An Analysis of Environmental, Social, and Corporate Governance (ESG) Ratings of Lean Versus Non-Lean Companies

Randall B. Bunker
University of North Alabama

Dan Harris
Murray State University

Corey S. Cagle
University of North Alabama

Lean manufacturing is a business philosophy concerned with continually eliminating waste from business processes while producing quality products with greater efficiency. In addition to profits, organizations worldwide are beginning to focus on environmental, social, and corporate-governance (ESG) factors because of the changing global environment. The Environmental Protection Agency has specifically stated that many organizations have found that implementing lean manufacturing concepts and tools results in improvements in environmental performance. This study uses a matched-pairs design, matching lean companies with non-lean companies, and assesses whether lean companies experienced better Sustainalytics ESG risk ratings than non-lean companies. Results show that lean companies achieved more favorable ratings in environmental, social, and corporate-governance factors than did non-lean companies.

Keywords: environmental, social, corporate governance (ESG), lean manufacturing

INTRODUCTION

According to the U.S. Environmental Protection Agency (EPA 2022a), many organizations have found that implementing lean manufacturing concepts and tools also results in improvements in environmental performance, even when lean business philosophies were not initiated for environmental reasons. This study seeks to provide empirical evidence to support the statement made by the EPA by comparing the environmental, social, and corporate-governance (ESG) factors of lean companies versus non-lean companies.

Lean manufacturing is a business philosophy concerned with continuous processing improvements and the elimination of non-value-added activities. The origins of lean operations come from Japan, most notably from the automobile manufacturer, Toyota, and the Toyota Production System (TPS) (Liker 2004, p. 6). Lean philosophies have been adopted by numerous firms across multiple disciplines. The implementation of lean manufacturing techniques is rapidly expanding in the manufacturing and service sectors such as automotive, electronics, and health care. While the focus of lean manufacturing is on eliminating waste and

driving continual improvement in cost, quality, service, and delivery, significant environmental benefits typically "ride the coattails" or occur incidentally as a result of these lean manufacturing production-focused efforts (EPA 2022a).

In addition to profits, organizations worldwide are beginning to focus on sustainability issues because of the changing global environment. Sustainability in business is a broad term that refers to a company's efforts to incorporate social and environmental considerations into their business philosophies. Launched in April 2006 with support from the United Nations (UN), the Principles for Responsible Investment (PRI) is an international organization that works to promote the incorporation of environmental, social, and corporate governance factors (ESG) into investment decision-making. According to their website, the PRI has over 2,700 participating financial institutions as of August 2021. Supporters of the PRI argue that it is both financially and ethically irresponsible to not consider the environmental impact of a company when evaluating it as a potential investment.

As a result of the changes in the global business environment, sustainability reporting has become an important issue for investors, creditors, regulators, and other corporate stakeholders. The three most common factors used when measuring the sustainability of a business are (1) environmental, (2) social, and (3) corporate governance. The environmental dimension is focused on improving the company's environmental performance. The social dimension is focused on a company's impact on its employees, customers, and the community. The governance dimension is focused on a company's leadership and corporate structure.

The current study uses a matched-pairs design, matching lean companies with non-lean companies, and assesses whether lean companies experienced better Sustainalytics ESG risk ratings than non-lean companies. Statistically significant results indicate that lean companies achieve better ESG risk ratings than non-lean companies. Whether intentional or unintentional, these results suggest that implementing lean manufacturing philosophies does result in improvements in environmental performance.

BACKGROUND

The relationship between corporate social responsibility and financial performance has been investigated for years. A common perception is that corporate social responsibility comes at a financial cost to organizations, and therefore to the investors and although ESG makes investors feel good, it effectively asks them to accept lower returns on investment. Kotsantonis et al. (2016) states that not only is it a false perception that the net financial effect of corporate efforts to address environmental and social issues is the reduction of corporate returns and, along with them, shareholder value, but that the opposite is true. The predominant academic finding is a positive association between ESG and financial performance (Brogi and Lagasio 2018). Crook et al. (2008) found a highly significant positive correlation between corporate social responsibility and financial performance. Maqbool and Zameer (2018) also found that corporate social responsibility exerts a positive impact on financial performance. Brogi and Lagasio (2018) found a significant and positive association between ESG and profitability, noting that companies should consider their ESG activities in order to foster their profitability. Numerous other studies have also found similar results, showing that corporate social responsibility does not hinder profitability, but that it actually improves it.

