Interdependence among dimensions of sustainability: evidence from Indian leather industry

Abstract

Purpose: To investigate the interdependence among dimensions of sustainability i.e. economic, social and environmental performance, this study focuses on leading states of Indian leather Industry.

Design/methodology/approach: This study followed exploratory research where Partial Least Square (PLS) based Structural Equation Modelling (SEM) has been used. The states has been selected based on judgmental sampling. The study used unit level data for the leading states of Indian leather Industry − namely, Tamil Nadu (TN), West Bengal (WB) and Uttar Pradesh (UP). The study has used Annual Survey of Industry (ASI) data from 2007-08 to 2011-12. The proposed hypotheses have been tested using WarpPLS 5.0 software.

Findings: The structural equation analysis of unit-wise leather industry data supports significantly bi-directional negative relationship between social performance and economic performance among all the selected states. In contrast, the relationship between economic performance and environmental performance, as expected and supported by many existing theories, has shown bidirectional positive relationship. However, the relationship between social and environmental performance has shown quite mysterious and mixed trends. TN has depicted significantly negative coefficients, which could be attributed to higher pressure for environmental compliance that might have led to trade-off between the two to gain cost competitiveness.

Research limitations: Unavailability of data for many critical indicators was the biggest limitation of this study.

Originality/value: The sustainability framework proposed in this work is an original contribution of authors to the existing literature. Moreover, this study on the Indian leather industry fills the gap and resolve the mystery of interconnection among the dimensions of sustainability.

Keywords: Sustainability; Indian Leather Industry; Structural Equation Modelling

1. Introduction

The relationships among the three dimensions of sustainability i.e. economic, social and environmental performance have been recognized by many researchers with theoretical as well as empirical perspectives. The results have been mixed, as such, there is no consensus. Among the few landmarked studies, Porter and van der Linde (1995) highlighted that the importance of well-designed strict environmental regulation can stimulate innovations to reduce the level of pollution which lead to lower production cost with inputs saving. Also, it offers the opportunity to sell the developed technology and reap the 'first mover advantage' (Esty and Porter, 1998). Moreover, Porter and van der Linde (1995) also mentioned that lax environmental regulation promotes end-of-pipe treatment which can be dealt with incrementally and without innovation. Therefore, cost of compliance may rise with stringency which can be offset with process and product innovation. Similarly, there are many other studies which support the positive relationship between environmental performance and economic performance (Lankoski 2000; Wagner 2000; Schaltegger and Synnestvedt 2002; Wagner et al. 2002). Interestingly, Endrikat et al. (2014) meta-analysis based on 245 bivariate and 208 partial correlations derived from 149 studies reveals overall positive relationship between corporate environmental and financial performance.

Contrary, other group emphasize the need for 'profit maximization' as the only objective: "there is one and only one social responsibility of business, to use its resource and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engage in open and free competition without deception or fraud" (Friedman, 1970). Thus, a company that consider social and environmental sustainability related activities incurs some extra cost and reduce its overall profit (Friedman 1962; Bragdon and Marlin 1972, McGuire et al. 1988; Henderson, 2004; Karnani, 2010). This kind of phenomenon is very commonly observed when a firm moves from a lax environmental regime, known as 'Pollution Heaven', to strict, follows 'Polluters Pays' principle. However, there is a need to carefully monitor the progress of environmental sensitive industries, so that the benefits of investment on environmental management certifications and awards, such as ISO 14000, LWG rating etc., could be harnessed optimally (Ann et al., 2006; Gupta and Racherla, 2016).

However, interestingly, Schaltegger and Synnestvedt (2002) and many other researchers have observed and supported inversely U-shaped relationship between environmental and social performance and economic success (Fig. 1). In environmental performance, the initial increasing trend of the curves in 'revisionist' view denotes win-win condition where integrated pollution prevention strategies based innovations add net positive economic value. In contrast, decreasing trend may hints towards exercising end-of-pipe treatment and disposal option for environmental compliance, which is 'traditionalist' view of environmental management in industries.

