, yet all motivation types saw perception relationships of some strength. Amotivation held the most significant all of relationships, suggesting that those who struggle to see the positive benefits to academics may benefit from partaking in online education. The three extrinsic motivation types saw the least and most weak relationships, indicating that those who seek external, more quantifiable justification for academics may not benefit as much from online education. The three intrinsic motivation types saw positive relationships mostly frequently in the communicative and interpersonal factors, including the fostering of written and verbal communication skills and the knowledge and communicative nature of online professors. This suggests that the satisfaction that comes with academic behaviors may be driven by the opportunity for interactivity and personal growth in a course.

The results of this study are extremely relevant during the current education trend in response to the COVID-19 pandemic. As universities continue to make decisions about the modality of courses for the Fall 2020 semester and beyond, more students may be facing unexpected course distribution, including online and hybrid options. As this data suggests that online courses perform just as well or better than in-person courses in terms of the general value of the course, providing students the option to pursue their education online may provide the same outcome as if students had taken all of their coursework in-person. For a fuller scope of the issue in the current educational climate, further research following the close of the Spring 2020 semester may provide better insight into the effect that the widespread online transition had on online education perceptions.

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SECTION 1: Online education perceptions

I am familiar with online education.

Online courses are more rigorous than on-campus courses.

Online courses have a heavier workload than on-campus courses.

Online courses are more flexible than on-campus courses

Online courses are more time consuming than on-campus courses.

Online courses are more educational than on-campus courses.

Online courses are more valuable than on-campus courses.

Students are more likely to cheat in online courses than in on-campus courses.

Online courses prepare students for real-world careers better than on-campus courses do.

Online courses teach written communication skills better than on-campus courses

Online courses teach verbal communication skills better than on-campus courses.

Professors of online courses are more knowledgeable than professors of on-campus courses.

Professors of online courses communicate well.

Professors of online courses do not care to know their students personally.

SECTION 2: Scenario and Material Response

Scenario 1 (Online Graduate)

This online class is required for your graduate degree. The course will not only prepare you for your future endeavors, but will allow you the experiences to ready you for the workplace. Being an online class, it fits perfectly with your schedule, allowing other classes and extracurricular pursuits to be flexible. This course is fun, highly rated, and the professor is well liked by other students.

Scenario 2 (Online Undergraduate)

This online class is a requirement in order for you to complete your undergraduate degree. The course will not only prepare you for your future endeavors, but will allow you the experiences to ready you for the workplace. Being an online class, it fits perfectly with your schedule, allowing other classes and extracurricular pursuits to be flexible. This course is fun, highly rated, and the professor is well liked by other students.

Summer 2020: 10 Week Course
Effective Speaking Across Audiences

ONLINE COURSE
Course do not meet at assigned times

Amiee J Shelton, *Ph.D., APR*
Professor of Public Relations

VIRTUAL OFFICE HOURS. Twice a week I will be available for virtual office hours - one morning and one evening session using Bridges. Click CHAT in the course navigation links

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Catalogue Description:
This class is designed to give the student experience in the practice of researching, preparing, analyzing, and delivering public and personal presentations most often found in the workplace. The primary focus of this course is to connect the role and practice of public speaking to students' current or future career goals. The course frames public speaking from a real world, professional approach. The interplay between audience analysis and speaker goals, and the development of personal style is emphasized. Assignments are relevant to adult learners and/or students in the professional world/ workplace. Various types of oral presentations in a variety of settings including interviews, small groups, board meetings, public forums and computer• enhanced speaking opportunities are explored. Students will ultimately gain confidence in their ability to organize and prepare concise and interesting oral presentations to multiple stakeholders needed to meet current and future career goals.

Pre-Reqs: None Course Description:
This course is a required course for many majors. This course also attracts experienced speakers who wish to hone or advance their presentation proficiency. Students will practice diction, verbal and non -verbal communication. The context for these proficiencies will be professional, business and executive environments, and the unique expectations needed in the modern work place. Through group work and a variety of presentations students not only learn and reinforce the mechanics of speaking in public, but are encouraged to find and develop their own unique styles. This course will prepare you for professional speaking opportunities by developing your speaking and delivery skills, enhancing your critical thinking and persuasive skills, and helping you focus on organizational skills to present the strongest oral case possible.

Course Structure:
This course is conducted entirely online, which means you do not have to be on campus to complete any portion of it. You will participate in the course using RWU's learning management system called Bridges.

Computer Requirements

- If you do not have access to a computer off campus, there are many computer labs on campus you can use to participate in the course. Most public libraries also have computers with internet access that you can use for free.

- You will need to have an up-to-date browser, operating system and some additional software on your computer to take this class. Check this Distance Education page for hardware & software requirements. Some of the documents in the is course will be available to you in PDF form. If you do not have Adobe Acrobat Reader software on your computer, you can download it by going to http://gcc.adobc.com/readcr/.

- All course readings are found in Bridges under lessons. Each lesson corresponds to one week. There is a schedule at the end of this syllabus.

- Discussion Forums are a way for you to engage with each other about the course content. Each lesson module will have a question that links to a forum. You can also access each forum by clicking on the DISCUSSIONS button in the course navigation links. In order to get full credit for each discussion, you will need to post a thoughtful, well-written response to the question and respond to two of your classmates' answers.

Course Goal:
To connect public speaking to the workplace for students in a competitive job market, allowing students to gain confidence in their ability to organize and prepare clear, concise and interesting oral presentations.

Student Learning Outcomes

1. Understand the importance of presentation skills in society and the workplace, specifically that effective speaking is an art form to practice.
2. Exhibit the ability to collect, analyze and use information in your current field to develop and adapt messages for specific audiences, purposes and settings.
3. Demonstrate the ability to create and deliver a persuasive oral presentation.
4. Appreciate how public speaking may apply to their specific current and future career goals.
5. Demonstrate a high level of delivery skills using voice and body to fine-tune their platform skills.
6. Technically describe and evaluate one's own speeches and the speeches of others.
7. Comprehend needs of various stakeholders/ listeners in the audience.

Assessment Methods
The grid below outlines which program competency is addressed in this course, and shows the impact the course content has regarding overall mastery of the individual competency. Additionally, each course outcome is shown, with options of learning activities and related assessment methods for each outcome. This method allows the instructor, in consultation with the program director, to develop learning activities and assessment methods in tandem to meet the needs of the student population.

Required Course Materials
Leeds, D. (2003). Power *Speak.* Career Press ISBN978-1564146847

Class Format:
This class will be offered online. This is not a lecture course. Students are required to provide grounded, actionable feedback to classmates following their presentations.

The following grading scale will apply: A • 900-1000 points, B • 800.899 Points, C700-799 Points,

D • 600-299 Points, F • 599 and below. This method allows you to see where you are at with your grade by adding up the points you have received to date, and dividing them by the total number of points to date. You can keep track of your grades on Bridges.

Graded Material:

Exercises:

Throughout each week, you will have various exercise to test your ability to apply the concepts discussed in the readings for the week. These exercises are each worth 10 points, and will be posted to the assignments section of Bridges. The link for every exercise will be posted in the corresponding weeks lessons.

Self-Assessments:

After each speech, you will be responsible for filling out a worksheet that provides an honest evaluation of your speech. You will be able to access the recording of your speech the rough Bridges. These should help you in future speeches both in this class and out. Each worksheet is 20 points. These assessments are posted to the assignment section of Bridges, and are only available to the professor.

Peer Evaluation;

After each speech, you will be responsible for filling out a worksheet that provides an honest evaluation of one classmate's speech. You should watch several of your classmates' speeches (either live or recorded) and provide honest feedback. These evaluations are posted for the entire class to read. Be kind, yet honest. These are to assist your classmates with their future speeches both in this class and out. These are posted in the Forums section of Bridges.

Speeches: You will have five speeches throughout the semester.

1. *Introduction Speech.* This speech should be between 2 and 3 minutes. You should cover the following information.
   - Your name
   - Your occupation
   - You r hometown
   - Where you are at the time of the speech
   - Two unique interesting things about yourself
   - Two things you consider yourself an expert on
   - What you hope to get out of this class.

2. *Persuade Your Boss.* Students can choose from the following scenarios when preparing for this speech. Regardless of the cho ice, students should spend 3-4 minutes on each speech during their live delivery.
   a. Hire you a new assistant
   b. Get a raise or rank adjustment
   c. Negotiate your o pening salary.

3. *Team Leader:* You have two choices for this assignment. Regardless of which you choose, each speech should be between 4-6 minutes.
   a. Think about a new issue, process, or policy at your organization/ job. You will be responsible for explaining the process etc. to a group of employees
   b. New employee orientation

4. *Complicated* Information. For this speech, you will be given various white papers to choose from. Each white paper discusses a fairly complicated issue. !twill be your assignment to figure out how to bring that information to your audience, in a way that they will understand and remember. This speech must use an in for graphic or visual aid of some type to assist in explaining the material. This speech should be 7-8 minutes

5. *Speech Repeat.* Students will choose which of the pasts three speeches they would like to revamp, and give again.

Forums/ Discussion:

Forums/discussions are found with in several weeks' lessons. Each will be ten points . Discussions will be around key ideas and thoughts from the readings that week. The link for each exercise will be posted in the corresponding weeks lessons. You are graded both on the amount of thought you have put into the discussion as well as how often you engage.

Audience Analysis:

Prior to each speech, you will be given an audience worksheet to fill out on your intended audience before each speech. These are each worth 20 points (which should high light the importance of audience analysis in the speech preparation process). These will be uploaded to assignments. You will only four of these, as one of your speeches will be a redo of a previous speech.

Professor as Mentor:

The objective of this class is to have a good learning experience. To that end, the professor is available for consultation and conversation. You should contact the professor if you have any questions about assignments of have other concerns.

Grading Information &Scale:

Individual assignments will be graded on effective demonstration of achievement matched to course and assignment objectives. No one item is weighted more than others, as all assignments and exams are awarded points as shown below:

Gradin1Z Schematic for IDS 210			
Exercises	Various Activities	15 xl0	150 Points
Self-Assessments	1 after first 4 speeches	25 x 4	100 Points
Peer Evaluation	1 after first 4 speeches	25 x 4	100 Points
Speeches	Introduction Speech Persuade you r Boss Complicated Info Team Leader Repeat Speech Choice	50 100 100 100 100	450 Points
Forums/ Discussion	Various Activities	l0xl0	100Points
Audience Analysis	One for each original speech	Ox 5	100 Points
		Total Points	**1OOO Points**

Scenario 3 (In-person Graduate)

This course is a requirement in order for you to complete your graduate degree. The course will not only prepare you for your future endeavors, but will allow you the experiences to ready you for the workplace, especially being in a physical class setting. The meeting time of Monday, Wednesday, Friday from 8-9 AM, is highly desirable, making it possible to fit in other classes and extracurricular pursuits, including part-time jobs. This course is fun, highly rated and the professor is well-liked by other students.

Scenario 4 (In-person Undergraduate)

This course is a requirement in order for you to complete your undergraduate degree. The course will not only prepare you for your future endeavors, but will allow you the experiences to ready you for the workplace, especially being in a physical class setting. The meeting time of Monday, Wednesday, Friday from 8-9 AM, is highly desirable, making it possible to fit in other classes and extracurricular pursuits. This course is fun, highly rated and the professor is well-liked by other students.

Summer 2020: 10 Week Course
Effective Speaking Across Audiences
(IDS 210)
Global Heritage Hall 205
Monday & Wednesday 5-8pm

Amiee *J* Shelton, Ph.D., APR
Professor of Public Relations

Catalogue Description:
This class is designed to give the student experience in the practice of researching, preparing, analyzing, and delivering public and personal presentations most often found in the workplace. The primary focus of this course is to connect the role and practice of public speaking to students' current or future career goals. The course frames public speaking from a real world, professional approach. The interplay between audience analysis and speaker goals, and the development of personal style is emphasized. Assignments are relevant to adult learners and/or students in the professional world/ workplace. Various types of oral presentations in a variety of settings including interviews, small groups, board meetings, public forums and computer• enhanced speaking opportunities are explored. Students will ultimately gain confidence in their ability to organize and prepare clear, concise and interesting oral presentations to multiple stakeholders needed to meet current and future career goals.

Pre-Regs: None Course Description:
This course is a required course for many majors. This course also attracts experienced speakers who wish to hone or advance their presentation proficiency. Students will practice diction, verbal and non-verbal communication. The context for these proficiencies will be professional, business and executive environments, and the unique expectations needed in the modern work place. Through group work and a variety of presentations, students not only learn and reinforce the mechanics of speaking in public, but are encouraged to find anddevelop theirown unique styles. T his course will prepareyou for professional speaking opportunities bydeveloping your speaking anddelivery skills, enhancing yourcritical thinking and persuasive skills, and helping you focus on organizational skills to present the strongest oral case possible.

Course Goal:
To connect public speaking to the workplace for students in a competitive job market, allowing students to gain confidence in their ability to organize and prepare clear, concise and interesting oral presentations.

Student Learning Outcomes

1. Understand the importance of presentation skills in society and the workplace, specifically that effective speaking is an art form to practice.
2. Exhibit the ability to collect, analyze and use information in your current field to develop and adapt messages for specific audiences, purposes and set tings.
3. Demonstrate the ability to create and deliver a persuasive oral presentation.
4. Appreciate how public speaking may apply to their specific current and future career goals.
5. Demonstrate a high level of delivery skills using voice and body to fine-tune their platform skills.
6. Technically describe and evaluate one's own speeches and the speeches of others.

7. Comprehend needs of various stakeholders/ listeners in the audience.

Assessment Methods

The grid below outlines which program competency is addressed in this course, and shows the impact the course content has regarding overall mastery of the individual competency. Additionally, each course outcome is shown, with options of learning activities and related assessment methods for each outcome. This method allows the instructor, in consultation with the program director, to develop learning activities and assessment methods in tandem to meet the needs of tl1estudent population.

Required Course Materials

Leeds, *D.* (2003). *Power Speak.* Career Press ISBN978-1564146847

Class Format:

This class will be offered online. This *is* not a lecture course. Students are required to provide grounded, actionable feedback to classmates following their presentations.

The following grading scale will apply: **A** ◦ 900.1000 points, B • 800.899 Points, C700.799 Points, D • 600-299 Points, F • 599 and below. This method allows you to see where you are at with your grade by adding up the points you have received to date, and dividing them by the total number of points to date. You can keep track of your grades on Bridges.

Graded Material:

Exercises:

Throughout each week, you will have various exercise to test your ability to apply the concepts discussed in the readings for the week. These exercises are each worth10 points, and will be posted to the assignments section of Bridges. The link for each exercise will be posted in the corresponding weeks lessons.

Self-Assessments:

After each speech, you will be responsible for filling out a worksheet that provides an honest evaluation of your speech. You will be able to access the recording of your speech through Bridges. These should help you in future speeches both in this class and out. Each worksheet is 20 points. These assessments are posted to the assignment section of Bridges, and are only available to the professor.

Peer Evaluation:

After each speech, you will be responsible for filling out a worksheet that provides an honest evaluation of one classmate's speech. You should watch several of your classmates' speeches (either live o r recorded) and provide honest feedback. These evaluations are posted for the entire class to read. Be kind, yet honest. These are to assist your classmates with their future speeches both in this class and out. These are posted in the Forums section of Bridges.

Speeches: You will have five speeches throughout the semester.

1. Introduction *Speech.* This speech should be between 2 and 3 minutes. You should cover the following information.
   - Your name
   - Youroccupation
   - Your hometown
   - Where you are at the time of the speech

- Two unique interesting things about yourself
- Two things you consider yourself an expert
- What you hope to get out of this class.

2. *Persuade Your Boss.* Students can choose from the following scenarios when preparing for this speech. Regardless of the choice, students should spend 3-4minutes on each speech during their Live delivery.
    a. Hire you a new assistant
    b. Get a raise or rank adjustment
    c. Negotiate your opening salary.

3. *Team Leader:* You have two choices for this assignment. Regardless of which you choose, each speech should be between 4-6 minutes.
    a. Think about a new issue, process, or policy at your organization/ job. You will be responsible for explaining the process etc. to a group ofemployees
    b. New employee orientation

4. *Complicated Information.* For this speech, you will be given various white papers to choose from. Each white paper discusses a fairly complicated issue. It will be your assignment co figure out how to bring that information to your audience, in a way that they will understand and remember. This speech must use an infographic or visual aid of some type to assist in explaining the material. This speech should be 7-8 minute s

5. *Speech Repeat.* Students will choose which of the pasts three speeches they would like to revamp, and give again.

Forums/Discussion:

Forums/discussions are found within several weeks' lessons. Each will be ten points. Discussions will be around key ideas and thoughts from the readings that week. The link for each exercise will be posted in the corresponding weeks lessons. You are graded both on the amount of thought you have put into the discussion as well as how often you engage.

Audience Analysis;

Prior to each speech, you will be given a n audience worksheet to fill out on your intended audience before each speech. These are each worth 20 points (which should highlight the importance of audience analysis in the speech preparation process). These will be uploaded to assignments. You will only four of these, as one of your speeches will be are-do of a previous speech.

Professor as Mentor:

The objective of this class is to have a good learning experience. To that end, the professor is available for consultation and conversation. You should contact the professor if you have any questions about assignments of have other concerns.

Grading information &Scale:

Individual assignments will be graded on effective demonstration of achievement matched to course and assignment objectives. No one item is weighted more than others, as all assignments and exams are awarded points as shown below:

Grading Schematic for IDS 210			
Exercises	Various Activities	15 x10	150 Points
Self-Assessments	1 after first 4 speeches	25 x 4	100 Points
Peer Evaluation	1 after first 4 speeches	25 x 4	100 Points
Speeches	Introduction Speech Persuade your Boss Complicated Info Team Leader Repeat Speech Choice	50 100 100 100 100	450 Points
Forums/Discussion	Various Activities	10x10	100 Points
Audience Analysis	One for each original speech	20 x 5	100 Points
		Total Points:	**1000 Points**

Material Response Questions:

This course would benefit me.

This course would be rigorous for me.

This course would have a heavy workload for me.

This course would be flexible for me.

This course would be time-consuming for me.

This course would be educational for me.

This course would be valuable for me.

I would be likely to cheat in this course.

This course would prepare me for a real-world career.

This course would teach me written communication skills.

This course would teach me verbal communication skills.

The professors in this course would communicate well.

The professors in this course would get to know me.

The other students in this course would get to know me.

APPENDIX
Survey Section 4
Academic Motivation Scale College Version
(AMS-C-28)

Does not correspond at all	Corresponds a little		Corresponds moderately	Corresponds a lot		Corresponds exactly
1	2	3	4	5	6	7

WHY DO YOU GO TO COLLEGE?

1	Because with only a high school degree I would not find a high paying job later on	1	2	3	4	5	6	7
2	Because I experience pleasure and satisfaction while learning new things	1	2	3	4	5	6	7
3	Because I think that a college education will help me better prepare for the career, I have chosen	1	2	3	4	5	6	7
4	For the intense feelings I experience when I am communicating my own ideas to others	1	2	3	4	5	6	7
5	Honestly, I don't know; I really feel that I am wasting my time in school	1	2	3	4	5	6	7
6	For the pleasure I experience while surpassing myself in my studies	1	2	3	4	5	6	7
7	To prove to myself I am capable of completing my college degree	1	2	3	4	5	6	7
8	In order to obtain a more prestigious job later on	1	2	3	4	5	6	7

9	For the pleasure I experience when I discover new things never seen before	1	2	3	4	5	6	7
10	Because eventually it will enable me to enter the job market in a field I like	1	2	3	4	5	6	7
11	For the pleasure I experience when I read interesting authors	1	2	3	4	5	6	7
12	I once had good reasons for going to college, but now I wonder whether I should continue	1	2	3	4	5	6	7
13	For the pleasure that I experience while I am surpassing myself in one of mt personal accomplishments	1	2	3	4	5	6	7
14	Because of the fact that when I succeed in college I feel important	1	2	3	4	5	6	7
15	Because I want to have a “the good life” later on	1	2	3	4	5	6	7
16	For the pleasure that I experience in broadening my knowledge about subjects which appeal to me	1	2	3	4	5	6	7
17	Because this will help me make a better choice regarding my career orientation	1	2	3	4	5	6	7
18	For the pleasure that I experience when I feel completely absorbed by what certain authors have written	1	2	3	4	5	6	7
19	I can’t see why I go to college. And frankly, I couldn’t care less	1	2	3	4	5	6	7
20	For the satisfaction I feel when I am in the process of accomplishing difficult academic activities	1	2	3	4	5	6	7
21	To show myself I am an intelligent person	1	2	3	4	5	6	7
22	In order to have a better salary later on	1	2	3	4	5	6	7
23	Because my studies allow me to continue to learn about many things that interest me	1	2	3	4	5	6	7
24	Because I believe that a few additional years of education will improve my competence as a worker	1	2	3	4	5	6	7

25	For the “high” feeling I experience when reading about various interesting subjects	1	2	3	4	5	6	7
26	I don’t know; I can’t understand what I am doing in school	1	2	3	4	5	6	7
27	Because college allows me to experience a personal satisfaction in my quest for excellence in studies	1	2	3	4	5	6	7
28	Because I want to show myself that I can succeed in my studies	1	2	3	4	5	6	7

APPENDIX

Survey Section 5

Demographics

Please indicate your age

□ 18-25 □ 26-33 □ 34-41 □ 42-49 □ 50+

What is your highest level of education?

□ High School Diploma □ Some college □ associate degree □ Bachelor’s Degree

□ Master’s Degree □ Professional Degree □ Other

Have you taken a college-level online course?

