Impact of customer sustainability pressure on the relationship between social supply chain sustainability practices and outcomes.

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Abstract

This paper examines the relationship between customer sustainability pressure and social supply chain sustainability practices and outcomes. We use hierarchical regression to examine the relationship between practices and outcomes and how customer sustainability pressure moderates these.

Keywords: Social sustainability, power, performance

Introduction

Sustainability literature is growing at a rapid rate. The majority of literature examines environmental sustainability, although recently literature has focused on social sustainability (Carter and Rogers, 2008; Sarkis, 2001). This paper looks at social supply chain sustainability as it is important to understand the different types of social sustainability practices that are implemented and how these practices impact on performance: both operational and financial. Performance is important as authors have discussed whether or not it pays to be green (Ambec and Lanoie, 2008) but fewer papers have examined if it pays to be good. Our main research objective is to understand if social supply chain sustainability practices affect operational and financial outcomes.

A growing body of work also looks at the impact of pressure on relationships as pressure in different forms leads to different outcomes. Studies have found that customer pressure has a detrimental impact in some cases (Maloni and Benton, 2005); while in other cases customer pressure has a more positive impact (Zhu and Sarkis, 2007). This paper takes the power and pressure literature further and examines if pressure impacts on company performance once they have implemented social supply chain sustainability practices: our second objective is to understand if pressure from key customers helps or hinders the performance of the company?

We developed social supply chain sustainability practice constructs: monitoring, management systems, innovation and strategy changes and examined their relationship to financial and operational outcomes. We examined the moderating relationship of customer sustainability pressure on this relationship.

Literature Review
Social supply chain sustainability practices and performance
The literature on social sustainability practices has expanded over the last few years but Iin terms of sustainability literature in general it is relatively unexplored (Vachon and Klassen, 2006; Carter, 2000; Carter and Jennings, 2002).   Much of the social supply chain sustainability literature has examined the categorization of social sustainability practices in the supply chain and how this social sustainability practices affect performance. Measures of social supply chain sustainability practices include monitoring suppliers to ensure compliance with health and safety requirements with targets for health and safety and audits of suppliers (Baden, Woodward and Harwood, 2009) and establishing social sustainability management systems with suppliers including work/life balance systems, OHSAS 18001 certification and ethical codes of conduct (Weaver, Treviño and Cochran, 1999). These monitoring and management systems are similar to Vachon and Klassen's (2006) idea of buying firms not being directly involved in the implementation of sustainability practices but making sure that their suppliers are compliant or going beyond regulation: external sustainability practices.

Internal sustainability practices include innovation through social supply chain sustainability, such as a developing new products or processes that reduce increase the health and safety of works and providing fair margins for suppliers (Tate, Ellram and Kirchoff, 2010). Authors have also examined the impact of supply chain strategy changes or redefining the idea of the supply chain by bringing NGOs and community groups in the decision-making process, paying fair wages and also protecting communities where the supply chain operates (Sharma and Henriques, 2005).

Previously, social practices were perceived as not increasing financial performance (Carter, 2001; Walley and Whitehead, 1994) but are now linked with positive performance for organizations (Carter and Rogers, 2008; Tate, Ellram and Kirchoff, 2010). Studies have shown that supply chain monitoring and management systems lead to positive outcomes for quality performance (Das et al, 2008) and that social sustainability strategies such as safety training have an positive influence on financial performance (Tate et al., 2010). Innovation and business re-definition also have positive impact on performance (Nidulomu et al, 2009).   Other studies have shown insurance-life benefits to companies that preserve financial performance due to sustainability practices towards secondary stakeholders such as communities (Godfrey, Merrill and Hansen, 2009).

H1: Social sustainability practices will have a positive relationship with operational performance
H2: Social sustainability practices will have a positive relationship with financial performance

Social sustainability practices, customer pressure and performance
Customer pressure has been shown to have a moderating impact on sustainability practices and outcomes (Zhu and Sarkis, 2007). Many studies of pressure use French and Raven's (1959) classifications of different powers in use to analyze the impact of these pressures on the outcomes for a firm: referent power (admiration for another companies practices or values); expert power (expertise or knowledge within another firm); reward power (exchange based power where one party expects to be rewarded for an action); legitimate power (power is exercised through legal or structural means); and coercive power (where threats or punishment are issued from one firm to another).

These power sources have been further grouped into non-mediated, mediated and reward power (Benton and Maloni, 2005). Non-mediated power is relationship based power made up of referent and expert powers; mediated power is a power which entails direct action and is made up of legitimate and coercive power; reward power has been categorized as mediated power, however, due to a very different impact from the other mediated powers it is falls into neither category and is used on its own. Many studies have examined the impact on power use on relationships and on firm performance but none, to our knowledge, have examined the effect of power on the relationship between companies practicing social supply chain sustainability and firm performance. In previous studies, non-mediated power use has had a positive impact on outcomes, while mediated power sources have had negative impacts on outcomes. Reward power has had mixed outcomes with some studies reporting negative impact on outcomes whilst others positive (Benton and Maloni, 2005; Maloni and Benton, 2000, Zhao et al., 2008).

