THE UNIVERSITY OF TENNESSEE MARTIN
COLLEGE OF BUSINESS AND GLOBAL AFFAIRS

JOURNAL OF INTERNATIONAL BUSINESS DISCIPLINES

www.jibd.org

The International Academy of Business Disciplines

Volume 17, Number 1 May 2022

Published By:
University of Tennessee at Martin and the International Academy of Business Disciplines

Journal of International Business Disciplines

Volume 17, Number 1 May 2022

Chief Editor:
Ahmad Tootoonchi
College of Business and Global Affairs
University of Tennessee at Martin
100 Business Administration Building
231 Lovelace Avenue
Martin, TN 38237
Tel: 731-881-7227
Tootoonchi@utm.edu

Editor:
Michele A. Krugh
University of Pittsburgh
4200 Fifth Avenue
Pittsburgh, PA 15260
Tel: 412-526-4271
michele.krugh@pitt.edu

Published By:
University of Tennessee at Martin and the International Academy of Business Disciplines

ISSN 1934-1822 WWW.JIBD.ORG

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The International Academy of Business Disciplines

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Journal of International Business Disciplines

Volume 17, Number 1 May 2022

Editorial Note

The May 2022 issue of the *Journal of International Business Disciplines (JIBD)* has been the result of a rigorous process of blind reviews, and in the end, the reviewers recommended three articles for publication in this issue of *JIBD*.

JIBD is committed to maintaining high standard of quality in all of its publications.

Ahmad Tootoonchi, Chief Editor
Journal of International Business Disciplines

Contents Volume 17, Number 1, May 2022

EFFECT OF FINANCIAL VARIABLES ON STOCK TRADING VOLUME AND BID-ASK SPREAD FOR COMPANIES ON THE STOCK MARKET

Morsheda Hassan, Grambling State University
morshedat@yahoo.com

Raja Nassar, Louisiana Tech University
Ran50@suddenlink.net

Ghebre Keleta, Grambling State University
keleta@gram.edu

ABSTRACT

In this study, we investigate the relationships between a company's financial variables and its stock trade volume and spread. The financial variables considered were: return on equity per share, return on assets, total debt divided by total assets, cash and short term investment divided by total assets, current assets divided by current liabilities, total liabilities, and gross income of the company. Using time series analysis on stationary data, it was found that each of the independent financial variables was related sporadically to stock volume or stock spread. Results were company specific and none of the variables was universal in its relationship to volume or spread. The highest percentage of the companies where a variable was related to volume or spread was 28.9%. This sporadic relationship raises the question as to whether other variables such as macroeconomic variables or human motivation (psychological effect) play a more important role than the company's financial factors.

INTRODUCTION

Two important measures regarding a stock on the stock market are trade volume of a stock and its bid-ask spread. Trade volume is the total quantity of shares traded for a specified security. Trade volume reflects the market's activity and the liquidity of the stock. Liquidity describes how quickly a stock can be bought or sold in the market or the ease of converting it to cash. Higher stock volume means higher liquidity and a market that is more active in connecting buyer and seller. Also, an increase in trade volume could indicate the direction of the stock market. Trade volume tends to vary during the day, from high near opening and closing times to low at midday (Kalok et al., 1995). There is some evidence that a stock trade volume is related to the stock return (Chen & Liu, 2015) and stock volatility (Naik et al., 2018)

The bid-ask spread is important in the marketplace It is defined as the amount by which the ask price for a share exceeds its bid price. It can be viewed as the difference between what the buyer is willing to pay for a stock versus what the seller is willing to sell for. The ask price is usually

higher than the bid price. Therefore, the bid-ask spread is the profit an investor can make by buying at the bid price and selling at the ask price. The bid-ask price is a reflection of the market's liquidity and volatility. The smaller the spread, the higher the liquidity and the lower the volatility. In addition, the bid-ask spread is of importance in stock trading and is relevant in reducing transaction costs. Price of a stock can have an effect on the bid ask spread. A low stock price can translate into a larger bid-ask spread.

Determining the different financial factors that influence the trade volume and the bid-ask spread will help investors limit their risk by making more informed decisions on their investments. In this study, we investigate using time series analysis the influence of some financial factors (Table 1) on spread and volume for 45 companies in the U.S. marketplace.

LITERATURE REVIEW

Lee and Rui (2000) examined the relationships between trading volume, stock return, and return volatility in four stock exchanges in China. It was found that trade volume did not Granger cause stock returns in any of the four markets. There was a feedback relationship among the four markets in stock return. Also, stock returns, volatility, and volume from financial markets in the US and Hong Kong were weak predictors for the Chinese financial market

Aitken and Frino (1996) examined the determinants of the bid-ask spread using data over a six-month period (June 1 to November 30, 1992) on the Australian Stock Exchange. The authors applied a log linear regression model where log of the percentage bid-ask spread was the dependent variable and log stock price, log trade activity, and log stock price volatility were the independent variables. The model explained 94% of the variability in log percent spread. Both log price and log volume were negatively related to log spread and log volatility was positively related to log spread.

Chen and Liu (2015) studied the relationship between stock price and trade volume in six international markets. They applied the Granger causality between price index and trading volume. The main result was that past information on trading volume helped predict the stock price.

Naik et al. (2018) reported on the relationship between trade volume and stock volatility for the Johannesburg Stock Exchange of South Africa using daily data over the period January 4, 2008 to August 31, 2016. Using the EGARCH and Granger causality models, the authors found that the relationship between volume and volatility was positive and contemporaneous.

Menyah and Paudyal (1996) examined factors that had an effect on the bid-ask spread on the London Stock Exchange. Using a log linear multiple regression analysis, they reported that stock price, stock trade volume, risk associated with stock return, and number of market makers explained 91 percent of the variation in spread.

Using monthly data for the 2005–2014-time period, Dodonova (2016), using least squares regression models, reported on the effect of lagged stock returns and lagged dispersion of stock

returns on trade volume. Dispersion of stock returns and absolute value of returns positively affected future trade volume. Also, extreme negative returns caused high future trade volume while extreme positive returns had no effect on future trading.

The relationship between trade volume and stock prices was investigated by Zerena and Konukb (2016) using panel causality test developed by Dumitrescu-Hurlin (2012) in 12 countries belonging to the Organization for Economic Co-operation and Development (OECD**).** Results of the study showed that stock price affected trade volume, but trade volume had no effect on stock price. This indicated that the cause effect relationship was in one direction (from stock price to trade volume) with no feedback effect.

The database from the Center for Research in Security Prices (CRSP) was used by Gold (2013) to examine the relationship between stock price and stock trade volume of all firms on the Dow Jones Industrial Average (DJIA) for the period 2007 to 2009. Results of the study supported the asymmetric information hypothesis, which proclaims that high trade volume leads to information asymmetry, in which investors differ in believes concerning the market. This leads to greater uncertainty in stock returns. This finding is of importance with regard to investment strategies.

The relationship between trade volume and stock prices was evaluated by Brown et al. (2009) using S&P 500 data on the largest 1,000 stock prices and measures of trade volume and turnover from January 1991 to December 2007. It was found that for these large stocks, which were relatively liquid, there was a positive relationship between trade volume and stock returns. Large stocks (with holding periods of 1-12 months) with higher trade volume and turnover had higher returns than those with lower trade volume. Furthermore, there was an indication that trade volume was a proxy for liquidity as well as momentum and information content.

The relationship between stock returns, volatility, and trade volume in the Brazilian stock market was investigated by De Medeiros and Van Doornik (2008). Data were obtained from January 3, 2000 through December, 29, 2005. The statistical methods used were the Garch (1,1) model, the Granger causality test, and a bivariate structural equations model involving return and volume for testing their relationship. Results from the structural equations model indicated that trade volume had a positive effect on stock return, but return had no effect on volume. The Granger test showed no relationship or causality between trade volume and stock return. On the other hand, it was found that trade volume granger caused volatility and volatility Granger caused trade volume.

A study to investigate the relationship between stock index futures and stock prices in Malaysia, Singapore, and London stock markets was undertaken by Azizan (2008). The study used the Granger causality test, the BDS (Broock–Dechert–Scheinkman) statistic to determine nonlinear behaviour in the trade volume, and the threshold auto-regressive model as a non-linear model. Results showed that trade volume had a nonlinear component. There was also a unidirectional relationship between trade volume and volatility. There was evidence, in Singapore and Malaysia, showing that stock markets with low trade volume exhibited better predictability (or less volatility) than highly liquid markets with high trade volume.

Groß-Klußmann and Hautsch (2013) used a long memory auto-regressive conditional Poisson model to forecast bid-ask spread for stocks traded on the NYSE and the NASDAQ. A property of

the Poisson model is its long-range dependence or long-range autocorrelation. Authors showed that forecasts from the Poisson model outperformed forecasts from other models, namely AR(p), ARMA (p q), ARIMA (p d q), auto-regressive conditional duration (ACD) and an exponentially weighted moving average (EWMA) model.

In a similar study, Cattivelli and Pirinoa (2019) used a Poisson process (with an intensity that is a function of two factors, a seasonal intraday pattern and a heterogeneous autoregressive component, to model and forecast the bid-ask spread on the NYSE stocks. The model was applicable to time series with long-term memory and seasonality. The authors showed how the model could be used to reduce the total cost incurred by investors.

Chen (2012) investigated the relationship between stock returns and trade volume for bull and bear markets. Using monthly data for the S&P 500 over the period 1973 to 2008, the author showed that stock returns predicted trade volume in both bull and bear markets. However, the evidence for trade volume predicting stock return was weaker.

Minardi et al. (2006) in a study on the São Paulo Stock Exchange (BOVESPA) used least square regression analysis to investigate the relationship between bid-ask spread and stock returns and liquidity measures. Authors reported a negative relationship between bid-ask spread and liquidity and a weak positive relationship between bid-ask spreads and stock returns. These same relationships existed in other markets where trading was different from that in Brazil, where participants trade directly without the benefit of dealers and brokers.

As can be seen from the literature, investigations were mostly limited to volume, spread, price, volatility and their relationships. There is a lack of investigations examining the effects of financial factors on spread and trade volume. This study helps in filling this gap.

DATA

Forty-five companies were selected over the years 1998 to 2017, based on having complete quarterly financial data, utilizing the Wharton Research Data Services (WRDS). Also, from WRDS, we obtained for each company its quarterly trade volume and spread over the same years.

METHOD

Time series analysis

In this study, we use the transfer function approach in time series to relate stationary input time series (independent variables) to a stationary output time series (dependent variable). We demonstrate the model for one input series. The model relating a stationary output series y_t to a stationary input series x_i is expressed as

$y_t = v(B)\, x_t + a_{t,}$ (1)

where $a_{t,}$ is the residual and

$v(B) = w(B)B^c/d(B)$.

Here, $w(B) = w_0 - w_1B - \ldots - w_sB^s$

$d(B) = 1 - d_1B - \ldots - d_rB^r$.

and c represents the time delay (or lag) until the input variable x_t produces an effect on the output variable $y_{t.}$

We assume that the input series follows an ARMA process, $\frac{\varphi(B)}{\theta(B)}\, x_t$. The function v(B) with its lags is determined from the cross correlations between the white noise input series $\frac{\varphi(B)}{\theta(B)}\, x_t$ and the filtered output series $\frac{\varphi(B)}{\theta(B)}\, y_t$ (Wei, 2006). For instance, if the correlation is significant at only lag 0, then Equation (1) becomes

$y_t = w_0x_t + a_t$. On the other hand, if the correlation is significant at only lag 1, then one has

$y_t = w_0x_{t-1} + a_t$

Once v(B) is identified, one can express a_t in Eq. (1) as

$a_t = y_t - v(B)\, x_t$ (2)

and identify the appropriate time series model for Eq. (2). With a_t known, one can determine the final model in Eq. (1). In this analysis a_t was identified as an AR (1) or AR (2).

For this analysis, each dependent and independent variable was tested for stationarity using the Phillips-Perron test and the augmented Dickey-Fuller test. Where a variable was not stationary, we used its first difference, which was stationary. Thus, all variables that entered the model were stationary. The backward elimination variable selection technique (Montgomery et al., 2001) was used so that the final model included only the independent variables that were significantly related at the 5% level to the dependent variable.

TABLE 1. LIST OF INDEPENDENT VARIABLES USED IN THE TIME SERIES ANALYSES WHERE A COMPANY'S STOCK VOLUME OR SPREAD WAS THE DEPENDENT VARIABLE.

ROEPS	Return on equity per share
ROA_	Return on assets
R2= leverage	Total debt divided by total assets
R4	Cash and short-term investment divided by total assets
Liability	Total liabilities
Cratio	Current assets divided by current liabilities
Income	Gross income

RESULTS AND DISCUSSION

Table 2 presents the financial variables for each company that were significantly related at the 5% level to volume or spread. This is summarized from Tables 3 and 4 in the Appendix. It is seen that the financial variables that relate to volume or spread are company specific. There was no variable that was predominantly related to volume or spread over all companies. Also, the signs of the coefficients varied over variables and were mixed (except for Cratio), positive for some companies and negative for others. Table 2 shows frequency (N) and percentage (%) of each independent variable, over the 45 companies, that showed a significant relationship with the dependent variable (stock volume or stock spread). The sign of the relationships is indicated with (+) or (-)

TABLE 2. FINANCIAL VARIABLES THAT WERE SIGNIFICANTLY RELATED AT THE 5% LEVEL TO VOLUME OR SPREAD

Dependent variable	Independent variables						
	ROEPS	ROA	leverage	R4	Liability	Cratio	Income
Volume	N % 13 (28.9) 4 (+) 9 (-)	N % 6 (13.3) 3 (+) 3 (-)	N % 11 (24.4) 5 (+) 6 (-)	N % 10 (22.2) 6 (+) 4 (-)	N % 9 (20) 6 (+) 3 (-)	N % 5 (11.1) 0 (+) 5 (-)	N % 9 (20) 5 (+) 4 (-)
Spread	N % 12 (26.7) 5 (+) 7 (-)	N % 7 (15.6) 4 (+) 3 (-)	N % 13 (28.9) 5 (+) 8 (-)	N % 11 (24.4) 5 (+) 6 (-)	N % 7 (15.6) 7 (+) 0 (-)	N % 12 (26.7) 8 (+) 4 (-)	N % 6 (13.3) 2 (+) 4 (-)

Volume

As is seen from Table 2 for volume that the percentages varied between 28.9% and 11.1%. This indicates that the financial variables do not seem to be related substantially to volume. Return on equity per share (ROEPS) was significantly related to volume in 28.9% of the companies. This was the highest percentage among all the variables. The variable Cratio was the lowest contributor with a percentage of 11.1. Return on assets (ROA) was significantly related to volume for 6 (13.3%) companies. Leverage was related to volume in 11 (24.4%) out of the 45 companies. Cash and short-term investment divided by total assets (R4) was related to volume in 10 (22.2%) of the companies. Liability was related to volume in 9 (20%) of the companies. Gross income was significantly related to volume in 9 (20%) companies.

Table 3 in the Appendix presents the time series model for each company. Each row gives the time series linear model relating the independent variables to volume, the dependent variable.

The parameters $Ø_1$ and $Ø_2$ refer to the AR(2) model for the residual, $a_{t,.}$ This is expressed as

$$a_t = Ø_1 a_{t-1} + Ø_2 a_{t-2} + e, \quad (3)$$

where e is the random error term.

Equation (2) can be written as

$$a_t = e / (1- Ø_1B - Ø_2B^2) \quad (4)$$

where B is the backward operator ($Ba = a_{t-1}$ and $B^2a = a_{t-2}$).

As an example, the model in Table 3 for the Chase company can be expressed as

$$\text{Volume}\,(t) = 2307.4 + 464.40\ \Delta R2\ (t) + e_t / (1- 0.389\ B - 0.399\ B^2) \quad (5)$$

Multiplying both sides of the equation by (1- 0.389 B - 0.399 B^2) and simplifying, one obtains the expression

$$\text{Volume}\,(t) = 489.16 + 0.389\ \text{Volume}\,(t-1) + 0.399\ \text{Volume}\,(t-2) + 464.40\ \Delta R2\ (t)$$

$$-180.65\ \Delta R2\ (t-1) - 185.39\ \Delta R2\ (t-2) + e_t \quad (6)$$

As can be seen, Volume at time t is related to its two lags and to ΔR2 (t) and its two lags. Here, ΔR2 is the first difference of leverage.

The models for each company can be read in a similar way. Where $Ø_1$ or $Ø_2$ in Table 3 is blank, it is not significantly different from zero and does not appear in the linear model.