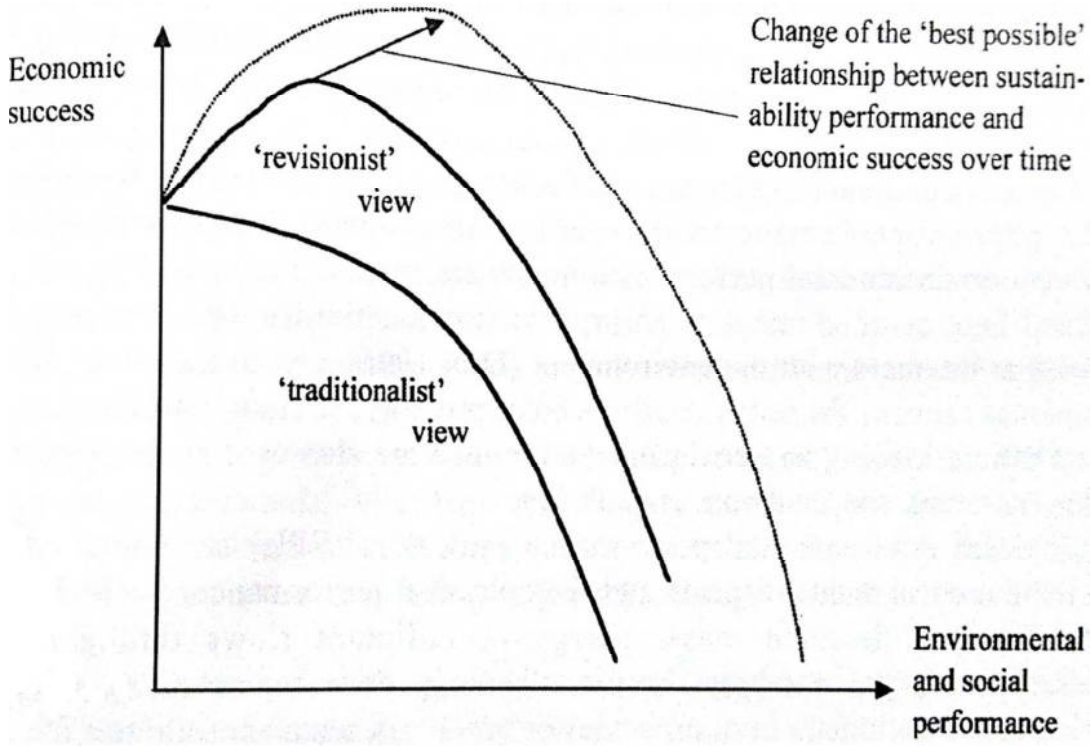

Fig. 1 The relationship between environmental and social performance and economic success (Source: similar to Lankoski 2000; Wagner 2000; Schaltegger and Synnestvedt 2002; Wagner 2003; Wagner et al. 2001)

Literature suggest that social performance of a business unit is measured with stakeholders' satisfaction level (Turban and Greening 1996; Gond and Crane 2009; Rowley and Berman 2000), which is generally captured under the clauses of a social audit. Hence, many researchers have explored the relationship between social performance and economic or financial performance and found the mixed results. The nature of relation varies with type of industry and moto behind social welfare measures (Fischer and Sawczyn, 2013; Stanwick and Stanwick, 1998; Waddock and Graves, 1997). Due to contradictory nature of relationships among sustainability dimensions in the existing literature, we recognized the need for investigating this dynamics as per industry context and business environment.

Therefore, this study has been designed to empirically test the interdependence between economic, environment and social performance based on unit-wise data of Indian leather industry. The outcome of the study could be used to help policy makers and industry owners to map and to take appropriate preventive or corrective steps to ensure long term sustainability of leather industry.

2. Research Methodology

The study used *unit level data* for the leading states of Indian leather Industry – namely, Tamil Nadu (TN), West Bengal (WB) and Uttar Pradesh (UP) – to assess their *economic, social and environmental performance*. The market share in India's export is 37.8%, 25.17% and 13.56% for TN, UP and WB respectively (CLE, 2015). The study has used Annual Survey of Industry (ASI)[1] data from 2007-08 to 2011-12. As recommended by Svensson and Wagner (2015) business sustainability literature should "evolve independently and freely from previous business theory", we grounded the theory development approach based on secondary data.