□ Yes □ No □ Unsure

The Efficient & Responsive Biopharma Supply Chain Digital Maturity Model

Frederick Johnson, Claremont Graduate University, USA
Chinazunwa Uwaoma, Claremont Graduate University, USA

Abstract

Business agility is required within the life sciences global market, especially given the COVID-19 global crisis. That means the global markets, but particularly international governments and their healthcare consumers, will reward and favor responsive organizations over efficiency almost every time. “The right combination of responsiveness and efficiency each major supply chain driver provides agility to increase throughput while reducing inventory and operating expenses” (Hugos, 2018). The key to Hugos’ theory is leveraging Industry 4.0 technology that will digitally connect the shopfloor with external partners, drive data-related decisions, and construct a digital ecosystem dedicated to delivering agility and value.

This school of thought has never been more true than in these unprecedented times, especially in the life science industry and biopharmaceuticals (biopharma) manufacturing. Recent research covers several aspects of Hugos’ theory on the Responsive Supply Chain and its predecessor, Collaborative Manufacturing. Given this, very little research provides functional models that demonstrate the relationship between the biopharma manufacturing plant's digital maturity and the entire biopharma manufacturing supply chain. This relationship is crucial since it establishes the digital ecosystem required to achieve business agility and responsiveness. More importantly, the current digital maturity models do not incorporate supply chain elements despite manufacturing being the core of the supply chain. Therefore, what models can IT and Supply Chain leaders use to gauge digital maturity within the manufacturing plant and across the manufacturing supply chain? This is immensely problematic for biopharma IT and Supply Chain leaders who must find alignment.

This study implements DSR principles and concepts to design, create and prescribe an artifact combining both a biopharma manufacturing plant digital maturity model and a digital maturity model supporting the Efficient & Responsive Biopharma Supply Chain, argued by Hugos. A case-study approach evaluates the value or utility biopharma IT, and Supply Chain Leaders see in building their digital transformation business strategies. The primary data collection method will use a validated online Likert scale survey. The survey will establish how useful or effective the models performed against the organization’s objectives of assisting in (1) Establishing, (2) Visualizing, and (3) Socializing their generalized strategy across their business units.

The study asserts that the findings will demonstrate that the model will provide a high level of usefulness in assisting IT and Supply Chain Leaders in communicating and aligning their business strategies. The model will also offer support for estimating initial investments costs. The more significant implications support IT and Supply Chain Leaders' ability to develop and align their high level strategic plans cross-referencing specific dimension

A Decision-Making Model for Supply Chain Reconstruction in ASEAN Countries in the Post-Pandemic Era

Harry Le, Yuan Ze University, Taiwan
Hua-Hung Robin Weng, Yuan Ze University, Taiwan
Ling-Lang Tang, Yuan Ze University, Taiwan

Abstract

A Decision-Making Model for Supply Chain Reconstruction in ASEAN Countries in the Post-Pandemic Era The research was primarily conducted to develop a theoretical framework for picking out the most advantageous destination for new investment or place of production shift based on the judgments of multinational firm managers. Porter's Diamond Model and various literature reviews are adopted to identify the significant determinants for evaluating the competitive edge of a location. Subsequently, the Analytic Hierarchy Process (AHP) method was applied to the four-layer hierarchy to discover the relative importance of evaluation criteria and classify the rankings of alternatives. Lastly, the aggregated results from the overall competitiveness rankings were used to compare with the country rankings from the IMD world competitiveness report.

The results behind the hierarchical analysis indicated that the qualified professionals regarded essential determinants in terms of importance as follows: Government (0.214), Demand factors (0.179), Related and supporting industries (0.170), Factor Conditions (0.167), Firm strategy, structure, and rivalry (0.155), and Chance (0.115). Ultimately, Vietnam is the top priority in the professionals' mind while considering a destination for post-pandemic competitiveness strategy. The empirical model would help multinational business leaders adequately make informed decisions on production site, bringing it highly suitable to commerce.

The Research on Trust Management Framework in Digital Supply Chain

Yu Cui, Otemon Gakuin University, Japan
Masaharu Ota, Osaka Gakuin University, Japan
Hiroki Idota, Kindai University, Japan

Abstract

With the arrival of the era of intelligent internet, the most exciting part of the new normal of global economy has led to the increasingly refined international division of labor. Simultaneously, supply chain enterprises gradually aware that mostly by relying on new technology to build the trust circle of the main transaction, they can reduce the cost and improve the efficiency, increase the value of the supply chain. Eventually, the traditional supply chain has gradually transferred to the digital supply chain. Due to the virtual characteristics of digital exchange, trust has become a key factor in the development of the supply chain. However, failures of digital supply chain transactions caused by trust issues have been increasing currently. Therefore, how to utilize digital technologies and blockchain mechanism to build a trust framework to reshape digital supply chain systems is the core issue of this research.

In this research, the current literature on supply chain trust problems and blockchain is systematically reviewed, the existing trust mechanism of supply chain and its shortcomings are analyzed, and a theoretical analysis on the trust of digital supply chain by using the theories of information asymmetry, transaction cost and game theory is done. Moreover, an in-depth study is made from transit between centralized and decentralized system architectures.

Furthermore, through case studies, from logistics, information and cash flows, which support operations of digital supply chains, validate the innovativeness and technical feasibility of block chain in building supply chain trust framework and promoting supply chain digitization.

Keywords: Supply Chain System, Trust Management Framework, Block chain Mechanism

Omnichannel as a Driver of Digitalization: Evidence from the European Market in the Fashion Industry

Natalia Szozda, Wroclaw University of Economics and Business, Poland

Abstract

Purpose – The model of contact with the end customer, who frequently moves into the virtual world, is changing. This paper explores the challenges for modern supply chains that arise as a result of new technologies and omnichannel solutions in the supply chain. This study aims to investigate the interrelationships among Industry 4.0. technologies in retail, omnichannel shopping intention, and customer experience.

Methodology – The study was conducted in the fashion industry in three fashion groups: LPP, CCC, and Inditex, which declare to use omnichannel solutions in their supply chains. The study researches 825 customers drawn from the European market. The research follows the Partial Least Squares (PLS) path model procedure.

Findings – Based on the study, it was concluded that out-store technologies are positively associated with omnichannel shopping intention and also positively associated with cognitive and affective customer experience. This study proves that the boundary between traditional and online stores is beginning to blur, and thanks to new technologies, customers can experience traditional shopping resembling online shopping and online shopping resembling traditional ones.

Research limitations/implications – Although the results provide several major contributions to theory and implications for practitioners, the study still demonstrates some methodological constraints. Specifically, although the study employs a relatively large research sample of 825 customers, it still focuses only on a selected group of customers in three fashion groups: LPP, CCC, and Inditex, and is limited to investigating solely a particular type of customer experience in the fashion industry.

Originality – The results of this study not only verify the theoretical concepts and assumptions of technologies supporting shopping in omnichannel but also provide a practical roadmap for creating omnichannel solutions providing the best customer experience.

Keywords – fashion industry, customer experience, omnichannel, webrooming, showrooming, in-store and out-store technologies

The Role of Culture in Technology Adoption

Manouch Tabatabaei, Georgia Southern University, USA

Abstract

The technology adoption has always been an important topic of research in computing. Many factors have been identified and examined to determine the adoption and more recently re-adoption of technology. The acceptance of the technology and therefore use and satisfaction with technology are indications of success with the implementation of lengthy and costly system projects. However, many projects are still failing causing significant loss of time and resources.

The purpose of this research is to focus on culture, the factor that has received little attention in technology adoption research. The literature suggests many factors that can influence adoption and re-adoption of different technologies, and the findings of this research suggest that culture is a factor that should receive more attention.

Keywords: Culture, Technology Adoption, Technology Acceptance

Enhancing Predictive Models of Decisions in Simultaneous Supply Chain Competitions through Behavioral Features

Mohsen Ahmadian, University of Massachusetts,-Boston, USA

Abstract

Developing models capable of predicting human decisions at a high level of accuracy is important to both researchers and practitioners. In recent years, various machine learning algorithms are developed to improve prediction accuracy. One undeniable parameter in humans' decision-making process is the influence of behavioral factors. In this study, we aim to incorporate behavioral features into the existing time series models to improve their prediction performance.

We develop our models based on autoregressive integrated moving average (ARIMA) and recurrent neural network (RNN) algorithms and examine the decisions of the subjects in a simultaneous competition. Our results show that adding behavioral features to the models improves their prediction accuracy. We also find that combination of the behavioral features resulting in the best predictive model is different between our ARIMA and RNN models. We present our model results and discuss the significance of our findings.

Keywords: Time Series, Machine Learning, Behavioral Decision-Making, Recurrent Neural Network, Autoregressive Integrated Moving Average, Simultaneous Competition

Application of Long Short-Term Memory (LSTM) Deep Neural Networks for Sentiment Classification

Bharatendra Rai, University of Massachusetts-Dartmouth, USA

Abstract

Recurrent neural networks (RNNs) are useful for text data classification problems. However, when sequence of words in text data have long-term dependencies, recurrent neural networks suffer from 'vanishing gradient problem' that makes network training difficult for long sequence of words or integers. Long short-term memory (LSTM) neural networks are a special type of RNNs that help to overcome this problem and make it possible to capture long-term dependencies between keywords or integers in a sequence that are separated by a large distance. This research provides an application example and illustrates steps for using LSTM deep neural network for movie review sentiment classification. The steps involved include text data preparation, creating LSTM model, training the model, and then assessing the model performance.

Privately Held Companies and Financial Disclosure: The Case of the U.S. & the EU

Lynn Ruggieri, Roger Williams University, USA
Minoo Tehrani, Roger Williams University, USA
Andreas Rathgeber, University of Augsburg, USA
Lawrence Fulton, Texas State University, USA
Bryan Schmutz, Western New England University, USA

Abstract

Both the Security and Exchange Commission in the U.S. and IFRS (International Financial Reporting Standards) require public companies to file annual reports regarding their financial information. However, the U.S. privately held companies are not required to disclose financial information. In contrast, the European Union requires disclosure of financial information of private companies. As some U.S. private companies are larger than public companies, this study explores the question: Should the U.S. privately held companies be required to disclose their financial information?

In contrast, the European Union requires disclosure of financial information of private companies. As some U.S. private companies are larger than public companies, this study explores the question: Should the U.S. privately held companies be required to disclose their financial information? In addition, the potential benefits of the financial disclosure of the privately held companies in the EU are examined.

Can ESG Disclosure Impact Consumers' Choice and Favor Financial Performance for Firms?

Amandine Bavent, ICN-ARTEM Business School, France
Elisabeth Paulet, ICN-ARTEM Business School, France

Abstract

ESG are three letters echoing through the boardrooms. Environment. Social. Governance. More and more companies intend to do well by doing good. ESG performance and the firms' financial performance have been researched extensively. In 2015, Friede and Busch (Friede et al., 2015) combine the findings of about 2200 individual studies with the conclusion that a large majority reports a positive relationship between ESG and corporate financial performance (and about 90% reports a non-negative relationship between the two). In 2021, the former Governor of the Bank of England, Mark Carney, dedicated a few pages of his book '*Value(s)*' (*Value(s)*, 2020) on evidence that companies can do well [financially] by doing good, but they can also destroy value and reputation when they mismanage ESG factors. Consequently, the use of ESG data in investment decisions continues to grow. However, while 90% of companies in the S&P 500 reports some sort of ESG reports, there is no agreement on general standards for ESG reporting yet. Auditors of those reports often use a broad statement: "We found no evidence of misreporting in the company's ESG report" (Kaplan & Ramanna, 2021). So, ESG ratings provided by independent rating agencies could have been the solution. But, here again, there is a substantial disagreement between the ratings provided to the firms by the agencies.(Bergman et al., 2021; Christensen et al., 2022)

To add on another layer of complexity, companies operate in a consumer economy. CEOs like Seth Goldman gets it: 'If you are committed to the idea of sustaining and upholding life, and yet you operate in a consumer economy… the definition of 'consume' by the dictionary is to devour and destroy. So, we all live in this contradiction, and there is no such thing as a socially responsible company that doesn't have a consumption component to it. So, how do we reconcile that?' (Mark Lefko, 2016)

According to PwC's 2021 consumer intelligence series survey on ESG, 83% of consumers think 'companies should be actively shaping ESG practices', more than 80% said to be more likely to buy from a company that stands for ESG. In some industries, like beers, it has been demonstrated that the companies could attract new consumers by communicating their commitment to sustainability ((Staples et al., 2020)). Some forms of sustainability information have a significant impact on consumer purchase decisions (O'Rourke & Ringer, 2016) and consumer awareness about sustainability can have a direct positive influence on being more responsible as a consumer (Buerke et al., 2017). It highlights the importance of doing the appropriate communication around ESG commitment (Buerke et al., 2017). However, consumers can be skeptical towards companies' communication, and advertising is seen as one of the least believable sources of information (Obermiller & Spangenberg, 2000).

Without an adequate framework to measure the progress towards the achievement of sustainable goals, how do those consumers assess companies' impact and ESG efforts?

This article intends to analyze the sustainability goals and ESG performance reporting framework through the eyes of the general population. It will analyze 50 US companies and 50 European

companies focusing on the following aspects:

1) From setting up sustainable goals to communicate the achievements

After listing the sustainable goals and reviewing the reporting of ESG performance of those companies, we will assess the communication done around those two elements on social media in 2021. This analysis seeks to understand how the companies assess themselves and the degree to which the progress is communicated on social media, beyond the ESG or sustainability reports as they are mostly for investors and financial analysts. If most of the consumers and the general population will less likely read those reports, reviewing publications on social media helps assess the degree of information disclosed to them.

2) The consumers' perception of publication on sustainability

Once we know a little bit more about what is disclosed and available to the general population, it is interesting to analyze the sentiment towards those goals and achievements. Are the efforts perceived by the general population? Are they well received? From the content analysis done in the first part, combined with MSCI ESG ratings and a sentiment analysis done on social media, the article seeks to establish a connection between positive/ negative ESG ratings and the general population's sentiment by analyzing the way sustainable goals and progress on sustainability targets are communicated on social media.

3) Clues of what matters to consumers

Through the second part of the analysis, we will intend to list some indicators and measures of ESG performance that matter to consumers.

By looking at those three points via US and European companies, this article can establish differences and similarities between the two regions.

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Sustainable Energy Transition and Its Demand for Scarce Resources: Insights into the German Energiewende through a New Risk Assessment Framework

Amelie Schischke, University of Augsburg, Germany
Patric Papenfuß, University of Augsburg, Germany
Andreas Rathgeber, University of Augsburg, Germany

Abstract

In this study, we develop a framework to analyse resource-demanding projects in regard to their risk of resource scarcity and exemplary apply the framework to the German energy transition. With the interpretation of a commodity's price being an economic scarcity indicator, we define price thresholds, which, once exceeded, determine a commodity to be scarce. The corresponding probability of scarcity is derived via a logistic regression model, given BIC based, pre-selected determinants. Combining this probability with the substitutability of a commodity, as well as the scaled demand per project, results in the commodity-specific expected scarcity, which, aggregated over all commodities, marks our final risk indicator, the expected scarcity per project. The exemplary application of the framework to the resource requirements for eight expansion pathways of the German energy system, differing in the climate targets as well as the German societies acceptance for the required actions, highlights the general high demand in cobalt, mainly used for energy storage. In combination with a relatively high probability of scarcity, this reveals a potential bottleneck for the German Energiewende.[1]

Keywords: Commodity risk modeling, German Energiewende, Resource scarcity, Risk analysis

Introduction

In this study, we develop a framework to analyse resource-demanding projects in regard to their resource scarcity risk and exemplary apply the framework to the context of the German Energiewende. Following classical microeconomic theory, a good's price is derived from the supply-demand equilibrium. Hence, high prices are the result of high demand and/or low supply, and therefore can be interpreted as a scarcity indicator. Large scaled projects like the German Energiewende require, due to the build-up of renewable energy technologies, an enormous amount of commodities in their realization, leading to a significant demand increase. This increase could therefore, even under elastic supply conditions, increase commodity prices, resulting in uneconomical conditions for their application, which is equivalent to a shortage.

This effect is underrepresented in the literature, as the review study of Schrijvers et al. (2020) on criticality assessment frameworks on a product, technology, company, country, region and a global level shows. The main objectives of the reviewed studies are to raise the government's and industry's awareness of supply issues, to provide information to policy and consumers for the mitigation of criticality and to generate a broad information basis for further, in-depth studies. Other renowned commodity risk assessment approaches by Graedel et al. (2012), Rosenau-Tornow et al. (2009), or the European Commission (2014) also focus on supply risks of single commodities, while, again, economic risks are underrepresented in the

literature.

In our framework, we interpret a commodity's price as a measure of its scarcity, where a high price represents a situation of comparably little supply paired with a high demand. To start, we define price thresholds above which a commodity is regarded scarce and determine commodity-specific price influencing factors by a two-step model selection. Through logistic regression models and appropriate scenarios for the input variables, we obtain an economic measure of a commodity's probability to become scarce, the probability of scarcity, inspired by the probability of default from credit risk models in the banking industry. In conjunction with a substitutability score and the scaled demand of the commodity for a specific project, we obtain our final commodity-specific risk indicator. The aggregation of this indicator over all commodities required leads to our project-level risk measure, the expected scarcity, in analogy to the expected loss on portfolio level, which enables the comparison of different project alternatives.

For an exemplary, empirical application of our framework, we analyse the German Energiewende in regard to its resource demand, given eight pre-defined expansion pathways, according to Sterchele et al. (2020) and Pfluger et al. (2017). Hereby, the German Energiewende marks the transition process from the current, fossile energy source based system, to the renewable energy source based system, which heavily relies on wind and sunlight for the energy production. However, this transition process is resource demanding, as the new technologies require large amounts of non-renewable, metal commodities, in the build-up phase. The eight expansion pathways differ in the underlying climate targets, as well as the hypothesized acceptance of the required actions within the German society, resulting in different technology mixes and ultimately in different resource demands, which are analysed within our framework, from a scarcity perspective. Overall, the four *ISI* pathways, with the underlying 80% CO_2 reduction goal, outperform the four *REMod* pathways, with the respective 95% goals, since higher climate targets ultimately lead to a larger amount of commodities required. Among the four *REMod* pathways, the sufficiency path *REMod−SUF*, which hypothesizes full support for the transition phase within the German society, outperforms the other paths. From a commodity-specific perspective, cobalt, mainly used in energy storage solutions, as well as indium, mainly allocated to solar PV technologies, show the highest risks of scarcity.

We contribute to the literature by an alternative framework, based on a different definition of resource scarcity, motivated by demand increases, in addition to supply shortages. Further, this framework allows the comparison of projects, including different, commodity competing technologies, based on their required amount as well as their substitutability.

In the following, we outline the structure of the paper. In Section 2 we establish our framework for assessing the economic risks of commodities. Thereby, we examine possible determinants of commodity prices in previous studies. The empirical analysis as well as the results are described in Section 3, while Section 4 concludes.

Framework

Our framework supports in the assessment whether and why projects are at risk from a commodity scarcity perspective. This is accomplished in a two-stage process. First, we calculate the individual probability of scarcity for each commodity of the project via a logistic regression. Second, we calculate and aggregate the commodity-specific expected scarcities to the expected scarcity on project level, our resulting measure of scarcity. Hereby, a high value indicates a high risk of scarcity for the resource-demanding project.

Probability of scarcity

The first stage of our framework uses a logistic regression model to calculate the individual probability of scarcity per commodity. To start, we select the price influential factors for a specific commodity, followed by the definition of an appropriate price threshold, which, once exceeded, determines the commodity to be scarce. Hereby, scarcity is associated with situations of extremely high prices. Further, we estimate a logistic regression model on the commodity-specific price determinants and the predefined price threshold. Finally, the regression is used to calculate the probability of scarcity per commodity, considering different scenarios of the price determinants.

Based on a predefined threshold price θ_i for each commodity $i \in \{1,...,N\}$, we classify the commodities into scarce or non-scarce states. Therefore, we define the commodity-specific, binary variable $scarce_{i,t}$, for all commodities i and times $t \in \{1,...,T\}$, with value 1 if the commodity price exceeds the threshold, indicating scarcity of the commodity, and value 0 else:

(1)
$$scarce_{i,t} = \begin{cases} 1, \; price_{i,t} > \theta_i \\ 0, \; price_{i,t} \leq \theta_i \end{cases}$$

We propose two approaches for setting the price threshold. First, it may be based on expert knowledge of the respective commodity markets. As the commodities under consideration are included in the profitability calculation of a project, experts may determine the price above which the utilisation of a commodity becomes uneconomic, leading to infeasible projects. Second, the threshold price may be derived statistically based on volatility measures or quantiles of historical data. In our case, we suggest to use the one-sigma approach, as, for normally distributed random variables, this leads to approximately 100% − 68,27% = 31,73% observations being classified scarce, which in turn enables a statistically valid analysis:

$$\theta_i = \mu_{price^i} + \sigma_{price_i} \forall \, i \in \{1,...,N\} \qquad (2)$$

with μ_{price^i} denoting the historical mean of the price of commodity i and σ_{price^i} being the corresponding standard deviation.[1]

To calculate the probability of scarcity per commodity, we model the dependencies between various price determinants on the variable $scarce_{i,t}$, defined via the threshold. Therefore, we start with a short overview of

[1] Instead of the historical mean and standard deviation over a predefined time period, a rolling window approach could be used to determine a time-varying price threshold.

the broad literature stream of commodity price determinants, which we divide into five dimensions: Macroeconomic, demographic, capital market driven as well as supply and demand variables.[2]

As macroeconomic factors, Chen et al. (2010) analyses the impact of commodity-specific exchange rates, called commodity currencies, on the respective commodity prices. Further, Guzma´n and Silva (2018) find significant influence of short-term interest rates on commodity prices, while Baffes and Savescu (2014) detect positive and highly significant effects of long-term rates on mineral commodities. In the study of Frankel and Rose (2010), the effect of the U.S. inflation rate on prices is investigated. Turning the attention to the economic activity, Gargano and Timmermann (2014) and Byrne et al. (2013) analyse the price influence of gross-domestic product and industrial production.