Spread

Table 2 summarizes the data in Table 4 of the Appendix relating the independent variables to the dependent variable, bid-ask spread. Results on spread are similar to those on volume in the sense that financial variables that relate to spread are company specific and there was no variable that was predominantly related to spread over all companies. Also, the signs of the regression coefficients varied over companies and were company specific. The percentage (over the 45 companies) of the relationship of each independent variable to spread varied between 28.9 for leverage to 13.3 for income. Except for liability, the signs of the coefficients associated with each independent variable are mixed, positive and negative. Among the other variables, return on equity per share (ROEPS) was related to spread in 12 (26.7) companies. Return on assets (ROA) was related to spread in 7 (15.6%) companies. Cash and short-term investment divided by total assets (R4) was related to spread in 11 (24.4) companies. Liability was related to spread in 7 (15.6%) companies and Cratio had a relationship with spread in 12 (26.7%) companies.

Table 4 gives the time series model for each company. The interpretation of each model is the same as given above for volume.

For instance, the model for Chase is expressed as

$$\Delta spread(t) = 0.056 - 0.106\ \Delta R2\ (t) + e_t / (1 + 0.593B)$$

$$\Delta spread(t) = 0.089 - 0.593\ \Delta spread(t-1) - 0.106 \Delta R2\ (t) - 0.063\ \Delta R2\ (t-1) + e_t$$

$$Spread(t) = 0.089 + 0.407 Spread(t-1) + 0.593 Spread(t-2) - 0.106 R2(t) + 0.043\ R2(t-1)$$

$$+.063 R2(t-2) + e_t \qquad (7)$$

Equation (7) shows that spread is related to its two lags and the two lags of leverage (R2).

The results of this analysis showed that financial variables were not very influential in affecting stock volume or stock spread. This is seen by the fact that the most effective variables were return on equity per share in relation to volume and leverage in relation to spread and these were for only 28.9 % of the companies. It would seem that investors were by and large relying on other factors in decision making, factors not related to the company's financial data.

These results, showing that company's financial data have little substantial impact on its stock volume and spread, are in agreement with results reported by Ligocká (2018), Berglund and Bergman (2013), and Hassan et al. (2020) on stock price, a related entity. This lack of a major significant association between financial data and stock volume and spread may mean that investors are not relying heavily on companies' financial data in making decisions about investment in stocks. They could be relying perhaps on macro financial data in investment decision making or decisions are made, as Earl (1972) pointed out, based on human motivation and not company's financial results nor economic or political situations. Earl argued that of influence in stock investment were tips that circulate among investors regarding whether a share is going to

rise or fall. As a result, investment in stocks can be psychological and not significantly based on rational financial determination.

CONCLUSION

The interest in this study was to determine which financial variables in a company might have a significant relationship to a company's stock trade volume and bid-ask spread. Trade volume reflects the market's activity and the liquidity of the stock. The bid-ask spread is the profit an investor can make by buying at the bid price and selling at the ask price. Spread is a reflection of the market's liquidity and volatility. The smaller the spread, the higher the liquidity and the lower the volatility. The financial variables considered in this study were: return on equity per share, return on assets, total debt divided by total assets, cash and short-term investment divided by total assets, gross income, total liabilities, and current assets divided by current liabilities.

Using time series analysis on stationary data, it was found that each of the independent financial variables was related to stock volume or stock spread. However, the relationships were sporadic in nature. None of the variables was universal in its effect on volume or spread. The variables with the highest representation over companies were return on equity per share and leverage. In 28.9% of the companies, return on equity per share was related to volume. Also, in 28.9% of the companies, leverage was related to spread. The percentages of the other variables were between 11.1% and 24.4% for volume and between 13.3% and 26.7% for spread.

These results seem to suggest that investors are not relying heavily on companies' financial data in making decisions about investment in stocks. These results are in agreement with Ligocká (2018), Berglund and Bergman (2013), and Hassan et al. (2020) with regard to stock price. Other factors could be in play when it comes to investment decisions. It could be that decisions are made, as Earl (1972) pointed out, based on human motivation (psychological in nature) and not company's financial results.

REFERENCES

Azizan, N. A. (2008). The predictability power of trading volume volatility in stock index futures markets. *Journal of Derivatives Markets, 5*(3), 72-90.

Aitken, M., & Frino, A. (1996). The determinants of market bid ask spreads on the Australian stock exchange: Cross-sectional analysis. *Accounting and Finance, 36*, 51-63.

Berglund, E., & Bergman, A. (2013). Financial ratios ability to predict excess returns of Swedish listed firms. (Degree project N. 3814407). http://lup.lub.lu.se/studentpapers/record/3814407

Broock, W. A., Scheinkman, J. A., Dechert, W. D. & LeBaron, B. (1996). A test for independence based on the correlation dimension. *Econometric Reviews, 15*, 197-235.

Brown, J. H., Crocker, D. K., & Foerster, S. R. (2009). Trading volume and stock investments *Financial Analysts Journal, 65*, 1-18.

Cattivelli, L., & Pirinoa, D. (2019). ASHARP model of bid–ask spread forecasts. *International Journal of Forecasting, 35*, 211–1225.
Chen, S. (2012). Revisiting the empirical linkages between stock returns and trading volume. Journal of Banking and Finance, 36, 781-1788.
Chen, S, & Liu, T. (2015). On asymmetric causality between stock prices and trading volume for some developed and emerging stock markets: A preliminary analysis. *International Review of Accounting, Banking and Finance, 7,* 3-26.
Cheng, F. L., &. Rui, O. M. (2000). Does trading volume contain information to predict stock returns? Evidence from China's stock markets. *Review of Quantitative Finance and Accounting, 14,* 341- 360.
De Medeiros, O. R., & Van Doornik, B. F. N. (2008). The empirical relationship between stock returns, return volatility and trading volume in the Brazilian stock market. *Brazilian Business Review, 5*, 1-17.
Dodonova, A. (2016). Variability of realized stock returns and trading volume. *Applied Economics Letters, 23*, 674–677.
Dumitrescu, E., and Hurlin, C. (2012), Testing for Granger non-causality in heterogeneous panels. *Economic Modelling, 29*, 1450-1460
Earl, V. (1972) What makes shares move? *Accountancy*, 83, 78-80.
Granger, C. W. J., & Newbold, P. (1974). Spurious regressions in econometrics. *Journal of Econometrics, 2*, 111-120.
Gold, S. (2013). Impact of trading volume on next day stock returns in the DJIA 2007-2009. *JFAR, 1*, 1-11
Groß-Klußmann, A., & Hautsch, N. (2013). Predicting bid–ask spreads using long-memory autoregressive conditional poisson models. *Journal of Forecasting, 32*, 724–742
Hassan, M., Nassar, R., & Witherspoon, A. (2020). Investigation of the relationships between a public company's financial factors and its stock price: An empirical study. *Global Journal of Accounting and Finance, 4*, 129-141.
Kalok C. Y., Peter, C., & Herb, J. (1995). The intraday behavior of bid-ask spreads for NYSE stocks and CBOE options. *Journal of Financial and Quantitative Analysis, 30*, 329-346.
Lee, C. F., & Rui, O. M. (2000). Does trading volume contain information to predict stock returns? Evidence from China's stock markets. *Review of Quantitative Finance and Accounting, 14*, 341-360.
Ligocka, M. (2018). Can financial ratios influence the stock returns of financial sector companies in Austria? *Schváleno k publikování, 14*, 25-35.
McInish, T., & Wood, R. (1992). An analysis of intraday patterns in bid/ask spreads for NYSE stocks. *Journal of Finance, 47*, 753-764.
Menyah, K., & Paudyal, K. (1996). The determinants and dynamics of bid-ask spreads on the London stock exchange. *Journal of Financial research, 19*(3), 377-394.
Minardi, A. M. A. F., Sanvicente, A. Z., & da Costa Monteiro, R. (2006). Bid-Ask spreads in a stock exchange without market specialists. *Latin American Business Review, 7*, 19-39
Montgomery, D. C, Peck, E. A., & Vining, G. G. (2001). *Introduction to linear regression analysis* (3rd ed.). John Wiley.
Naik, P. K., Gupta, R., & Padhi, P. (2018). The relationship between stock market volatility and trading volume: Evidence from South Africa. *The Journal of Developing Areas, 52*, 99-114
Wei, W. S. (2006). *Time series analysis: Univariate and multivariate methods*. Addison-Wesley.

Zerena, F., & Konukb, F. (2016). The nexus between trading volume and stock prices: Panel evidence from OECD countries. *Business and Economics Research Journal*, *7*, 21-29

APPENDIX

TABLE 3. PARAMETER ESTIMATES FROM TIME SERIES ANALYSIS OF STOCK VOLUME, AS THE DEPENDENT VARIABLE, ON FINANCIAL FACTORS, AS THE INDEPENDENT VARIABLES, FOR DIFFERENT COMPANIES ON THE STOCK MARKET. THE SYMBOL Δ REFERS TO FIRST DIFFERENCE.

	Dependent variable		Independent variables							
Company		Mean	ΔR4 (t)	ΔR4 (t-1)	ΔROE PS (t)	ΔROE PS (t-1)	ROE PS (t)	ΔR2 (t)	$Ø_1$	$Ø_2$
Bank of America	Vt	-4346020.2	631735060	533385233					0.815	
Bristol-Myers	Vt	-399832.9			-36472.9				0.498	
Caterpillar	Vt	1031663.9			-32554.9				0.838	
Chase	Vt	2307.4						464.40	0.389	0.399
Community health	ΔVt	9646.7							-0.349	
Diamond drilling	Vt	390535.8			9402.9				0.483	
DTE Energy	Vt	146721.1							0.319	0.353
Edwards life sciences	Vt	161375.7						660290.3	0.477	0.398
Eli Lilli	Vt	880765.3							0.500	0.403
First Energy	ΔVt	9787.6			-2489.1				-0.559	-0.551
Fiserv Inc.	Vt	273942.4							0.654	
G&K Services	Vt	1460.2							0.357	
GAP Inc	Vt	1135560.9			24773.4				0.570	0.303
Hain Celestial	Vt	160144.7							0.357	0.516
Halliburton	Vt	2043094.9							0.435	0.266
Harris Corp	Vt	162583.5							0.374	0.383
Hershey	Vt	202844.9	-522112.9						0.308	0.466
I.D.Systems	Vt	8624.8							0.349	
ICU Medical	Vt	34952.1							0.473	
J.B.Hunt	ΔVt	-274.563							-0.444	
J.C. Penny	Vt	2188405.2							0.418	
Jewett-Cameron	Vt	978.392							0.227	

Kellog	Vt	265179.3							0.786	
Kewaunee Scientific	Vt	986.87511							0.359	
L.B. Foster	Vt	11342.8							0.769	
Laboratory Corp	Vt	195247.6							0.303	
M.D.C. Holding	Vt	93212.0							0.396	0.524
Manpower Group	Vt	181260.1					-3739.8		0.403	
Nanometrics	Vt	113814.9						9309832.6		
Nanophase	Vt	23498.0							0.359	
Ocean Biochemical	Vt	3725.5				-520.356				
Oceaneering International	Vt	164445.5						671640.7	0.776	
Panhandle Oil and Gas	Vt	34.471							0.778	
Par Technology	Vt	3026.3							0.715	
Quacker Chemicals	Vt	16241.2							0.818	
Quanta Service	ΔVt	301011.9							0.847	
Radisys Corp	Vt	20582.9		-168411.8					0.252	
Rambus Inc	Vt	406607.7					-5578.8		0.379	
Salem Media Group Inc.	Vt	28394.3								
Take-Two Interactive Software	Vt	395305.2					-1.794		0.289	
Tampa Electric	Vt	-238131.4							0.33	0.37
UGI Corp	ΔVt	76761.6						-369655.8	0.75	
W.R.Grace & CO	Vt	131015.0							0.50	
Walt Disney	Vt	1044559.6							0.61	
WW Grainger Inc.	Vt	119678.9							0.64	

Vt = Trade Volume, dependent variable
ROEPS = Return on equity per share
R2 = leverage = Total debt divided by total assets
R4 = Cash and short-term investment divided by total assets

Table 3 (continued)

Company	ΔROA (t-2)	ΔROA (t)	ΔInc (t)	ΔInc (t-1)	Liab (t)	CR (t)	CR (t-3)	liab (t-4)	R4 (t-2)
Bank of America									
Bristol-Myers									
Caterpillar									
Chase									
Community health	9646.7								
Diamond drilling		20294.4	0.0008196		0.000304	-22092.7			
DTE Energy						55942.0			
Edwards life sciences			0.0011820						
Eli Lilli			0.00014						
First Energy									
Fiserv Inc.									
G&K Services			-0.000562					0.00014	
GAP Inc		-71867.9							
Hain Celestial				-0.00171					
Halliburton									
Harris Corp									
Hershey									
I.D.Systems									
ICU Medical									
J.B.Hunt									
J.C. Penny		-98540.8							
Jewett-Cameron									
Kellog									
Kewaunee Scientific									
L.B. Foster									
Laboratory Corp							-37507		1304868.5
M.D.C. Holding				-0.000189					
Manpower Group									
Nanometrics									
Nanophase									

Ocean Biochemical									
Oceaneering International									
Panhandle Oil and Gas									
Par Technology									
Quacker Chemicals									
Quanta Service									
Radisys Corp		-3829.6							
Rambus Inc									
Salem Media Group Inc.									
Take-Two Interactive Software					0.000393	378387.2			
Tampa Electric									
UGI Corp									
W.R.Grace & CO									
Walt Disney									
WW Grainger Inc.									

ROA = Return on assets
Inc = Income
Liab = Liability
CR = Cratio

Table 3 (continued)

Company	ΔR2 (t-2)	ΔLiab (t)	ΔR4 (t-4)	ΔR4 (t-5)	R4 (t)	ROEPS(t-1)	Liab (t-1)	ΔCR (t)
Bank of America								
Bristol-Myers								
Caterpillar								
Chase								
Community health								
Diamond drilling								
DTE Energy								
Edwards life sciences								
Eli Lilli								
First Energy								
Fiserv Inc.								
G&K Services								
GAP Inc								
Hain Celestial								
Halliburton	-5045084	-0.0000444						
Harris Corp								
Hershey								
I.D.Systems								
ICU Medical			-24854.4					
J.B.Hunt						5157.4		
J.C. Penny		0.000448				-37281.1		
Jewett-Cameron								
Kellog								
Kewaunee Scientific				19877.0				
L.B. Foster								
Laboratory Corp								
M.D.C. Holding								
Manpower Group								
Nanometrics								

Nanophase								
Ocean Biochemical								
Oceaneering International		-0.000731						-161498.2
Panhandle Oil and Gas							0.000366	
Par Technology								
Quacker Chemicals								
Quanta Service		-0.0001051						
Radisys Corp						-1341.3		
Rambus Inc								
Salem Media Group Inc.						157.853		
Take-Two Interactive Software								
Tampa Electric								
UGI Corp								
W.R.Grace & CO								
Walt Disney					17865535			
WW Grainger Inc.					-31782.5			

Table 3 (continued)

Company	Inc (t-3)	Inc (t)	Inc (t-2)	R2 (t)	R2 (t-1)	R2 (t-3)	ΔLiab (t-5)	R4 (t-3)	ΔROA (t-1)
Bank of America									
Bristol-Myers									
Caterpillar									
Chase									
Community health									
Diamond drilling									
DTE Energy									
Edwards life sciences									
Eli Lilli									
First Energy									
Fiserv Inc.									
G&K Services									
GAP Inc									
Hain Celestial									
Halliburton									
Harris Corp									
Hershey									
I.D.Systems									
ICU Medical									
J.B.Hunt									
J.C. Penny	-0.000934			-15883008	-18295322				
Jewett-Cameron							0.00099		
Kellog								2571484	
Kewaunee Scientific									
L.B. Foster									
Laboratory Corp									
M.D.C. Holding									

Manpower Group									
Nanometrics									
Nanophase									
Ocean Biochemical									1955.5
Oceaneering International									
Panhandle Oil and Gas		0.000268			9002				
Par Technology									
Quacker Chemicals						-40970.6			
Quanta Service									
Radisys Corp									
Rambus Inc									
Salem Media Group Inc.				-33290.0					
Take-Two Interactive Software									
Tampa Electric									
UGI Corp			0.000078						
W.R.Grace & CO									
Walt Disney									
WW Grainger Inc.									

TABLE 4. PARAMETER ESTIMATES FROM TIME SERIES ANALYSIS OF STOCK SPREAD, AS THE DEPENDENT VARIABLE, ON FINANCIAL FACTORS, AS THE INDEPENDENT VARIABLES, FOR DIFFERENT COMPANIES ON THE STOCK MARKET. THE SYMBOL Δ REFERS TO FIRST DIFFERENCE.