For performance assessment purpose, a framework has been developed based on theoretical constructs, namely - economic, social and environmental performances – which are weighted averages of indicator values (Fig. 2). These indicators are in turn based on literature precedence, recommendations by industry experts, correlation analysis[2] and available data.

Economic Performance. The study assessed the economic performance based on three indicators, namely – Return on Investment (ROI), Fixed Asset Turnover (FAT), Turnover-

[1] This database in managed by Ministry of Statistics and Programme Implementation, Government of India (GoI)
[2] We calculated correlation coefficient to avoid multicollinearity into the measurement model

per-Man-day (TPMD) - which we arrived at, based on expert opinion survey to find out their materiality[3] (Lydenberg et al., 2010; GRI, 2011) with respect to leather industry, and correlation analysis, performed in sequence (Fig. 3.1).

Social Performance. The social performance[4] has been assessed based on five indicators, namely - Employee Payment Ratio (EPR), Percent Salary Wages Expense (PSWE), Percent Bonus Expense (PBS), Percent PF Expense (PPFE), and Percent Welfare Expense (PWE). Unfortunately, we considered but dropped other indicators such as – Percent Child Labor (PCL), Differences in Remuneration (DIR) between men and women, and Percent Community Welfare Expense (PCWE), due to unavailability of data.

Environmental Performance. In case of environmental performance, we considered various indicators (based on: GRI, 2011; Spence et al., 2012) after expert opinion survey and correlation analysis, such as – Material Intensity (MI), Power Intensity (PI) and Fuel Intensity (FI) on the input side, and Effluent Treatment Index (ETI), Solid Waste Disposal Index (SWDI), Emission Index (EmI) on the output side. Unfortunately, three of the output side indicators had to be dropped (grey in color, Fig 3.1) due to absolute lack of data.

Table 1 outlines all the indicators and their formulae used for selected indicator value calculations.

To analyses the interdependence among dimension of sustainability, we applied with Structural Equation Modeling (SEM). SEM is a group of statistical methods designed to test a conceptual or theoretical model with empirical data (Kaplan, 2008). Some of SEM

[3] Materiality has been captured on five issues: Financial impact / risk, legal regulatory policy drivers, business peer based norms, stakeholder concerns/social trends and opportunity for innovation. (for details refer: http://www.sasb.org/wp-content/uploads/2012/03/IRI_Transparency-to-Performance.pdf)

[4] We considered employee salaries, wages & benefits, employee & community relations (GRI, 2011)

methods include confirmatory factor analysis, path analysis, and covariance structure modeling.

The study has applied partial least squares (PLS) approach of SEM. It offers an alternative to covariance-based SEM (Wold, 1985), which is especially suited for situations when data is not normally distributed (Monecke and Leisch, 2012). PLS-SEM has experienced increasing dissemination in a variety of fields in recent years with non-normal data, small sample sizes and the use of formative indicators being the most prominent reasons for its application (Hair et al., 2014). Though there are many application software available for PLS-SEM, We used WarpPLS 5.0 software[5], developed by Ned Kock (Kock, 2015). The software has the capability to identify nonlinear relationships, and estimates path coefficients accordingly.