Demographic factors cover indicators of societal evolution including socio-economic progress and population growth with the examples of total population or employment. Since the influence of demographic factors on commodity prices are not yet as thoroughly investigated, we refer to Aksoy et al. (2019), Bloom et al. (2010), and Yoon et al. (2018) analysing the influence of demographic on macroeconomic factors including GDP, economic growth and other real variables. For the capital market driven risk factors, we rely on the MSCI World index as well as on the S&P 500, which are analysed by Kagraoka (2016) and Buncic and Moretto (2015), respectively.

Turning the attention to the supply side of markets, besides the actual supply volume, Arendt et al. (2020) and Graedel et al. (2012) consider the global supply concentration of raw materials, measured by the Herfindahl-Hirschman Index (HHI) (see Rhoades (1993)),
as scarcity indicator, defined as:

$$HHI_{i,t} = 10000 \cdot \sum_{r=1}^{R} \left(\frac{prod_{i,t,r}}{\sum_{r=1}^{R} prod_{i,t,r}} \right)^2, \tag{3}$$

in $prod_{i,t} = \sum_{r=1}^{R} prod_{i,t,r}$represents the production for commodity *i* at time *t*, for all

production countries $r = 1,...,R$. The price impact of natural disasters, another potential supply disruption, is investigated by Bundesanstalt fuer Geowissenschaften und Rohstoffe (2019). Furthermore, Gygli et al. (2019) use the KOF Globalization Index to measure the trade activity and political relations. The analysis of Vansteenkiste (2009) and Byrne et al. (2013) show a significant connection between oil prices, a proxy for input costs, hence influencing the supply, and other commodity prices.

Lastly, besides the actual demand, we investigate the effect of demand proxies on prices. Therefore, Cuddington and Zellou (2013) find a relationship between commodity prices and the commodity demand, proxied by the income per capita. Further, Batten et al. (2010) and Thomas et al. (2010) analyse the impact of money supply, used as a liquidity measure, as well as commodity-specific consumption data on prices.

[2]More detailed information may be found in Appendix A.

To select the determining variables from the previously described large list of attributes in Table 8, we apply a two-step model selection for each commodity.[3] In the first step, we implement univariate linear regression models for all covariates, with the commodity prices as dependent variable. This way, we pre-select the influential variables based on the 5% significance level. In the second step, we determine the final set of covariates per commodity by applying a stepwise model selection using the Bayesian Information Criterion (BIC) on the pre-selected variables. Using the variance inflation factor, we ensure, none of our final models suffer from multicollinearity. In case of an initial model with variance inflation factor above 5, we exclude one of the highly correlated variables from the analysis.

To calculate the probability of scarcity per commodity, we first estimate a logistic regression model. Therefore, we regress the commodity-specific price determinants $x_{i,t} = (x_{1,i,t},...,x_{Ki},i,t)$, resulting from the previous model selection, on the dependent variable $scarce_{i,t}$, defined in Equation 1 by the threshold θ_i:

$$P(scarce_{i,t} = 1|X = x_{i,t}) = \frac{1}{1 + \exp(-z_{i,t})} \tag{4}$$

with the logit $z_{i,t}$:

$$z_{i,t} = \beta_0 + \beta_1 x_{1,i,t} + \beta_2 x_{2,i,t} + ... + \beta_{K_i} x_{K_i,i,t} + \varepsilon_{i,t}, \tag{5}$$

in which β_0 denotes the intercept, $\beta_{1,...,}\beta_{Ki}$ are the coefficients corresponding to the K_i covariates $x_{1,i,t},...,x_{Ki},i,t$ for commodity $i \in \{1,...,N\}$ at time $t \in \{1,...,T\}$ and $\varepsilon_{i,t}$ represents the error term. Hereby, we obtain the estimated parameters $\hat{\beta}_0,...,\hat{\beta}_K$ of Equation 4 via the Maximum-Likelihood approach. The estimated logistic regression models per commodity enable us to calculate the probability of scarcity, which is the probability of a commodity becoming scarce under predefined conditions for the covariates. The variation of these predefined conditions enables a scenario-based risk assessment. In the following, we focus on the scenarios $\zeta \in \{1,...,Z\}$ for the covariates, namely a mean scenario, a shock scenario, an extreme value scenario and a focus scenario. In the mean scenario $\zeta = 1$, the covariates $k_i = 1,...,K_i$ for commodity i follow the sample average:

$$x_{k_i,i,1} = \frac{1}{T}\sum_{t=1}^{T} x_{k_i,i,t} = \mu_{k_i,i} \tag{6}$$

.

In the shock scenario $\zeta = 2$, each covariate follows the one-sigma approach:

$$x_{ki,i,2} = \mu_{ki,i} + sgn(\beta_{ki})\sigma_{ki,i}, \tag{7}$$

[3] For the application of the risk assessment framework to other projects, one might alternatively use a set of fixed, predefined covariates or other model selection procedures.

in which $\mu_{ki,i}$ denotes the sample mean, $\sigma_{ki,i}$ is the standard deviation of the sample and $sgn(\beta_{ki})$ is the signum function of the estimated coefficient in Equation 5. In the extreme scenario $\zeta = 3$, each covariate follows the two-sigma approach:

$$x_{ki,i,3} = \mu_{ki,i} + 2sgn(\beta_{ki})\sigma_{ki,i}. \quad (8)$$

In the focus scenario $\zeta = 4_j$, the j-th covariate follows the extreme scenario, whereas the remaining variables follow the mean scenario:

$$x_{ki,i,4_j} = \mu_{ki,i} \qquad \forall k_i \in \{1,...,K_i\} \setminus j \quad (9)$$
$$x_{j,i,4j} = \mu_{j,i} + 2sgn(\beta_{k_i})\sigma_{j,i}.$$

Using the scenario values of the covariates $x_{1,i,\zeta},...,x_{Ki,i,\zeta}$ and the corresponding estimated logistic regression of Equation 4, we calculate the probability of scarcity per commodity and scenario. On the one hand, the scenario-specific comparison between multiple commodities may be used to decide between possible substitute materials from a risk perspective, while on the other hand, the commodity-specific comparison between the scenarios may be used as a sensitivity analysis.

Expected scarcity on commodity and project level

The main objective of the framework is the comparison of several energy system transformation pathways, which each represent a resource demanding project, in respect to their economic scarcity risk of the commodities they require. Hereby, these paths may differ in the selection and quantity of the commodities included. Given a certain scenario and project, we know the probability of scarcity as well as the required amount of each commodity. The aggregation of these commodity-specific information to a project level risk measure is similar to the combination of multiple credit contracts into a portfolio-based risk measure. Within credit risk modelling, portfolios may be compared by the expected loss, defined as:

$$EL = \sum_{cred \in pf} EL_{cred} = \sum_{cred \in pf} EAD_{cred} \cdot LGD_{cred} \cdot PD_{cred} \quad (10)$$

in which EL_{cred} denotes the expected loss of credit *cred* in the portfolio *pf*, PD_{cred} the respective probability of default, LGD_{cred} the loss given default and EAD_{cred} the corresponding exposure at default, see Basel Committee on Banking Supervision (2005). While the probability of default (PD) and the probability of scarcity (PS) may be regarded equivalently, the adoption of the expected loss (EL) to the expected scarcity (ES) of commodity markets requires adjustments on the loss given default (LGD) and the exposure at default (EAD).

The loss given default normally represents the loss a bank realizes in case a borrower defaults. The respective measure of our framework, the loss given scarcity (LGS), is linked to the substitutability rate (SR),

representing a normalized indicator for the substitutability of commodity *i*, by:

$$LGS_i = 1 - SR_i \in [0,1]. \tag{11}$$

Hereby, a LGS_i of 0 indicates the commodity *i* is perfectly substitutable by other commodities, hence its scarcity is irrelevant in a project context. In contrast, a LGS_i of 1 indicates no substitute for the commodity *i* is available and the project is unfeasible in case of scarcity.

To convert the exposure at default to the exposure at scarcity, we assume, in case of scarcity, the entire amount of the specific commodity is not available, independent of the project's state $p \in \{1,...,P\}$ at which the scarcity occurs. For a project comparison, independent of the selection and quantity of the commodities included, we scale the exposure at default measure by the world production S_i of the respective commodity *i*, resulting in the project and commodity-specific exposure at scarcity:

$$EAS_{p,i} = \frac{q_{p,i}}{S_i}, \tag{12}$$

in which $q_{p,i}$ denotes the required amount of commodity *i* for the project *p*. Using the adjusted parameters, we are able to calculate the expected scarcity for project *p*, commodity *i* and scenario ζ:

$$ES_{p,i,\zeta} = EAS_{p,i} \cdot LGS_i \cdot PS_{i,\zeta}. \tag{13}$$

Subsequently, we aggregate the commodity-specific expected scarcities, in analogy to credit risk modelling, on project level:[4]

$$ES_{p,\zeta} = \sum_{i=1}^{N} ES_{p,i,\zeta} = \sum_{i=1}^{N} EAS_{p,i} \cdot LGS_i \cdot PS_{i,\zeta} \tag{14}$$

The resulting expected scarcity enables the comparison of various projects from a commodity scarcity risk perspective. Hereby, the framework takes advantage of the flexibility provided through an ex-ante BIC based model selection, which prevents data limitation issues for the covariates. Further, the determination of the commodity-specific threshold θ_i, which is required for the definition of the binary $scarce_i$ variable, is adjustable to the project of interest. Additionally, depending on the use-case, multiple of the proposed scenarios, as well as combinations and extensions of them, allow for a detailed sensitivity analysis.

Empirical analysis of resource requirements for the German Energiewende

In the following, we exemplary apply our risk assessment framework on the resource requirements of eight

[4] The assumption of independence between the commodities allows for the additivity of the expected scarcity values, as potential dependencies between commodities may be reflected in the probability of scarcity via the macroeconomic determinants already.

possible, predefined transformation pathways of the German energy system, which each represent a resource demanding project. While the initial expansion pathways of the energy system are modelled according to Sterchele et al. (2020) and Pfluger et al. (2017), a translation of these pathways into resource demands is performed via a life-cycle assessment as well as a system dynamics model,[5] see Betten et al. (2020). In general, the paths differentiate by the overall energy demand Germany requires, as well as the technology selection providing this energy, which ultimately results in a variation of the selection and quantity of the commodities considered.

The Bundesanstalt fuer Geowissenschaften und Rohstoffe (2019) highlights, the nine commodities silver (Ag), cobalt (Co), copper (Cu), dysprosium (Dy), indium (In), lithium (Li), neodymium (Nd), nickel (Ni) and platinum (Pt) are key resources for the German Energiewende, which is why we focus on them. Their main uses, the largest mining countries and the largest producing countries of these resources are summarized in the Appendix in Table 7.

Data

Exemplary, we show the application of our risk assessment framework on the resource demanding German Energiewende. Therefore, we analyse different expansion pathways of the German energy system, generated under the restriction of a 95% or 80% CO_2 reduction in 2050, compared to Germany's emissions in 1990, which originate from the studies of Sterchele et al. (2020), called *REMod* paths, and Pfluger et al. (2017), called *ISI* paths.[6]

The base path of *REMod*, notated as *REMod − REF*, assumes the acceptance of actions towards the 95% CO_2 reduction goal in the German society remains unchanged, without any harming or enhancing behaviour. In contrast, a substantial change in the behaviour of the German population towards a decrease in the energy consumption, i.e. by tripling the maximum renovation rate for buildings, is modelled in the *REMod−SUF* path, resulting in the least energy requirements of all *REMod* pathways. However, mental reservations of the population for new technologies could cause a substantial time delay for the spreading and usage of renewable energy technologies, as well as a continuous high demand of conventional energy technologies, represented in the *REMod − PER* path. In addition, local protests against big infrastructural projects, such as wind energy parks or power grid expansions, are modelled in the *REMod − UNA* path. To reach Germany's climate goals under these restraints, the demand for solar plants increases drastically, as does the respective change in commodity requirements.

The base path of *ISI*, notated as *ISI − REF*, represents a cost optimized system regarding actions towards the 80% CO_2 reduction goal, which is established under three major constraints for solar plants, offshore wind

[5] These calculations are generated within the project InteRessE, Grant-Nr: 03ET4065B, supported by the German Federal Ministry for Economic Affairs and Energy, which aims to analyse the resource demand of the German Energiewende from various perspectives. As the project is still ongoing, the specific data for the technologies considered as well as the resource requirement are not yet published.

[6] More information on the pathways are displayed in the Appendix in Table 6.

parks and carbon capture and storage technologies. While a reduced expansion of the transmission networks, causing a different power distribution in Germany, is modelled in the *ISI −LIN* path, the *ISI −RED* differs from the *ISI − REF* mainly in the location of onshore wind turbine parks, reflecting an alternative regional distribution of renewable energy technologies. Within the *ISI − LRE* path, the three major restrictions of the *ISI−REF* path are still included, but in a relaxed form.

To obtain the expected scarcities for each expansion path described above, we first calculate the commodity-specific probability of scarcity. Hereby, we consider 18 initial input factors from existing literature, which are expected to have direct or indirect price influence, as the most relevant factors are subsequently selected by the two-step model selection, while avoiding data limitation issues.

The determinants originate from macroeconomic and demographic dimensions, as well as from capital market driven risk factors, additionally to the classical supply and demand. A detailed overview of the factors, their sources and previous considerations in the literature are given in Table 8 of the Appendix. Information on the descriptive statistics of the commodity-specific as well as macroeconomic and demographic factors is provided in Table 9 of the Appendix.

Due to the annual frequency of the commodity-specific supply and demand data, we foot our study on an annual basis. Therefore, we compute the yearly average for higher frequency determinants. Further, we apply the augmented Dickey-Fuller test in conjunction with the Phillips-Perron unit root test for stationarity. In case either states non-stationary variables, we calculate (log-)returns or differences, see Table 9. Finally, we standardize the data to guarantee interpretability and comparability between commodities and projects. This results in a final data set of 49 observations per time series, spanning from 1971 through 2019.

Results

The project analysis is structured in two steps, starting with the calculation of the individual probability of scarcity per commodity, followed by the comparison of the resulting expected scarcities on project level. To classify the commodities in scarce and non-scarce states, we define an appropriate price threshold, which, once exceeded, determines the scarcity of the commodity. In our case, we set this threshold statistically,[7] using the one-sigma approach displayed in Equation 2.

	ag	co	cu	dy	in	li	nd	ni	pt
$/*t*	817041	64299	7789	608299	749374	113836	81920	24678	49440405

Table 1: Commodity price threshold

Price threshold per commodity in *US*$/*t*, derived from the one-sigma approach, based on price data from the last 15 years.

[7] For other applications, we suggest setting this threshold based on individual, expert knowledge, where applicable.

With the resulting threshold values given in Table 1, we estimate the individual logistic regression models. The resulting coefficients per commodity are displayed in Table 2. Hereby, the U.S. Dollar Index and the oil price are price determining factors for three of nine commodities.[8] Overall, the short-term interest rate has the highest influence of the determinants, especially on lithium, indicating a high interest rate leads to a high probability of scarcity. This is counter-intuitive, as interest rates raise the costs of capital, which ultimately results in lower demand and a probably reduced risk of scarcity.

To obtain the probability of scarcity for each commodity, we analyse different scenarios of the input variables. The initial mean scenario, proposed in Equation 6, leads to moderate results displayed in Table 3, indicated by row PS Mean. The sensitivities to the scenarios of commodities are heterogeneous. While lithium's risk increases to a high and extremely high value for the shock and extreme scenario, the probability of scarcity of silver and nickel are comparably low, even under the extreme scenario. In addition, indium shows remarkably low risks in all scenarios. Cobalt as well as the rare earth metals bear a moderate risk of scarcity in the mean scenario, which raises to over 50% for the extreme scenario.

To calculate the loss given scarcity, an indicator describing the substitutability of commodities, we use the information about metals applications with primary substitutes and substitute performance from Graedel et al. (2015). By aggregating over the different metals:

	ag	co	cu	dy	in	li	nd	ni	pt
FX			0.04	-0.63	0.05		-0.63		-0.11
LIR		0.10						-0.03	
SIR			-0.39	0.85		1.55	0.85		
CPI						-0.39			
GDP				0.46			0.46		
EMP		-0.21							
S								0.78	
ND		-0.29							
OIL	0.16		0.21		0.61				0.49

[8] Due to data limitation issues, the model selection could not be performed for dysprosium and neodymium. Instead, we manually selected the U.S. Dollar Index, the short-term interest rate as well as the GDP for their logistic regression models. Since the models of dysprosium and neodymium also show identical times, in which they are classified as scarce, their results in the framework are equal.

GDPc	-0.12	0.90

Table 2: Logistic regression parameters

Estimated coefficients for the U.S. Dollar Index (FX), the 10 Year U.S. Treasury Rate (LIR), the 3 Month U.S. Treasury Rate (SIR), the U.S. Consumer Price Index (CPI), the World Gross Domestic Product (GDP), the U.S. Employment (EMP), the Commodity World Production (S), the Global Natural Disasters (ND), the WTI Spot Crude Oil Price (OIL) and the World Gross Domestic Product per Capita (GDPc) of the logistic regression model per commodity.

	ag	co	cu	dy	in	li	nd	ni	pt
PS Mean	0.04	0.06	0.04	0.01	0.03	0.03	0.01	0.02	0.07
PS Shock	0.05	0.21	0.08	0.12	0.06	0.47	0.12	0.05	0.12
PS Extreme	0.07	0.53	0.18	0.59	0.11	0.96	0.59	0.14	0.19
LGS	0.59	0.63	0.75	1.00	0.62	0.56	0.47	0.62	0.67
EAS REMod - REF	0.20	6.52	0.40	0.02	2.20	0.44	0.07	1.42	0.01
EAS REMod - SUF	0.14	4.39	0.28	0.01	1.61	0.29	0.05	0.96	0.00
EAS REMod - PER	0.23	4.70	0.34	0.02	2.25	0.31	0.06	1.13	0.01
EAS REMod - UNA	0.32	6.68	0.35	0.01	3.35	0.45	0.03	1.42	0.00
EAS ISI - REF	0.03	1.96	0.12	0.01	0.37	0.13	0.02	0.39	0.00
EAS ISI - LTN	0.04	1.96	0.14	0.01	0.45	0.13	0.02	0.39	0.00
EAS ISI - RED	0.03	1.96	0.13	0.01	0.37	0.13	0.02	0.39	0.00
EAS ISI - LRE	0.02	1.96	0.13	0.01	0.24	0.13	0.02	0.39	0.00

Table 3: PS, LGS and EAS values

Probability of scarcity for the three scenarios mean (PS Mean), shock (PS Shock) and extreme (PS Extreme), the loss given scarcity (LGS) and the exposure at scarcity for each of the 8 paths analyzed, for all commodities.

For other applications of the framework, where a metal is only used in a specific application, one may apply technology specific parameters for the substitutability of the commodities. Table 3 displays the final loss given scarcities per commodity, highlighting the inability to substitute dysprosium, indicated by a loss given scarcity of 1. In contrast, lithium as well as neodymium have adequate substitutes resulting in a score of approximately 50%. Thereby, the comparably low loss given scarcity of neodymium is caused by the possibility to substitute it within its major application, neodymium magnets.

In addition to the probability of scarcity and the loss given scarcity, the exposure at scarcity determines the expected scarcity. As described in Equation 12, the required quantity per commodity and pathway is

scaled by the mean of the last five years' annual world production. The resulting exposure at scarcity per path and commodity is displayed in Table 3. While the demands of the precious metals platinum and silver, as well as the rare earth metals neodymium and dysprosium, are relatively low in each path, the scaled required amount of cobalt is outstandingly high. Overall, we clearly notice a reduced exposure at scarcity of all commodities for the *ISI* paths, compared to the *REMod* ones, caused by the 80% reduction goals modelled in *ISI*, in contrast to the 95% goals of *REMod*, which require less build-up of renewables and ultimately fewer commodities. While the differences in *ISI* pathways are only minor, the *REMod* paths differ substantially. Hereby, the *REMod−SUF* path shows the lowest exposure at scarcity for all commodities, indicating the acceptance of society determines the resource requirements. In contrast, the unacceptance of the society for new infrastructural projects, represented in *REMod−UNA*, causes a compensation through additional solar park and energy storage build-ups, which leads to the highest demand in cobalt and indium. This results in cobalt requirements being as high as six times of the average annual world production, allocated only for the German Energiewende. However, the comparably low exposures at scarcity for the *REMod−PER* path are remarkable, as the persistence on - and usage of - conventional technologies in the German population, for the transportation and housing sector, leads to reduced commodity demands, especially in cobalt. Overall, we clearly identify cobalt as a key commodity, followed by indium and nickel.