		Independent Variables									
Company		Mean	ΔROEPS (t)	ROEPS (t-1)	R4 (t)	R4 (t-1)	ΔR4 (t)	ΔR2 (t)	ΔR2 (t-1)	$Ø_1$	$Ø_2$
Bank of America	SPt	-0.188								0.620	
Bristol-Myers	SPt		-0.0224		-3.121					0.511	
Caterpillar	SPt	-0.124					0.39			0.619	
Chase	ΔSPt	0.056						-0.11		-0.593	
Community health	SPt	-0.088						0.50	-0.56	0.777	
Diamond drilling	SPt	-0.277								0.634	0.345
DTE Energy	SPt	-0.413				28.49				0.399	
Edwards life sciences	SPt	1.725		-0.037						0.860	
Eli Lilli	SPt	0.583			-4.28					0.478	-0.282
First Energy	SPt	-0.089						-2.05		0.416	0.415
Fiserv Inc.	SPt	-0.016								0.219	
G&K Services	SPt	0.149								0.036	
GAP Inc	SPt	-0.138		0.013				-0.92		0.843	
Hain Celestial	SPt	-0.016			-0.68						
Halliburton	SPt	-0.129			0.93			-1.16		0.727	
Harris Corp	SPt	-0.397	0.0349							0.191	0.241
Hershey	SPt	-0.091								0.854	
I.D.Systems	SPt	-0.034									
ICU Medical	SPt										
J.B.Hunt	SPt										
J.C. Penny	ΔSPt	-0.018								0.805	
Jewett-Cameron	SPt	-0.335								0.267	
Kellog	SPt	-1.311								0.999	
Kewaunee Scientific	SPt	0.046								0.485	

L.B. Foster	SPt	-0.117								0.334	
Laboratory Corp	SPt	-0.105								0.804	
M.D.C. Holding	SPt	-0.12110						1.96		0.784	
Manpower Group	SPt	-4.085			-3.02					0.884	
Nanometrics	SPt	-0.051	-0.030							0.365	
Nanophase	SPt	-0.137						-9.27			
Ocean Biochemical	SPt										
Oceaneering International	SPt	-0.140								0.221	
Panhandle Oil and Gas	SPt	-0.593									
Par Technology	SPt	-0.282								0.744	
Quacker Chemicals	SPt	-0.20125								0.635	
Quanta Service	SPt	-0.11713								0.361	0.451
Radisys Corp	SPt	-0.044								0.114	
Rambus Inc	SPt	-0.017									
Salem Media Group Inc.	SPt	-0.066			-1.00					0.326	
Take-Two Interactive Software	SPt	-0.058									
Tampa Electric	SPt	-0.347								0.288	
UGI Corp	SPt	-0.205								0.909	
W.R.Grace & CO	SPt	-0.055								0.418	
Walt Disney	SPt	-0.148								0.785	-0.238
WW Grainger Inc.	SPt	-0.728			4.67					0.504	

SP = Spread, dependent variable

Table 4 (continued)

Company	CR (t)	ROA (t)	ΔLiab (t)	ΔLiab (t-4)	ROE PS (t)	ΔROA (t)	ΔROEP S (t-2)	ΔROA (t-1)	ΔCR (t)
Bank of America									
Bristol-Myers									
Caterpillar									
Chase									
Community health									
Diamond drilling	0.014								
DTE Energy	0.710	-0.162							
Edwards life sciences			2.273x E-9		-0.126	0.133			0.310
Eli Lilli									
First Energy		-0.012							
Fiserv Inc.				3.937 E-11					
G&K Services								0.101	
GAP Inc	0.148								
Hain Celestial							0.00955		
Halliburton									
Harris Corp						-0.0843			
Hershey									
I.D.Systems	-0.0042								
ICU Medical									
J.B.Hunt									
J.C. Penny									
Jewett-Cameron									
Kellog									
Kewaunee Scientific									
L.B. Foster									
Laboratory Corp									
M.D.C. Holding									
Manpower Group	2.979		3.504 E-10						
Nanometrics						0.036			
Nanophase									

Ocean Biochemical									
Oceaneering International									
Panhandle Oil and Gas									
Par Technology									
Quacker Chemicals									
Quanta Service									
Radisys Corp					-0.00081	0.00263			
Rambus Inc									
Salem Media Group Inc.									
Take-Two Interactive Software	0.016				6.88xE-7				
Tampa Electric	0.436								
UGI Corp									
W.R.Grace & CO									
Walt Disney									
WW Grainger Inc.									

Table 4 (continued)

Company	ΔR2 (t-2)	Inc (t)	Inc (t-1)	ΔInc (t-1)	ΔInc (t)	ΔCR (t-3)	ΔCR (t-1)	ΔCR (t-5)	ROE PS (t-4)	ROE PS (t-5)
Bank of America										
Bristol-Myers										
Caterpillar										
Chase										
Community health										
Diamond drilling										
DTE Energy										
Edwards life sciences										
Eli Lilli										
First Energy										
Fiserv Inc.										
G&K Services										
GAP Inc										
Hain Celestial	0.814									
Halliburton		-1.256x E-10								
Harris Corp						-0.219				
Hershey							-0.056			
I.D.Systems										
ICU Medical										
J.B.Hunt										
J.C. Penny		-4.647x E-11								
Jewett-Cameron										
Kellog										
Kewaunee Scientific										
L.B. Foster	0.484									
Laboratory Corp										
M.D.C. Holding										
Manpower Group										
Nanometrics								-0.019		
Nanophase										

Ocean Biochemical										
Oceaneering International										
Panhandle Oil and Gas										
Par Technology										
Quacker Chemicals										
Quanta Service										
Radisys Corp										
Rambus Inc									0.00172	
Salem Media Group Inc.										-0.011
Take-Two Interactive Software										
Tampa Electric			3.10x E-10							
UGI Corp										
W.R.Grace & CO				-1.29xE-9						
Walt Disney										
WW Grainger Inc.					3.45xE-10					

Table 4 (continued)

Company	ΔROEPS (t-1)	R2 (t)	R2 (t-1)	ΔR4 (t-5)	ΔR4 (t-4)	Liab (t)	R2 (t-3)	CR (t-1)	ΔInc (t-4)
Bank of America									
Bristol-Myers									
Caterpillar									
Chase									
Community health									
Diamond drilling									
DTE Energy									
Edwards life sciences									
Eli Lilli									
First Energy									
Fiserv Inc.									
G&K Services									-5.39x E-8
GAP Inc									
Hain Celestial									
Halliburton									
Harris Corp									
Hershey									
I.D.Systems									
ICU Medical									
J.B.Hunt									
J.C. Penny									
Jewett-Cameron									
Kellog									
Kewaunee Scientific									
L.B. Foster									
Laboratory Corp	-0.017								
M.D.C. Holding									
Manpower Group		-2.652							
Nanometrics				-0.992					
Nanophase									
Ocean Biochemical									
Oceaneering International									
Panhandle Oil and Gas						3.19156E-8		0.123	
Par Technology						4.21E-9			
Quacker Chemicals							0.586		
Quanta Service									
Radisys Corp									
Rambus Inc									
Salem Media Group Inc.						1.31x E-9			

Take-Two Interactive Software									
Tampa Electric			-0.934			2.29x E-10			
UGI Corp									
W.R.Grace & CO					0.928				
Walt Disney									
WW Grainger Inc.									

MODERN TRENDS IN ECUADORIAN LEADERSHIP: EXPLORING CULTURAL CHANGE IN POLITICAL, AGRICULTURAL & BUSINESS LEADERSHIP

Jeffrey L. McClellan, Frostburg State University
Jlmcclellan@frostburg.edu

ABSTRACT

This article examines the cultural history of leadership in Ecuador with an emphasis on leadership in the modern era. Building on the work of McClellan (2016, 2017), which examined leadership in the precolonial and colonial eras, this article looks at how leadership culture has begun to change based on an examination of political leadership, agricultural leadership, and business leadership. While continuation of many of the themes of colonial leadership are evident, particularly in the political arena. There are some significant changes in leadership culture emerging from within the agricultural/indigenous leadership and the business arenas.

INTRODUCTION

Leadership in Ecuador is currently an understudied phenomenon. Only a handful of studies have examined the concept of leadership from a cross national perspective. Nonetheless, there is a need in the leadership literature to delve more deeply into the study of specific nations to better understand how people influence one another to achieve goals. Consequently, this article offers an overview of the interdisciplinary literature on leadership in Ecuador. By taking a historical approach to the study of leadership in Ecuador, this article first overviews the literature related to precolonial and colonial leadership patterns in Ecuador and then examines interdisciplinary contributions to leadership studies in the country in the modern era in the political, agricultural, and business realms.

PRE-COLONIAL LEADERSHIP IN ECUADOR

Prior to the colonization of Ecuador by Spain, Ecuador was inhabited by a multitude of different tribal and agricultural societies that remained largely politically separate because of the geographic and societal structures that surrounded them. In an article based on historical and anthropological sources, McClellan (2017) examined the nature of this leadership based on a cultural analysis rooted in the work of Schein. Schein (1992) suggested that culture existed at three levels: artifacts, values, underlying assumptions. McClellan suggested that leadership culture existed at three similar levels: means of influence, goals of the leader, and sources of power. Sources of power represent the foundational beliefs that cause people to accept others as leaders. Goals are a reflection of what a leader values and means of influence are procedural artifacts. In reviewing the

literature regarding precolonial societies in Ecuador (Bray, 2008; Hurtado, 2010; Luciano, 2010; Salomon, 1986), McClellan found that influence was rooted in kinship and economic networks of influence, paternal heritage and masculinity, wealth, religion, and military strength, and the acquisition of formal positions of power.

Those who emerged as leaders based on these sources generally sought to further increase and maintain their power in relation to each of these areas while providing genuine paternalistic care for their followers. They generally did this through demonstrations of strength and courage, fear-based influence and punishment, redistribution of resources to benefit all, management of strategic relationships, trade, sponsoring of feasts, symbolic leadership via ceremonies, dispute resolution, labor administration, and directing military efforts. In a follow-up article, McClellan (2016) reconceptualized these means of influencing others as involving the use of authoritative decision-making, demonstrations of strength and courage, use of fear and corporal punishment, redistribution of resources, management of strategic relationships, acquisition of resources, and reciprocal relationships. While these precolonial leadership practices represent the cultural roots of leadership in Ecuador, the Incas and Spanish brought with them cultural approaches to leadership that overlayed, contrasted with, and reinforced various aspects of these influence processes.

THE INCA INFLUENCE

The Inca arrived in Ecuador a generation before the Spanish and had an impact on leadership culture in the highlands. Although a foreign colonizer, the Inca have come to be seen to some extent as Ecuadorian, as evidenced by the general perception that the last Inca king is often revered as being Ecuadorian given his birth to an Ecuadorian mother in Quito (Lauderbaugh, 2012). This is likely, at least in part, because of the many similarities between Inca leadership and traditional Indigenous leadership and because of the tendency that the Incas had to rule through local leaders (D'Altroy, 2002). Based on an article exploring the cultural foundations of leadership in Ecuador, McClellan (2016) found that the sources of power in Inca society included: kinship, through the Sapa Inca lineage; divine right, the Inca leaders were seen as divine inheritors of the right to rule; and military prowess, as conquest was seen as a means of consolidating, maintaining, and extending power.

Based on these sources, the goals of leadership generally focused on expansion of the kingdom, maintenance and expansion of authority, and increased wealth. These goals were achieved through influence processes that focused on the use of strong oratory skills, effective bureaucratic organization, redistribution of resources, demonstration of strength and courage, use of preexisting power structures, reciprocal relationships, decisive and authoritative decision-making, and military punishment of opposition and relocation of resistant peoples (McClellan, 2016). Of these practices, the use of preexisting power structures and redistribution of resources likely facilitated the acceptance of Inca leadership culture once any opposition was squelched via conquest and relocation practices. Spanish leadership culture did not align as well.

SPANISH CULTURAL INFLUENCES

At the time of the conquest, Spain's leadership culture represented an amalgamation of catholic (especially the works of Thomas Aquinas), Roman, and renaissance philosophy, such as Machiavelli (Dealy, 1992; McIntosh, 2011). Spanish society was feudalistic and monarchical in nature. Power came from hereditary wealth and centered on the importance of social networks. Although, enlightenment philosophy was influencing social norms in Spain, it would ultimately have little immediate impact on the Spanish Colonies (Behrens, 2009).

As a result, of these cultural foundations, Spanish colonial leadership culture reflected a unique approach known as *cuadillaje*, or rule by strongmen (Spillan et al., 2014). Based on the underlying philosophical virtues of *dignidad*, leisure, grandeur, generosity, manliness, and deception (Dealy, 1992), colonial leadership drew its power from social status and kinship, networks of influence and wealth, positional authority, and charisma (McClellan, 2016). Once in power, leaders sought to maintain authority, increase their power and status, expand their networks, and increase their wealth while demonstrating a paternalistic care for followers and maintaining a lifestyle characterized by leisure. This was achieved through perception management, the use of charismatic interpersonal skills. Reciprocal relationships, consolidation of power, demonstrations of strength and courage, and machismo-based dominance of women and sexual prowess, decisive authoritative decision-making, and redistribution of resources (McClellan, 2016).

It is worth noting that while some of the elements of Spanish leadership culture were similar to those of Inca and Indigenous cultures, these apparent similarities ultimately created more conflict than alignment. For example, while both cultures appear to advocate for paternalistic care of followers and redistribution of resources, the Spanish approach to this was much less authentic and equitable, and more exploitative and racially biased (Hurtado, 1985, 2010; Lyons, 2006). As a result, Indigenous populations became disenchanted with leadership that did not demonstrate genuine concern for their well-being and largely exploited them (Becker, 2008).

FROM COLONIAL ECUADOR TO THE MODERN ERA

While little formal research exists to specifically address the transformation of leadership culture in Ecuador since the colonial era. Additional non-traditional sources suggest that the patterns of the colonial past predominated, with a few alterations and introductions, up to the modern era. In this section some sources will be examined for insights regarding this development. The first of these sources is a historical examination of presidential leadership in Ecuador. The second is a narrative history of life in the hacienda system that includes descriptions of the leadership structures and processes. The third examines business leadership in Ecuador.

PRESIDENTIAL LEADERSHIP

In his history of Ecuador, Lauderbaugh (2012) focused heavily on the actions of presidents. As a result, he provides a summary view of how political leadership evolved from the colonial era up until the mid-1900s. His writings are particularly relevant to leadership given that in Latin America, political figures tend to represent a dominant archetype for leadership (McIntosh, 2011). Thus political ideals of leadership manifest themselves in the hacienda system, the home, the military, and other aspects of society in Ecuador (Paz & Cepeda, 2010).

After reviewing the first three decades of independent nationhood, Lauderbaugh (2012) identified several trends that significantly influenced later historical developments. Many of these trends deal directly with leadership. These trends included the emergence of bitter conflicts between the liberal and conservative parties that established the tradition of a disloyal opposition in Ecuador constantly seeking to remove the party in power from office. The implications for leadership and leader-follower relations are significant.

Leaders had to constantly battle to retain their positions of power and keep a close eye on followers. Small scale rebellions had to be dealt with swiftly and powerfully to avoid widespread rebellion. Followers and those who aspired to leadership did not support leaders in pursuit of the common good. Instead, it was expected that they would oppose leadership when they disagreed and that they would seek to overthrow leaders when possible. Thus, the existence of a disloyal opposition strengthened the need for expanding networks, maintenance of authority, and paternalistic care taking of followers. Likewise, it reinforced the need to consolidate power, build reciprocal relationships (especially with the military), and punish dissidents using violence and shows of strength.

The second trend that Lauderbaugh (2012) identified was the reinforcement of "caudillismo or the rule by strongmen who are unwilling to relinquish power according to constitutions" (p. 51). By strong men, Lauderbaugh was referring to leaders who created a following based on wealth, status, reciprocal, paternalistic relationships, etc. He further explained that these militaristic *caudillos* "used the army as a base of support" (Lauderbaugh, 2012, p. 51). In addition, their leadership was characterized by personalism, in that the ultimate loyalty of their followers was not based on the follower's alignment with the leader's policies, but rather on loyalty to the leader. Thus, "some men who started out as liberals later became conservatives, but their ultimate loyalty usually rested with the leader they followed" (Lauderbaugh, 2012, p. 51). This loyalty, however, was often tenuous as followers frequently betrayed their leaders when it gave them an opportunity to achieve power themselves. This led to a tendency to engage in self-protective leadership that disregarded constitutional mandates regardless of one's political leanings, as both the ultra-conservative Moreno and the ultra-liberal Alfaro both engaged in dictatorial leadership.

In addition to these early, explicitly stated trends, Lauderbaugh's (2012) work suggests that Ecuadorian presidents tended to be quite visionary and were very much focused on strengthening the nation and responding to the developmental needs of the country. Much of their efforts focused on education, transportation, and improvements to quality of life (i.e., potable water, sewage systems, etc.). Furthermore, many strived to promote honest and effective administration.