[5] http://www.scriptwarp.com/warppls/

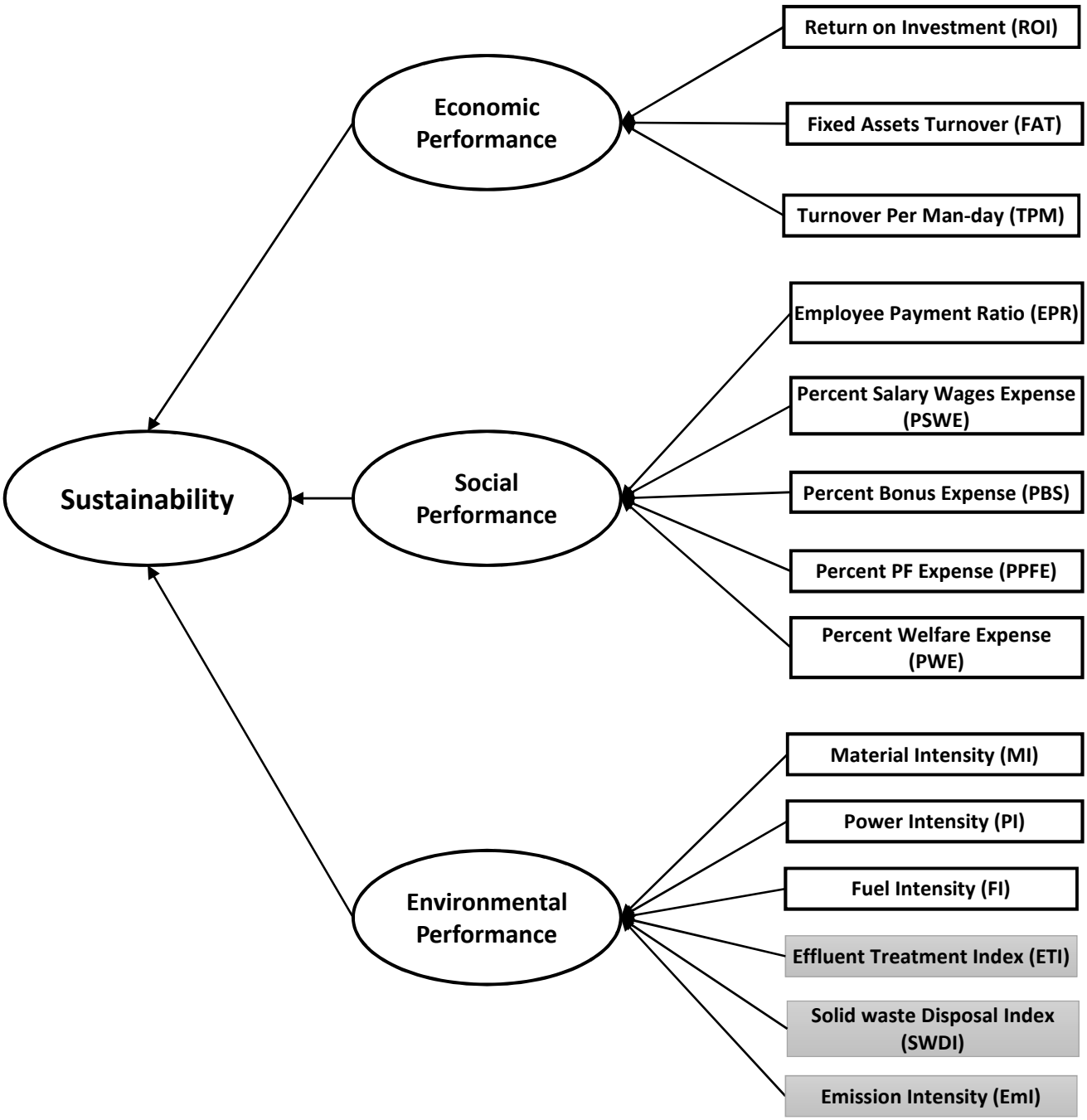

Fig. 2 Theoretical Framework for Sustainability Assessment (TFSA)

Table 1 Sustainability indicators and their formula

Sustainability dimension	Indicator	Formula
Economic Performance	Return on Investment (ROI)	Net Profit / Invested capital
	Fixed Assets Turnover (FAT)	Turnover / Fixed assets
	Turn Over Per Man-day (TPM)	Turnover/man-days
Social Performance	Employee Payment Ratio (EPR)	Wage per day / Salary per day
	Percent Salary Wages Expense (PSWE)	Salary & wages paid / Turnover
	Percent Bonus Expense (PBS)	Bonus paid / Turnover
	Percent PF Expense (PPFE)	Provident fund paid / Turnover
	Percent Welfare Expense (PWE)	Welfare expense / Turnover
Environmental performance	Material Intensity (MI)	Material consumption / Turnover
	Power Intensity (PI)	Electricity Consumption / Turnover
	Fuel Intensity (FI)	Petroleum product consumption /Turnover

3. Results and discussion

The interdependence among the dimensions of sustainability have been explored based on the theoretical basis of non-linearity (Fig. 3). The following sections discuss the comparative performance and degree of dependency among the sustainability dimensions.