Following Equation 13, we use the information provided in Table 3 to calculate the expected scarcity per commodity, scenario and path. The commodity- and project-specific expected scarcities, for the mean scenario, are displayed in Table 4. Due to the low prob-

	ag	co	cu	dy	in	li	nd	ni	pt
REMod - REF	0.00	0.24	0.01	0.00	0.04	0.01	0.00	0.02	0.00
REMod - SUF	0.00	0.16	0.01	0.00	0.03	0.01	0.00	0.01	0.00
REMod - PER	0.01	0.18	0.01	0.00	0.05	0.01	0.00	0.01	0.00
REMod - UNA	0.01	0.25	0.01	0.00	0.07	0.01	0.00	0.02	0.00
ISI - REF	0.00	0.07	0.00	0.00	0.01	0.00	0.00	0.00	0.00
ISI - LTN	0.00	0.07	0.00	0.00	0.01	0.00	0.00	0.00	0.00
ISI - RED	0.00	0.07	0.00	0.00	0.01	0.00	0.00	0.00	0.00
ISI - LRE	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Commodity-specific expected scarcities - Mean

Expected scarcities based on the mean scenario for all expansion paths per commodity. The expected scarcities are near zero, while cobalt and indium are outstanding, originating in their high exposure at scarcity. Although the probability of scarcity is the highest for platinum in the mean scenario, the respective expected scarcity is near zero, rooted in the comparably small amount required. From an economic perspective, the scarcity risk of rare earth metals in the German Energiewende is almost negligible, at least in

the mean scenario discussed here.

	Mean	Shock	Extreme
REMod - REF	0.33	1.14	2.77
REMod - SUF	0.22	0.78	1.87
REMod - PER	0.26	0.86	2.06
REMod - UNA	0.36	1.21	2.88
ISI - REF	0.09	0.33	0.81
ISI - LTN	0.09	0.34	0.82
ISI - RED	0.09	0.33	0.81
ISI - LRE	0.09	0.33	0.80

Table 5: Project-specific expected scarcities

Expected scarcities on project level for all expansion paths and scenarios.

Aggregating these commodity-specific expected scarcities on path level, we obtain our final measure of scarcity, the expected scarcity $ES_{p,\zeta}$ per project and scenario displayed in Table 5. Due to the similar required amounts of the commodities in the four *ISI* paths, we recognize similar expected scarcity values on project level, independent of the scenario considered. As for the exposure at scarcity and the expected scarcities on commodity level, the aggregated expected scarcity measure is significantly lower for the *ISI* pathways, compared to the *REMod* ones. This is again rooted in the 15% difference in the CO_2 reduction goals for the pathways of *ISI* and *REMod*.

For the four *REMod* pathways, the sufficiency path *REMod − SUF* bears the lowest risk, due to the least required amount of commodities. The *REMod − UNA* path shows the highest expected scarcity values of all pathways, in any scenario considered, due to the high demand in cobalt, caused by the large amount of battery storage required in this path, where its expected scarcities are closely followed by those of the *REMod−REF* path. The lower values for the *REMod − PER* path, compared to the *REMod − REF*, are mainly determined by the comparably low exposure at scarcity of cobalt. Overall, our analysis suggests, higher climate goals bear higher scarcity risks of commodities. However, if the 95% reduction target is considered, the *REMod − SUF* scenario should be accomplished.

We contribute to the literature by the development of a new resource-scarcity framework, motivated by demand increases from resource-demanding projects, such as the German Energiewende. Comparing different expansion paths, including different acceptance in the society and technologies, which are competing for commodities, we detect cobalt and indium as the commodities with the highest risk, due to their high demand in energy storage technologies and solar plants.

Conclusion and Policy Implications

In this study, we develop a framework to analyse resource-demanding projects in regard to their economic

risk of resource scarcity and apply the framework to eight energy transformation pathways for the German Energiewende in an exemplary manner. With the assumption of the commodity price being the result of the supply and demand equilibrium, we turn the price into a reliable economic indicator of commodity scarcity.

Methodologically, the framework is a two-stage process: First, we determine commodity-specific probabilities of scarcity via logistic regressions, based on pre-selected determinants and an appropriate price threshold. Second, we combine this probability with a substitutability rate as well as the required amount per project and aggregate the commodity-specific risk indicators to our final measure, the expected scarcity, on project level.

Exemplary, we apply our framework on eight transformation pathways of the German energy system, focusing on the nine commodities silver, cobalt, copper, dysprosium, indium, lithium, neodymium, nickel and platinum, which the Bundesanstalt fuer Geowissenschaften und Rohstoffe (2019) regards as key resources. The pathways considered differ in the underlying climate targets, as well as the acceptance of the required actions within the German society. This leads to varying technology mixes, with the corresponding resource requirements and in turn different scarcity risks for the commodities considered. Hereby, cobalt and indium, mainly allocated to energy storage and solar PV technologies, bear the highest risks, while lithium demonstrates a high probability of scarcity for the extreme scenario. Overall, the sufficiency scenario *REMod − SUF*, which models the expansion of the German energy system with full support by the society, shows the lowest expected scarcity among the paths aiming for the 95% CO_2 reduction goals.

Further research could include time-varying parameters in the framework. Additionally, the proposed risk assessment could be extended to a risk prognosis by exchanging the scenarios with forecasted values for the price determinants.

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Greener Pastures? Does Changing the Corporate Tax Domicile Actually Create Greater Shareholder Value?

AJ. Stagliano, Saint Joseph's University, USA
John McQuilkin, Roger Williams University, USA

Abstract

For many years, U.S. companies have sought to mitigate tax liability through tax inversions. By changing their legal/corporate home to a foreign country with lower tax rates, U.S companies have been able to lower their taxes. The assumption is that by lowering corporate taxes, tax inversions create additional value, specifically by increasing average operating margins, average return on total assets, and average returns on tangible assets. This paper challenges this assumption by providing a case-level analysis of seven companies over a five-year period from 2009-2013, by looking primarily at the companies' return on assets. This paper is timely. Prior to the 2017 Tax Cuts and Job Act (TCJA) the U.S. federal corporate income tax rate was the highest in the world. While the Biden Administration's new corporate tax rates are at this point unclear, the assumption is that U.S. corporate tax rates will increase. Concurrently, in the summer of 2021 the G7 reached a historic global tax agreement. While the details have not been fully worked out, the goal is to level the global tax playing field. Given the current global corporate tax environment, the question still remains: have tax inversions really ever achieved what they hoped to achieve in terms of corporate value creation?

The Continuing Need for Developing an Interactive Map of College-Level Cybersecurity Academic Programs in the United States

Russell Beauchemin, Roger Williams University, USA
Doug White, Roger Williams University, USA

Abstract

The U.S. Department of Labor reports a 33% increase in jobs in the field of Information Security Analysts between 2020 – 2030. They continue on to report a median pay of $103,590/year and a minimum of a bachelor's degree required to enter the field making this an attractive option to students considering potential majors and investigating possible career avenues. This statistic for growth only takes into account jobs in the U.S., the world-wide market will be much bigger based on extrapolation. As of now, there is no specific unbiased and comprehensive resource for people looking to explore academic programs in the field of Cybersecurity or any of its many more-specialized subsets such as digital forensics, penetration testing, and cryptography. While there are resources like cybersecurityventures.com, studyusa.com, and cyberdegrees.org, they are either commercial sites representing the interests of paid-participants, incomplete lists highlighting only the top x programs, or too specific and focused on other aspects such as region or cost to be comprehensive. This lack of resource prevents upcoming students from seeing the whole picture of program offerings and allowing them to make more informed decisions from a comprehensive and unbiased data set. This paper will discuss continued work related to the need for a project such as this, present a walk-through of the project, and demonstrate a sample of a working map.

Keywords: Cybersecurity, Academic Programs, College Degree, Degree Programs, Security

The Necessity of Multi-Factor Authentication for Individuals and Enterprise Environments

Robert Murphy, Roger Williams University, USA

What is authentication and what are the problems with it?

Authentication is an essential practice that keeps computer services secure by only permitting users who can prove their identity. The most common form of authentication entails a user providing their username and password[1], which gets compared to a local database of to see if that username and password are allowed to access the protected recourse. While the username and password combination once provided decent security, its inherent flaws now make them insecure when used as the only method of authentication. The first flaw of usernames and passwords is that it requires users to remember them. Often, users will write their credentials down on sticky notes or use insecure passwords because it makes them easier to remember. The second flaw of usernames and passwords is that people tend to reuse their credentials on different accounts, which can lead to multiple accounts getting compromised.

What is Multi Factor Authentication (MFA) and what are different implementations of it?

MFA is an additional security control that adds protection to services by requiring users to submit two or more valid forms of identification (factors) during authentication. MFA is not a new concept, nor is it limited to online services. For example, most ATM services require users provide two factors of authentication like their physical card and a PIN number. A common form of MFA for online services includes the use of one-time passwords (OTP), which are often sent to a user's phone via SMS or their email account.

What can a factor be?

Factors of authentication can include something that the user is, something that the user has, or something that the user knows[2]. Something that the user is references a unique biometric feature of the user, such as their fingerprint, facial structure, or retina. Something that the user has refers to a physical device that the user possesses, which can include a smartphone, Smart Card, or RFID badge. Lastly, something that the user knows refers to a piece of information that is unique to the user, such as a password, PIN, or an answer to a question.

MFA technologies

- Authenticator apps

  Google Authenticator is an app that provides MFA for online accounts through One Time Passwords. When a user attempts to login to an account like Gmail, it will require the user to open the Authenticator app on their phone and enter the number that the app generated, which expires after 30 seconds. This method of MFA is resistant to phishing because the threat actor does not have physical access to the phone.

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1 https://support.microsoft.com/en-us/topic/what-is-multifactor-authentication-e5e39437-121c-be60-d123- eda06bddf661

2 https://support.microsoft.com/en-us/topic/what-is-multifactor-authentication-e5e39437-121c-be60-d123-eda06bddf661

- YubiKey

  The YubiKey is similar in size to a USB thumb drive and is used to generate codes, such as One Time Passwords for MFA. When users are prompted for a second factor of authentication, they plug the YubiKey into their device and it will generate a code for the account. These devices are a separate piece of hardware, which means that if a device is compromised, the threat actor does not have access to any accounts that utilize the YubiKey for MFA.
- Biometric security

  There are various biometric authentication technologies available on most smartphones in today's marketplace. For example, since 2017, Apple has FaceID on all their iPhones, which allows users to scan their facial structure as a secondary means of authentication. In addition, older iPhones and many Android devices offer fingerprint readers that can be used as a second factor for authentication.

Various credential-based attacks on single factor authentication and how MFA could mitigate them.

- Phishing

  Phishing is a tactic used by many threat actors to get victims to disclose sensitive information that they would not otherwise expose. Some of the forms of phishing include spear phishing, whaling, smishing, and vishing. According to the 2019 Verizon Data Breach Report nearly one-third of all cyber breaches involved phishing[3].

  Typical phishing attacks attempt to steal credentials from users and if successful, result in the complete compromise of a user account. One of the ways to mitigate this attack is by protecting all user accounts with MFA, so that even if a threat actor obtains credentials, they will still need another form of authentication.

- Credential stuffing

  The most common way for threat actors to obtain usernames and passwords is to purchase them off the dark web. Once they have these credentials, they will use a program to enter these credentials into thousands of different websites in hopes that some work. This attack has become common due to how people tend to reuse their credentials on multiple sites. According to a Google 2019 survey of 3,000 adults, 52% of them admitted that they use the same password on many of their online accounts[4].

  Credential stuffing attacks are one of the most simple and effective attacks a threat actor can utilize. By protecting user accounts with MFA, this attack can be mitigated because the threat actors do not have access to the second form of authentication.

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3 https://www.safeguardcyber.com/blog/phishing-attacks-are-what-percentage-of-cyber-attacks

4 https://services.google.com/fh/files/blogs/google_security_infographic.pdf

- SIM Swap

  SIM Swapping is an attack where threat actors call a cell phone provider and pretend to be the victim. Then they convince the provider that they want to swap the victim's SIM card to their "new" phone, which the threat actor owns. Once successful, the threat actor can take control of the victim's accounts, all their text messages, and phone calls. Unfortunately, if the victim is already using MFA through SMS, the threat actor will have access to those MFA requests when attempting to access online accounts[5].

  The only way to mitigate this attack is to set up a PIN on your cell phone provider's account or to use a different form of MFA, such as an authentication app or a physical security key.

Case in which MFA protected companies

- According to google, when they implemented physical security keys as a form of Universal 2nd Factor (U2F) in early 2017 for all employees, they did not report a single user account breach[6].

5 https://www.consumer.ftc.gov/blog/2019/10/sim-swap-scams-how-protect-yourself

6 https://krebsonsecurity.com/2018/07/google-security-keys-neutralized-employee-phishing/

Computational Simulations of Transcranial Electrical Stimulation with Variable Electrical Conductivity Properties

Edward Dougherty, Roger Williams University, USA

Abstract

Parkinson's disease (PD) is a lifelong, terminal condition that occurs when dopaminergic neurons within the brain experience decreased functioning and prematurely enter apoptosis. PD is classified as a movement disorder due to symptoms related to deficient bodily control, which can include incontrollable tremors, bradykinesia, and loss of balance. Despite being the second most prevalent neurodegenerative condition in the world, a cure continues to elude the biomedical field. Nevertheless, medical interventions are known that have proven success in mitigating PD symptoms, however, a significant drawback is that they are not comprehensively understood in terms of their organ-level impacts and cellular-level mechanisms. While far from ideal, this scenario does present a prime application where mathematical modeling and computational simulation can be used to help augment the research communities' understanding of PD treatments. One such therapy that has shown great success in combating PD movement related symptoms is Transcranial Electrical Stimulation (TES), a noninvasive neurotherapy that applies a low dose of electrical current to targeting brain regions. Mathematical simulations of TES have been used to predict electrical current distribution within the head cavity. What is not known is how inherent variabilities among patient-specific cranial tissue properties impacts these simulations, and thus their utility to the neurological field. In this work, we have implemented a mathematical model and computational simulations of TES that integrates biologically based tissue electrical conductivity variability. Simulations are run on an idealized two-dimensional domain as well as an MRI-derived head geometry, each encompassing five distinct tissue types. Results demonstrate the importance of integrating tissue-based conductivity variability within TES models and simulations to enhance their usability for computational neurology applications.

The Initiative to Combine Sustainable Video Innovations to Make Streaming Greener

Yohann Guilloux, Ateme Company, France

Abstract

To understand the topic, we must explore three questions:

- What is video streaming industry?
- How does this industry influence the consumption of energy?
- What innovation can transform this industry to a more sustainable one?

What is video streaming industry?

The video streaming industry is a fairly unknown industry. Everybody watches videos contents on a daily basis on its TV, on its mobile phone, on internet; everybody knows how to start a screen to display a live show or an On Demand one; some of us even pay subscriptions to access specific contents. Now, very few know how a video travels from a camera in a studio or a stadium to the screen of their choice.

There are several ways of reaching TV screen:

- Analogue terrestrial television is the grand parent of the video streaming. The video is display by broadcasting a signal in the air on a specific frequency through transmitters and high antenna and repeaters. Then Analog TV catches the signal and displays it on a screen. The signal is called a channel and in analogue TV, there can be only 1 channel per frequency Digital Terrestrial Television is an evolution of the Analog Terrestrial TV. Both share the same principle of broadcasting signal frequency in the air. However, Digital allows having multiple channels for a single frequency. The signal is created in servers called a head end. The head end compress the videos bandwidth and aggregates them into a signal to push to the transmitter and antenna. A receiver aka a Set Top Box catches the signal to display on a Digital TV
- Satellite Television aka Direct To Home (DTH) shares the same architecture principle as Digital TV, with a head end manipulating the video stream pushing a single signal output. Then instead of passing through a terrestrial transmitter, the signal flows through an earth station (aka teleport) to send the signal to a Satellite. A Satellite receiver receive the signal to display on a TV Cable Television shares the same principle as Digital TV and this time the signal flows through physical cables
- IP Television aka IPTV shares the same principle as digital television and the signal flows through an IP network Over The Top (OTT) is the latest and most popular technology used for video streaming. It makes full use of a telecommunication infrastructure (Internet, 4G, 5G, data center, data storage) to distribute video

At this point, we scratched the surface of what Video Streaming is. Here, we only mentioned about the distribution of content that is the closest mile to a user. In this industry, you should also consider the contribution (to distribute raw video), the studio (cameras, lights), the playout (to add logos, subtitles, metadata), the security (encryption, protection of contents), the storage to archive Video on demand.

How does the industry affect the ecology?

- From the camera all the way to the display screen, we can already sense the need of raw materials is critical to build the infrastructures;
- The quantity of energy is tremendous to feed all the electronic components;
- The space required to install the infrastructure (datacentre, cables, transmission site, antenna);
- Also, a collateral effect is the need of efficient cooling system

What kind of innovation can transform the industry and make it greener?

A key area to improve is to understand

- How components of groups of systems work together to produce a live stream
- The energy usage of the system both under load and at resting.

For instance:

- A better video compression helps reducing the number of servers to distribute a signal
- think of architecture that minimize the amount of data and video to archive
- Use common infrastructure for different purpose (are Cloud and Microservices the solution?)
- Reuse and repurpose an existing infrastructure (technology of Docsis 3.1 to repurpose cables; reuse TV transmitters sites and combine data transmission for Amazon Web Service).

Revival of the Silk Road Using the Applications of AR/VR and Its Role on Cultural Tourism

Sahar Zandi, Texas A & M University, USA

Abstract

Abstract The history of Iran dates back to the Mesopotamian era. Iran accounts for a Natural Heritage site and 24 UNESCO Cultural Heritage sites. In addition, its expansive national lands and climate are fantastic tourist sites, such as the geo parks, ski resorts, and the deserts. Persian heritage has been researched extensively. However, despite the fact that heritage tourism is an attractive topic for academic research, there are research gaps in this area that deserve further attention. In particular, the city of Kermanshah, in the northwestern part of Iran, has an important and deep connection to the Silk Road and the legacy of the historical Silk Road still exists there. However, there have been very few studies exploring Silk Road heritage in the city of Kermanshah. This study concentrates on Kermanshah to explore the heritage tourism in relationship to the Silk Road. The research aims to understand the relationship between the Silk Road and the heritage tourism in Iran and how to preserve the historic places along this ancientroad. The research aims at answering the following questions: 1) What is the current status of the Silk Road heritage in Iran? 2) Can the Silk Road be useful as a tourist attraction in Iran? 3) What can be done to conserve historic places along this ancient road that are difficult to reconstruct? The study examines the use AR/VR (Augmented Reality and Virtual Reality)in reconstructing and conservation of these historical places.

Measuring, Calculating, and Evaluating the Performance of Green Storm Water Infrastructure: Case Studies from the United States

Ebru Ozer, Florida International University USA
Koray Ozer, Roger Williams University, USA

Abstract

Managing storm water runoff in cities is a major concern for both citizens and municipalities. Increased urbanization continues to expand impervious surface areas such as roads, parking lots and plazas, and limit infiltration and uptake of surface runoff. Catastrophic floods, landslides, and mudslides continue taking lives, while economies, ecologies, and human health are being seriously affected by untreated storm water discharge into the world's precious water bodies. Many municipalities across the globe have made financial commitments in integrating green infrastructure into their urban landscapes to better capture, treat, and reuse storm water runoff. Recent research indicates that municipal officials often perceive green infrastructure as performing inconsistently across its lifecycle and requiring labor-intensive maintenance. These officials hold positive views about green infrastructure but want more information on performance and costs to reduce runoff (Meng, Hsu, & Wadzuk 2017). This research aims to introduce three case studies from the United States where the performance of urban parks, plazas, and streetscapes in reducing runoff is empirically measured and documented. By generating and disseminating quantified data, the research aims to provide guidance on better informed green storm water infrastructure investment in cities. The research also looks at ways and means to reduce labor and maintenance costs of green storm water infrastructure. Data collection and analysis processes were performed according to the Landscape Architecture Foundation's case study investigation (CSI) methodologies. The study sequence included identifying possible performance indicators by reviewing each studied project's challenges and solutions, determining appropriate metrics for each performance indicator, gathering primary and secondary data, and calculating performance, and comparing findings from each case studies. Primary and secondary data collection methods included user counts, user observations, temperature comparison studies, and review of design and construction documents obtained from the designers, stakeholders, and different public databases. Quantifying green storm water infrastructure's contribution to urban resiliency and sustainability is not only important in supporting the development of better design and engineering standards for such systems in our cities but also provides municipal leaders with much needed datasets to make informed decisions during the fund allocation phases. Meng, Hsu, & Wadzuk. 2017. Green and Smart: Perspectives of City and Water Agency Officials in Pennsylvania toward Adopting New Infrastructure Technologies for Storm water Management. Journal of Sustainable Water in the Built Environment. Keywords: landscape performance, post-occupancy evaluation, empirical data analysis

The Master of Use in Algeria: An Essential Actor in the Search for a Position

Nedjima Mouhoubi, Abderrahmane Mira Bejaia University, Algeria

Abstract

One of the actors marginalized for several decades in the urban development projects in Algeria is the user. Reconsideration develops his integration, putting him in an expert position and attributing to it the notion of master of use. Is it not he who uses the space, who lives it and appropriates it! His expertise is then derived from real and daily experience.

Master of use then brings together the inhabitants (organized in an association or acting as an individual) and any user of the urban or architectural space (visitors, tourists, users, etc.). It constitutes the third sphere of development and design actors alongside the designer and project owner.