Nonetheless, the system was generally rife with corruption, which many presidents did actively promulgate. Furthermore, financial problems were constantly limiting their efforts and military spending and activities were significant as a means of managing, or repressing, the disloyal opposition.

Additional trends identified in Lauderbaugh's (2012) text included: the tendency of many of the Ecuadorian presidents to view themselves as the only person capable of leading the country and the tendency for political leaders to come from the families of former political leaders, thus reinforcing the tendency for leadership to be based on social status, wealth, and family centered networks of influence.

Perhaps the most significant aspect of leadership in Ecuador to emerge in the modern era has been populism. Populism refers to leadership that seeks popular support by appealing to the masses as opposed to depending entirely on one's own network of supporters. While evidence of this approach is clear in the early history of Ecuador (De la Torre, 2007; Paz & Cepeda, 2010), the individual who most exemplified and popularized this approach was Velasco Ibarra. Ibarra was a fiery, charismatic speaker. He refused to align himself with any party and actively sought the support of the people. As Lauderbaugh (2012) explained, Velasco

> launched the first modern political campaign in Ecuador's history by taking his cause directly to the people, personally campaigning throughout the country. . . . Velasco flattered average Ecuadorians with his appeal for their support and he exhorted the crowds to vote for change that only he could bring about (p. 102).

Though his presidencies were generally unproductive and all but one ended in his being removed from office and exiled from the country, his ability to appeal to the people led to landslide victories on 5 separate occasions. As a result, he set a precedent for populist leadership that exists to the present.

Ibarra's populism focused on conveying a set of ideals about leadership that are perhaps best expressed in the content analysis of one of the early speeches given by Ibarra (De la Torre, 1994). In the content analysis, the following moral qualities of Velasco and his followers were identified: "democracy, heroic pueblo (soldiers), the spiritual (the moral), emotion, institutions (suffrage), honorable people, modest citizen, sincerity, morality, and revolution that is transcendental, profound, and truthful" (De la Torre, 1994, p. 706). Additionally, the following themes, which reflect the agenda of populism, were identified in Ibarra's approach. First, he claimed that he was an individual who had suffered much to overcome great challenges, like the people themselves, and, therefore, could represent them and embody their will. Consequently, they needed only to trust in him, and he would lead them. Thus, the idea that the leader embodies the people is a central tenet of populism (De la Torre, 2007) and allows for the leader to impose that will upon the people as if it were their own (Paz & Cepeda, 2010).

Second, political life represents a struggle between good and evil as embodied in the people and the oligarchy. The populist leader represents good. The opposition is evil. Compromise is, therefore, impossible as it is immoral because "those who are not included in the leader's vision of the people [and] their values either belong to the anti-nation or do not exist in these constructs"

(De la Torre, 2007, p. 394). Consequently, "they do not have rights, because those who are against the leader are considered to be enemies of the nation and the people, whose goals and values are those of the leader" (De la Torre, 2007, p. 394).

As a result of these ideals, populism values democratic practices but often tends toward authoritarianism. Nonetheless, in the more fluid, network oriented, participative structures that typify populist campaigns leaders provide a sense of democratic participation that appeals to many followers (De la Torre, 2007; Paz & Cepeda, 2010). Consequently, it represents both a manifestation of the leadership trends that emerged during the precolonial and colonial era and an alteration/addition to these. In sum, populisms main contributions to an Ecuadorian conceptualization of leadership were its paradoxical appeal to democratic ideals, instead of platforms and policies, while practicing authoritarian leadership. In addition, its philosophical, but not necessarily actual, dependence on the common people as a source of personal authority represented a new trend in leadership that, nonetheless, simply reflects the older paradigms and processes of leadership in the colonial era.

HACIENDA LEADERSHIP

A unique lens on Ecuadorian leadership reveals itself in the work of Lyons (2006). He conducted fieldwork in the Chimborazo region of Ecuador to understand the nature of hacienda society in the 1900s. As a part of his work, he explored the authority and social influence structures and processes that characterized both hacienda life and the communities that have taken the place of Hacienda's in modern Ecuador.

As Lyons (2006) explained, when the Spaniards arrived, they implemented an *encomienda* system which effectively gave European elites control over large tracts of land and the labor and lives of the Indigenous people who lived on the land. The primary emergent structure was that of the hacienda. While haciendas represented economic structures, the connection between the haciendas and the political structures of the country were significant as the hacienda owners, in most cases, were the ones who held political authority in the country. As Hurtado (1985) explained "the hacienda was at the center of political power and the *hacendados* became the central focus of political authority" (p. 53). Indeed, Hurtado suggested that the

> protective and oppressive, autocratic, and paternal model of authority inspired by the hacienda system constituted the pattern adhered to by all who participated in a supervisory capacity in all kinds of organizations—government, municipal, commercial, industrial, educational, political, popular—in which the structures of paternalism became overwhelmingly predominate. (p. 54)

Thus, hacienda owners used their wealth and status as *caudillos* or "caciques" to consolidate their authority and dominate the political, social, and economic regions over which they presided.

Lyons' (2006) research provides insights into how leadership was practiced during the late hacienda period and how it evolved with the decline of the hacienda system. The typical hacienda

structure consisted of an owner, a steward, and an overseer. The owner was generally a member of the "white" elite class and typically lived in the city and spent little time directly involved in the work of running the hacienda. In general, this was likely a result of the leisure-oriented values of society. However, Lyons does suggest that the traditional view of landlords as disinterested investors is outdated.

In the case of the hacienda where Lyons (2006) did his research, the owner was the Diocese of Riobamba. Renters typically filled the role of owner. The steward was generally more directly involved and typically lived on the hacienda. He practiced leadership via an overseer who "aided the steward in planning and supervising daily labors" (Lyons, 2006, p. 78). Stewards were typically members of the mestizo class, whereas overseers were often Indigenous.

The owners typically engaged in paternalistic leadership and practiced the previously cited method of punishing through intermediaries. As a result, Lyons (2006) suggested that the owners or landlords practiced paternalistic leadership, in that they displayed "benevolence and [expected] loyalty and obedience [and respect] in return," in ways that were often consistent with the parenting approaches of their society. Indeed, Lyons (2006) drew some guarded comparisons between the way in which landlords and their stewards persuaded and punished their laborers and the way parents did the same with their children. As a result, the owners were generally expected to demonstrate benevolence, generosity, and detached kindness for their "children" while they exacted work and punished them via the overseers and stewards. In addition, they were able to bestow privileges and rewards upon their workers, in exchange for their efforts and respect. Consequently, they were expected to and generally did engage in redistribution of resources, in the form of products and profits, consistent with the traditional practices of the Indigenous people. Nonetheless, redistribution rarely reflected the quantitative and qualitative values of the Indigenous people in a way that reflected their ideals. When the Indigenous people left or critiqued their former landowners, they often faulted them for failure to practice true reciprocity.

It is worth noting that when reciprocity expectations were not met, peasants often resorted to theft as a means of exacting the resources they felt were due to them (Lyons, 2006). The overseers and stewards tended to be more prone to the use of fear and violence as a means of persuasion. However, they were often caught in the difficult space of middle managers who had to keep both the upper-level leaders happy while at the same time not overly offending the people they led.

While the general approach to leadership was as parental figures, one cannot overlook the reality of the exploitative nature of these relationships. Sexual and physical exploitation, whether directly imposed by owners or via there stewards and overseers were common occurrences. Fear was frequently used as a means of influence, as was religious indoctrination. Indeed, Lyons (2006) outlines how the whippings that took place on the hacienda were conceived of as at least partially spiritual in nature. As a result of the contradictory behavior of the owners and their stewards, it is not surprising that they were viewed as both morally deficient and in league with the devil as well as being considered respected "Elders" and "appropriate delegates of God" (Lyons, 2006, p. 236).

In addition to the formal structures of the haciendas, informal leadership and authority relationships were also present. These were largely based on elder-junior relationships, kinship, and *compadrazgo*. In general, junior members of society were expected to show respect and

deference to elder members. Family relationships were primary and represented a key means of support and power. Expanded family networks via *compadre* (God-father/mother) relations further extended the power of these networks. These interdependent relational networks were also based on the ideals of generosity and reciprocity. As Lyons (2006) noted

> Reciprocity differs from contractual or market exchange in several ways. First, the transaction is not wholly voluntary- rejecting a gift or failing to reciprocate appropriately risks damaging the relationship. Second, the terms of exchange are not set by an explicit negotiation based on open self-interest. . . . Each side's best interests [are] best served by displaying generosity, hospitality, and consideration for the other. (p. 91)

This places an emphasis on the relationship instead of the transaction itself, which represented an ideal, in the minds of the Indigenous people, for both formal and informal leader-follower interactions. Clearly such relationships were more common in the informal realm than in the formal authority structures of the hacienda where owners tended to view the relationships with followers in more paternalistic, transactional terms.

As land use policies were reformed and the hacienda system gave way to community structures, the Indigenous peoples implemented their own leadership structures which often reflected both their own traditions and those of the political left (Becker, 2008). In the area where Lyons (2006) conducted his research, *comuna's* replaced the administrative structures of the haciendas. *Comuna's* are, in accordance with Ecuadorian law, headed by "presidents and other officers" (p. 272). The authority of these leaders is typically relatively limited, in comparison to the traditional roles of caudillos or caciques. In fact, these roles were compared by Lyons to the historical role of a fiesta sponsor, who gained social status and prestige by sponsoring fiestas for the entire community at great expense. In part, the role of these leaders is to assemble the community and coordinate the work of the same. Regarding this work, Lyons wrote, "the community assembles weekly for a formal meeting, and one day a week, occasionally two, villagers work together in tasks of collective benefit" (p. 272). The leadership roles for overseeing these efforts typically rotate among members.

Villegas (1999) suggests that these new structures and the changing values are creating a new form of leadership among some Indigenous peoples in Ecuador. He calls this form of leadership "liderazgo comunitario" or community leadership. In contrast to the reciprocity based, power-oriented approach to leadership typified in the caudillo or cacique, communitarian leadership is different in form and function. In communitarian leadership, authority is based on a relationship characterized by greater equality between leader and follower. Followers, therefore, empower the leader because he or she is seen as sincerely desiring to represent the will of the people. Consequently, this approach to power does not depends on the use of wealth and power as a means of retaining followers. Nor does it focus on fostering relations of paternalistic dependency. Instead, the focus is on defending and representing the people's interest and using power to achieve the goals of the group, because the leader is a member of the group and his or her interests are aligned with the groups. This alignment is not, however, merely symbolic as in populist leadership. Instead, it is procedural as the leader's role is to work with the group to identify interests, goals, and methods that represent the will of the group. It is worth noting that rotation of power is not uncommon in this model. Nonetheless, this is not likely a universal approach to leadership in

Indigenous communities of the highlands (Buchelli, 1984). However, it does reveal the nature of change in relation to leadership that is occurring in Ecuador.

It is worth mentioning that one of the major items of discussion by Lyons (2006) is how notions of respect have evolved over time. Since the authority structures and the leadership practices of the *hacendados* demanded and enforced respectful follower behavior, though often at the expense of actual respect, the decline of the system has altered the need for such external demonstrations of respect. As a result, many bemoan the loss of respect for authority within formal and informal hierarchical relations. Nonetheless, "a hierarchy of respect spanning the ethnic-boundary is not altogether gone" (Lyons, 2006, p. 288). The same is true for other leader-follower relations.

It is also worth noting that greater involvement and oversight by the government and churches has replaced some of the political and religious authority structures that were previously filled by the *hacendados*. Nonetheless, these structures lack the absolute symbolic and authoritative power that landowners possessed in dealing with issues, which has led to more conflicts that are not as easily resolved as when one man's word was law (Lyons, 2006).

In overviewing the traditional leadership structures outlined by Lyons (2006) and Hurtado (1985) and discussing the changes that have occurred, it is evident that some major differences have emerged in the way leadership is demonstrated among some of the Indigenous people of Ecuador. While the early hacienda system appears to have mirrored the leadership practiced in the political arena as outlined in the model presented previously, the latter forms of leadership represent a significantly different approach to leadership that is characterized by a weakening of individual power, a sharing of decision-making and influence, the democratization of leadership practices, and a focus on community development as opposed to personal status and wealth. If as Hurtado suggested, the hacienda system was the source from which all forms of leadership emerged, it is possible that the trends that characterize leadership in its demise may reflect some future directions for leadership in Ecuador.

BUSINESS LEADERSHIP

The transformation of the hacienda system and its authority structures and processes is not the only source of evidence of change in the way leadership is being practiced and will be practiced in the future. Another area in which change is occurring is that of business.

In 2004, Romero drafted an article in which he discussed the changing nature of leadership in Latin America. He referred to the traditional approach to leadership in Ecuador and Latin America which has been outlined previously as the style of "*el patron*" or "the boss". This style was characterized by paternalistic leadership that "can be described as autocratic and directive" but relationship-oriented and conflict-avoidant (Romero, 2004, p. 30). Basing his description of this approach on the research on leadership in Latin America, he explained that such leaders seldom delegate work or use teams. They tend to engage in "formal top-down communication as the normal mode of communication" (Romero, 2004, p. 30). Furthermore, they are expected to be aggressive and assertive.

However, Romero (2004) suggested that things were changing in that global and regional trends already appeared to be transforming the way leadership was practiced in Latin America. The first of these trends related to the increased international interaction with MNCs and "developed" countries, which Romero believed would lead to emulation of more foreign leadership styles. The second trend was economic development, which he believed would alter the cultural environment by increasing the individualistic nature of the cultures of Latin America. Finally, he suggested that the increasing abundance of women in leadership roles in Latin America would further alter the leadership culture as women typically possess styles more consistent with what he termed modern leadership. Romero defined modern leadership as leadership that was more participative and supportive, increasingly likely to view workers as responsible, willing to delegate and use teams more often, and more committed to cooperation and collaboration, while remaining conflict avoidant and relationship oriented.

There may be some evidence to suggest that within the world of business and perhaps beyond it, these trends are indeed occurring. First, when one enters a bookstore in Ecuador and reviews the literature on leadership and business, much of what one sees are translated texts from U.S. authors. Second, the educational materials in business programs in Ecuador are largely based on research conducted in the United States and other similar countries. Indeed, the curriculum of the programs appears to be evolving along similar lines as more organizational behavior and managerial theory is becoming part of the curriculum. Women are emerging as recognizable leaders in business and other sectors (Moser, 2009) and appear to reflect some of the approaches of the style outlined by Romero (2004). In fact, the Vistazo edition that identified 100 important leaders in Ecuador listed Isabel Noboa as the top leader (the author recognizes the limited validity of this list, but recognizes the value such a list has as a reflection of and influence on culture) (Vistazo.com).

Despite the existence of such anecdotal evidence, research on business leadership in Ecuador remains limited. The most significant research project to examine Ecuadorian business leadership was the GLOBE Study (House et al., 2004). The global leadership and organizational behavior effectiveness program, or GLOBE study, is a multiphasic research program "designed to explore the fascinating and complex effects of culture on leadership, organizational effectiveness, economic competitiveness of societies, and the human condition of members of the societies studied" (House et al., 2004, p. 10). The project incorporated both quantitative and qualitative research methods to better understand leadership in 62 countries. The study focused on identifying the traits and behaviors that were viewed as contributing to or delimiting the practice of outstanding leadership in each society. Thus, the focus was not on the practice of the leadership, but rather perceived leadership ideals, what the GLOBE researchers referred to as culturally endorsed leadership traits or CLTs.

The quantitative data, which will be the focus of this analysis, was acquired by collecting 17,370 surveys from middle managers who worked in organizations in the food processing, financial services, and telecommunications industries. The total number of surveys collected in each country varied from 27 to 1790. The surveys were developed and validated and deemed reliable using appropriate psychometrics processes.

Some important contributions that the GLOBE study made to research on leadership was to identify specific behaviors and characteristics that contribute to leadership throughout much of the

world. Furthermore, the study identified which of these are generally seen as contributing to outstanding leadership and which delimit the same. For example, the GLOBE study identified the following universally positive leadership attributes: trustworthy, just, honest, foresight, plans ahead, encouraging, positive, dynamic, motive arouser, confidence builder, motivational, dependable, intelligent, decisive, effective bargainer, win-win problem solver, administratively skilled, communicative, informed, coordinator, team builder, and excellence-oriented. These were identified as universally positive because they received scores of 4.5 or higher, on the GLOBE seven-point scale, in all of the societies.