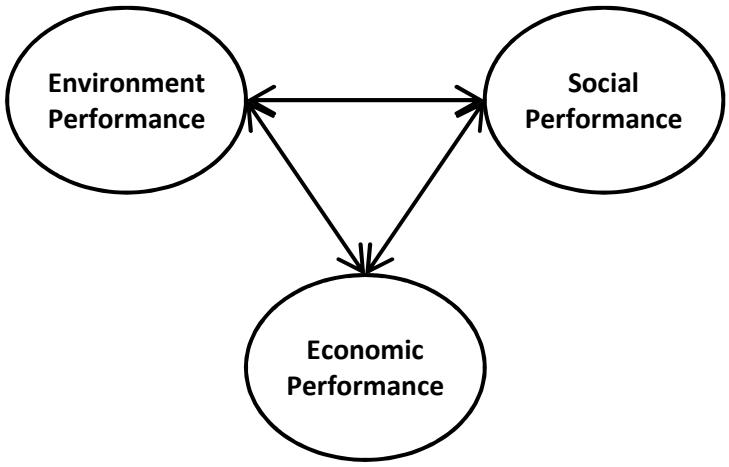

Fig. 3 Interdependence among the dimensions of sustainability

3.1 Social and Economic

Theoretically, better social performance should, at one end, boost the morale of employees and consequently improves the productivity and economic performance, contrary, it may also result in additional cost which may erode a firm's profitability. Similarly, the firms with higher economic performance are expected to do better in social performance. Thus, the following null hypothesis have been tested in the study:

H1: Social performance is positively related to economic performance

H2: Economic performance is positively related to social performance

However, the findings support significant *bi-directional negative* relationship between social and economic performance among the selected states (Table 2 and 3). It indicates that leather firms have been relying on social cost mitigating measures like having higher proportion of contract labour, outsourcing the job to small unorganized firm, and opting piece basis wage structure.

Table 2 Influence of social performance on economic performance in Indian leather industry

Social Performance >>> Economic Performance						
	UP		**TN**		**WB**	
	Coeff.	**P value**	**Coeff.**	**P value**	**Coeff.**	**P value**
FY08	**-0.16**	**0.04****	**-0.29**	**< 0.01*****	**-0.31**	**0.03****
FY09	**-0.19**	**< 0.01*****	**-0.18**	**< 0.01*****	**0.12**	**0.2**
FY10	**-0.21**	**< 0.01*****	**-0.24**	**< 0.01*****	**-0.43**	**< 0.01*****
FY11	**-0.31**	**< 0.01*****	**-0.37**	**< 0.01*****	**-0.21**	**0.04****

FY12	**-0.4**	**< 0.01*** **	**-0.53**	**< 0.01*** **	**NA**	**NA**

*significant at $p < 0.10$, ** significant at $p < 0.05$, *** significant at $p < 0.01$

Table 3 Influence of performance economic on social performance in Indian leather industry

Economic Performance >>> Social Performance						
	UP		**TN**		**WB**	
	Coeff.	**P value**	**Coeff.**	**P value**	**Coeff.**	**P value**
FY08	**-0.28**	**< 0.01*** **	**-0.41**	**< 0.01*** **	**-0.42**	**< 0.01*** **
FY09	**-0.18**	**0.01****	**-0.56**	**< 0.01*** **	**0.15**	**0.14**
FY10	**-0.29**	**< 0.01*** **	**-0.37**	**< 0.01*** **	**-0.58**	**< 0.01*** **
FY11	**-0.54**	**< 0.01*** **	**-0.58**	**< 0.01*** **	**-0.18**	**0.06***
FY12	**-0.35**	**< 0.01*** **	**-0.59**	**< 0.01*** **	**NA**	**NA**

*significant at $p < 0.10$, ** significant at $p < 0.05$, *** significant at $p < 0.01$

3.2 Environmental and Economic

The literature supports both the contradictory views on relationship between environmental performance and economic performance. However, we consider positive influence to test the hypothesis because of pollution intensive nature of the leather industry due excess use of various inputs due poor housekeeping practices. Thus, in initial phase, without much investment, tanneries can economize their operation with saving of valuable resources. The following hypotheses have been tested across the clusters:

H3: Environmental performance is positively related to economic performance

H4: Economic performance is positively related to Environmental performance

The results obtained with SEM analysis support the proposed directional positive relationship based hypothesis in most of the cases, except, it was quite weak in WB. As the field survey reveals that, in WB, CETP charges tanneries based on area of tannery or the capacity allocated,

whereas, in other clusters, most of the tanning capacity is charged based on effluent quantity which motivate tanners to take preventive measures to improve their environmental performance. This finding also validates the proposed measurement matric of the performance parameters.