Nevertheless, it presents a handicap translated by his inability to produce the space where he lives, because of his ignorance of his urban environment (who is responsible? how to proceed? the techniques? .. .). But above all the lack of environmental and urban education. The quality of an urban development is measured according to the appropriation of the inhabitant and his satisfaction regarding its realization, it is essential to seek quality by relying on the expertise of this mastery of use and above all by trying to overcome the handicaps it faces.

In this contribution, it is a question of presenting the mastery of use, of identifying its handicaps in the Algerian society and of proposing integration mechanisms which will give it the status of actor in an active way in order to improve the quality of urban development.

Keywords: Mastery of use, actor, urban development, expertise, Algeria.

Undermining DEI: Effects of Asylum Case Delays in the United States

Autumn Quezada-Grant, Roger Williams University, USA

Abstract

Prior to the beginning of Covid-19, the United States Immigration court system has experienced an overload of cases flooding Immigration Courts across the country. Covid-19 only worsened the situation. In 2022, news circuits report that the backlog of immigration cases equal the population of Philadelphia. This is not surprising as a Country Conditions Expert Witness for cases from Mexico and Central America. Cases that I work on have court dates extended two years from now. The central question to this discussion is 'what do immigrant/asylum seekers do while they wait for their day in court?' Lags in the system place migrants in this country in precarious positions wondering if they can work, can they go to school, where they can live, do they have access to health care, could they be targeted by ICE, amongst other questions. Such a standstill of immigration to the United States undermines our notions of diversity, equity, and inclusion. Migrants whose lives hang in the balance do not count in census data undermining our noted diversity. Lack of access to services undermines our argument for equity. Lastly, asylum seekers in particular are excluded in society seen as pariahs on society. We must better understand the situation of asylum seekers in the United States and adversities they face today.

Successful Resolution of Conflict over Water Resources in an Arid State in the U.S.

Patricia Mariella, Arizona State University, USA

Abstract

In this presentation the case of a large dam that was planned to be constructed at the confluence of two major rivers just upstream of the major Phoenix metropolitan area of the state of Arizona. The dam was intended to provide regulatory storage for a large, federally-funded water project (the Central Arizona Project) that transports water from the Colorado River at the border of Arizona and California to central Arizona, largely for farming. The reservoir behind the dam would have flooded almost all of a Native American/American Indian reservation. The Tribal Nation (the Fort McDowell Yavapai Nation or FMYN) relentlessly opposed the construction of the dam and the loss of their reservation lands.

With a coalition of taxpayer groups, environmental groups, and other tribes and tribal organizations, the 400 member FMYN succeeded in forcing a re-evaluation of the cost and benefits of the dam. This result was accomplished despite all the major political stakeholders in the state pushing for the dam's construction. The stakeholders agreed to a proposal to raise several old dams upstream that had been determined to be unsafe and needed to be repaired. The federal government agreed to fund the repairs and simultaneously increase the height of the existing dams. The increased storage provided almost all of the benefit that the Orme Dam had been designed to accomplish, cost less to taxpayers, and did not result in the loss of reservation land. It also avoided the significant environmental damage that the new dam would have caused, including flooding out nesting Bald Eagle sites on the reservation – an endangered species at that time, and a symbol of the United States.

Today, the Tribal Nation (FMYN), which had been one of the poorest in the US as a racial/ethnic group, has a successful casino and a continually growing economy. None of this economic growth would have been possible without their reservation land - if the dam had been constructed.

During the Orme Dam controversy, the presenter was contracted by the Tribal Nation and conducted an economic analysis of the cost and benefits of the dam for the Tribe.

Understanding Product Strategies in Luxury Industry

Guy Deloffre, ICN-ARTEM Business School, France

Abstract

This paper deals with product strategies in the luxury industry. A specific consideration is made on the result of luxury strategies: how can products be considered from premium products to luxury class.

We start from the general qualities of luxury: comfort, elegance and expense. Luxury products are not necessary, but the customers want them; people who acquire and possess luxury goods show a social status in front of others. Luxury brands also use the paradigm of time, a sense of timelessness: luxury products are eternal.

The characteristics of luxury products can be described as follows:
- Very high level of quality from the materials used and from the know-how,
- High price related to the concept of quality,
- Scarcity, products reserved to some social elite,
- Beauty,
- Uselessness, because luxury products are not necessary,
- Long history and respect of the tradition.

Studying the distribution strategies and classes of distribution (the variables considered are the number of points of sales, and the price point of products) results in the following scale:
- Everyday luxury (e.g.,: Champagne, restaurants…),
- Affordable luxury (jewelry, eyewear…),
- Premium core (watches, accessories…),
- Super premium (jewelry, watches),
- Ultra high end and Bespoke (jewelry, yachts, crystal…).

By consideration of the evolution of products, markets, potential customers and commercial strategies, we present how luxury companies adapt their products from premium to luxury ; the variables we study are (1) offer and demand ; (2) price ; (3) functionality ; (4) rationality.

A final comparison between premium and luxury allows to evaluate if this difference is structural or not.

CSR & Jewelry Industry: Tiffany and Cartier

Michel Makiela, ICN-ARTEM Business School, France
Kateryna Sabattie, ICN-ARTEM Business School, France
Sylviane Jeandel, ICN-ARTEM Business School, France

Abstract

The high-end of the jewelry industry has been historically associated with the lack of corporate social responsibility, such as procurement of blood diamond and dirty gold. This research investigates the history of two major companies in this industry, Tiffany and Cartier. In addition, the study examines the current strategies of these two companies, their strengths, weaknesses, and their sustainability strategies. The research concludes with highlighting the competitive advantages of these companies and their potential of future success.

An Explorative Study on Corporate Reputation and Donations

Miao Zhao, Roger Williams University, USA
Ruby Saine, Roger Williams University, USA
Yimin Zhu, Sun Yat-Sen University, China

Abstract

The research aims to explore whether or not and how corporate donation affects consumers' attitudes and purchase intention towards the brand as a function of corporate reputation. Consistent with our prediction, a significant interaction effect is found between these constructs. The study has important managerial implications due to the fact that consumers perceive certain donations as more self-serving to the brand and less charitable than others, therefore brands with differing levels of corporate reputation should consider its optimal donation type to achieve higher consumer attitudes and purchase intentions. Limitations of research and future research directions are discussed.

Richard Briotta Best Paper Award in Knowledge Management & Strategy

Theory of Fields and Perspectives on Sustainability: A Case-based Approach

George Joseph, University of Massachusetts-Lowell, USA
Richard Trubey, Mesoamerican Development Institute, USA

ABSTRACT

This paper proposes a theoretical framework that combines a macro institutional environment in which sustainability endeavors emerge, with micro-level strategic fields or arenas where dynamic change occurs through the interaction of actors and organizations in their institutional context (Fligstein and McAdam, 2012). The paper presents a theoretical framework that aligns with the sustainability/CSR literature to explain shifts in perceptions and developments in CSR/sustainability. Specifically, the framework applies theory of fields to explain the growth and diversity in sustainability endeavors (O'Dwyer and Unerman, 2016) at different periods of time and in different regions As new fields emerge, actors play their roles in consolidating and extending the fields. Individual domain theories such as legitimacy, stakeholder and agency explain the emergence of and continuation of the fields (O'Dwyer and Unerman, 2016). Further, the paper presents a case study of developments of different phases in the growth of a firm in the coffee industry that illustrates the application of the framework. Overall, the case metanarrative highlights the multifaceted nature of sustainability, its challenges and opportunities in making a difference in communities where such sustainability can improve living conditions.

Keywords: Corporate Social Responsibility, Theory of Fields, Institutional Theory

INTRODUCTION

The concept of Corporate Social Responsibility (CSR) has witnessed a shifting landscape in the past few decades, emerging from the Friedman era where the "social responsibility of business was to make a profit," to a greater realization that capital markets and profits do not solve the social and economic problems that emerge from capitalism. Corporations are increasingly called upon to play a role in sustainable development that does not compromise the future generations of resources and quality of life (UN's Brundtland Commission definition). Specifically, sustainable development includes considering and reporting on social, environmental and economic aspects impacted by firms when pursuing organizational goals, thereby increasing the pressure to conform to some threshold of responsibility. This creates a platform for fairness and equity that expands with dissemination through measurement and reporting systems that set up criteria for corporation social responsibility to legitimize corporate activities.

In examining the nature of sustainability, it is important to consider challenges on how it is popularly expressed and interpreted. Gray (2010) points out that one convergent theme has been that much of the "procedural baggage" associated with conventional accounting is no longer relevant when seeking to account for sustainability. While "modernist views of utopia" have been dispelled, replaced by the "social optimism of the Enlightenment," nevertheless, there was pessimism on how sustainability goals were to be pursued. Globalization of business and the increased awareness and mobilization of stakeholders on socio-economic implications of that business has increased awareness of the needs of sustainability (Hediger, 2010). However, institutional differences across the globe and the prevalence of divergent practices resulting from such institutions increased the challenges to how sustainability was implemented. While examining different theoretical concepts undergirding sustainability accounting, O'Dwyer and Unerman (2016) highlighted the need for a meta-theory to explain how actors aligned interests within the field or domain that led to sustainability related outcomes. Such a theory framework that is sufficiently broad to explain variations and shifts in the general view of CSR, while encompassing micro-level factors that influence individual corporations in their decisions, may provide directions for research and practice.

This paper proposes an institutional theory based framework that presents a meta-theory to explain developments in sustainability and Corporate Social Responsibility. Grounded in institutional theory, the role of institutions is seen in the light of global factors and stakeholder influences that result in variations in how such institutions are actualized. The framework presents four institutional fields or arenas where each arena forms a sphere of influence that allows for the identification of the particular roles of field participants and the nature of their interactions (Fligstein and McAdam, 2012; Smith, Haniffa and Fairbrass, 2011). An important aspect of the framework is identification of the arenas. Defining institutional influences of stakeholders based on regulatory/professional, normative and cognitive-cultural categories (Scott, 2014), this paper proposes that stakeholder initiatives lead to the cognitive shifts that create opportunities for more widespread acceptance (normative) of sustainability. Such acceptance further leads to evolution of cognitive and regulatory/professional institutional developments. Specifically, normative pressures that lead to increased sustainability focus and the market for information that can bring about growth of influences by regulatory and professional institutional developments that regulate and facilitate the outcomes.

As indicated, institutions do not operate uniformly across the globe. Rather, local factors influence how institutions develop and impact the environment. For instance, some areas where institutional voids or lack of institutional influences can lead to increased voluntary and state-centered regulations. The resulting arenas or fields that emerge from the different interactions between entities, such as shareholder, community, professions and the state. These developments are not necessarily geographic, and serve to influence the interactions between stakeholders with that region or between different regions. These developments continue to evolve driven by cognitive and regulatory institutions that represent dominant institutions in different arenas, leading to institutionalization of forms of sustainability addressing social, environmental, and economic questions.

The four arenas that form the framework represent four varied perceptions of CSR that have emerged over the past few decades. Recent research, for instance depicts this variation in CSR forms a narrative that depict the environments in which the ideas of CSR exist in some form. The literature attests to distinctions between the arenas in the framework and further suggest that such arenas may also evolve with changes in the environments that could potentially lead to the emergence of new sustainability paradigms (Jennings and Zandbergen, 1995).

Further, the roles of individual stakeholders can vary from entrepreneurial to expertise of the professional in integrating and consolidating these changes marked by increasing "articulation and specialization" (Kuhn, 1996, p. 172). Specifically, the professions also play a critical role in measurement and authentication to validate the criteria to institutionalize the emerging consensus. A case of the coffee industry is used to illustrate the basic environment in the four arenas. The case highlights stages in the development of the sustainable entrepreneurship that involves stakeholder initiatives that develop and expand to different arenas. Stakeholders and institutional regimes represent variations in institutions depicting arenas that provide the basis for such illustration. Hence, the potential for further growth involves developments in the institutional arena.

The remaining sections are as follows: The next section presents the theoretical framework, with research that highlights the implications of operating in the different arenas. This is followed by the case illustration section. The final section discusses and presents conclusions.

A SUSTAINABILITY THEORY FRAMEWORK

The idea of Corporate Social Responsibility (CSR) has evolved over time as a concept, most recently as sustainability, encompassing social, economic, and environmental issues confronting corporations (Gray, 2010). Sustainability has widened CSR to extend accountability to stakeholders other than shareholders. It is within this context that the paper endeavors to present a theoretical perspective that could provide a broad frame of reference to encompass evolution and the diverse forms of research in this area, while also presenting narrower views of scenarios as new research questions emerge and are examined. To this end, the discussion first relates to the appropriateness of the different theories in meeting this projected goal for a meta-theory framework.

Theories such as agency, stakeholder, legitimacy and institutional theories have found applicability within the context of sustainability research. Agency theory has been applied to understand management behavior in the context of principal-agent relationships (Eisenhardt, 1989). The theory seeks to identify/describe governance mechanisms that limit the agents' self-serving behavior. The general assumption underlying agency theory, that the shareholder as principal, has interests that remain the fundamental drivers of Corporate Social Disclosure (CSD)

patterns (e.g., shareholder wealth maximization, reputation risk management and maintaining organizational legitimacy), allows limited scope where CSR may challenge the unquestioned obligation to shareholder wealth maximization (Adams and Whelan, 2009) and extend beyond shareholders to other stakeholder concerns. Specifically, corporations have obligations to stakeholders and society in establishing and maintaining their right to operate. Suchman (1995, p. 574) considers that "Legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions." Thus, legitimacy recognized that accountability extended beyond the owner/shareholder and is necessary for the corporations to operate in their environment. However, given the same incentive systems that obligated management to shareholders, management would indulge in some form of legitimacy seeking exercise to maintain their right to operate (Neu, Warsame and Pedwell, 1998). While legitimacy explained sustainability from one perspective, it was limited in that it left out the real concerns that led to the need for such accountability. However, the more pertinent limitations of Stakeholder and Legitimacy theories lie in their shortcomings in describing CSR/sustainability. Fligstein and McAdam (2012), for example, highlights limitations of the theories in depicting the evolution of organizations and activities of such organizations in complex environments. As Smith, Haniffa and Fairbrass (2011) point out, the fundamental inability of both stakeholder and legitimacy theories to conceptualize the interactions between companies, assurance providers and other interested parties limit their effectiveness for investigating the dynamics of "capture," i.e., the processes whereby professions and management take control of Sustainability Reporting and Assurance policy and practice.[1] While the theories played an important role in the embryonic fields of study, there is increased recognition of their limitations in providing perspectives in maturing fields.

Institutional theory presents yet another alternative that depicts the emergence of institutions or informal rules and norms (North, 1991). The theory provides a basis to understand these forces shaping social systems, including organizations. Institutions are socially structured rules, practices and structures that emerge from institutional orders, which at the societal level,

[1] Additionally, divergent outcomes are possible applying legitimacy theory, providing a rationale for CSR in some situations and not in others (e.g., Guthrie, J. and Parker, L. D., 1989). Hence, the theory by itself has limited scope and would not suffice to explain changes.

include community, families, religion, state, professions, markets, and corporations (Thornton, Ocasio and Lounsbury, 2012). According to North (1991), organizations are shaped by institutions, or rules and norms that relate to specific socio-political and historic factors of the region that develop within the context of these institutional orders. These institutional orders vary in influence over time and between regions based on historical factors (Campbell, 2004). Institutions are foundations of social life, consisting of formal and informal rules, monitoring and enforcement mechanisms, and systems of meaning that define the context within which corporations and individuals operate. Institutional theory highlights the assumptions that other theories tend to ignore. For example, capitalist systems often benefit from government non-intervention, greater access to markets and less regulatory interference in their actions. Institutions however, form static spheres, which limit the ability to envision change (Fligstein and McAdam, 2012). Institutional logics[2] that forms the basis for agents to construct the "practices and rule structures" (Thornton and Ocasio, 2008, p. 101) also tends to imply too much consensus in the field among actors, and omits differences in the power and perspectives of actors in their assertions of their own point of view and psitions of power (Fligstein and McAdam, 2012). For example, the market logics that produces incentive systems through which some agents intervene in the institutional system (Friedland and Alford, 1991), may lead to opposing reactions from other actors, whose actions are determined by stakes that may be adversely impacted.

To understand the environments in which actors operate, before exploring how actors can shape their environment, we combine institutions with the theory of fields (Fligstein and McAdam, 2012) to present a basis for the theoretical framework that depicts a variety of institutional environments. National level institutions in such areas as the political system, labor and education and cultural systems, and corruption and stakeholder power (i.e., unions) were found to influence the levels of CSR (Ioannou and Serafeim, 2012). The dynamic nature of this interaction of agents applying the institutional logics within their sphere is encompassed within an alternative neo-institutional view that calls for "institutional arenas" or theory of fields (Fligstein and McAdam, 2012). Such organizational fields of operation allow both the

[2] Institutional logics has been defined as taken for-granted social prescriptions, cultural symbols and material practices that guide actors' behavior, enabling them to organize in time and space and bring meaning to their lives Thornton, P. H., Ocasio, W. and Lounsbury, M. (2012).

identification of the particular roles of field participants and a classification of the form of their interactions. Actors do not have static perspectives nor are they equal in power. Emerging institutions challenge the status quo and lead to the legitimacy seeking behavior by firms. They use their resources, proclivities and perceived advantages to jockey for position in existing fields and better their situation, and in doing so, can create change in both their position and the underlying order of the "field" or arena.

In presenting the theoretical framework, the essential elements of the strategic arenas are first depicted through the intersection of macro-level institutions. Such institutions could be broadly classified into regulatory/professional, normative and cognitive-cultural (Scott, 2014). Regulatory and professional institutions that include laws and the political system, lead to compliance, and legitimacy, a 'condition reflecting perceived consonance with relevant rules and laws or normative values or alignment with cultural-cognitive frameworks' (Scott, 2014, p. 72). Normative institutions set the norms or ethics that determine what is appropriate and prevail within that society, including levels of transparency and corruption. Cognitive-cultural institutions form cognitive or creative responses that include the language and symbols, within a cultural context, that further shapes the institutional environment. Thus, this classification is useful as it leads to arenas where actors play a role in shaping the norms for sustainability and corporate CSR. The arenas in the framework depict developments in sustainability emerging from stakeholder initiatives that mold the approach to issues, influencing the language and symbols. These lead to more widespread norms that shape markets for services and products, including professional services, also influencing changes through regulatory institutions.

Stakeholders as institutional agents support the development of institutions leading to the emergence of sustainability norms connected to sustainability logics (Bouten and Everaert, 2015). Stakeholders were broadly defined as those who had legitimate interests in corporate activity (Donaldson and Preston, 1995, p. 85) given that they are impacted (directly or indirectly) "by the achievement of the organization's objectives" (Freeman, 1984, p. 46). These include managers, stakeholders, governments, professionals and others who may operate within each field and have power that determines how they can shape their institutional environments. Mitchell, Agle and Wood (1997) defined stakeholder power as the extent to which a party has or can gain access to physical, material or social (prestige) means to impose their will, plans and purposes. Stakeholders therefore have different roles within each arena based on their power and

the salience (i.e., legitimacy) of their claims. The dynamism is captured in the application of 'institutional arenas' (Fligstein and McAdam, 2012), where the identification of the particular roles of field participants and a classification of the form of their interactions occurs within each 'field of action'.

The intersection of the institutions and the influence of agents forms the appropriate basis for the four fields (see Table 1). Table 1 provides an overview of the Institutional Framework consisting of the fields or arenas where changes take place under the influence of institutional agents. The four segments depict institutional environments in which organizations and other agents operate and influence the nature of sustainability. These theoretical arenas can be further illustrated applying the literature on the diverse streams of sustainability research (Ramoglou and Tsang, 2016; Suddaby, 2014). This facilitates a cohesive understanding of the underlying factors influencing this diverse body of literature to help classify and apply that knowledge in furthering the appropriate goals of the research (Gray, 2010).

----------Insert Table 1 here----------

Arena I: This arena can encompass regions with few to no regulations, some that may protect free markets and others, particularly in developing areas, where market forces are left with few guidelines, hence are characterized by institutional voids. In some regions, particularly in more developed regions, management incentive systems may lead to opportunistic behavior that could pose a threat to sustainability and CSR. Tregidga, Milne and Kearins (2014), for example, point out that the strategic approach to social and environmental issues may lead to a "trust us" rhetoric from firms concerned to develop a sustainable identity, although faith in such organizations may not be warranted given that responses may be largely cosmetic rather than substantive. Hence, internal actions and decisions remain committed to maintaining the status quo related to managerial incentives that conform to the principal-agent relationship. Strategic goals for profit take precedent in this segment. Strategic approaches to CSR have become widely prevalent, with Porter and Kramer (2002) emphasizing the opportunity to enhance competitive advantage through such CSR strategy. A corollary to this proposition was that self-interest was a sufficient motivator for such philanthropy, given economic benefits that would accrue from such initiatives.

This segment epitomizes the absence of ethical norms, stakeholder actions and the ability to actively address institutional voids. The principle-agent relationship built on self-interest alone was not a reliable basis for implementing responsible behavior. The reaction to institutional voids may reflect the dynamics within the specific institutional action field and the power of individual players. Increasing evidence of social and environmental ills raised serious questions about the effectiveness of the regulatory frameworks, as well as the roles played by NGOs and other pressure groups in developing countries such as Tanzania. According to Lauwo, Otusanya and Bakre (2016), the lack of government regulatory controls and NGO activism resulted from the institutional voids in a region where such actors were weaker or unwilling to intervene due to the strong capitalist institutions. As the authors point out, weak legal and regulatory frameworks governing gold mining in Tanzania led to the inadequate enforcement of obligations on MNEs to create structures for improving social and environmental performance and CSR disclosure. The lack of NGO representatives who could take up the case for the poor in addressing the adverse impact of mining industry on their lives was not a reflection of absence of urgency of the problem, but rather of stakeholder power, a key factor in determining stakeholder salience.