Financial market interest in nonfinancial information, including ESG information, is growing. According Eccles et al. (2011), there is a large and growing market interest in the level of a company's degree of transparency about its ESG performance and policies, as shown in the disclosure scores calculated by Bloomberg. Financial markets need to assess the risks and opportunities facing individual companies arising from environmental, social, and governance (ESG) issues (IFRS 2021). One barrier to widespread acceptance and use of nonfinancial information by investors and other stakeholders is the lack of a generally accepted information framework and reporting standards (Eccles et al. 2011). In recent years, a number of organizations have developed frameworks and issued guidance for reporting ESG information, but a consistent approach has yet to be adopted. Investors and regulators have called for the International Financial Reporting Standards (IFRS) Foundation to use its experience in creating accounting standards

used in more than 140 jurisdictions worldwide to bring comparable reporting on sustainability matters to the financial markets (IFRS 2021).

In November 2021, the IFRS Foundation announced three significant developments to provide financial markets with quality disclosure information concerning sustainability issues. These developments include: (1) the formation of a new International Sustainability Standards Board (ISSB), created to develop comprehensive sustainability disclosure standards, (2) a commitment by leading sustainability disclosure organizations to consolidate into the new board, including the consolidation of the Climate Disclosure Standards Board and the Value Reporting Foundation by June 2022, and (3) the publication of prototype climate and general disclosure requirements developed by the Technical Readiness Working Group, a group formed by the IFRS Foundation Trustees to undertake preparatory work for the ISSB. The ISSB will develop sustainability standards, including disclosure requirements that address companies' impacts on sustainability matters relevant to assessing enterprise value and making investment decisions (IFRS 2021).

The Association of International Certified Professional Accountants, which represents the American Institute of CPAs (AICPA) and the Chartered Institute of Management Accountants (CIMA), welcomed the creation of the ISSB (AICPA 2021). According to the AICPA (2021), the ISSB will be a means for developing the consistent, reliable, and comprehensive global sustainability standards needed to create purposeful, resilient organizations and a more sustainable future. According to the AICPA, this signals a new era in corporate reporting, one where the same level of rigor will be demanded for sustainability reporting as for financial information (AICPA 2021).

Companies adopting a lean manufacturing business philosophy concentrate their focus on continually eliminating waste from business processes while producing quality products with greater efficiency. For manufacturers and service providers, lean describes a way of doing "more and more with less and less – less human effort, less equipment, less time, and less space – while coming closer and closer to providing customers with exactly what they want" (Womack & Jones 2003, p. 15). Supporters of lean business philosophies believe that lean operations provide solutions for problems caused by traditional batch-and-queue operations. Advocates claim that a successful transformation from a traditional company to a lean company will improve productivity, while reducing errors, inventory, lead times and overall costs (Womack & Jones 2003). Ultimately, successful lean operating practices should impact a company's environmental performance in a positive manner.

RESEARCH METHODOLOGY AND RESULTS

The focus of this study was whether lean companies experienced better ESG risk ratings than non-lean companies. According to their website, Sustainalytics is a leading ESG research company that provides high-quality, analytical environmental, social, and governance research, ratings and data to institutional investors and companies. Sustainalytics develops an ESG risk rating for companies that is composed of two main dimensions, exposure and management. Exposure represents a company's vulnerability to ESG risks. The management dimension refers to actions taken by a company to manage ESG issues. Sustainalytics ESG risk rating is based on multiple data sources and measures a company's unmanaged risk for all ESG issues. All of these items are combined to calculate a company's overall ESG risk rating. The lower a company's ESG risk rating, the lower their overall risk of experiencing material negative financial impact due to ESG factors. Sustainalytics overall ESG risk ratings for the lean and non-lean companies in this study were obtained and these risk ratings were used for statistical testing.