Table 4 Influence of environment on economic performance in Indian leather industry

Environmental Performance >>> Economic Performance						
	UP		TN		WB	
	Coeff.	P value	Coeff.	P value	Coeff.	P value
FY08	0.46	< 0.01***	0.41	< 0.01***	0.21	0.12
FY09	0.32	< 0.01***	0.29	< 0.01***	0.29	0.02**
FY10	-0.2	< 0.01***	0.16	< 0.01***	0.12	0.17
FY11	0.3	< 0.01***	0.13	0.02**	-0.18	0.06*
FY12	0.25	< 0.01***	0.19	< 0.01***	NA	NA

*significant at $p < 0.10$, ** significant at $p < 0.05$, *** significant at $p < 0.01$

Table 5 Influence of economic on environment performance in Indian leather industry

Economic Performance >>> Environmental Performance						
	UP		TN		WB	
	Coeff.	P value	Coeff.	P value	Coeff.	P value
FY08	0.33	< 0.01***	0.31	< 0.01***	0.4	< 0.01***
FY09	0.3	< 0.01***	0.18	< 0.01***	0.22	0.05*
FY10	-0.22	< 0.01***	0.08	0.1	0.2	0.05*
FY11	0.29	< 0.01***	0.11	0.04*	-0.21	0.03**
FY12	0.21	< 0.01***	0.3	< 0.01***	NA	NA

*significant at $p < 0.10$, ** significant at $p < 0.05$, *** significant at $p < 0.01$

3.3 Social and Environmental performance

Though existing literature does not provide any comment on relationship between social and environmental performance, I proposed positive influence. The first argument is higher social

performance would infuse higher motivation of employees for better and efficient resource utilization. Secondly, higher social performance due to experience workers hiring could improve the environmental performance. Therefore, the following hypothesis has been tested:

H5: Social performance is positively related to environmental performance

The results obtained were quite mysterious and mixed in nature. The UP has demonstrated ambiguous relationship between social and environmental performance, whereas, TN and WB contradict it. In TN higher pressure for environmental compliance might have led to trade-off between the two to gain cost competitiveness. While, in WB, pressure for social compliance due to strong labour union presence could be a factor for the demonstrated trade-off between the two.

Table 6 Influence of social on environment performance in Indian leather industry

Social Performance >>> Environmental Performance						
	UP		**TN**		**WB**	
	Coeff.	**P value**	**Coeff.**	**P value**	**Coeff.**	**P value**
FY08	**-0.43**	**< 0.01*** **	**-0.2**	**< 0.01*** **	**-0.48**	**< 0.01*** **
FY09	**0.14**	**0.05***	**-0.37**	**< 0.01*** **	**-0.32**	**< 0.01*** **
FY10	**0.1**	**0.11**	**-0.35**	**< 0.01*** **	**0.15**	**0.13**
FY11	**0.16**	**0.02** **	**-0.31**	**< 0.01*** **	**0.17**	**0.07***
FY12	**0.62**	**< 0.01*** **	**-0.25**	**< 0.01*** **	**NA**	**NA**

*significant at $p < 0.10$, ** significant at $p < 0.05$, *** significant at $p < 0.01$

As there is no theoretical basis for influence of environmental performance on social performance, therefore, the study didn't consider that relationship.

4. Implications

The outcome of the study can be used to help policy makers and industry owners to map and to take appropriate preventive or corrective steps in terms of selecting and supporting various social and environmental interventions, which are having positive influence on economic sustainability of leather industry. The leather industry in India, specifically in the selected states, has been extending employment opportunities to thousands of men and women. However, the industry is also found responsible for water pollution and various health hazards in the areas of close vicinity. Therefore, it is essential to understand the interdependence among sustainability dimensions and optimize the trade-off before planning further about this industry.