The presence of such institutional voids (or the absence of institutions, whether regulatory or normative (ethical), (e.g., Chakrabarty and Bass, 2014) resulting from a lack of established ways to consider stakeholder interests, and the inherent powerlessness of some stakeholders, lead to the intervention of global NGOs and other regulators to contain moral and ethical violations.

Arena II: The shift to the new stakeholder intensive environment begins with the recognition of an institutional void, effectively involving an absence of clearly articulated systems, norms or regulations that address issues relevant to society and the resulting representation of stakeholders in key aspects of firm performance. Voids are sometimes communicated through the research literature that focuses on areas with robust institutions. Kolk (2016), for example, highlights the lack of research on developments in sustainability in the international business literature, particularly areas such as poverty, inequality, peace and conflict, within and across countries, and the accompanying institutions (and their ‘voids’), and use of sustainability performance measures in decision-making in addressing such issues as the conflict between energy development and protection of wildlife (Epstein and Widener, 2010).

With stakeholder involvement, there is growing emphasis on greater accountability on how corporate activities impacts stakeholders. Normative institutions that subsequently develop lead to the basis for shifts, from the traditional shareholder-based agency role supporting capital markets to greater accountability to stakeholders. New players with greater power and/or access to resources who now act as institutional entrepreneurs who establish new sustainability standards and criteria for establishing industry. Stakeholder-based sustainability research classifies the environment in which firms operate as either stakeholder-oriented, or shareholder-oriented (van der Laan Smith, Adhikari and Tondkar, 2005; Dhaliwal *et al.,* 2014). van der Laan Smith, Adhikari and Tondkar (2005) explored the differences in social disclosures internationally using stakeholder perspective, based on how stakeholders were defined in society. Gallhofer, Haslamb and van der Walt (2011) review accountability and transparency in relation to human rights, highlighting its complexity and need for notions of accountability and transparency through greater involvement of supra-national and international organizations such as the ILO, OECD, UN, and World Bank. To systematize the understanding of stakeholder, and to understand their motivations and goals, research has classified stakeholders as internal (employees and others) and external (customers, suppliers, etc.) (Baumgartner and Rauter, 2017), primary (transacting with the firm, such as customers, suppliers) and secondary (not directly transacting, such as community) (Clarkson, 1995). Perrault and Quinn (2016), classifying stakeholders into primary and secondary, examined the KLD data report on firms' actions towards such stakeholders using Corporate Social Performance dimensions (environment, social, etc.) that firms generally engaged in. Their results indicated that while firms expended more resources on garnering strengths in primary stakeholder dimensions, this trend was sharply deteriorating to the benefit of secondary stakeholders – notably the natural environment.

Overall, these studies suggest an orientation to stakeholder related strategy focused on integrating stakeholder issues into strategy. Normative institutions begin to take force as stakeholder pressures increase the need for firms to develop strategies from a stakeholder perspective. Stakeholder driven initiatives, particularly through nonprofits and global entities play a crucial role in the development of institutional change. With sustainability oriented normative institutional developments, changing approaches towards stakeholders, whether as customers, or social groups and increased focus on extended goals of such stakeholders would begin to influence corporate decisions.

Arena III: This arena highlights an increasing normative shifts to systematizing institutional developments from stakeholder initiatives, and creating the market for information that could institutionalize stakeholder gains. This would lead to the need for wider acceptance of the innovations and stakeholder entrepreneur initiatives, such that the sustainability approach would become more normative. Changes to greater acceptance of sustainability (i.e., sustainability logics) lead to the question of how to integrate CSR within the corporation, based on how it could benefit corporations. Some would see the growth in this arena as a strategic opportunity. However, extension of business to a global arena presents challenges, given that the nature of underdeveloped normative and regulatory institutions allows global companies to operate without the regulatory oversight. Further, with greater stakeholder orientation, stakeholders emerge as institutional entrepreneurs to extend institutions and create new ones leading to new forms of legitimacy seeking behavior. They also harness legitimacy for sustainability norms, effectively integrating the cognitive and regulatory elements in the institutional framework, particularly through the development of sustainability reporting on a wider scale, providing stabilization along the lines of traditional financial reporting systems.

The role of corporations in society has entered a phase where responsibility is increasingly perceived as crucial to a firm's acceptance in society. Corporate consider self-regulation in response to new awareness of global issues and changing norms as they encounter differences in local conditions in comparison to global standards. Epstein and Roy (1998) for example highlight the institutional ambiguity that multi-national enterprises (MNEs) face regarding corporate environmental performance. This arises from differences in local and global regulations. As part of their environmental strategy, they must decide whether they will adopt a global company standard or otherwise adapt their standard to meet local requirements. Such issues have emerged in areas such as labor practices, child labor and environmental management, that exist in many industries such as the apparel industry. Increased stakeholder activism has motivated corporations to develop codes of conduct that will enable managers to decide upon a strategy that would consider such factors while evaluating the long-term impacts of their decisions. They also incorporate such stakeholder concerns into strategy, recognizing the need to increase responsiveness and transparency.

Kolk and Pinkse (2005) examine strategic options available to companies who have considerable discretion in their response to the Kyoto Protocol. For example, under a flexible

regulatory regime, managers could choose improvements in their business activities through innovation or compensatory approaches such as emissions trading. They could also opt to implement such initiatives independently or in concert with external actors, such as companies in the supply chain or industry, NGOs or (local) governments. Regarding carbon emissions, Ioannou, Li and Serafeim (2016) examine how target difficulty affects the degree of target completion in long-term non-financial performance. Using a Carbon Disclosure Project (CDP) dataset, they find that firms setting more difficult targets complete a higher percentage of such targets. Their results also showed that target difficulty was more effective for carbon reduction projects requiring more novel knowledge and in high-pollution industries. Hence, firms develop approaches to learning and developing corporate sustainability based on their individual philosophy, innovation and industry. This also leads to further pioneering developments within firms that form the basis for advancement in self-regulation. Jennings and Zandbergen (1995) cite examples of such pioneering work in the development of Total Quality Environment Management (TQEM) at 3M through their Pollution Prevention Program (3P) or the environmental ethic at The Body Shop.

Despite institutional voids, changes often do not occur where NGOs are weak and governments remain inactive to continue to attract investments (Lauwo, Otusanya and Bakre, 2016). Thus, empowering local NGOs through educational, technological and NGOs' advocacy campaigns and networking may increase the likelihood of pressures on regulators for change, and on MNEs to increase sustainability reports. Resultantly, the professional emerges as an important actor in developing the expertise necessary to develop information and reporting systems that takes shape in the fourth arena. The need for skilled collective actors increases, leading to an expanding class of educated professionals who are called to satisfy this demand. Such professionals also serve as key support for institutional entrepreneurs who are crucial to the development of the institutional field as they create new forms of organizing and means to coordinate activities within and between their organizations and external stakeholders (Fligstein and McAdam, 2012, p. 80). Additionally, stimulating socially conscious investors to be informed and actively support institutional change would be necessary before this field can be transformed through the intervention of new actors who have power and resources to initiate change. In some fields, normative pressures lead to self-regulation as managers also increase their own initiative to create innovative approaches to develop sustainability practices and reporting. Thus, firms and

stakeholders set about institutionalizing gains, and set the trend for others to follow. However, this arena highlights remaining institutional voids that need to be addressed through regulatory reforms and increased reporting measurements that allow for transparency to complete the cycle of sustainable development, as highlighted in the fourth arena.

Arena IV: As cognitive structures emerge and professional roles are defined, greater uniformity and conformity begin to grow, where organizations assimilate to co-exist within the institutional environment (Dacin, 1997; Deephouse, 1996; DiMaggio and Powell, 1983). Thus, the professional (particularly technological, managerial and accounting) play key roles in this arena in extending cognitive institutions through increasing "articulation and specialization" (Kuhn, 1996, p. 172) that could potentially lead to the new institutional environment. Specifically, with the need to increase information about sustainability, the value from such endeavors, and the reliability of such measures, standards to arbitrate on sustainability issues were necessary for greater objectivity. Ilinitch, Soderstrom and Thomas (1998) highlight the role of the accounting profession establishing metrics to support sustainability, since the domain of accounting typically included measuring, communicating, and regulating information about company performance. Expanding accountants' domain to include environmental performance can greatly contribute to the usefulness of environmental performance metrics. The need for sustainability reports was now widely recognized as an information source on companies' environmental performance by a wide range of stakeholders including shareholders, government regulators, consumers, employees, and the general public (Ilinitch, Soderstrom and Thomas, 1998). The variety and variations of reporting mechanisms that have emerged (namely, Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC), the Sustainability Accounting Standards Board (SASB), and the Carbon Disclosure Project (CDP)) attest to this complexity and indicate the need for some form of increased professional involvement in assurance services to increase legitimacy (Hales *et al.*, 2016). Joseph (2012) highlights the variations of reporting mechanisms within a reporting developed by the Global Reporting Initiative (GRI). (Simnett, Vanstraelen and Chua, 2009) find that global firms increasingly publish separate general purpose, nonfinancial (sustainability) reports. Some of these are independently assured and assurers may or may not be from the auditing profession. They also found that stakeholder-orientated countries are more likely to choose the auditing

profession as an assurer. However, there appeared to be evidence that there was wide variation in the disclosure media, and the disclosure practices among firms at large.

Ratnatunga, Jones and Balachandran (2011) highlight the importance of carbon management schemes to meet carbon ratio targets and includes discussion on the disclosure of such information. They suggest expanding the discussions from reporting of current carbon assets and liabilities in the balance sheet and the timing effects of carbon releases in the income statement to how to value and report the underlying non-current assets and liabilities that produce or use carbon allowances on the balance sheet. Research has also examined other forms of specific disclosures such as carbon emissions data disclosed to the Carbon Disclosure Project by S&P 500 firms (Matsumura, Prakash and Vera-Munoz, 2014). The results confirm that firm value decreased with increased metric tons of carbon emission disclosures, but the median value of firms that disclose their carbon emissions was significantly higher than that of comparable non-disclosing firms, results indicating that the markets penalize all firms for their carbon emissions, but that a further penalty is imposed on firms that do not disclose emissions information.

Overall, the meta-theory framework presents multi-faceted aspects and opportunities for integrating domain theories to explain change at different stages and involving varied agents. It provides analytical breadth and depth; the breath necessary to understand and anticipate change, driven by new perspectives and developments that extends to the institutional fields that encompasses local and global goals. In addition, the framework allows for analytical depth to understand processes that evolve as actors apply their resources and opportunity to attain their goals within the institutional context in which they find themselves.

ILLUSTRATING THE FRAMEWORK: THE MDI CASE

This section reviews the CSR case within the theoretical framework as depicted in Table 1. The case focuses on a start-up coffee producer that has a vision to bring sustainable coffee to address social, economic and environmental problems in Honduras and the Central America region. The Mesoamerican Development Institute (MDI) begins as a nonprofit to address the sustainability issues in Honduras. The case describes the multifaceted nature of sustainability in the coffee industry, highlighting opportunities, problems and constraints that influence the founder's vision. They enter new phases in their development, from addressing the deforestation

issue, to the coffee cultivation and branding (The Café Solar brand). This phase extends the sustainability strategy incorporating innovation, cost and quality considerations across the value chain for successful implementation of the strategy. Further, the third phase includes educational endeavors and carbon accounting to systematize gains and provide financial viability. This phase sees MDI being designated as Co-Manager of Pico Pijol National Park in Honduras to scale up its model of forest-friendly coffee production and processing in an initiative to restore forest habitat in the coffee regions linking seven threatened national park – the Yoro Biological Corridor. The case also highlights uncertainties and difficulties in attaining sustainability goals that can come from varied sources, and increases the need for vigilance and continued active monitoring to ensure success of the entrepreneurial initiative.

Arena I: Institutional Voids and need for sustainable development. Coffee cultivation is a significant cause of deforestation, water shortages, and loss of habitat for migratory bird species in Central America. Coffee however, is also one of the few viable industries providing employment to the region. Honduras is now the largest coffee producer in Central America; Central America as a region is the second largest producer. Coffee is replacing pine-oak and cloud forest, impacting watersheds and the nation's largest power generation utility.

Honduras however, was a region in crisis. Coffee expansion had become the primary threat to cloud forest and national parks. El Cajon hydro utility (figure 1) generated $200 million in electricity per year and was the source of power to the region. It was now being impacted by deforestation due to coffee expansion in higher elevation forests. The water sources were depleted due to forest denudation, removing the cloud cover that led to reduced rainfall. Thus,

deforestation causing critical water shortages for domestic consumption as well, while leaving hydroelectric generation subject to unreliable source of energy.

Market forces did not consider sustainability issues in producing country, focusing on an extractive model relying on low labor costs, rural poverty and depletion of natural resources. Furtherm banking & finance had little or no experience financing innovation for alternatives such as clean technology. It was easier to finance conventional equipment and methods, that led to wood burning and forest loss. Further, corruption was associated high turnover of officials in banking, central & municipal government. Understandably, international donors were hesitant to fund government programs. To resolve the problems to sustainable processing (infrastructure) & production required significant investment of resources in educating specialists in several fields: field biologists; engineers, operations technicians, accounting, quality control. Further, the revenue for coffee farmers subject to volatility Continued low coffee prices besides increasing energy costs for processing. The lack of job opportunities has also led to widespread emigration.

Arena II: In this environment of institutional voids, how will the partnership be able to create a new trajectory to being about change What are the opportunities? The global systems allows to some extent the transfer of technology. Hence, the solution lay in the intervention form stakeholders who were able to develop technology in Western labs through coordination of different like-minded individuals, the initiative for research and intervention using sustainable technology. International collaborative research with university networks and US forest service. This segment includes many stakeholder innovations to bring a sustainability awareness and address the problems that plagued the region.

Café Solar® embodies the vision of the founders to address a complex set of issues haunting Honduras. MDI worked with stakeholders to implement a multifaceted approach to sustainable development of the coffee growing regions connecting threatened national parks. Drawing from the experience and expertise of ornithologists, engineers, academics, coffee farmers, women activists and an array of global stakeholders, the vision took shape in the emergence of sustainable coffee cultivation, processing, and the Fairtrade Cooperative, COMISUYL working with the nonprofit, MDI and its for-profit affiliate, MDI Honduras that implemented and marketed the vision. Crucial to success was the creation of a brand that attracted a network of global customers desirous of Fairtrade and sustainable coffee plantation.

Sustainable coffee began with coffee cultivation methods that could stem the tide of increased deforestation while seeking higher yield, given that the economy was highly dependent on revenue from the sale of coffee. Hence, the vision commenced with transformation of cultivation from the traditional sun grown coffee that led to widespread deforestation. Shade coffee, which addressed deforestation, had significantly lower yields. The Integrated Open Canopy (IOC)™ coffee production (figure 2), conceived by a coffee farmer and agronomist, Victor Julio Arce, who worked with MDI, developed protocols with input from the local community and coffee producers. IOC had yield levels comparable to sun-grown coffee, while it also preserved the environment from deforestation and habitat destruction. IOC maintained a minimum 1:1 ratio of forest to coffee production in three hectare areas that allowed for preservation areas to retain the forests that served as carbon sinks and also preserved habitat of migratory birds, while maintaining rainforests that allowed headwaters to supply the dam below.

Figure 2: Integrated Open Canopy land sparing system conserves forest

Drying processes were another important stage in coffee production. However, traditional drying energy sources were either wood-burning resulting in increased greenhouse gas (GHG) emissions, or hydroelectric power, an erratic source highly dependent on the reservoirs that in turn depended on the watersheds fed by the rainforests. Another approach, a rudimentary "solar" power solution, involved the use of "patios" and other forms of "passive" solar systems in very small scale operations, and usually in regions in which wages were kept artificially low to maintain economic feasibility. In Nicaragua for example, if minimum wage laws were enforced, the highly labor intensive method of "patio" drying that required seven to fifteen day drying intervals, would not be economically sustainable. The Off-Grid Facility (figure 3) was the first

industrial plant to break 140 years of the use of tropical forest in the form of firewood to dry the coffee harvest. MDI combined IOC cultivation with the industrial use of solar and biofuel energy for drying, eliminating the use of firewood from tropical forests for the drying of the annual coffee harvest. Coffee processed using 100% renewable energy – Solar and Biofuel – in harmony with tropical forest and national parks.

Figure 3: The Off-Grid Facility- the first Solar Power based industrial plant

Increased stakeholder interventions in the processes through Innovations brought about a new vision to Honduras. Without compromising on the need for employment in the coffee industry, the sustainability entrepreneurs had ventured to bring about land-sparing coffee production that restores/conserves forest habitat on farms. Integrated Open Canopy coffee production has an area of forest equal to or greater than the area of cultivation. This also led to capacity building to support new forms of employment, particularly in locally produced biofuels and operation of clean processing technology, as well as specialized fields such as carbon offset verification/validation services by local entities, and export and quality control.

Arena III: The initial vision indicated that there were solutions to remediate the problems of Honduras. However, it needed expansion to a wider scale, and increased effort to develop greater consensus among the population, particularly those in positions of influence. Thus, the next stages were to liaison with groups inside Honduras and increased access to populations such that benefits were more evident to the population. For instance, the need to further the extension of these initiatives involves increasing employment opportunities, extending the markets to those sections of society that could lead to developing norms of behavior that recognize the importance of supporting such initiatives. Hence, MDI identified stakeholders who were potential partners. These included the Honduran Forest, Wildlife and

Park Services; municipal and local governments, water committees, coffee producers, local biofuel producers, newly formed processing and export company, the national electric utility, and coffee importers/roasters in Canada, Europe, and the US. Further, MDI researcher partners included different departments from a range of US universities including Tulane, University of Kentucky, Center for Tropical Ecology & Conservation, Antioch University of New England, University of Georgia, Warnell School of Forestry, Department of Environmental Conservation & Center for Women & Work, University of Massachusetts, in addition to the USDA Forest Service.

Partnerships were of the essence in MDI's approach. One important partner was COMISUYL (Cooperativa Mixta Subirana Yoro Limitada), a Fair Trade Cooperative serving the producers of the Yoro region. In addition to having the required coffee quality, the cooperative had a strong vision and strategic plan regarding the partnership with MDI and the confidence to co-invest their funds in the project. The cooperative included many experienced members such as the dynamic and quitely determined co-founder, Maira Manzanares. Initially, both the Cooperative and the local banks showed apprehension and resistance to the innovative technology and the presence of a significant number of women in the administration. It was Maira Manzanares, herself a small *Finca* (farm) owner, who led the early skirmishes and heated debates, first with their coop fellow members and then with the banks to gain support for their innovative clean mill. The banks finally signed the agreement for the loan of $500K to begin capital investments.

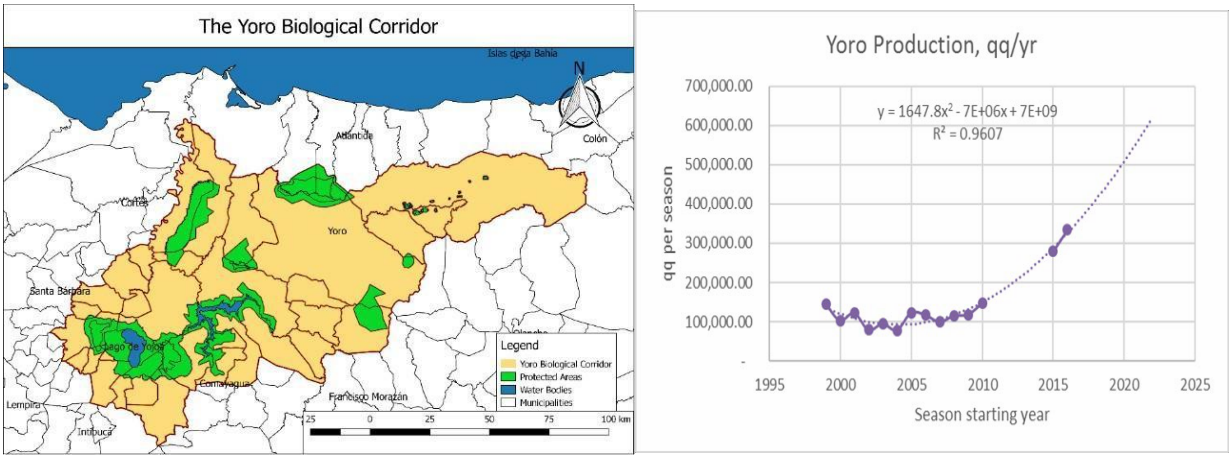

Figure 4: Impact on the Yoro Corridor

With growth in reputation, Mesoamerican Development Institute (MDI) was designated as Co-Manager of Pico Pijol National Park in Honduras to scale up its model of forest-friendly coffee production and processing in an initiative to restore forest habitat in the coffee regions linking seven threatened national parks – the Yoro Biological Corridor. Yoro Biological Corridor (figure 4) consisted of 12,000 square kilometers with 26 municipalities and included participation of indigenous community (Federation of Xicaque Tribes, Yoro, Honduras (FETRIXI)). Current coffee production of 1,486,685 qq from an area of coffee cultivation of 52,247 Ha or 129,106 acres containing 15,266 registered coffee producers. There was a total population of approximately 884,660 and the region included ten threatened protected areas. The off-grid drying systems were particularly important for the coffee-rich Department of Yoro that had no coffee mill capable of preparing coffee to export standards for the specialty coffee market. MDI projected that their technology would serve over 8,000 registered families producing coffee in the Yoro Biological Corridor. New large scale off-grid carbon-neutral processing plant (Drying, milling, sorting, classification, hermetic storage) is shovel ready with 70% of financing approved. The new factory and participation of large players will help to transition more farms to Integrated Open Canopy and eliminate use of firewood in process and support more biofuel producers (Figure 5 depicts this model). More coffee processed means more revenue pl – upstream – can lead to more farms – 70% of financing available and Downstream – more exports.