In addition to these universally positive leadership attributes, the GLOBE researchers identified a smaller number of universally negative leader attributes. These included: loner, asocial, non-cooperative, irritable, nonexplicit, egocentric, ruthless, and dictatorial. These were inferred to be universally negative based on their receiving a score of 3 or less on the seven-point scale in all 62 societies. There were also 25 culturally contingent variables that varied from society to society. The range of these items was from 1.26 to 6.73. As a result of these initial finding and based on data analysis, primary leadership dimensions were identified by grouping these variables together into themes. These themes were labeled and are referred to as primary CLTs. From these primary CLTs, 6 culturally endorsed implicit leadership dimensions were identified. These dimensions were referred to as secondary CLTs and included charismatic/value based, self-protective, humane-oriented, team-oriented, participative, and autonomous leadership.

In addition to the emphasis placed on leadership, the GLOBE researchers examined ideal and real cultural values to better understand the contexts in which leadership took place. This analysis occurred at both the organizational and societal level. The analysis in this article will focus only on the societal level data. The cultural components examined in the study included uncertainty avoidance, future orientation, power distance, in-group and institutional collectivism, humane orientation, performance orientation, gender egalitarianism, and assertiveness.

In relation to both the leadership and the cultural measure results, the GLOBE researchers identified bands of significance based on calculating the significance levels necessary to suggest that the highest scoring country in one band was significantly different from the highest scoring country in a lower band. While the number of bands varies depending on the range of variation, these bands were labeled as A (the highest), B, C, D, and E (the lowest). Thus, the countries in band B demonstrate significantly lower mean scores than the highest country in band A.

In Ecuador, the GLOBE study collected only 49 surveys from within the combined three industries. This obviously limits the strength of the study and suggests sampling limitations regarding the interpretation of the results. Consequently, the results will be examined in relation to the other research that has been conducted in Ecuador.

Among the GLOBE study societies, Ecuador placed 45th in relation to the practice of uncertainty avoidance with a mean score of 3.68. This placed Ecuador within 2 standard deviations of all countries and within .04 of the mean for Latin American countries. This suggested that in relation to their tendency to "seek orderliness, consistency, structure, formalized procedures, and laws to cover situations in their daily lives" (House et al., 2004, p. 602). Ecuadorians appeared to be

consistent with other Latin American countries but demonstrated significantly lower uncertainty avoidance than most of the countries examined in the GLOBE study generally.

With regards to the valuing of uncertainty avoidance, Ecuador ranked 14th with a mean score of 5.16, in comparison to the 4.62 mean score (.61sd) of all GLOBE countries and 4.98 score (.27sd) in Latin America. As the mean practice score for all societies was 4.16, with a standard deviation of .60, and 3.62 in Latin America, with a standard deviation of .25, Ecuador was lower on average at 3.68 in the practice of uncertainty avoidance than the GLOBE sample, but slightly higher on average than Latin America. In relation to the value score, Ecuador ranked in the A band. Contrariwise, Ecuador fell into Band C for uncertainty avoidance practices.

Ecuador placed 36th among GLOBE study nations in the practice of future orientation. The countries mean practice score of 3.60 placed them within one standard deviation of the norm for all countries (3.85m/.46sd) and for Latin American countries (3.85m/.28sd). Consequently, Ecuador was relatively average in their emphasis on and concern for the future as opposed to the present. In contrast, Ecuador was among the highest in relation to the valuing of future orientation, they ranked 6th overall with a mean score of 5.94. In comparison to the average for all GLOBE countries Ecuador was within 2 standard deviations of the mean (5.48m..41sd). However, they were within one standard deviation of the Latin American mean (5.75m/.22sd) of Latin American countries. Not surprisingly, Ecuador ranked in band A for valuing of future orientation and band C for practices.

Power distance, which was defined as "the extent to which a community accepts and endorses authority, power differences, and status privileges" (House et al., 2004, p. 513), was also high in Ecuador. Overall, Ecuador ranked 9th in the practice of power distance and fourth in Latin America. The Ecuadorian score of 5.60 was .43 points higher than the mean for all countries (5.17), which is just higher than one standard deviation (.41) above the mean. However, the extent to which power distance is valued within Ecuador was significantly lower. In fact, Ecuador scored 58th among the 62 countries in relation to the valuing of power distance. The overall mean was 2.75 with a standard deviation of .35. Ecuador's score was 2.3, which is just over one standard deviation below this mean. In Latin America, the mean is 2.52 with a standard deviation of .39, which places Ecuador within one standard deviation of the mean. However, only Venezuela scored lower in its valuing of power distance. It is worth noting that the practice of power distance scores within organizations were considerably lower than the differences in society in general within Latin America. Ecuador fell into band A in the practice of power distance and band D in the valuing of power distance.

Institutional collectivism referred to whether or not "institutional practices at the societal level encourage and reward collective action" (House et al., 2004, p. 463). This contrasted with in-group collectivism which examined the "extent to which individuals express pride, loyalty, and interdependence in their families" (House et al., 2004, p. 463). In Ecuador, institutional collectivism received a mean value score of 5.41 (3rd overall) and a practice score of 3.9 (48th overall). The mean scores for all countries value of institutional collectivism were 4.72 with a standard deviation of .49 and 4.25 and .43 respectively for the practice of institutional collectivism. The scores for Latin America were 5.32 (value) and 3.86 (practice). Ecuador ranked in the C band for practices and the A band for value.

The in-group collectivism values score was 6.17 (8th overall and the highest in Latin America) with a practice score of 5.80 (5th overall). In all cases these numbers were higher than the mean scores for all countries and for Latin America. In contrast, in-group collectivism scores for all countries were 5.66 with a standard deviation of .35 (values) and 5.13 with a standard deviation of .73 (practice). In Latin America the in-group value mean was 6.06 and the practice mean was 5.52. Ecuador's scores earned the country an A band ranking in practices and value in this area.

The GLOBE Study researchers defined a humane orientation as characterized by a society that "encourages and rewards individuals for being fair, altruistic, friendly, generous, caring, and kind to others" (House et al., 2004, p. 569). Among all countries, Ecuador ranked 8th in the practice of humane orientation with a score of 4.65 on the GLOBE 7-point scale, which ranked Ecuador first among all Latin American countries. The Ecuadorian values score in this dimension was, like most countries, higher at 5.26 (47th overall). Compared to the overall mean for the GLOBE countries of 5.42 (.25sd) for values and 4.09 (.47sd) for practice, Ecuador appeared to practice a humane orientation considerably more than the "average" country. Compared to Latin America, the practice mean was 4.03 with a .32 standard deviation with a value mean and standard deviations not provided. Band rankings for Ecuador in relation to practices and values were B and C respectively.

Performance orientation, or the "extent to which a community encourages and rewards innovation, high standards, and performance improvement" (House et al., 2004, p. 239), was an important characteristic of culture. Ecuador ranked 27th (4.20m) among GLOBE countries in the practice of a performance orientation and 9th in the valuing of performance orientation (6.32m). Thus, while they were only slightly higher than the overall mean in practice (4.09m/.47sd) they were considerably higher in valuing this important cultural characteristic (5.94m/.34sd). The reverse was the case in relation to Latin America where Ecuador scored only slightly higher than the mean in valuing (6.24m/.20sd) but somewhat higher in practice (.385m/.28sd). Ecuador ranked A in the value of performance orientation and B in practices.

In addition to the cultural components outlined thus far, the GLOBE study examined the gender egalitarianism of the societies studied. This cultural characteristic focused on the level of gender differentiation that existed in societies. In Ecuador, the practice of gender egalitarianism (3.07m) was lower than most societies (3.37m/.37sd) and Latin America (3.41m/.25sd). In values, however, Ecuador was slightly higher (4.57m) than the "average" GLOBE country (4.51m/.48sd) but quite a bit lower than other Latin American countries (4.77m/.17sd). Ecuador was in band B for practices and values.

Finally, the GLOBE study explored the assertiveness of the 62 nations studied. This component of a society "reflects beliefs as to whether people are or should be encouraged to be assertive, aggressive, and tough" (House et al., 2004, p. 395). In general Ecuador appeared not to value assertiveness, relatively speaking. The score for the country on valuing assertiveness was slightly lower than average at 3.65 in comparison to the overall score of 3.82 (.63sd). The practice score was 4.09, which was only slightly lower than the 4.14 score (.37sd). In comparison to Latin America, the practice score was also lower than that of Latin American nations studied (4.15m/.28sd), but higher in valuing given the lower-than-average score of Latin American in general (3.54m/.32sd). Ecuador found itself in band B in both values and practices on this one as well.

In conclusion, the leadership culture in Ecuador can be summed up, based on the GLOBE Study data, as demonstrating a high emphasis, as characterized by a 5 or higher on the GLOBE 7-point scale, on the valuing of uncertainty avoidance, institutional collectivism, in-group collectivism, humane-orientation, performance orientation, and future orientation. In practice, however, Ecuador was characterized as high in only power distance and in-group collectivism. In contrast, their values scores were quite low (3.5 or lower) in relation to power distance and assertiveness, while in practice they were also low in gender egalitarianism.

In addition to studying the cultural environment in which leadership takes place, the GLOBE study examined the implicit leadership theories of individuals within these societies. To accomplish this, the researchers surveyed participants regarding their perceptions of the attributes and behaviors of leaders to identify those that contributed to or inhibited outstanding leadership. This was done at two levels the first explored 112 leader attributes and behavior items. These were analyzed using factor analysis, which revealed 21 leadership subscales. The data for these subscales, including comparisons with overall means and Latin American means is provided in Table 1.

TABLE 1. COMPARISON OF MEANS

Leadership Subscale	Ecuador	Rank Overall	Latin America (LA)	LA Diff.	Global Mean	Global Diff.
Performance Oriented	6.64	1	6.23	+.41	6.02	+.62
Autocratic	2.5	38	2.57	-.07	2.65	-.15
Modest	5.46	6	5.11	+.35	4.99	+.47
Charismatic: Self-Sacrificing	5.99	1	5.34	+.65	5.01	+.98
Collaborative Team Orientation	5.99	2	5.74	+.25	5.47	+.52
Decisive	6.29	4	5.81	+.48	5.79	+.50
Diplomatic	5.66	18	5.55	+.11	5.49	+.17
Face-saver	2.57	22	2.89	-.32	2.94	-.47
Charismatic: Visionary	6.50	1	6.12	+.38	6.02	+.48
Humane Oriented	4.71	13	4.54	+.17	4.77	-.06
Integrity	6.79	1	6.26	+.52	6.08	+.69
Bureaucratic	4.30	25	4.22	+.08	3.87	+.43
Administratively Competent	6.35	2	6.04	+.32	5.78	+.57
Self-centered	1.83	56	2.09	-.26	2.19	-.36
Autonomous	3.53	47	3.51	+.01	3.86	-.33
Status Conscious	5.13	9	4.85	+.28	4.33	+.80
Charismatic: Inspirational	6.63	1	6.22	+.40	6.07	+.56
Malevolent	1.39	61	1.69	-.30	1.80	-.41
Team Integrator	6.43	2	6.18	+.25	5.87	+.56
Internally competitive	4.45	10	4.13	+.32	3.99	+46
Participative	5.51	23	5.40	+.11	5.33	+.18

The results of this review of the GLOBE date provide some interesting insights into Ecuadorian leadership. In general, to be perceived as an outstanding leader in Ecuador, individuals needed to be more performance oriented, modest, self-sacrificing, collaboratively team oriented, decisive, visionary, administratively competent, status conscious, inspirational, and internally competitive. Likewise, they should have demonstrated high levels of integrity and been effective team integrators. It is important that they also were perceived as less malevolent and self-centered.

As mentioned previously, once they had collected the data on these 21 subscales, the GLOBE researchers collapsed these into 6 second order culturally endorsed leadership traits (CLT). These included: charismatic/value-based, team oriented, self-protective, participative, humane-oriented, and autonomous leadership. The first order variables included in these second order variables are outlined in table 2.

TABLE 2. CULTURALLY ENDORSED LEADERSHIP TRAITS IN ECUADOR

Second Order CLT Variables	First Order CLT Variables
Charismatic/Value-Based	Charismatic 1: Visionary** Charismatic 2: Inspirational** Charismatic 3: Self-Sacrificing** Integrity** Decisive** Performance Oriented**
Self-Protective	Self-centered* Status Conscious** Conflict Inducer Face Saver Procedural
Humane Orientation	Modest** Humane Orientation
Team Oriented	Team 1: Collaborative team orientation** Team 2: Team Integrator** Diplomatic Malevolent (reverse scored)** Administratively competent**
Participative	Autocratic (reverse scored) Nonparticipative (reverse scored)
Autonomous	Autonomous
Items marked with an ** are those that *appear* to be more significant CLTs in Ecuador than in the GLOBE study generally given the overall ranking and the size of the difference between the Ecuador mean and the general mean (Lack of sufficient access to the data makes this difficult to validate) Items marked with * are those that *appear* to be significantly lower in Ecuador than in the GLOBE study generally	

In relation to each of these second order CLT scores, Ecuador ranked as follows. The country was first in the world in both Charismatic/Values based leadership and Team orientation. The mean

scores on these two variables were 6.46 and 6.26 respectively. These were high even in comparison to the Latin American scores at 5.74 and 5.88 and global scores of 5.83 and 5.76. Ecuador ranked 22nd in self-protective leadership with a score of 3.62 and 22nd in participative leadership at 5.51. These scores were relatively similar to those of the rest of Latin America where the self-protective leadership mean was also 3.62 and the participative mean was 5.42. However, they were higher than the global mean for self-protective (3.46); and participative (5.33) leadership. The humane oriented leadership mean in Ecuador of 5.13 ranked 19th in the world and was higher than the average score in Latin America of 4.85 and the global mean of 4.88. Finally, autonomous leadership in Ecuador ranked 48th in the world (3.53), where the mean was 3.86, but was very consistent with that of the rest of Latin America (3.51m)

Based on these results, we can propose a model for culturally perceived effective business leadership in Ecuador based on implicit leadership theory that involves a modification of the second order categories proposed by the GLOBE researchers for general global use. This model would suggest that for a leader to be perceived as outstanding in Ecuador, they must, first, demonstrate strongly charismatic leadership that is characterized by a visionary, performance oriented, and inspirational style that demonstrates a willingness to be self-sacrificing. They must also be decisive and demonstrate integrity. Second, they must be status conscious, without being self-protective. Third, they should be more modest in their approach to leadership. Fourth, they should be very team oriented with an emphasis on collaboration, integration, and administrative competence that avoids any malevolent actions. Finally. there is no major need for them to be more participative (nor should they be less participative) than other leaders. However, they will likely need to demonstrate less autonomy and more interdependence.

This ideal business leader stands in sharp contrast to the traditional model of leadership outlined earlier in this article and reflects many of the elements of modern leadership outlined by Romero (2004). At the same time, the ideal vs. current practice scores for Ecuador suggest that the transition to this ideal is still in progress. Once again, however, the limited scope of this research suggests caution in accepting this data at face value. Currently, a second GLOBE study is underway that will likely provide more up to date and more rich date regarding the status of business leadership in Ecuador. However, there is evidence of a call for alternative models of leadership in business in Ecuador based on models and approaches in the international leadership literature (Lasio, 2008).

CONCLUSION

In conclusion, Ecuador has a long and distinct historical leadership culture that is undergoing some significant transformation in the modern era. Early Indigenous models of leadership rooted in an authoritative, but seemingly authentic, paternalism and defined by redistribution of resources to benefit the community were overlaid by the Incas similar but more militant hierarchical structure. These were ultimately washed over by Spanish Colonial leadership culture, which demonstrated a façade of similar elements but practiced a much more, exploitative, racist, self-serving paternalism. In the modern era, however, some significant changes seem to be taking place in the business arena and among the Indigenous populations with regards to leadership culture that are bringing about

more participative styles. Changes also appear to have taken place in the political arena. However, these seem to be more a continuation of the old ways than indications of true reform. Consequently, leadership culture in Ecuador is likely becoming more diverse. What the ultimate results of these changes will be has yet to be determined. However, the implications for the study of leadership in Ecuador are significant. The diversity outlined herein likely only scratches the surface regarding the true diversity of leadership approaches within the country. Greater research should examine how different populations approach leadership within Ecuadorian society. Then these models can be examined based on their impacts and outcomes. The result may well be the emergence of truly Ecuadorian models of leadership that can then be used to further strengthen the leadership culture from within as opposed to allowing external models to dominate the leadership discussion.

REFERENCES

Becker, M. (2008). *Indians and leftists in the making of ecuador's modern indigenous movements*. Duke University Press.

Behrens, A. (2009). *Culture and management in the Americas*. Stanford University Press.

Bray, T. (2008). Ecuador's pre-columbian past. In C. De La Torre & S. Striffler (Eds.), *The Ecuador reader: History, culture, and politics* (pp. 15-26). Duke University Press.

Buchelli, R. V. (1984). Concentraciones de poder: 'Caciquismo' en una communidad andina. In *Antropologia* (Vol. 3, pp. 114-126). PUCE.