5. Limitations and Future scope for study

The opaqueness with which the Indian Leather Industry operates and follows environmental and social practices clearly limits the availability of accurate and reliable primary data. Unfortunately, due to unavailability of data, many critical indicators were dropped from the theoretical framework of sustainability measurement. These are – Percent Child Labor (PCL), Differences in Remuneration (DIR) between men and women, Percent Community Welfare Expense (PCWE), Effluent Treatment Index (ETI), Solid Waste Disposal Index (SWDI), and Emission Index (EmI). Even queries raised through RTI (Right to Information) failed to generate any useful data. However, in future, effort should be made to conduct case-study based in-depth analysis of functioning of Indian leather industry. Moreover, the proposed conceptual framework of sustainability can be applied in other similar industries having high environmental threats, such as textile, sugar refinery, pharmaceutical etc., due to their high chemical intensiveness. In future, this study could be extended to analyze the interdependency between sustainability dimensions among small, medium and large

organizations separately. Influence of firm size on sustainability dimensions may help policy makers in designing appropriate aids, specifically for small firms, which have been struggling for their survival.

6. Conclusions

The descriptive analysis revealed that UP has performed better in social and environmental performance, whereas, TN has shown leadership in economic performance. This could be attributed to higher export margin and superior technological advancement of TN. The worst performance of WB may be assigned to its less incentive and low motivation for pollution preventive measures, and strong hold of labor union. In order to protect the interest of the leather industry and to thrive the local economy, state government of WB has to provide a platform to resolve conflicts between industry and labor union representatives.

The structural equation analysis of unit-wise leather industry data supports significantly *bi-directional negative* relationship between social performance and economic performance among all the selected states. In contrast, the relationship between economic performance and environmental performance, as expected and supported by many existing theories, has shown *bidirectional positive* relationship. However, the relationship between social and environmental performance has shown quite mysterious and mixed trends. TN has depicted significantly negative coefficients, which could be attributed to higher pressure for environmental compliance that might have led to trade-off between the two to gain cost competitiveness. We recommend regular social and environmental audits by an independent body to recognize and advice on various critical issues.

References

Ann G. E., Zailani S., & Wahid N. A., (2006) "A study on the impact of environmental management system (EMS) certification towards firms' performance in Malaysia", Management of Environmental Quality: An International Journal, Vol. 17 Issue: 1, pp.73-93, https://doi.org/10.1108/14777830610639459

Bragdon, Jr J.H., Marlin J.A. (1972). Is Pollution Profitable. *Risk management.* 19:9-18.

Endrikat, J., Guenther, E., & Hoppe, H. (2014). Making sense of conflicting empirical findings: A meta-analytic review of the relationship between corporate environmental and financial performance. European Management Journal, 32(5), 735-751.

Esty, D. C. & Porter, M. E. (2005). National Environmental Performance: An Empirical Analysis of Policy Results and Determinants. Faculty Scholarship Series. Paper 430 Available at: http://digitalcommons.law.yale.edu/fss_papers/430/

Fischer, T.M., & Sawczyn A.A. (2013). The relationship between corporate social performance and corporate financial performance and the role of innovation: evidence from German listed firms. *J Manag Control*. 24(1):27–52. doi:10.1007/s00187-013-0171-5

Friedman, M. (1962). Capitalism and Freedom. University of Chicago Press, Chicago

Gond, J., Crane A. (2010). Corporate social performance disoriented: Saving the lost paradigm? *Business & Society.* 49(4):677-703. doi:10.1177/0007650308315510

GRI (2011). *Sustainability Reporting Guidelines*, Version 3.1 edn. (Amsterdam). Available at: https://www.globalreporting.org/standards/g4/Pages/default.aspx

Gupta, S. and Racherla, U. S. (2016). Effect of ISO 14000 Certification on Sustainability: Evidence from the Indian leather industry. The Journal of Social, Political, and Economic Studies, 41(1), 34.

Hair, J.F., Sarstedt, J.M., Hopkins, L., Kuppelwieser, V.G. (2014). Partial least squares structural equation modeling (PLS-SEM). *European Business Review*. 26(2): 106 – 121. doi:10.1108/EBR-10-2013-0128

Henderson, D. (2004). The Role of Business in the World of Today. Competitive Enterprise Institute Washington, DC. Available at: http://www.greenleaf-publishing.com/content/pdfs/jcc17hend.pdf

Kaplan, D.W. (2008). *Structural Equation Modeling: Foundations and Extensions*. Advanced Quantitative Techniques in the Social Sciences Series Sage Publication volume 10.