Figure 5: Solar Power Expansion Plans

Partnerships helped solve challenges confronting MDI. The Honduran Coffee Institute (IHCAFE), and the National Autonomous University of Honduras (UNAH) collaborated with MDI to provide intensive training for the local youth in charge of operating the factory.

Currently, 55 employees were involved in running the factory at peak operation, and the training facilitated the manpower availability for future growth. These initiatives also resulted in another partnership between MDI and the Honduran Forest Service that launched the Yoro Biological Corridor Initiative to expand and replicate the "Yoro Model" throughout the coffee growing regions of Yoro, thereby protecting four national parks and endangered species (Fiigure 6).[3]

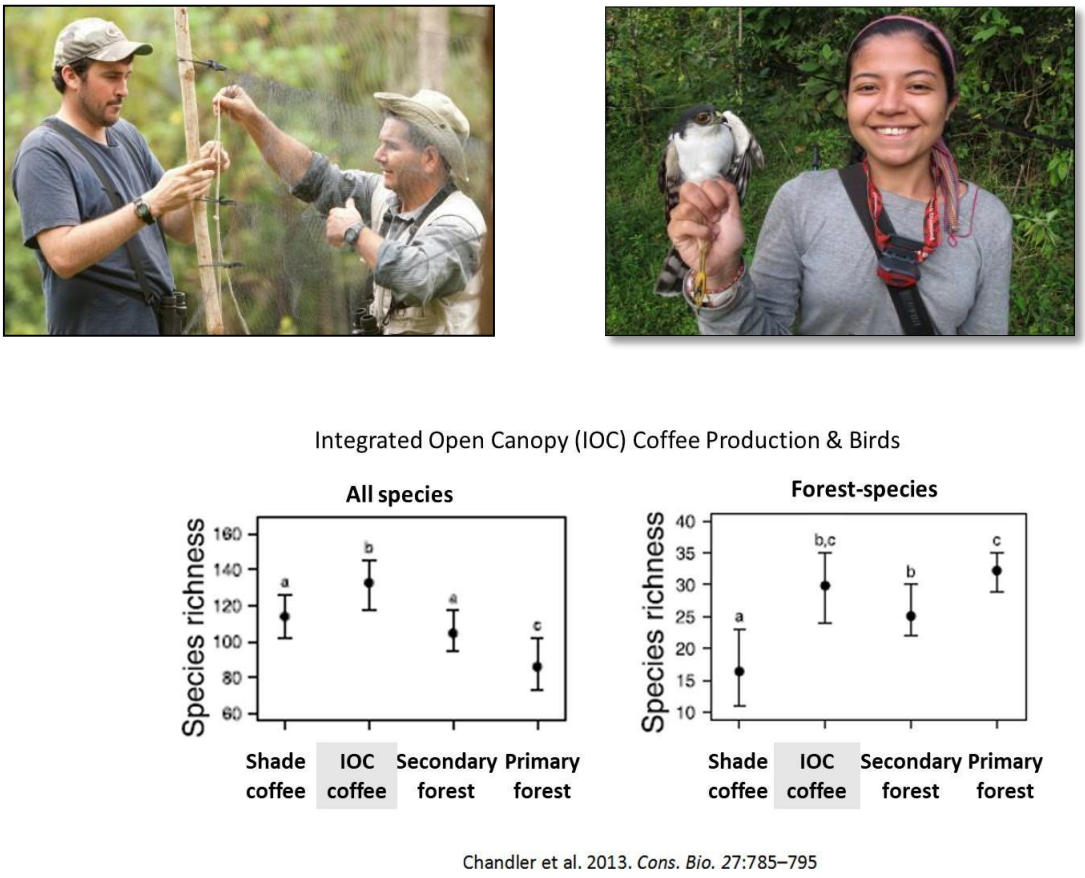

Figure 6: Assessing Biodiversity Benefits

Forest service increasingly included in the conversation (research is providing credibility for the alternative model with policymakers). MDI also partnered with academics and the US Forest Service to study the IOC's benefit to biodiversity through its impact on the migratory

[3] As part of the Yoro Biological Corridor Initiative, MDI and COMISUYL were designated as co-managers of Pico Pijol National Park by the Honduran Forest, Park and Wildlife Services in order to address the threats to clouds forest and national parks posed by expanding coffee production and processing through promoting the transition to IOC coffee farms.

Golden-Winged Warbler, whose breeding grounds were in northeastern United States and wintering grounds included the coffee regions of Honduras.[4]

To develop self-sufficiency in production while retaining sustainability goals required the buy-in from larger companies to support scale up investment. While industries had committed on paper to lessen deforestation, there were no meaningful developments. Sustainability initiatives required the means whereby export, marketing and documentation control with business orientation could enable corporations to create value. One source was the ability to create new capacities for carbon validation, which was increasingly needed by corporations in line with Kyoto protocols. However, there was a shortage of trained youth in carbon neutral processing and carbon accounting, as validation of carbon offsets are critical to scale up of carbon revenues and certifying brand claims (higher price for coffee). Scaling up was required to attract larger coffee companies. This capacity building to support local ability to validate and verify carbon offsets (currently no accredited carbon validators in Central America) was further endangered by migration, and therefore, employment opportunities could stem the migration tide and loss of personnel trained in the technical areas. Carbon trading also provided additional incentive to conserve and/or regenerate forest. Below is a computation of carbon valuation assessing of above ground carbon stocks and payments from MDI IOC implementation (Figure 7). With a current total of 20 IOC farms mapped to date, the total estimated offsets are 6,955 MTCO2/year with 68 ha of coffee cultivation and 171 ha of IOC forest habitat. At $8.00 per metric ton of CO2, the total value of this year's carbon offsets is $55,639. Estimated Potential Offsets for the Yoro Biological Corridor are 3 million MTCO2 per year ($24 million @ $8 / MTCO2).

IOC carbon sequestration, MTCO2/yr		6,289.07	90.4%
organic production: soil carbon, MTCO2/yr		465.91	6.7%
firewood elimination, MTCO2/yr		185.20	2.7%
electricity grid elimination, MTCO2/yr		14.64	0.2%
Total sequestration, MTCO2/yr		**6,954.82**	100.0%
Total IOC+ Soil sequestration, MTCO2/yr		**6,754.98**	
Total Value of CO2 Trading, $	$	**55,638.55**	
Total Value of CO2 Trading on IOC+Soil, $	$	**54,039.85**	

[4] Research conducted jointly by University of Massachusetts and the US Forest Service demonstrated that these sustainable practices supported migrant bird populations. Such practices are viewed by Honduran Conservationists as the last best hope for conserving the region's dwindling forests, critically threatened by expansion of unsustainable coffee cultivation.

Total IOC Region Carbon Trading Payments, $/yr	IOC+S			
Payments to IOC region coffee producer, $/yr	50.0%	$	27,019.92	49%
Payments to other groups, $/yr	0.0%	$	-	0%
MDI IOC Implementation-Expansion-Operations Fund, $/yr	25.0%	$	13,509.96	24%
NERC^{2}arbon® IOC region, $/yr	15.0%	$	8,105.98	15%
MDI Honduras Off-Grid Facility Fee, $/yr	10.0%	$	7,002.68	13%
Total IOC plus Off-Grid Factory Carbon Trading	**100.0%**	$	55,638.55	100%

Figure 7: Computation of Carbon Valuation Assessing of above Ground Carbon Stocks

Arena IV: This arena ties together the institutions, integrating markets and regulation to provide symmetry, conformity, and usefulness. For institutional change that can be more widespread (isomorphic), the early diffusion within the fields further extends to the three pillars, regulatory, normative, and cultural-cognitive, leading to legitimacy, a "condition reflecting perceived consonance with relevant rules and laws or normative values or alignment with cultural-cognitive frameworks" (Scott, 2014, p. 72). This state of consonance indicates wider acceptance of the criteria for such sustainability, greater feasibility of meeting these criteria and acceptance of outcomes by those in positions of power in the emerging field. Hence, this Arena brings the stakeholder and regulatory roles into cohesion, forming the culmination of the CSR efforts that could lead to a paradigm shift (Jennings and Zandbergen, 1995). Changing norms also lead to corporate self-regulation, institutional pioneers/entrepreneurs who lead change within corporations by addressing normative questions information or developing new initiatives to meet increased normative expectations.

Maria led the initiative on educating and enabling producers to sell carbon credits earned through reforestation and reduced coal consumption, providing an additional premium from their coffee farms. Key to economic viability of the project was the relationships with the loyal customers, such as Bewley's, who provided the financing to continue to pay the farmers and the ongoing processes that led to the quality coffee. Maria and her team arranged for customers such as the Bewley's to visit Honduras and directly to meet with producers. Raul had emphasized the importance of context, such as the application of United Nations Sustainable Development Goals (UN SDGs), which were aligned with the vision that had spurred him to commit to launch the MDI. Now achieving the UN SDGs appeared to hold the key to addressing the issues plaguing coffee cultivation in Honduras and to creating a model in the regions of Central America. Additionally, the sale of carbon offsets represented a significant potential source of income and

revenue stream for the farmer. However, carbon verification costs were a challenge for the small producer. MDI saw this as a new challenge that involved long-term curricular development and educational effort, particularly through the collaboration with the National Autonomous University of Honduras (UNAH).

As indicated earlier, the professional has a role in coordinating and bringing stability through supporting institutionalization of the emerging norms. This is crucial for the wider acceptance of the protocols that could lead to the emergence of the new paradigm. Jennings and Zandbergen (1995) point out that the "greater the proportion of organizations in society that are devoted to sustainability, the more likely a new paradigm in society for sustainability is being developed" (p. 1038). There are signs of greater conformity resulting from the institutional entrepreneurial initiatives for Sustainability Reporting, Assurance Services and Integrated. Reporting that are also increasingly global, in addition to evidence that investors and other stakeholders use sustainability reports in decision-making.

This arena depicts an expansion of the former paradigm, where the underlying themes of shareholder rights, profit orientation and capital markets are expanded to encompass a larger sphere out of which other actors have emerged to create a new consensus, further extending the role of the professions and their specialization. Kuhn (1996) points out that professions will not embrace changes unless convinced that two all-important conditions are being met. First, the emerging paradigm must seem to resolve "some outstanding and generally recognized problem that can be met in no other way" (Kuhn, 1996, p. 169). Second, the new paradigm must "promise to preserve a relatively large part of the concrete problem-solving ability that has accrued through its predecessors" (Kuhn, 1996, p. 169). Thus, the role of the accounting professional in developing adequate measures to capture key elements of sustainability and in providing assurance services that increase reliability on such reports, present important opportunities, and challenges. In order for the sustainability endeavors to reach the overall vision, increasing opportunities through professional development, measurement systems, changing reporting systems and the ability to increase opportunities for the local population where such institutions do not exist or are merely reflections of the more widespread rhetoric that may be seen as having implications on the future of the local political ambitions and economic implications of the more powerful groups in the society. What remains, includes entering the global marketplace, with

branding increasingly identifiable with sustainability and the renewal of Honduras. Further, the asserts need authentication and reporting, that includes defining measures and abiding by reporting and assurance standards; hence the importance of professions and accountability in the final phase of the narrative.

DISCUSSION AND CONCLUSION

Pursuant to the call for a meta-theory that can explain current developments in CSR and sustainability (O'Dwyer and Unerman, 2016), this paper proposes the institutional theory framework where four institutional arenas or fields represent the areas within which CSR evolves. Institutional theory combined with theory of fields provides the constructs to describe the social systems in shaping sustainability. The fields encompass different players with different levels of power and access to resources shape the new institutional environment by reinforcing existing institutions or helping develop new ones as it gravitates to adjoining fields with the emergence of new actors as institutional entrepreneurs. Thus, while the status quo in some institutional regimes consists primarily of corporations/managers/owners, other stakeholders and professions/regulators enter the institutional with the perceived need to develop and strengthen institutions For instance, the accounting profession in this instance has the role as liaison between regulators and the different stakeholders and present “objectivity” and “accountability” as arbitrators in the fields where reporting systems develop to generate greater institutionalization across agents who have opposing interests and perspectives.

The sustainability literature is seen from the perspective of key actors. For example, stakeholder activism seen in institutional entrepreneurship leads to growth and development of institutions. Further, increased voluntary CSR reporting may be a means of legitimizing behavior. Developing systems of assurance services are necessary to strengthen the basis for institutionalization of the new norms in that environment, where accounting professionals equipped with skills necessary to develop cognitive-cultural institutions associated with new reporting systems. The framework also encompasses research into different regions of the world with diverse responses to CSR, highlighting the differences in power of actors and institutions due to historic factors, that lead to differences in outcomes between regions. This would also necessitate different forms of intervention based on the specific needs of the region and the stakeholders, particularly those with limited power. The framework also provides the opportunity

to present a meta narrative of the case. The stages in the growth of the entrepreneurship through differing institutional environments that evolve with greater stakeholder power indicates the nature of the arenas, that can differ by region and the individual players, as new forces emerge to shape the environment.

Some limitations need to be mentioned. While a range and diversity of research literature are included in the review, the list is not exhaustive, but rather, constitutes only a representative list of the literature. As Roberts and Wallace (2015) point out, the research literature in SEA literature represents a diversity of thought and methods that also highlights the struggles within both the mainstream and critical accounting literature. Further, the case metanarrative encompasses several aspects of the theoretical framework but is still in progress. Clearly, the outcomes are optimistic expectations, perhaps hopeful expressions of encouragement that could enable the people of Honduras find stability within their boundaries. Recognizing that this included multifaceted aspects, employment opportunities, industry development, power generation, wild-life conservation, equitable income, and women's upliftment, were difficult to encompass in the story of one entrepreneurship venture. Nevertheless, it presents a glimpse into the means whereby industry can play a role in such ambitious and benevolent aspirations.

TABLE 1: INSTITUTIONAL THEORY FRAMEWORK AND CSR

INSTITUTIONAL LOGICS	Market logics (Stockholder Pressure)	Cognitive shifts (Stakeholder pressure)
Stakeholder (Low)	Arena I Institutional Voids; few controls to a Principal-Agent relationships	Arena II A Stakeholder Perspective on Markets: Cognitive-Cultural and strategy
Regulatory/Institution	Arena III A Normative Intervention: *Can CSR be regulated? Professional institutions* Regulators and Professional legitimacy	Arena IV Integrative: C*an doing good be assimilated? Regulatory/professional/markets* Institutional Pillars and Institutionalization

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A Systematic Review of Social Media and Its Applications in Sustainable Cities

Sharmin Attaran, Bryant University, USA

Introduction/Problem Statement: It is incumbent upon cities to attract investors, companies, and tourists in an effort to stand out. More and more cities make use of social media to create a positive image and strengthen their place in the global competition for attractive cities. In addition, social media can be viewed as a source of knowledge for urban planning and management (Ciuccarelli et al., 2015). In the past years, people changed how they use the technology available and urban planners can make use of data that users are sharing on social networking platforms. Additionally, cities look for ways to use social networks and mobile applications to engage the younger generation in the planning process. The information found on social media can influence both government and corporate operations (Pandey and Purohit, 2018).

Research Objectives: This study aims to identify the major areas of application of social media in sustainable cities. Research Methodology: The authors started their preliminary research by narrowing the subject area from social media to more targeted research questions related to its application in sustainable cities. After establishing these parameters, the authors developed relevant keywords including "social media," "user-generated content," "branding," "green cities," "sustainable cities," "sustainable communities," and "marketing" in different combinations. Next, the authors identified several databases as the basis of their systematic review, including Business Source Complete and JSTOR. The authors then used the predetermined keyword phrases to complete searches on each database and created a master list of published relevant scholarly work. Duplicates and publications that did not meet the inclusion criteria were eliminated. The authors are currently in the process of reviewing identified manuscripts through a thematic analysis in an effort to aggregate and compare the major themes commonly found in the current literature. These themes will serve as the basis of the results, which will include a list and analyses of all social media application in green and sustainable cities.

Preliminary or Final Results: Preliminary results present several application themes for social media in sustainable cities. An initial review of the final database revealed that social media is a communication tool, promotional tool, informational tool, provides opportunities for harnessing big data, urban planning and management, crowdsourcing, branding, and sustainability reporting. The authors will present an analysis of how social media can be integrated into current and future sustainable cities.

Research Impact: This study is instrumental in guiding transformations to traditional processes while addressing a number of challenges through the integration of social media in sustainable cities. The results of this study will allow researchers and practitioners to better understand new areas of social media applications and how they can add value to sustainable cities.

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COVID-19 Pandemic Analysis by the λISR Volterra Integral Equation Model: A Case Study of South Africa

Yajni Warnapala, Roger Williams University, USA
Kate Gilbert, Roger Williams University, USA

Abstract

Inspired by the COVID-19 pandemic, the research investigated the feasibility of obtaining good convergence results for a nonhomogeneous Volterra integral equation model. Volterra integral equations are often used to model infection and recovery of diseases in a population and can be used to model a pandemic or an endemic. The model uses a Volterra integral equation of the second kind to predict the number of recovered individuals in South Africa. The integral is approximated by using the Gaussian Quadrature Method, first by seven nodes and later increasing the nodes and using Fortran 77 for approximation of the integrand for the higher number of nodes. The λISR model accounts for many variables of the pandemic including the number of initially infected individuals (I0), susceptible individuals (S0), and removed (R0) individuals. It also accounts for the initial recovery rate (γ), the infectivity of the virus (β), and the total population of South Africa (N). In addition, we also considered the blood types $S(x)$, and the rh factor $\lambda(x)$.

$$R(t) = (R0 + I0 - I0e^{-\gamma t}) + \beta N \int_0^t \lambda(x)S(x)I(t, x)R(x)(1 - e^{-\gamma(t-x)})dx$$

The model is constructed in "person-days," with the combined variable of time t (days) and the number of individuals (x). Specific blood types with the presence of the rh factor have been shown to have varying susceptibility to infection and severity of infection and is therefore an important parameter for this model. As vaccinations and variants of the disease are changing the susceptibility of a person to get infected and recover, the model is specifically applied to the Omicron variant that originated in South Africa.

The Moderating Effects of Product and Consumer-Brand Relationship on Type of Rewards in Consumer Co-creation

Miao Zhao, Roger Williams University, USA
[a]Ruby Saine, Roger Williams University, USA
Yimin Zhu, Sun Yat-Sen University, Republic of China
Zhengzhu Wu, Sun Yat-Sen University, Republic of China

ABSTRACT

In this paper, we examine the differential effectiveness of monetary and non-monetary rewards on motivating consumers to participate in co-creation during the process of new product development. We further study whether or not and how product type and consumer-brand relationship moderate the effects of monetary vs. non-monetary rewards on consumers' willingness to participate in consumer co-creation. Results of our studies provide empirical evidence that the differential effectiveness of monetary and non-monetary rewards depends on product type and consumer-brand relationship type. Specifically, consumers are more motivated by monetary rewards when they are engaged in the co-creation of utilitarian products; consumers are more attracted by non-monetary rewards when helping develop hedonic products. Moreover, the relationships between consumers and products (in either an exchange relationship or a communal relationship) will also affect the effects of monetary vs. non-monetary rewards on consumer co-creation. In other words, monetary rewards work better motivating consumers to participate in co-creation when there is an exchange relationship between consumers and products, while non-monetary rewards motivate consumers in a communal relationship better.

Keywords. Consumer co-creation, New product development, Reward type, Product type, Consumer-brand relationship type

Introduction

Since the introduction of service-dominant (S-D) logic (Vargo and Lusch 2004, 2008), consumer co-creation has been gaining popularity in marketing research and with marketers (Hoyer et al. 2010; Leung et al. 2019; Read et al. 2019; Xie and Jia 2016). Consumer co-creation refers to as "a collaborative new product development activity in which consumers actively contribute and select various elements of a new product offering" (O'Hern and Rindfleisch 2009, 4). It advocates collaborative creation (Prahalad and Ramaswamy 2000) and marks a shift away from a company-centric view. In a co-creation process, consumers provide knowledge and communicate ideas with brands to develop new products or to improve existing products (Ernst et al. 2010) in an easy and cost-effective way (Hoyer et al. 2010; Xie and Jia 2016).

Benefits of doing so abound. Involving consumers in co-creation allows brands to better understand consumer needs, improve customer satisfaction, increase product development efficiency and effectiveness, gain advantages over competitors, and decrease the likelihood of new product failure (Hauser, Tellis, and Griffin 2006; Hoyer et al. 2010; Leung et al. 2019; Prahalad and

Ramaswamy 2004; Xie and Jia 2016). Given such benefits, brands have developed programs to motivate consumers to participate in the co-creation process. In these programs, consumers are offered either monetary rewards (e.g., cash awards, coupons, vouchers, etc.) or non-monetary rewards (e.g., recognitions, VIP status, etc.) when their contributions are adopted.

For example, on Lego Ideas, Lego's online community, consumers are able to submit their ideas/designs of new sets. Once a new set idea receives 10,000 votes, Lego reviews the design which, if approved, will be produced and sold worldwide. The creator (consumer) will be rewarded a certain percentage of sales (monetary reward) and the recognition as the creator on all packages (non-monetary reward) (Milbrath 2016). Lego Ideas has proven to be a powerhouse fueling the brand's continuous innovations and competitive advantages.