D'Altroy, T. N. (2002). *The Incas*. Blackwell.

De la Torre, C. (1994). Velasco ibarra and 'la revolucion gloriosa': The social production of a populist leader in ecuador in the 1940s. *Latin American Studies, 26*, 683-711.

De la Torre, C. (2007). The resurgence of radical populism in latin america. *Constellations, 14*(3), 384-397.

Dealy, G. C. (1992). *The Latin Americans: Spirit and ethos*. Westview Press.

House, R. J., Dorfman, P. W., Javidan, M., Hanges, P. J., & Sully de Luque, M. F. (2014). *Strategic leadership across cultures: The globe study of CEO leadership behavior and effectiveness in 24 countries*. Sage Publications.

Hurtado, O. (1985). *Political power in Ecuador* (N. D. Mills Jr., Trans.). Westview Press.

Hurtado, O. (2010). *Portrait of a nation: Culture and progress in Ecuador* (B. Sipe, Trans.; English-language ed.). Madison Books.

Lasio, V. (2008). Un sistema de liderazgo: Adios a los superheroes! *Debates, 12*(1), 12-13.

Lauderbaugh, G. (2012). *The history of Ecuador*. Greenwood.

Luciano, S. O. (2010). *Las antiguas sociedades precolombinas del Ecuador: Unrecorrido por la sala de arqueologia del museo nacional de Ecuador*. Banco Central de Ecuador.

Lyons, B. J. (2006). *Remembering the hacienda: Religion, authority, and social change in highland Ecuador* (1st ed.). University of Texas Press.

McClellan, J. L. (2016). Exploring the cultural foundations of leadership in Ecuador. *Journal of International Business Disciplines, 11*(1), 20-35.

McClellan, J. L. (2017). Precolonial indigenous leadership: Exploring the foundations of leadership culture in Ecuador. *Leadership and the Humanities, 5*(1), 5. https://doi.org/https://doi.org/10.4337/lath.2017.01.01

McIntosh, T. (2011). *Leadership Peruvian style: How Peruvians define and practice leadership*. iUniverse.
Moser, C. O. N. (2009). *Ordinary families, extraordinary lives : Assets and poverty reduction in Guayaquil, 1978-2004*. Brookings Institution Press.
Paz, J. J., & Cepeda, M. (2010). Caudillos y populismos en el Ecuador. *Polemika*, *1*(3), 72-81.
Romero, E. (2004). Latin American leadership: El patron y el lider moderno. *Cross Cultural Management*, *11*(3), 25-37.
Salomon, F. (1986). *Native lords of quito in the age of the Incas: The political economy of north Andean chiefdoms*. Cambridge University Press.
Schein, E. H. (1992). *Organizational culture and leadership* (2nd ed.). Jossey Bass.
Spillan, J. E., Virzi, N., & Garita, M. (2014). *Doing business in Latin America: Challenges and opportunities*. Routledge.
Villegas, L. F. B. (1999). Aunque me cueste la vida: Movilizacion, etnicidad y liderazgo comunitario en ecuador. *Nueva Antropologia*, *17*(56), 63-79.
Vistazo.com. *Las cien empresas y lideres*. Retrieved September 9 from http://www.vistazo.com/100empresas/lideres.php

DIGITAL TECHNOLOGIES FOR DISCOVERING OPPORTUNITIES IN ENTREPRENEURSHIP EDUCATION: FUTURE TRENDS

Eren Ozgen, Florida State University
eozgen@fsu.edu

ABSTRACT

The trend towards digital transformation in entrepreneurship education research is gaining importance globally as entrepreneurship is critical for economic growth. Utilizing and incorporating various digital technologies are considered very effective in teaching entrepreneurship and designing courses and more innovative teaching methods need to be studied to better understand and improve entrepreneurship education worldwide. The paper provides a literature review on innovative digital technologies in entrepreneurship education to understand the trends and developments in entrepreneurship education and highlights findings on the impact of digital transformation on opportunity recognition in academic entrepreneurship education. Grounded on the incremental innovation theory and social entrepreneurship theory the paper outlines the impact of numerous digital technologies that provide entrepreneurship students with necessary skills and effective learning experience and ease their opportunity recognition. The paper summarizes research gap on digital technologies in entrepreneurship education studies and generates questions for future research direction.

INTRODUCTION

Entrepreneurship education research has shown a fast progress globally (Igwe et al., 2021) as entrepreneurship is vital in economic advancement and global competitiveness (Ratten & Usmanij, 2021; Ozgen & Minsky, 2019; Ozgen, 2020). Innovation and opportunity recognition are considered the essence of entrepreneurship process and therefore entrepreneurship education courses incorporate opportunity recognition as core element in entrepreneurship curricula. Identifying and exploiting opportunities for new viable ventures and addressing a need in an innovative way is fundamental in entrepreneurship (Secundo et al., 2020a).

Kirzner's incremental innovation theory is grounded on the asymmetry of information and addresses that information gaps exist and knowledge is unevenly diffused in a competitive market (Kirzner, 1973). This situation creates various volatile profit opportunities for alert entrepreneurs who have knowledge (Kirzner, 1973). The theory ties entrepreneurship to innovation requiring the entrepreneur to innovate and search for information (Kirzner, 1973, 1979). Kirzner especially points out that alertness is not non-random discovery as alert individuals are those who possess information that will help them discover opportunities (Kirzner, 1997). An arbitrary individual without information cannot identify and exploit market opportunities. Kirzner's incremental innovation theory suggests that alertness and therefore possession of information and having

knowledge are the key in exploitation of incremental innovation for existing products, service, methods, processes to stay competitive (Kirzner, 1973, 1979, 1997). Alertness is commonly accepted as the antecedent of opportunity recognition (Valliere, 2013).

Entrepreneurship education stimulates students to exploit innovative opportunities by improving their knowledge, creativity, and competencies and provides avenues for more advantageous learning (Costa et al., 2017; Tantawy et al., 2021; Wang et al., 2021). Courses in entrepreneurship facilitate innovation, competition, and socio-economic development and help developing transversal skills and competencies (Greene & Saridakis, 2008; Nambisan et al., 2017; Ilonen & Heinonen, 2018; Wang et al., 2021), creative thinking, problem-solving, and analytical skills (Ozgen & Minsky, 2013). Entrepreneurship education curriculum includes a wide array of areas. such as opportunity recognition, commercializing a concept, managing resources, and initiating a business, which all help providing effective versatile competences relevant to real life and business settings. In entrepreneurship curriculum, appropriate and innovative teaching methodologies that help sharpen students' entrepreneurial alertness, idea generation, and cognitive processes are essential for an effective learning experience. Having information through entrepreneurship education assists students in a wide array of entrepreneurship process (i.e., recognizing possible signals, needs for venture ideas; preparing mindset in seizing opportunities; networking, problem solving, communicating, marketing, leadership, etc.) (Handayati et al., 2020). Previous studies reported that entrepreneurship education fosters entrepreneurial intention (Cui et al., 2021; Jena, 2020); students' perceptions of desirability and feasibility of starting a new venture (Sukavejworakit et al., 2018), and improves competence (Byun et al., 2018; Ratten & Jones, 2020; Bonesso et al., 2018).

Entrepreneurship education should inspire a dynamic and self-regulating attitude and develop a better mindset that is always on the lookout for new opportunities (Ndou et al., 2018; Cui et al., 2021; Rosendahl Huber et al., 2020; Martínez-Gregorio et al., 2021; Ratten & Jones, 2021). The current trends in entrepreneurship education show that a preference for self-employment is a good indicator of whether a student will want to enroll in an entrepreneurship course (Ratten & Usmanij, 2021; Wardana et al., 2020; Boubker et al., 2021).

Entrepreneurship education helps link academic teaching, theory, and models to current business practices. Grounded on the learning theory of cognitive structure and the planned behavior theory, entrepreneurship education (EE) has shown a positive effect on entrepreneurial intention among college students (Wang et al., 2021). Both personal attitude and behavioral content make up the main determinants of entrepreneurial intent. In a study on entrepreneurship education, students "relational support, structural support, and education support" are found as key factors in students' entrepreneurial behavior. "Higher education support" was found to be significant for explaining both personal attitudes (0.26) and perceived behavioral control (0.53) (Ben Youssef et al., 2021).

Entrepreneurship education is much more than just formal education in a classroom setting, due to its interactive, industry collaboration based experimental learning methodology (Lu & Jover, 2019; Ratten & Jones, 2021; Ratten & Usmanij, 2021), and its connection with multiple stakeholders (Galvão et al, 2020). Social network theory suggests that access to social network ties are helpful in entrepreneurs' having information and access to critical resources which lead them to opportunity recognition. Entrepreneurs' social ties are strongly linked to their recognition of

entrepreneurial opportunities (Arenius et al., 2005; Ozgen & Baron, 2007; Santarelli & Tran, 2013). Social networking is an antecedent of opportunity recognition (Ozgen & Baron, 2007; Singh, 2000). Engaging in social network through multiple stakeholders and contacts increase collaboration, enlarge potential entrepreneurs' knowledge, give them access to experience, expertise, and provide them resources that will increase the probability of discovering opportunities (Sexton & Bowman,1991; Perry-Smith, 2006; Ozgen & Baron, 2007).

THE ROLE OF DIGITAL TECHNOLOGIES IN ENTREPRENEURSHIP EDUCATION

Globally there is a growing trend in adopting advanced digital technologies (Rippa & Secundo, 2019) to ease entrepreneurial ecosystems (Zahra et al., 2022) and improving entrepreneurship education (Miller et al., 2018; Tarabasz et al., 2018). Incorporating digital technologies in entrepreneurship process helps diffusing knowledge (Secundo et al., 2017), ease innovation opportunities (Cohen et al., 2017; Nambisan et al., 2017; Ramaswamy & Ozcan, 2018), and help universities be more entrepreneurial (Miller et al., 2018; Tarabasz et al., 2018). In entrepreneurship education, digital technologies are found helpful in improving cognitive process of students, emotional intelligence, entrepreneurship competencies (Rippa & Secundo, 2019), creativity, problem-solving, an ability to marshal resources, financial and technological knowledge, access to resources, and connections to markets and various stakeholders (Abernathy & Clark, 1993). Digital technologies, such as having access to the facilities of the Internet and social media, provide learning environments that foster collaboration (Chen et al., 2021) and knowledge building and ease recognizing opportunities.

Using digitalization in entrepreneurship education includes more stakeholders for the identification of entrepreneurial opportunities (Rippa & Secundo, 2019; Secundo et al., 2020a). Digital technologies make the technology transfer faster and easier to create research collaboration with industry and wider networks between a growing number of stakeholders (Horta et al., 2016).

Digitalization process expands student partnerships and networks with their peers across countries, entrepreneurial educators, and business communities. For instance, digital technologies provide opportunities to review organizational processes within the universities to obtain more effective results in patents production, technology transfer activities and spinoff creation within academic entrepreneurship. The collaboration of digital technologies supporting academic entrepreneurship helps promote new organizational forms and business models. Digital technologies help students and researchers discover and create more ideas. It also gives universities the chance to move into an open and flexible bureaucratic organization instead of a closed one (Rippa & Secundo, 2019).

The experiential nature of entrepreneurial learning fits well in adopting new innovative digital technologies (Chen et al., 2021). Digital technologies make adaptations to curricula and teaching techniques and improve students' entrepreneurship skills by combining creativity, problem-solving ability and adopting learning mindsets to engage and appeal students. Digital tools could help entrepreneur students comprehend specific challenges and unique circumstances in their recognition of opportunities for viable entrepreneurial ventures.

As digital technologies are gaining importance in entrepreneurship education it will be helpful to review current digital technologies that are being used in entrepreneurship education and outline future research direction in opportunity recognition in entrepreneurship education. Studying the status of effective digital teaching methodologies and future direction will help us improvise teaching design and better implement innovative approaches in entrepreneurship education.

RESEARCH PURPOSE

Based on the incremental innovation theory and social network theory, possession of information, alertness, and networking are crucial in opportunity recognition and therefore play a key role in entrepreneurial process. Digital technologies are found helpful in entrepreneurship education for students' access to resources, information, and networking and therefore recognition of opportunities. The paper intends to review the current state, research gap, and the future direction of digital technologies to better understand opportunity recognition in entrepreneurship education.

RESEARCH QUESTIONS

What are some of the digital technologies being used in entrepreneurship education that will ease opportunity recognition?

What is the future research direction on digital technologies in opportunity recognition in entrepreneurship education? (i.e., what is the research gap?)

DATA

To review digital entrepreneurship education studies, mainly Science Direct data base was used. Research articles are included; editorial, book reviews, book chapters, and encyclopedias are excluded. The scope of search is limited to only a few keywords in the database. Digital technologies, entrepreneurship education, opportunity recognition keyword searches resulted in 792 articles. Selected articles in this group were used in most of the review.

DIGITAL TECHNOLOGIES USED IN ENTREPRENEURSHIP EDUCATION

Digital technologies used in entrepreneurship education include digital artifacts, digital infrastructure, and digital platforms (Marzano & Miranda, 2021; Elia et al., 2020; Cenamor et al., 2019; Niemand et al., 2017). In the context of entrepreneurship education, the adoption of digital platforms, digital infrastructures, and digital artifacts support the integration of resources (Parker

et al., 2016), knowledge sharing, development of entrepreneurial skills, and facilitate collaboration of multiple players in discovering opportunities (Adner, 2006; Iansiti & Levien, 2004).

Digital Artifact

Digital artifact (i.e., digital documents, presentations, programs and codes, video and audio files, images, etc.) is a digital component, application, or media content that is part of a new product and offers a specific functionality to the user (Marzano & Miranda, 2021).

Dynamic concept maps are digital artifacts that are found helpful in online learning to facilitate students' understanding of topics in greater detail by helping the learner rearrange and organize their own knowledge (Marzano & Miranda, 2021). Various technologies such as e-LENA; Single-Sign On plug-in; PHP engine; and Javascript client interface are integrated to apply Dynamic concept maps (Marzano & Miranda, 2021). The data on dynamic concept mapping was collected from Italian students pursuing BA degree in Primary Education Sciences and suggested as an innovative and effective online tool to enhance student learning. Podcast, an audio or video broadcast, is another digital artifact that is found highly effective in enhancing entrepreneurial students' competencies (Vidal et al., 2021).

Digital Infrastructure

Digital infrastructure is cloud computing, data analytics, online communities, social media (Ali et al., 2017), 3D printing, digital maker spaces, which offer communication, collaboration and/or computing capabilities. Social media technologies, such as LinkedIn, Facebook, Twitter, Google+, etc., trigger students' entrepreneurial spirit and motivation for social engagement, develop creativity and teamwork, and support community outreach (Chen et al., 2021). Social media is found to be very helpful in identifying and exploiting new entrepreneurial opportunities, as it provides collaboration, widespread reach, and quick dissemination of information (Ali et al., 2017; Aniemeka, 2013). Facebook was found as the most effective social media tool in entrepreneurship education compared to Wiki (Chen et al., 2021). Social media is considered a multifunctional tool, as it is usually supplemented by other technologies when it is embedded in entrepreneurship education (Chen et al., 2021). For instance, gamification may enhance social media (Wu & Song, 2019).

In a comparative study of three digital technologies used in entrepreneurship education social media (Facebook) received the highest rating in facilitating students' interaction and student-entrepreneur interaction and cooperation compared to MOOC and gamification (Chen et al., 2021). Chen et al. (2021) suggested that social media is very effective in assisting teamwork and sharing information in EE. In Italy, in the entrepreneurial Clab survey on entrepreneurship students, the usage of ten different categories of digital technologies were inquired (Secundo et al., 2020b). On a five-point Likert scale, the degree of adoption of every single technology in students' daily activities were inquired. Social media is listed as the most adopted technology, with an average

score of 4.33. The digital platform, with 3.17, is found as the second most used digital technology (Secundo et al., 2020b).

Digital Platforms

Digital Platforms are a common set of services and architecture that serves to host complimentary offerings, are among digital technologies that are used in entrepreneurship process, and are growing in importance globally (Liu et al., 2018; Deng et al., 2021; Heeks et al., 2021). Facebook, Google Play, and Apple App Store are among the heavily used digital platforms in entrepreneurship in fostering entrepreneurial mindsets and trigger the acquisition of knowledge about global future trends, business management and business planning, and launching innovative actions (Fan et al., 2021). Digital platforms facilitate alertness in discovering potential entrepreneurial opportunities (Fellnhofer, 2021).