Karnani, A.G. (2010). Doing well by doing good": The grand illusion. *California Management Review*. 53(2):69-86.

Kock, N. (2015). WarpPLS 5.0 User Manual. Laredo, TX: ScriptWarp Systems

Lankoski, L. (2000). *Determinants of Environmental Profit*. Helsinki: Helsinki University of Technology

Lydenberg, S., Rogers, J., Wood, D. (2012). From Transparency to Performance. Available at: http://www.sasb.org/wp-content/uploads/2012/03/IRI_Transparency-to-Performance.pdf

McGuire, J.B., Sundgren, A., Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. *Academy of Management Journal.* 31(4):854-872. doi: 10.2307/256342

Monecke, A., Leisch, F. (2012). semPLS: Structural Equation Modeling Using Partial Least Squares. *Journal of Statistical Software.* 48(3). http://www.jstatsoft.org/

Porter, M.E., & Linde, C.V. (1995). Green and competitive: Ending the Stalemate. *Harvard Business Review*, 73(5):120–134.

Rowley, T., Berman, S. (2000). A brand new brand of corporate social performance. *Business & Society*. 39(4):397-418. doi:10.1177/000765030003900404

Sanja S, Pattnayak SM (2005) Economic reform and productivity growth in Indian manufacturing industries: an interaction of technical change and scale economies. Economic Modelling 22:601– 615

Sankar U. (2006a), Trade Liberalization and Environmental Protection- Responses of Leather Industry in Brazil, China and India, Economic & Political Weekly, 17 June.

Sankar, U. (2006b), Trade and Environment - A Study of India's Leather Exports, Oxford University Press.

Saravanabhavan S. , Rao J. R., Nair B. U., Ramasami T. (2007) An eco-efficient rationalized leather process. Journal of Chemical Technology and Biotechnology 82:971–984

Schaltegger, S., Synnestvedt, T. (2002). The link between green and economic success: environmental management as the crucial trigger between environmental and economic performance. *Journal of Environmental Management*. 65(4):339-346. doi: 10.1006/jema.2002.0555

Spence, L.J., Agyemang, G., Rinaldi, L. (2012). *Environmental Aspects of Sustainability: SMEs and the Role of the Accountant*. Certified Accountants Educational Trust (London). ISBN: 978-1-85908-479-3

Stanwick, P.A., & Stanwick, S.D. (1998). The Relationship between Corporate Social Performance, and Organizational Size, Financial Performance, and Environmental Performance: An Empirical Examination. *Journal of Business Ethics*. 17:195–204. doi: 10.1023/A:1005784421547

Svensson G., & Wagner B., (2015) "Implementing and managing economic, social and environmental efforts of business sustainability: Propositions for measurement and structural models", Management of Environmental Quality: An International Journal, Vol. 26 Issue: 2, pp.195-213, https://doi.org/10.1108/MEQ-09-2013-0099

Turban, D.B., Greening, D.W. (1997). Corporate social performance and organizational attractiveness to prospective employees. *Academy of Management Journal.* 40(3): 658-672. http://www.jstor.org/stable/257057

Waddock, S.A., & Graves, S.B. (1997). The corporate social performance–financial performance link. *Strategic Management Journal*. 18(4):303-319. DOI 10.1002/(SICI)1097-0266(199704)18:4<303::AID-SMJ869>3.0.CO;2-G

Wagner, M. (2000). The relationship between environmental and economic performance of firms. Paper Presented at the Second POSTI Meeting in Collaboration with the ESST Annual Scientific Conference, 27–28 May. BETA, Universite´ Louis Pasteur, Strasbourghttp//www.esst.uio.no/posti/workshops/wagner.html.

Wagner, M., Schaltegger, S., Wehrmeyer, W. (2001). The relationship between the environmental and economic performance of firms. *Greener Management International.* 34(1):94-111. doi:10.9774/GLEAF.3062.2001.su.00009

Wold, H. (1985) *Partial Least Squares*. In S Kotz, NL Johnson (eds.), Encyclopedia of Statistical Sciences 6:581–591. John Wiley & Sons, New York.