Matched-Pairs Design

This study used a matched-pairs design, which is appropriate where the sample size is relatively small and heterogeneous for the dependent variable. "In the matching design, we are trying to make each pair of participants as though they were the same participant by matching on a criterion relevant to the dependent variable" (Gliner & Morgan 2000, p. 186). Each lean company was matched with a non-lean company on two measures: (a) their four-digit SIC code and (b) company size, based on total sales revenue for the five-year period. Matched-pairs designs are considered to be repeated-measures designs and accordingly, use

similar statistical procedures (Gliner & Morgan 2000). For this study, a within-subjects, repeated-measures design is appropriate, where the non-lean companies are considered a pre-test control group, and the lean companies are considered a post-test treatment group.

Wilcoxon Signed-Ranks Test

The Wilcoxon signed-ranks test is appropriate for matched-pairs when: (a) there is one independent variable with two levels (here, lean company or non-lean company); (b) the pairs of participants have been matched on one or more relevant variables (here, both the four-digit SIC code and total sales revenue); and (c) the dependent-variable data are at least ordinal (here, continuous data) and not normally distributed (Gliner & Morgan, 2000, p. 245). The Wilcoxon signed-ranks test incorporates the direction (or sign) of the differenced observation, then the absolute values of each of the signed ranks are summed within each group. For hypothesis testing, the absolute-value sums of the signed ranks generate a score that is compared to a critical value, based on the sample size and significance level. This design tests the differences between the respective values within each matched pair. The main inferential question for the Wilcoxon test was whether the respective ESG measures for lean companies significantly differed from ESG measures for the non-lean companies.

Lean/Non-Lean Variable

A reliable database that identifies companies by their lean or non-lean status does not currently exist. Therefore, the Lean/Non-Lean variable for this study was hand-collected by a multi-step process. The preliminary sample of companies consisted of: (a) each company that was listed on the Standard & Poor's 500 Composite Index (at the time of the data collection); (b) each company that was listed on the Russell 2000 (Small-Cap) Index and classified within 38 Global Industry Classification (GIC) sub-industries deemed likely to identify Lean companies; and (c) each of the publicly traded companies that had been represented by one or more registrants at each of the 2005 through 2012 annual Lean Accounting Summits, an annual conference that began in 2003.

For each company within the preliminary identification sample, every 10-K Annual Report for the period from 1999 through 2014 was examined for the keyword, "lean." The EDGAR database supplied the 10-Ks. Ultimately, in order to have been designated as a lean company for this study, a company within the preliminary identification sample of public companies specifically had to use the keyword, "lean," its 10-K reports to refer to its lean operations and not merely within an executive's brief biography: (a) at least once within fiscal years 2006 through 2014; (b) for at least two consecutive fiscal years over the 16-year period from 1999 through 2014; and (c) with the first such reference being no later than fiscal year 2009.

After the Lean companies had been identified, all of the publicly traded companies that had the same four-digit SIC codes as previously identified Lean companies were sorted by their total sales revenue for fiscal years 2008 through 2012. Companies from those SIC codes that were of substantially similar size in terms of total sales revenue to the previously identified lean companies then went through a series of tests for matching purposes. The goal of these tests was to identify companies that had not implemented either substantial lean practices or substantial Six-Sigma practices.

Each potential non-lean company went through a 10-k keyword search for fiscal years 1999 through 2014, using the keywords, "lean," "just-in-time," and "sigma." For a company to move on to the next non-lean classification tests, it could not have made any material references to any of the three keywords in any of its 10-k reports for the 16-year period. The remaining potential non-lean companies went through both Lexis-Nexis® Academic database newswire and Google searches for significant (and thus, disqualifying) lean and/or Six-Sigma activity. Lastly, a preliminarily matched pair that had the same four-digit SIC code, but a significantly different six-digit GIC code from one another as reported by Compustat, was not ultimately matched to one another.

Results

The final dataset used for this study included 35 matched pairs of companies, or 70 companies in total. Each matched pair consisted of one lean company and one non-lean company that was matched together

based on their four-digit SIC code and total sales revenue over the five-year fiscal period from 2008 through 2012. The Compustat database was used to acquire financial data for each of these 70 companies. Using the Wilcoxon signed-ranks test, this study compares ESG risk ratings of lean companies to non-lean companies. See Table 1 for results.

For the Sustainalytics overall ESG risk rating, lean companies had an average score of 22.17, while non-lean companies had an average score of 27.71. A lower ESG risk rating is favorable. The z-score for the ESG risk rating was -5.160 for a p-value of 0.000. Lean companies had a lower average ESG risk rating than non-lean companies and the difference was statistically significant, indicating that lean companies had better environmental performance measures compared to non-lean companies.