MOOCs

Various digital educational platforms such as massive online courses, MOOCs, have an important role in entrepreneurship education (Vinogradova et al., 2019; Al-Atabi & DeBoer, 2014; Vorbach et al., 2019; Secundo et al., 2020a). MOOCs are found highly effective in the diffusion of wide entrepreneurial culture, mindset, collaborative learning, and opportunity recognition (Chen et al., 2021; Al-Atabi & DeBoer, 2014). MOOCs are entirely online and usually two categories (i.e., cMOOCs emphasize connectivity and focus more on collaborative tools and social interaction and follow a set-in time, whereas xMOOCs focus on knowledge dissemination and duplication) are incorporated as hybrid MOOCs (Żur, 2018). Empirical research on 53 leading entrepreneurship MOOCs provided by eight international MOOC platforms (Coursera, edX, Udacity, Openlearning, Openlearn, Futurelearn, iversity, Alison, and Canvas Network) revealed that incorporating MOOCs in university entrepreneurship programs brings significant benefits (Żur, 2018). Some of the benefits of top entrepreneurship MOOCs are reported as clear description of the learning goals and outcomes, rich academic thematic content, incentives for students (idea pitch, student competition, mentoring), high quality video/audio content, e-books and high-quality materials to download, possibility of working in groups, interactions with instructor and other participants to exchange ideas, and getting feedback (Żur, 2018). In a comparative study of three digital technologies used in entrepreneurship education MOOCs (Coursera) received the highest rating in acquiring entrepreneurship knowledge, quality of entrepreneurship activities, achievement of objectives and efficiency, and few errors compared to social media and gamification (Chen et al., 2021).

Digital technology transformation in entrepreneurship education is developing 3D technologies (Rippa & Secundo, 2019; Secundo et al., 2020a), augmented reality, artificial intelligence, big data analytics, and virtual laboratories (Zhang, 2021). “The augmented reality and artificial intelligence could supplement the existing online teaching methods by filling the gap in real-life immersion. They are expected to replicate diverse campus activities and some certain practical experience in

the digital environment" (Zhang, 2021; p. 450). Social media, gamification and digital platforms are found as most popular technologies in entrepreneurship education (Chen et al., 2021).

Simulations

Simulations are increasingly being used in entrepreneurship education (Costin et al., 2018; Orel, 2020) as they provide a learning environment that facilitates entrepreneurial knowledge and practical skills (Orel, 2020). Simulated virtual enterprises and gamifications are part of the simulations used in entrepreneurship education.

Simulated Virtual Enterprises

A study on virtual entrepreneurial firms operating in cybermediary platforms suggested that virtual firms enable connectivity with multiple actors and are effective in increasing online social networks (Chandna & Salimath, 2020). Entrepreneurship students can retain more information and can effectively use learned skills and obtained knowledge after participating in virtual reality simulation (Orel, 2020). A few studies found virtual reality environment help entrepreneur students improve rehearsing business pitches, self-efficacy, engage in social interactions with their peers, visualize their actions which all impact opportunity recognition.

Simulation Games

Simulation games are digital game-based learning. Gamified learning is found very helpful in higher education as it improves student-engagement, motivation, and performance (Subhash & Cudney, 2018). Gamification also enables students to think critically on game scenarios via participation in gamifications, which can be strengthened and embedded in their mind by theoretical learning which follows the gaming activities (Subhash & Cudney, 2018; Fox et al., 2018).

Gamification is a virtual setting that enables learners to experience a variety of different settings that cannot be achieved in real physical cases (Kauppinen & Choudhary, 2021). Learning from lectures only is not an appropriate method of entrepreneurship and business education, because it is sometimes not providing a real business scenario. Digital tools (i.e., online gaming) give students the real business dynamism. Gamification had a positive impact on students' subsequent business behavior and practices (Kauppinen & Choudhary, 2021). Interactive simulations, and games are found very helpful for engaging students and stimulating students' mindset and creative thinking. Gamifications provide good learning stimuli in entrepreneurial classrooms (Fox et al., 2018; Kauppinen & Choudhary, 2021). Gamification is found effective to learn and deepen their understanding of theories and models (Fox et al., 2018). Chen et al. (2021) did a comparative study on three digital technologies used in entrepreneurship education and reported that gaming

facilitated e-mindset, motivation, mastering information and competence, and gave more user satisfaction more than social media and MOOCs.

FUTURE RESEARCH DIRECTION

Entrepreneurship education needs a specialized environment in order to pursue real-life entrepreneurial activity. Building a digital technology-based entrepreneurship education is critical in enhancing the rigor of entrepreneurship education. Although digital technologies research is growing, still more studies are needed to sufficiently address the impact of digital technologies on the entrepreneurial process (Elia et al., 2019).

This literature review has outlined some digital technologies used in entrepreneurship education. Although previous studies proved that using digital technologies in entrepreneurship programs had a positive effect on entrepreneurial students' recognition of opportunities, the review identified some more research areas on this topic that will shed more light on opportunity recognition in entrepreneurship education. Future research needs are outlined below.

Teaching Methodology

More studies are needed on adjusting the teaching methodology, technology on the needs of the student who have different backgrounds in education. Most previous studies on the impact of digital technologies in entrepreneurship education are geared to business majors, and many other students are left out. (Yami et al., 2021). For instance, digital artifacts, such as dynamic concept maps, are found helpful in students' learning the material, yet wider samples with different backgrounds in various disciplines from different universities are suggested to study to improve the findings of dynamic concept maps (Marzano & Miranda, 2021). More integrative and interdisciplinary studies are needed to better understand the impact of digital artifacts (Zaheer et al., 2019). Different cultures, environment, and educational backgrounds change the way in which students view entrepreneurship process (Secundo et al., 2021; Ben Youssef et al., 2021). Students with varied backgrounds in other disciplines (engineering, business, management, etc.) and in other countries (emerging, developed, developing economies) (Coduras et al., 2018) need to be studied to understand the impact of digital technology on entrepreneurial intention (Yami et al., 2021; Ben Youssef et al., 2021) and opportunity recognition.

Rigor

There are still challenges on how to handle technology, management, government policies, and stakeholders' engagement in incorporating digital tools in entrepreneurship education. There is a need for more rigorous studies on how digital technology can be enhanced to create a greater learning environment (Sousa et al., 2018; Ratten & Usmanij, 2021) and facilitate opportunity

recognition. More methodological rigor is suggested in entrepreneurship education studies (Sousa et al., 2018; Ratten & Usmanij, 2021). Most studies are still undertheorized or need a robust theoretical background (Rippa & Secundo, 2019; Secundo et al., 2020a) and more empirical research on the effectiveness of digital tools in opportunity recognition in entrepreneurship education is needed. A review study on 165 journal papers on digital academic entrepreneurship suggests that, despite the growing number of studies on digital entrepreneurship, there still will be a need for theory-based academic entrepreneurship studies with technological, economic, and social focus (Secundo et al., 2020a). Studies on how incorporating theoretical concepts in digital infrastructures, information systems, digital artifacts, and platforms can impact entrepreneurship education (Rippa & Secundo, 2019) and increase opportunity recognition will be helpful.

Generalizing Results

Using digital platforms is linked to opportunity recognition, yet more studies are required to generalize the results (Fellnhofer, 2021). For instance, the Fellnhofer (2021) digital platform study on entrepreneurial alertness was conducted using a sample from four European countries and suggested more studies in different country settings, with different innovation ecosystems, to better understand the recognition of opportunities. Extending this suggestion, it is also recommended to conduct cross-cultural studies to better understand and compare the impact of digital platform technologies on opportunity recognition in entrepreneurship education in different countries with different innovation ecosystems. How digital technologies are affecting entrepreneurship students' opportunity recognition in different phases of entrepreneurship curriculum needs to be addressed.

Need for Comparative Studies on Various New Digital Technologies

Studies on digitalization in entrepreneurial education are growing, yet there needs to be more systematic reviews on digitalization and a broader scope to better understand its effectiveness and impact on opportunity recognition. To date, usually the focus of digitalization in entrepreneurship education includes one or two digital technologies. The Chen et al. (2021) study was the first study to compare the effectiveness of three relatively mature technologies (social media, gamification, and digital platform) used in entrepreneurship education. Chen et al. (2021) suggested more comparative studies that include various new technologies may help better underpin the effectiveness in opportunity recognition in EE (Chen et al., 2021; Buzady & Almeida, 2019) and better construct entrepreneurship education courses (Chen et al., 2021).

MOOCs

MOOCs offer high quality learning experiences for all types of learners, but, at present, they are too linear and one dimensional to fit the needs of all participants (Yepes-Baldò et al., 2016). More

studies on how MOOCs evolve, so they can better cater to individuals with differing goals and skills and increase opportunity recognition, will be fruitful (Rippa & Secundo, 2019).

Need for More Studies on the Impact of Digital Technologies

Even if there is a growing interest on digital technologies research, still results are general. There is need for more studies on various digital technologies and the impact of digital technologies on entrepreneurship education (Rippa & Secundo, 2019) and specifically on opportunity recognition. For instance, virtual reality environment has not yet been widely adopted and, to date, studies are limited. Further investigation of different perspectives of digital technologies (such as 3D printing, augmented reality, virtual reality, big data analytics) toward academic entrepreneurship will be fruitful.

Studies are needed on how digital technology could better improve entrepreneurship education by implementing new designs and delivery. Also, how digital technologies can be reconfigured to help with entrepreneurial education during any future emergency, such as the Covid-19 pandemic (Secundo, et al., 2021).

Gamification

Although previous studies found that online games are beneficial for entrepreneurship students and motivate them to participate in class activities, studies are limited on the impact of online games on enhancing students' ability to recall information (Kauppinen & Choudhary, 2021). More research is needed on how to enhance students' learning outcome and opportunity recognition from online game-based modules.

Need for Tailored Digital Technology Skills

It has been long accepted that possession of information and alertness are an antecedents of opportunity recognition. There is a need for digital technologies to be tailormade for students with diverse backgrounds to increase knowledge retention and possession of information. Some studies suggest that it will be helpful to adopt digital technologies that align with, and meet students' needs in entrepreneurship settings to better prepare students, so they can be alert for challenges and opportunities in the future (Lamine et al., 2021; Snihur et al., 2021; Yami et al., 2021).

Stakeholders and Policy Makers

More studies on digitalization in entrepreneurship education that involve stakeholders and policy makers could be valuable, as stakeholders provide the necessary funding for technology and entrepreneurial education (Yami et al., 2021). Grounded on social network theory, networking is an antecedent of opportunity recognition. Therefore, how digital technology can be incorporated to increase collaboration among various stakeholders will be helpful in better understanding opportunity recognition.

Using Various Databases

It is also suggested to looking for data in other databases. Other countries might have their own databases that have missing information. Bringing this subject to more schools around the globe will help increase awareness and studying trends from different geographic locations will be helpful in opportunity recognition research.

FURTHER QUESTIONS TO EXPLORE

Based on Kirzner's incremental innovation theory and social network theory, possession of information, alertness, and networking are considered antecedents of opportunity recognition. Based on these theories and the literature review on digital technologies in entrepreneurship education, the paper generates these questions below for further studies in opportunity recognition in entrepreneurship education:

- What theories other than incremental innovation theory and social network theory can be applied to better underpin the impact of digital technologies on opportunity recognition in entrepreneurship education?
- What are the major challenges facing students in the digitalization process in entrepreneurship education in recognizing opportunities?
- What are the major challenges for embedding social media, such as Facebook, Twitter, etc., in entrepreneurship education in recognizing opportunities?
- What are the major challenges for embedding simulations in entrepreneurship education in recognizing opportunities?
- Which digital technologies better support alertness and networking and opportunity recognition in entrepreneurship education?
- Which digital technologies better support research collaboration between universities and industry and enhance opportunity recognition?
- What is the effect of digital technology on entrepreneurship students' alertness, networking, and opportunity recognition in different countries?
- What is the effect of digital technology on entrepreneurship students' alertness, networking, and opportunity recognition from other disciplines (i.e., engineering, science)?

- How are digital technologies affecting entrepreneurship students' alertness, networking, and opportunity recognition in different phases of entrepreneurship curriculum?
- How does incorporating virtual reality in entrepreneurship education impact alertness, networking, and opportunity recognition?
- How does incorporating augmented reality in entrepreneurship education impact alertness, networking, and opportunity recognition?
- How does incorporating 3D printing in entrepreneurship education impact alertness, networking, and opportunity recognition?
- How does incorporating artificial intelligence in entrepreneurship education impact alertness, networking, and opportunity recognition?

REFERENCES

Abernathy, W. J., & Clark, K. B. (1993). Innovation: Mapping the winds of creative destruction. *Research Policy*, *22*(2), 102. https://doi.org/10.1016/0048-7333(93)90040-o

Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review*, *84*, 98.

Ahmed, T., Chandran, V. G. R., Klobas, J. E., Liñán, F., & Kokkalis, P. (2020). Entrepreneurship education programmes: How learning, inspiration and resources affect intentions for new venture creation in a developing economy. *The International Journal of Management Education*, *18*(1), 100327. https://doi.org/10.1016/j.ijme.2019.100327

Al-Atabi, M., & DeBoer, J. (2014). Teaching entrepreneurship using massive open online course (MOOC). *Technovation*, *34*(4), 261–264. https://doi.org/10.1016/j.technovation.2014.01.006

Ali M. M., Hashim N., & Ibrahim A. 2017. The evaluations of Facebook as an educational technology tool in polytechnic's entrepreneurship courses. *Journal of Fundamental and Applied Sciences. 9*(6S), 805.

Aniemeka, E. O. (2013). *Social media and entrepreneurship education: Pedagogical implications of computer mediated communication in higher learning in Africa*. Greenleaf University.

Arenius, P., & Clercq, D. D. (2005). A network-based approach on opportunity recognition. *Small Business Economics*, *24*(3), 249-265.

Becker, M. C., Rullani, F., & Zirpoli, F. (2021). The role of digital artefacts in early stages of Distributed Innovation Processes. *Research Policy*, *50*(10), 104349. https://doi.org/10.1016/j.respol.2021.104349

Ben Youssef, A., Boubaker, S., Dedaj, B., & Carabregu-Vokshi, M. (2021). Digitalization of the economy and entrepreneurship intention. *Technological Forecasting and Social Change*, *164*, 120043. https://doi.org/10.1016/j.techfore.2020.120043

Bonesso, S., Gerli, F., Pizzi, C., & Cortellazzo, L. (2018). Students' entrepreneurial intentions: The role of prior learning experiences and emotional, social, and cognitive competencies. *Journal of Small Business Management*, *56*, 215–242. https://doi.org/10.1111/jsbm.12399

Boubker, O., Arroud, M., & Ouajdouni, A. (2021). Entrepreneurship education versus management students' entrepreneurial intentions. A PLS-SEM approach. *The International Journal of Management Education, 19*(1), 100450. https://doi.org/10.1016/j.ijme.2020.100450

Buzady, Z., & Almeida, F. (2019). FLIGBY-A serious game tool to enhance motivation and competencies in entrepreneurship. *Informatics, 6(3), 27.* DOI:10.3390/informatics6030027

Byun, C.-G., Sung, C., Park, J., & Choi, D. (2018). A study on the effectiveness of entrepreneurship education programs in Higher Education Institutions: A case study of Korean graduate programs. *Journal of Open Innovation: Technology, Market, and Complexity*, *4*(3), 26. https://doi.org/10.3390/joitmc4030026

Cenamor, J., Parida, V., & Wincent, J. (2019). How entrepreneurial SMEs compete through digital platforms: The roles of digital platform capability, network capability and ambidexterity. *Journal of Business Research, 100,* 196–206. https://doi.org/10.1016/j.jbusres.2019.03.035

Chandna, V., & Salimath, M. S. (2020). When technology shapes community in the cultural and craft industries: Understanding virtual entrepreneurship in online ecosystems. *Technovation*, *92-93*, 102042. https://doi.org/10.1016/j.technovation.2018.06.005

Chen, L., Ifenthaler, D., & Yau, J. Y.-K. (2021). Online and blended entrepreneurship education: A systematic review of applied educational technologies. *Entrepreneurship Education, 4*(2), 191–232. https://doi.org/10.1007/s41959-021-00047-7

Coduras, A., Velilla, J., & Ortega, R. (2018). Age of the entrepreneurial decision: differences among developed, developing, and non- developed countries. *Economics and Business Letters*, *7*(1), 36. https://doi.org/10.17811/ebl.7.1.2018.36-46

Cohen, B., Amorós, J. E., & Lundy, L. (2017). The generative potential of emerging technology to support startups and new ecosystems. *Business Horizons*, *60*(6), 741–745. https://doi.org/10.1016/j.bushor.2017.06.004

Costa, S. F., Santos, S. C., Wach, D., & Caetano, A. (2017). Recognizing opportunities across campus: The effects of cognitive training and entrepreneurial passion on the business opportunity prototype. *Journal of Small Business Management*, *56*(1), 51–75. https://doi.org/10.1111/jsbm.12348

Costin, Y., O'Brien, M. P., & Slattery, D. M. (2018). Using simulation to develop entrepreneurial skills and mind-set: An exploratory case study. *International Journal of Teaching and Learning in Higher Education, 30*(1), 136-145.