After conducting a meta-analysis, Chang and Taylor (2016) summarized four categories of factors which affect the effectiveness of consumer participation in a co-creation process: contextual factors, relationship factors, organizational support factors, and consumer participation design factors. Previous research has been evolving separately, studying individual constructs belonging to the four categories. For example, Franke, Keinz, and Klausberger (2013) studied reward type in the context of consume co-creation, one of consumer participation design factors. Witell, Gustafsson, and Johnson (2014) studied product type, one of the contextual factors. Athaide, Stump, and Joshi (2003) studied the consumer-brand relationship, which is one of the relationship factors. However, little research has examined the interaction effects of these factors to date. We hope to fill this gap in the literature. This is important because none of these factors are likely to work exclusive of others. To the best of our knowledge, no research has ever empirically investigated consumer co-creation in the contexts of those variables.

Moreover, most of the participation motive research examined brand community members and focused on the impacts on the effectiveness of consumer co-creation. Franke, Keinz, and Klausberger (2013) called for more research on consumers' initial decision to participate. Our research addresses such issues by examining the impact of reward type, especially the effects of monetary versus non-monetary rewards on consumers' willingness to participate in consumer co-creation (WPCC). In this study, we further propose two moderators, product type and consumer-brand relationship type, and examine their effects on the link between reward type and WPCC.

Our research offers important theoretical and practical value. Our experiments extend the existing marketing literature on consumer co-creation, and introduce two important moderators in the relationship between reward type and WPCC. Practically, our results suggest that companies should use different rewards to promote consumer participation in new product development. Companies, in addition, would benefit by knowing that their existing relationship type with a consumer (exchange or communal) affects the impact of monetary vs non-monetary rewards on consumer co-creation. Figure 1 illustrates the conceptual framework of this research.

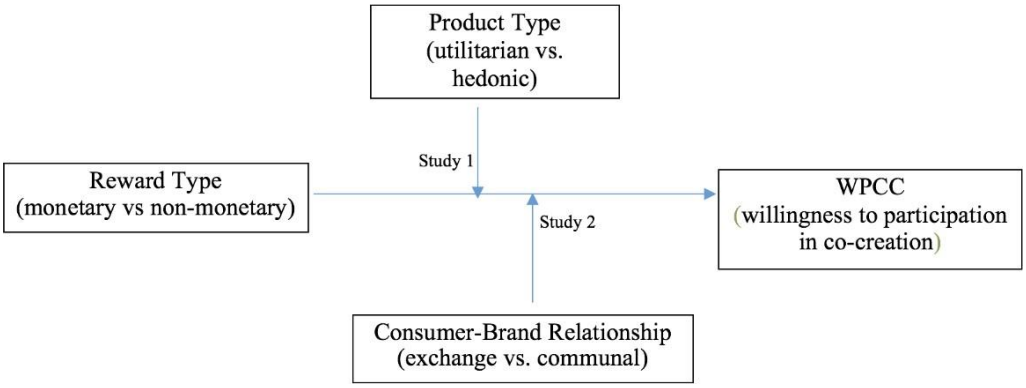

Figure 1. Conceptual Framework.

Literature review and hypotheses

Reward type

Marketing literature on consumer co-creation motive mainly focuses on identifying different motivations (i.e., Xie and Jia 2016), and discussing factors which affect the effectiveness of consumer co-creation (Chang and Taylor 2016; Franke, Keinz, and Klausberger 2013). Literature shows that consumers are motivated to participate in the co-creation process for two reasons: (1) intrinsic motivations such as curiosity, feeling of self-achievement, dissatisfied with current products, interests in innovation, and altruism (Fuller, Faullant, and Matzler 2010; Hars and Ou 2002; Nambisan and Baron 2009; Xie and Jia 2016) and (2) extrinsic incentives such as monetary rewards, future return expectation, and the recognition by the corporates and the public (Fuller, Faullant, and Matzler 2010; Hars and Ou 2002; Jeppesen and Frederiksen 2006; Oreg and Nov 2003; Xie and Jia 2016).

Consumers are intrinsically motivated if they have an inherent need to feel capable and self-determined (Deci 1975) and they participate in co-creation for its own sake (Fuller, Faullant, and Matzler 2010). Consumers are extrinsically motivated if the participation originates from the environment and is driven by rewards (Hars and Ou 2002). Due to the lack of adequate research in the domain of extrinsic incentives in the context of consumer co-creation, we decided to limit our research to examining the impacts of two types of extrinsic motivations, monetary versus non-monetary rewards.

The rewards consumers receive play a critical role in attracting them to participate (Keh and Lee 2006). Using rewards consumers do not always necessarily appreciate leads to their hesitation to join the programs (Ruzeviciute and Kamleitner 2017). Thus, companies need to understand which type of reward is able to motivate consumers.

There are two types of extrinsic rewards: monetary rewards (e.g., cash awards, coupons, vouchers, etc.) and non-monetary rewards (e.g., the recognitions, VIP status, etc.; Franke, Keinz, and Klausberger 2013) mainly adopted by the companies. Generally, monetary rewards provide “economic benefits” while non-monetary rewards focus more on “experiential or relation-oriented benefits” (Ruzeviciute and Kamleitner 2017, 114).

Researchers have examined monetary versus non-monetary incentives in different contexts. For example, Ruzeviciute and Kamleitner (2017) found that monetary referral rewards are better than non-monetary referral rewards in the loyalty programs across various industries. Monetary rewards are valued

(Furinto et al. 2009) because of its utilitarian benefits (Ruzeviciute and Kamleitner 2017) and attention-grabbing (Hubner and Schlosser 2010), thus they are a better motivator (Hammermann and Mohnen 2014).

Among the very limited research on the differential effectiveness of monetary vs. non-monetary rewards in a consumer co-creation process, researchers came to different conclusions. For example, monetary rewards, in general, seem to produce better performance than non-monetary rewards, but non-monetary rewards may not incentive everybody to the same degree, due to objective numeracy, or the ability to understand or use mathematical concepts (Svensson 2019). In addition, Herstatt and Von Hippel (1992) argued that economic benefits were the major reason why consumers were involved in consumer co-creation; while Fuller et al. (2006) indicated that non-monetary rewards had a bigger impact on consumer involvement in co-creation when motivating lead users of BMW automobile accessories. Similarly, Franke, Keinz, and Klausberger (2013)'s exploratory research indicated that featuring winning consumer's name on the product is one of the most effective ways to increase consumers' willingness to participate through fairness perception of the co-creation process.

WPCC

Consumer participation in co-creation refers to a consumer's involvement in the company's new product development process (Fang 2008). Since involving consumers in the early ideation stage has a higher impact on new product financial performance than in the later launch stage and the development stage (Chang and Taylor 2016), our research focuses on consumer participation in the early ideation stage. Most of the researches on participation motives use samples (i.e., brand communities' members) who have already showed interests in participating, and focus on the impacts of motivations on effectiveness and efficiency of co-creation. Franke, Keinz, and Klausberger (2013) posited the importance of more research on willingness to participate in consumer co-creation for two reasons: 1) brand communities need to attract new members constantly due to their "volatile and loose nature" (Franke, Keinz, and Klausberger 2013, 1497) and 2) more consumers are needed since many more companies will launch co-creation programs. Therefore, our research particularly focuses on the effects on WPCC.

Since previous work examining the differential effectiveness of monetary and non-monetary incentives in the consumer co-creation process has shown mixed results, we propose two moderators, product type and consumer-brand relationship type (Chang and Taylor 2016), which affect reward type – WPCC relationship.

Moderator #1: Product Type

Strahilevitz and Myers (1998) classified products into two types: utilitarian products and hedonic products. Utilitarian products refer to the products purchased to "fill a basic need or to accomplish a functional task" while hedonic products are defined as something for "sensual pleasure, fantasy, and fun" (Strahilevitz and Myers 1998, 436). Both utilitarian and hedonic products rely on consumer co-creation for new product ideas. Using as an example of utilitarian products, DEWALT, a leading manufacturer of power tools (utilitarian products), gathered invention submissions from its insight community with more than 10,000 members (Milbrath 2016). Lego is an example of hedonic products using co-creation.

According to the exchange theory framework (Ryu and Feick 2007), whether consumers are willing to participate in co-creation depends on its perceived benefits and costs of the exchange. The perceived benefits or motivations for participating in co-creation include intrinsic benefits such as the feeling of self-achievement and altruism (Fuller, Faullant, and Matzler 2010) and extrinsic benefits such as monetary

rewards and non-monetary rewards (Fuller et al. 2006). Participating in consumer co-creation also involves costs such as time and effort (Ryu and Feick 2007) contributing to the co-creation and the potential ego risk if the submission is not accepted.

Chandon, Wansink, and Laurent (2000) developed a benefit congruency framework, arguing that the effectiveness of a sales promotion depends on the congruency between the benefits provided by the sales promotion (utilitarian benefits such as savings vs. hedonic benefits such as opportunities for value expression) and its promoted products (utilitarian vs. hedonic). They further empirically proved that monetary promotions delivered more utilitarian benefits, thus were more effective for utilitarian products than hedonic products while non-monetary promotions were more effective for hedonic products than utilitarian products. Based on the benefit congruency framework, we argue that a similar relationship exists in a consumer co-creation process – monetary rewards deliver more utilitarian benefits (Ruzeviciute and Kamleitner 2017) and work better for utilitarian products; non-monetary rewards deliver more hedonic benefits and work better for hedonic products. On the cost side, we argue that perceived costs would be the same for utilitarian and hedonic products. Therefore, we propose the following hypotheses.

H1a: For utilitarian products, monetary rewards are more effective in enhancing consumers' WPCC than non-monetary rewards.

H1b: For hedonic products, non-monetary rewards are more effective in enhancing consumers' WPCC than monetary rewards.

Moderator #2: Consumer-brand Relationship Type

Aggarwal (2004, 87) examined two relationships that consumers could form with brands: an exchange relationship in which "benefits are given to others to get something back" and a communal relationship in which "benefits are given to show concern for other's needs". As argued by Aggarwal (2004), consumers' evaluations rely on whether brands adhere to or violate the norms of relationships between consumers and brands. As proposed by Clark and Mills (1993) and empirically tested by Aggarwal (2004), exchange relationship norms require prompt, comparable, and monetary benefits in return; however, communal relationship norms expect non-immediate, non-comparable, and non-monetary benefits since it is based on the concerns for consumers' genuine needs rather than simply quid pro quo. Thus, monetary rewards are more effective for an exchange relationship while non-monetary rewards work better for a communal relationship. On the cost side, the perceived costs of consumer participation are not influenced by the consumer-brand relationship. Following the exchange theory framework (Ryu and Feick 2007), we argue that when consumers in an exchange relationship with a brand, they will be more willing to participate in a co-creation process if monetary rewards are offered; in a communal relationship, consumers will prefer non-monetary rewards. Therefore, we propose the following hypotheses.

H2a: When consumers have an exchange relationship with a brand, monetary rewards are more effective in enhancing consumers' WPCC than are non-monetary rewards.

H2b: When consumers have a communal relationship with a brand, non-monetary rewards are more effective in enhancing consumers' WPCC than are monetary rewards.

Methodology

Pretests

Three pretests were conducted. Ten students in a university were randomly selected and interviewed in pretest 1. The interviewees were asked to talk about the products they were interested in and willing to get involved in the co-creation process, the ten most frequently mentioned products were identified.

Then in pretest 2, another 20 students from the same university were recruited to answer an online

survey. After given the definitions of utilitarian products and hedonic products (Strahilevitz and Myers 1998), the participants were asked to rate the ten products identified in the first pretest on a 7-point Likert scale (1 = it is definitely a utilitarian product; 7 = it is definitely a hedonic product). Moreover, the attractiveness (Khan and Dhar 2010) of the ten products were also measured. After examining the ratings of all ten products, T-shirts were chosen as the utilitarian products ($M_{\text{T-shirts}} = 2.55$) and cameras the hedonic products ($M_{\text{cameras}} = 4.65$). A repeated measures ANOVA with a Greenhouse-Geisser correction indicated mean product type differed significantly between the two products ($F(1,19) = 24.72$, $p < .001$). There was no significant difference between the two products in their attractiveness ($M_{\text{T-shirts}} = 4.75$, $M_{\text{cameras}} = 5.55$; $F(1,19) = 3.51$, $p = .08$). Therefore, T-shirts and cameras were chosen as stimuli used in the following Study 1. Moreover, the pretest 2 identified books as neither a utilitarian nor a hedonic product ($M_{\text{books}} = 3.70$) and showed an acceptable level of attractiveness ($M = 4.15$). Therefore, we chose a bookstore as the stimulus used in Study 2.

Pretest 3 tested the manipulations of two types of consumer-brand relationship – exchange relationship and communal relationship used in Study 2. Following the manipulations of consumers' relationships with a bank (Aggarwal 2004, 91), we revised the scenario descriptions to manipulate consumers' exchange and communal relationships with a bookstore.

Exchange Relationship Scenario Description. You have been visiting Bookstore X for the last three years. You have used the bookstore quite extensively and have been very happy with their efficiency and the quality of their services. The bookstore has a variety of books and you can easily locate the books you want. The bookstore also periodically holds author events and book clubs, in which you may share your thoughts with authors and other readers. In the past, whenever you have gone to the bookstore you have gotten your work done very fast—they respect your time, and get the job done fast. Overall your experience with Bookstore X has been excellent.

Communal Relationship Scenario Description. You have been visiting Bookstore X for the last three years. You have used the bookstore quite extensively and have been very happy with the quality of their services. You still remember how thrilled you were when you visited the bookstore the first time. You have always associated the bookstore with positive feelings since you often visit the bookstore. The bookstore has always treated you well. Over the past few years, whenever you have visited the bookstore you have had a very pleasant and warm interaction. They seem to be taking a personal interest in you, and have often taken the initiative to suggest new books which you are interested in. Overall your experience with Bookstore X has been memorable.

Thirty participants were randomly assigned to one of the two consumer relationship types. After they read the bookstore description, participants answered 10 questions on the consumer-bookstore relationship to form a Net Communality Score by averaging the ratings of the 10 questions (Aggarwal 2004). Manipulation check showed that the two relationship types were manipulated successfully ($M_{\text{exchange}} = 3.74$, $M_{\text{communal}} = 4.81$; $F(1,28) = 20.27$, $p < .001$).

Study 1

A 2 (reward type: monetary vs. non-monetary rewards) × 2 (product type: utilitarian vs. hedonic products) between-subject factorial design was conducted to test the moderating role of product type in reward type – WPCC relationship. One hundred and thirty-two university students (53% female) were recruited and randomly assigned to the four conditions.

Participants were exposed to a description of the scenario: After buying a (*T-shirt/camera*) from company A, you are satisfied with the product. Currently, company A would like to invite you to design a product with a new pattern, color, or shape. Your design/idea will be evaluated by the company. The top three

ranked consumers will receive *certain financial reward or become company A's VIP consumers as the reward*. After reading the description, participants answered the degree to which they were willing to participate in consumer co-creation on a 3-item 7-point Likert scale. The measure of WPCC was adapted from Nambisan and Baron (2009) and was calculated by averaging the ratings on the following three questions (1 = strongly disagree; 7 = strongly agree): I am willing to participate in the company's creation activity; I am willing to submit my design and ideas to the company; I am willing to positively respond to and help other consumers' creation activities (α = 0.84). Demographics were also collected. An ANOVA results showed that cameras ($M_{cameras}$ = 5.14) were rated more hedonic than T-shirts ($M_{T\text{-}shirts}$ = 3.29, $F(1,130)$ = 54.43, $p < .001$). Therefore, product type was successfully manipulated.

A 2 × 2 ANOVA was performed to test the impacts of product type and reward type on WPCC. Neither the main effect of reward type ($M_{monetary}$ = 4.08, $M_{nonmonetary}$ = 3.88; $F(1,128)$ = .02, p = .92) nor that of product type ($M_{utilitarian}$ = 3.84, $M_{hedonic}$ = 4.12; $F(1,128)$ = .04, p = .88) was statistically significant. As predicted by H1a and H1b, a significant interaction effect of reward type and product type on WPCC was identified ($F(1,128)$ = 58.27, p <.001).

The results showed that participants were more likely to be motivated to participate in co-creating utilitarian products by monetary rewards ($M_{monetary}$ = 4.67) than non-monetary rewards ($M_{nonmonetary}$ =3.02, $F(1,64)$ = 70.76, $p < .001$); for hedonic products, non-monetary rewards (Mnonmonetary = 4.75) worked better than monetary rewards ($M_{monetary}$ = 3.48, $F(1,64)$ = 14.92, p <.001). Therefore, H1a and H1b were supported.

Study 2

The second study tested the moderating role of consumer-brand relationship type in reward type – WPCC relationship. A 2 (reward type: monetary vs. non-monetary rewards) × 2 (consumer-brand relationship type: exchange relationship vs. communal relationship) between-subject factorial design was conducted. One hundred and thirty-three participants were recruited and randomly assigned to the four conditions. After removing seven incomplete questionnaires, a total of 126 (58.7% female) effective surveys from university students were included for further analyses. Consumer-brand relationship type was manipulated as in Pretest 3 and reward type was the same as in Study 1.

After participants read the description of the consumer relationship with Bookstore X (exchange relationship vs. communal relationship), they were told: You are invited to participate in designing a newly expanded area of Bookstore X with book selections, store displays, and store layout. Your design/idea will be evaluated by the bookstore. The top three ranked consumers will receive *certain financial reward (monetary reward) or become Bookstore X's VIP consumers as the reward (non-monetary reward)*. Then participants answered the questions of the 10-item consumer relationship measure (α = 0.86), the 3-item consumers' WPCC measure (α = 0.77) and demographics. Exchange relationship consumers ($M_{exchange}$ = 3.65) showed a significant lower communality score than communal relationship consumers ($M_{communal}$ = 4.97, $F(1,124)$ = 79.19, p <. 001). Therefore, consumer relationship type was successfully manipulated in Study 2.

A 2 × 2 ANOVA was performed to test the hypotheses. None of the main effects was statistically significant (reward type: $M_{monetary}$ = 4.79, $M_{nonmonetary}$ = 4.72, $F(1,122)$ = .01, p = .95; consumer-brand relationship type: $M_{exchange}$ = 4.85, $M_{communal}$ = 4.66, $F(1,122)$ = .05, p = .86). A significant interaction effect of reward type and consumer relationship type on WPCC was identified ($F(1, 122)$ = 14.50, $p < .001$). When participants had an exchange relationship with the bookstore, monetary rewards ($M_{monetary}$ = 5.24) worked better than non-monetary rewards ($M_{nonmonetary}$ = 4.41, $F(1,61)$ = 8.62, $p < .05$) in motivating consumers to participate in co-creation process; while under the communal relationship, non-monetary rewards ($M_{nonmonetary}$ = 5.01) had a bigger impact than monetary rewards ($M_{monetary}$ = 4.30, $F(1,61)$ = 6.03, $p < .05$). Therefore, H2a

and H2b were supported.

Discussion and Conclusion

This research tests the differential effectiveness of reward type (monetary versus non-monetary) on consumers' willingness to participate in a co-creation process (i.e., WPCC). We further examine the two factors moderating the effect of reward type on WPCC: product type and consumer-brand relationship.

Study 1 finds that the differential effectiveness of monetary and non-monetary rewards on WPCC exists as a function of product type (utilitarian products and hedonic products). Since monetary rewards provide more utilitarian benefits than hedonic benefits, consumers are more motivated by the monetary rewards when they are co-creating utilitarian products; while non-monetary rewards deliver more hedonic benefits than utilitarian benefits, consumers are more attracted by the non-monetary rewards when helping develop hedonic products. Moreover, the results of Study 2 show that the relationship between consumers and a brand – exchange or communal – also affects the effect of monetary vs. non-monetary rewards in consumer co-creation. Exchange relationship norms favor monetary rewards in return when consumers offer help, therefore, monetary rewards work better motivating consumers to participate in co-creation when there is an exchange relationship between consumers and companies. Communal relationship norms prefer non-monetary rewards, which motivate consumers in the communal relationship better.

The results of our studies provide important implications for managers. First, we inform brands that need to choose between monetary and non-monetary rewards through motivating consumers in a co-creation process. Different from either Herstatt and Von Hippel (1992) or Fuller et al. (2006), our results indicate monetary and non-monetary rewards showed no difference in affecting cocreation willingness. Given the inconsistent results in the literature, the performance of consumer co-creation depends on various moderators such as market, consumer, and product characteristics (Chang and Taylor 2016).

Second, brands can increase consumers' participation in co-creation by matching the type of reward with the type of product. If brands would like to invite consumers to co-create utilitarian products, money is a better way to reward consumers; if brands try to motivate consumers to co-develop hedonic products, non-monetary incentives such as recognitions and honors should be provided. Finally, brands should also match the type of reward with the type of consumer-brand relationship when increasing consumers' participation in co-creation: monetary rewards work better for consumers in the exchange relationship; non-monetary rewards better for consumers in the communal relationship.

In sum, our research suggests that both product type and consumer-brand relationship type should be taken into consideration when brands design their consumer co-creation rewarding mechanism. Since our research used student samples, future research should use non-student samples to enhance the generalization of current studies. Moreover, we only tested two moderators, product type and consumer-brand relationship type. Future research should propose and test the moderating roles of other factors such as cultural differences in the link between reward type and consumer co-creation performance.

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