TABLE 1
A COMPARISON OF SUSTAINALYTICS ESG RISK RATINGS FOR LEAN AND NON-LEAN COMPANIES

Performance Measure	ESG Risk Rating	
Company Type	**Lean**	**Non-Lean**
Mean	22.1657	27.7429
Std. Dev.	6.88	8.67
Minimum	6.70	7.90
Maximum	38.50	45.70
N	35	
Z	-5.160	
p-value	0.000	
Data collected from Sustainalytics.com 2022		

CONCLUSIONS AND COMMENTS

Lean manufacturing traditionally focuses on a company accomplishing more and more while using fewer resources. Interestingly, it has been noted that the use of lean manufacturing principles often leads to environmental benefits. The Environmental Protection Agency has specifically stated that many organizations have found that implementing lean manufacturing concepts and tools does result in improvements in environmental performance. By matching lean companies with non-lean companies, this study provides data to support that which has been suggested by the EPA. Specifically, the study found that lean companies achieved more favorable ratings in environmental, social, and corporate-governance factors (as measured by the Sustainalytics ESG risk rating) than did non-lean companies.

The EPA has stated that the significant environmental benefits companies have realized typically "ride the coattails" or occur incidentally as a result of these lean manufacturing production-focused efforts. This research provides evidence that implementing lean manufacturing practices does result in improvements in environmental performance. The implications of the findings of this study are that companies seeking positive improvements on environmental, social, and corporate governance factors should explore how adopting lean strategies might help them achieve not only success in those factors, but also financial success. Future research by companies and by academic researchers should focus on what specific aspects of lean manufacturing have the most positive impacts on ESG factors.

REFERENCES

American Institute of CPAs (AICPA). (2021). *What you need to know about sustainability reporting*. Retrieved February 2022, from https://www.aicpa.org/news/article/what-you-need-to-know-about-sustainability-reporting

Brogi, M., & Lagasio, V. (2019). Environmental, social, and governance and company profitability: Are financial intermediaries different? *Corporate Social Responsibility and Environmental Management*, *26*, 576–587.

Crook, T.R., Ketchen, D.J., Combs, J.G., & Todd, S.Y. (2008). Strategic resources and performance: A meta-analysis. *Strategic Management Journal*, *29*(11), 1141–1154.

Eccles, R.G., Serafeim, G., & Krzus, M.P. (2011). Market Interest in Nonfinancial Information. *Journal of Applied Corporate Finance*, *23*(4), 113–127

Gliner, J.A., & Morgan, G.A. (2000). R*esearch Methods in Applied Settings: An Integrated Approach to Design and Analysis*. Mahwah, New Jersey, Lawrence Erlbaum Associates.

International Financial Reporting Standards Foundation (IFRS). (2021). *IFRS Foundation announces International Sustainability Standards Board, consolidation with CDSB and VRF, and publication of prototype disclosure requirements*. Retrieved February 2022, from https://www.ifrs.org/news-and-events/news/2021/11/ifrs-foundation-announces-issb-consolidation-with-cdsb-vrf-publication-of-prototypes/

Kotsantonis, S., Pinney, C., & Serafeim, G. (2016). ESG Integration in Investment Management: Myths and Realities. *Journal of Applied Corporate Finance*, *28*(2), 10–16.

Liker, J.K. (2004). *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*. New York: McGraw-Hill.

Maqbool, S., & Zameer, M.N. (2018). Corporate social responsibility and financial performance: An empirical analysis of Indian banks. *Future Business Journal*, *4*(1), 84–93.

U.S. Environmental Protection Agency (EPA). (2022a). *Lean Manufacturing and the Environment*. Retrieved February 2022, from https://www.epa.gov/sustainability/lean-manufacturing-and-environment

U.S. Environmental Protection Agency (EPA). (2022b). *Sustainable Manufacturing*. Retrieved February 2022, from https://www.epa.gov/sustainability/sustainable-manufacturing

Womack, J.P., & Jones, D.T. (2003). *Lean Thinking: Banish Waste and Create Wealth in Your Corporation* (revised and updated). New York: Free Press.