Cui, J., Sun, J., & Bell, R. (2021). The impact of entrepreneurship education on the entrepreneurial mindset of college students in China: The mediating role of inspiration and the role of educational attributes. *The International Journal of Management Education*, *19*(1), 100296. https://doi.org/10.1016/j.ijme.2019.04.001

Deng, X., Guo, X., Wu, Y. J., & Chen, M. (2021). Perceived environmental dynamism promotes entrepreneurial team member's innovation: Explanations based on the uncertainty reduction theory. *International Journal of Environmental Research and Public Health, 18*(4), 2033.

Elia, G., Margherita, A., & Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technological Forecasting and Social Change*, *150*, 119791. https://doi.org/10.1016/j.techfore.2019.119791

Elia, S., Messeni Petruzzelli, A., & Piscitello, L. (2019). The impact of Cultural Diversity on Innovation Performance of MNC subsidiaries in Strategic Alliances. *Journal of Business Research*, *98*, 204–213. https://doi.org/10.1016/j.jbusres.2019.01.062

Fan, M., Qalati, S. A., Khan, M. A., Shah, S. M., Ramzan, M., & Khan, R. S. (2021). Effects of entrepreneurial orientation on social media adoption and SME Performance: The moderating role of innovation capabilities. *PLOS ONE*, *16*(4). https://doi.org/10.1371/journal.pone.0247320

Fellnhofer, K. (2021). Entrepreneurial alertness toward responsible research and innovation: Digital technology makes the psychological heart of entrepreneurship pound. *Technovation*, 102384. https://doi.org/10.1016/j.technovation.2021.102384

Fox, J., Pittaway, L., & Uzuegbunam, I. (2018). Simulations in entrepreneurship education: Serious games and learning through play. *Entrepreneurship Education and Pedagogy*, *1*(1), 61–89. https://doi.org/10.1177/2515127417737285

Galvão, A. R., Marques, C. S. E., Ferreira, J. J., & Braga, V. (2020). Stakeholders' role in entrepreneurship education and training programmes with impacts on regional development. *Journal of Rural Studies*, *74*, 169–179. https://doi.org/10.1016/j.jrurstud.2020.01.013

Giones, F., & Brem, A. (2017). Digital Technology Entrepreneurship: A definition and research agenda. *Technology Innovation Management Review*, *7*(5), 44–51. https://doi.org/10.22215/timreview/1076

Greene, F. J., & Saridakis, G. (2008). The role of higher education skills and support in graduate self-employment. *Studies in Higher Education*, *33*(6), 653–672. https://doi.org/10.1080/03075070802457082

Handayati, P., Wulandari, D., Soetjipto, B. E., Wibowo, A., & Narmaditya, B. S. (2020). Does entrepreneurship education promote vocational students' entrepreneurial mindset? *Heliyon*, *6*(11). https://doi.org/10.1016/j.heliyon.2020.e05426

Heeks, R., Gomez-Morantes, J. E., Graham, M., Howson, K., Mungai, P., Nicholson, B., & Van Belle, J.-P. (2021). Digital platforms and institutional voids in developing countries: The case of ride-hailing markets. *World Development*, *145*, 105528. https://doi.org/10.1016/j.worlddev.2021.105528

Horta, H., Meoli, M., & Vismara, S. (2015). Skilled unemployment and the creation of academic spin-offs: A recession-push hypothesis. *The Journal of Technology Transfer*, *41*(4), 798–817. https://doi.org/10.1007/s10961-015-9405-z

Iansiti, M., & Levien, R. (2004). *The keystone advantage: What the new dynamics of business ecosystems mean for strategy, innovation and sustainability*. Harvard Business School Press.

Igwe, P. A., Okolie, U. C., & Nwokoro, C. V. (2021). Towards a responsible entrepreneurship education and the future of the workforce. *The International Journal of Management Education*, *19*(1), 100300. https://doi.org/10.1016/j.ijme.2019.05.001

Ilonen, S. & Heinonen, J. (2018) Understanding affective learning outcomes in information support system. *Journal of Entrepreneurship Education, 22*(5), 1-12.

Jena, R. K. (2020). Measuring the impact of business management student's attitude towards entrepreneurship education on entrepreneurial intention: A case study. *Computers in Human Behavior, 107*, 106275. https://doi.org/10.1016/j.chb.2020.106275

Kauppinen, A., & Iftikhar Choudhary, A. (2021). Gamification in entrepreneurship education: A concrete application of Kahoot! *The International Journal of Management Education, 19*(3), 100563. https://doi.org/10.1016/j.ijme.2021.100563

Kirzner, I. M. (1973). *Competition and entrepreneurship.* University of Chicago Press.

Kirzner, I. M. (1979). *Perception, opportunity and profit*. University of Chicago Press.

Kirzner, I. M. (1997). Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature, 35*, 60-85.

Lamine, W., Mian, S., Fayolle, A., & Linton, J. D. (2021). Educating scientists and engineers for technology entrepreneurship in the emerging Digital Era. *Technological Forecasting and Social Change*, *164*, 120552. https://doi.org/10.1016/j.techfore.2020.120552

Liu, J., Nandhakumar, J., & Zachariadis, M. (2018). When guanxi meets structural holes: Exploring the guanxi networks of Chinese entrepreneurs on digital platforms. *The Journal of Strategic Information Systems*, *27*(4), 311–334. https://doi.org/10.1016/j.jsis.2018.10.003

Lu, Y., & Jover, G. (2019). An anthropocosmic view: What Confucian traditions can teach us about the past and future of Chinese higher education. *Higher Education*, *77*(3), 423–436. https://doi.org/10.1007/s10734-018-0280-z

Lytras, M., Sarirete, A., & Damiani, E. (2020). Technology-enhanced learning research in higher education: A transformative education primer. *Computers in Human Behavior*, *109*, 106350. https://doi.org/10.1016/j.chb.2020.106350

Martínez-Gregorio, S., Badenes-Ribera, L., & Oliver, A. (2021). Effect of entrepreneurship education on entrepreneurship intention and related outcomes in educational contexts: A meta-analysis. *The International Journal of Management Education*, *19*(3), 100545. https://doi.org/10.1016/j.ijme.2021.100545

Marzano, A., & Miranda, S. (2021). Online learning environments to stimulate in students the processes of mutual interaction between digital and analog artefacts to enhance student learning. *MethodsX*, *8*, 101440. https://doi.org/10.1016/j.mex.2021.101440

Miller, K., Alexander, A., Cunningham, J. A., & Albats, E. (2018). Entrepreneurial academics and academic entrepreneurs: A systematic literature review. *International Journal of Technology Management*, *77*(1/2/3), 9. https://doi.org/10.1504/ijtm.2018.091710

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital Innovation Management: Reinventing Innovation Management Research in a Digital World. *MIS Quarterly*, *41*(1), 223–238. https://doi.org/10.25300/misq/2017/41:1.03

Ndou, V., Secundo, G., Schiuma, G., & Passiante, G. (2018). Insights for shaping entrepreneurship education: Evidence from the European entrepreneurship centers. *Sustainability*, *10*(11), 4323. https://doi.org/10.3390/su10114323

Niemand, T., Rigtering, J. P. C., Kallmünzer, A., Kraus, S., & Maalaoui, A. (2021). Digitalization in the financial industry: A contingency approach of entrepreneurial orientation and strategic vision on digitalization. *European Management Journal*, *39*(3), 317–326. https://doi.org/10.1016/j.emj.2020.04.008

Orel, M. (2020). The potentials of virtual reality in entrepreneurship education. *New Perspectives on Virtual and Augmented Reality*, 38–48. https://doi.org/10.4324/9781003001874-3

Ozgen, E. (2020). Female entrepreneurs in developing countries: a review of rural versus urban regions. *Journal of International Business Disciplines, 15*(2), 46-66.

Ozgen, E., & Minsky, B. D. (2019). The impact of socio-economic factors and regional differences on entrepreneurial activities in Vietnam. *Journal of International Business Disciplines, 14,* 38-54.

Ozgen, E., & Minsky, B. (2013). Why some college students engage in entrepreneurial activities while others not? *Journal of Entrepreneurship Education, 16,* 45-58.

Ozgen, E., & Baron, R. A. (2007). Social Sources of information in opportunity recognition: Effects of mentors, industry networks, and Professional Forums. *Journal of Business Venturing, 22*(2), 174–192. https://doi.org/10.1016/j.jbusvent.2005.12.001

Parker, G., Van Alstyne, M. W., & Jiang, X. (2016). Platform ecosystems: How developers invert the firm. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2861574

Perry-Smith, J. E. (2006). Social yet creative: The role of social relationships in facilitating individual creativity. *Academy of Management Journal, 49*(1), 85–101. https://doi.org/10.5465/amj.2006.20785503

Ramaswamy, V., & Ozcan, K. (2018). What is co-creation? an interactional creation framework and its implications for value creation. *Journal of Business Research, 84*, 196–205. https://doi.org/10.1016/j.jbusres.2017.11.027

Ratten, V., & Jones, P. (2020). *Transformational entrepreneurship*. Routledge.

Ratten, V., & Jones, P. (2021). Entrepreneurship and management education: Exploring trends and gaps. *The International Journal of Management Education, 19*(1), 100431. https://doi.org/10.1016/j.ijme.2020.100431

Ratten, V., & Usmanij, P. (2021). Entrepreneurship education: Time for a change in research direction? *The International Journal of Management Education, 19*(1), 100367. https://doi.org/10.1016/j.ijme.2020.100367

Rippa, P., & Secundo, G. (2019). Digital academic entrepreneurship: The potential of digital technologies on academic entrepreneurship. *Technological Forecasting and Social Change, 146*, 900–911. https://doi.org/10.1016/j.techfore.2018.07.013

Rosendahl Huber, L., Sloof, R., Van Praag, M., & Parker, S. C. (2020). Diverse cognitive skills and team performance: A field experiment based on an entrepreneurship education program. *Journal of Economic Behavior & Organization, 177*, 569–588. https://doi.org/10.1016/j.jebo.2020.06.030

Santarelli, E. & Tran, H. T. (2013). The interplay of human and social capital in shaping entrepreneurial performance: The case of Vietnam. *Small Business Economics, 40*(2), 435–458.

Secundo, G., Mele, G., Vecchio, P. D., Elia, G., Margherita, A., & Ndou, V. (2021). Threat or opportunity? A case study of digital-enabled redesign of entrepreneurship education in the COVID-19 emergency. *Technological Forecasting and Social Change, 166,* 120565. https://doi.org/10.1016/j.techfore.2020.120565

S, G., Rippa, P., & Cerchione, R. (2020a). Digital academic entrepreneurship: A structured literature review and avenue for a research agenda. *Technological Forecasting and Social Change, 157,* 120118. https://doi.org/10.1016/j.techfore.2020.120118

Secundo, G., Rippa, P., & Meoli, M. (2020b). Digital transformation in entrepreneurship education centres: Preliminary evidence from the Italian Contamination Labs network. *International Journal of Entrepreneurial Behavior & Research, 26*(7), 1589–1605. https://doi.org/10.1108/ijebr-11-2019-0618

Secundo, G., Del Vecchio, P., Schiuma, G., & Passiante, G. (2017). Activating entrepreneurial learning processes for transforming university students' idea into entrepreneurial practices. *International Journal of Entrepreneurial Behavior & Research*, *23*(3), 465–485. https://doi.org/10.1108/ijebr-12-2015-0315

Sexton, D. L., & Bowman-Upton, N. B. (1991). *Entrepreneurship: Creativity and growth*. Macmillan.

Silveyra, G., Herrero, N., & Pérez, A. (2021). Model of Teachable Entrepreneurship Competencies (M-TEC): Scale development. *The International Journal of Management Education*, *19*(1), 100392. https://doi.org/10.1016/j.ijme.2020.100392

Singh, R. (2000). *Entrepreneurial Opportunity Recognition through Social Networks*. Garland.

Snihur, Y., Zott, C., & Amit, R. (R. (2021). Managing the value appropriation dilemma in business model innovation. *Strategy Science*, *6*(1), 22–38. https://doi.org/10.1287/stsc.2020.0113

Sousa, M. J., Carmo, M., Gonçalves, A. C., Cruz, R., & Martins, J. M. (2018). Creating knowledge and entrepreneurial capacity for HE students with digital education methodologies: Differences in the perceptions of students and entrepreneurs. Journal of Business Research. https://doi.org/10.1016/j.jbusres.2018.02.005 ISSN: 0148-2963.

Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, *87*, 192–206. https://doi.org/10.1016/j.chb.2018.05.028

Sukavejworakit, K., Promsiri, T., & Virasa, T. (2018). Increasing entrepreneurial intention with the application of experiential learning theory: An innovative learning method and empirical test. *Asia-Pacific Social Science Review*, *18*(2), 1-15.

Tantawy, M., Herbert, K., McNally, J. J., Mengel, T., Piperopoulos, P., & Foord, D. (2021). Bringing creativity back to entrepreneurship education: Creative self-efficacy, creative process engagement, and entrepreneurial intentions. *Journal of Business Venturing Insights*, *15*. https://doi.org/10.1016/j.jbvi.2021.e00239

Tarabasz, A., Selaković, M., & Abraham, C. (2018). The classroom of the future: Disrupting the concept of contemporary business education. *Entrepreneurial Business and Economics Review*, *6*(4), 231–245. https://doi.org/10.15678/eber.2018.060413

Valliere, D. (2013). Towards a schematic theory of entrepreneurial alertness. *Journal of Business Venturing*, *28*(3), 430–442. https://doi.org/10.1016/j.jbusvent.2011.08.004

Vinogradova, M., Konstantinov, V., Prasolov, V., Lukyanova, A., & Grebenkina, I. (2019). Level entrepreneurship-role in the digital economy, tendencies of improvement of the information support system. *Journal of Entrepreneurship Education*, *22*(5), 1-12.

Vorbach, S., Poandl, E., & Korajman, I. (2019). Digital Entrepreneurship education - the role of moocs. *International Journal of Engineering Pedagogy (IJEP)*, *9*(3), 99. https://doi.org/10.3991/ijep.v9i3.10149

Wang, C., Mundorf, N., & Salzarulo-McGuigan, A. (2021). Entrepreneurship education enhances entrepreneurial creativity: The mediating role of entrepreneurial inspiration. *The International Journal of Management Education*, 100570. https://doi.org/10.1016/j.ijme.2021.100570

Wardana, L. W., Narmaditya, B. S., Wibowo, A., Mahendra, A. M., Wibowo, N. A., Harwida, G., & Rohman, A. N. (2020). The impact of entrepreneurship education and students' entrepreneurial mindset: The mediating role of attitude and self-efficacy. *Heliyon*, *6*(9). https://doi.org/10.1016/j.heliyon.2020.e04922

Wu, Y., & Song, D. (2019). Gratifications for social media use in entrepreneurship courses: Learners' perspective. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01270

Yami, S., M'Chirgui, Z., Spano, C., & Gontier Barykina, O. (2021). Reinventing science and technology entrepreneurship education: The role of human and social capitals. *Technological Forecasting and Social Change*, *164*, 120044. https://doi.org/10.1016/j.techfore.2020.120044

Yepes-Baldó, M., Romeo, M., Martín, C., García, M. Á., Monzó, G., & Besolí, A. (2016). Quality indicators: Developing "MOOCs" in the European higher education area. *Educational Media International*, *53*(3), 184–197. https://doi.org/10.1080/09523987.2016.1236998

Zaheer, H., Breyer, Y., & Dumay, J. (2019). Digital entrepreneurship: An interdisciplinary structured literature review and research agenda. *Technological Forecasting and Social Change*, *148*, 119735. https://doi.org/10.1016/j.techfore.2019.119735

Zahra, S. A., Liu, W., & Si, S. (2022). How digital technology promotes entrepreneurship in ecosystems. *Technovation*, 102457. https://doi.org/10.1016/j.technovation.2022.102457

Zhang, Z. (2021). The impact of digital technologies on entrepreneurship education. *Advances in Social Science, Education and Humanities Research*. https://doi.org/10.2991/assehr.k.210407.088

Żur, A. (2018). Changing Entrepreneurship Learning Ecosystems: Massive open online courses. opportunities and limitations. *Przedsiębiorczość - Edukacja*, *14*, 473–482. https://doi.org/10.24917/20833296.14.32

JOURNAL OF INTERNATIONAL BUSINESS DISCIPLINES

Volume 17, Number 1 May 2022

Published By:
University of Tennessee at Martin and the International Academy of Business Disciplines

ISSN 1934-1822 WWW.JIBD.ORG

Printed in the USA by University of Tennessee at Martin

Printed in the USA by University of Tennessee at Martin