Customer pressure or market pressure's moderating effect has been examined in the relationship between green supply chain management practices and performance outcomes (Zhu and Sarkis, 2007). The findings conclude that customer pressure positively moderates the relationship and lack of customer pressure leads to a loss of customers and negatively impacts economic performance (Zhu and Sarkis, 2007). As pressure to be socially sustainable as well as environmentally sustainable is mounting we hypothesize that the same relationship will exist for social supply chain sustainability practices. From previous studies and literature we would hypothesize:

H3: Non-mediated power will positively moderate sustainability practices and operational performance
H4: Mediated power will negatively moderate sustainability practices and operational performance
H5: Reward power will have a mixed influence on the relationship between sustainability practices and operational performance.
H6: Non-mediated power will positively moderate sustainability practices and financial performance
H7: Mediated power will negatively moderate sustainability practices and financial performance
H8: Reward power will have a mixed influence on the relationship between sustainability practices and financial performance

Methods
In order to test our hypotheses we used a survey-based instrument. The unit of analysis for our research was the supply chain relationship. Within supply chain research, the relationship between a focal company and its key customer is accepted to be indicative of relationships with other strategic customers (Cao and Zhang, 2011).

We used the key informant approach, where the person in charge or with the most knowledge of supply chains is selected to complete the questionnaire (Singh, Power and Chuong, 2011; Paulraj, Augustine and Chen, 2008; Cao and Zhang, 2011). The respondents chosen were those in the best position to provide informed responses to the sustainability efforts of the firm.

A seven-point Likert scale was used with end points of either no implementation or no development and fully implemented or fully developed. We opted for a telephone survey in an effort to improve and ensure response rates, which also helped us identify the supply chain sustainability expert in the organization. As well as this phone interviews give further scope for

clarification of any obscure questions and gave respondents a chance to ask questions (Pagell and Gobeli, 2009).

The survey consisted of three customer power scales, non-mediated powers (comprising expert and referent scales), mediated powers (comprising coercive and legitimate powers) and reward powers (all adapted from Zhao et al., 2008). There were also two outcomes scales operational (Lawson, Tyler and Cousins, 2007) and financial (Nahm, Vonderembse and Koufteros, 2004). An original social supply chain sustainability scale was also created and will be discussed in the next section.

Item creation

The items used to measure supply chain sustainability practices were taken from previous studies. These items were then adapted and tested in the final constructs. The initial constructs adapted included internal environmental management (IEM), eco-design, health and safety management system, and product safety from Zhu, Sarkis and Lai, (2007). Reduction of material usage was taken from Sarkis, Gonzalez-Torres, and Adenso-Diaz (2010) and Vachon and Klassen's (2006) environmental and social monitoring of suppliers. Sharma and Henriques (2005) referred to recirculation items, while stakeholder relations and social practices were taken from Berman, Wicks, Kotha and Jones (1999). Pullman, Maloni and Carter (2009) supplied items on community, diversity, employees and social practices. Items were also adapted from Awaysheh and Klassen (2010): Supplier labor practices and supplier codes of conduct; while Wu, Ding and Chen (2012) provided a foundation for green purchasing items. These constructs were adapted and four new constructs created. These constructs were q-sorted through several iterations. This research employed a variation of the Q-sorting technique, which in our case comprised four separate stages: (1) item creation; (2) two rounds of Q-sorts; and (3) a round of pre-testing and (4) a pilot study (Moore and Benbasat, 1991)

Prior to implementing a field study a pilot test (n=33) was carried out to ensure reliability the new scales. A sample of respondents who would be in similar positions and companies to the target population of the final study were chosen. A Cronbach's alpha value was generated for each new construct. The constructs were accepted if the Cronbach's alpha value was greater than 0.7. All the new scales reached well above a value of 0.7. The customer power (Zhao et al., 2008), operational outcomes (Lawson, Tyler and Cousins, 2007) and financial outcomes scales (Nahm, Vonderembse and Koufteros, 2004) are pre-established. Respondents also provided feedback on the questionnaire and its constructs. Most of the discussion focused on more accurate definitions of what was meant regarding social sustainability. This ensured there were no ambiguous items and therefore common method bias was avoided (Podsakoff et al., 2003; Zhu, Sarkis and Lai, 2013)

Research design

The target sample covered 11 ranges of industries in Ireland based on the American Industry Classification System 2007 (NAICS) codes. This ensures results will be directly comparable to future international studies. The choice of locating the survey in a country whose regulations are the same nationwide removes any effects of differing regulations (Pagell and Gobeli, 2009).

An initial list of 1,000 companies was drawn from an established database. These companies were selected in adherence to three main criteria, the NAICS specifications listed, plant size based on number of employees (50 employees minimum) and job function (supply chain manager or equivalent). Larger plants based on size were chosen as a method of gaining

better insight into sustainable supply chain practices. The sample size was reduced upon examination of the dataset received, duplicates were removed as well as companies whose primary industry did not adhere to our NAICS code specifications. Following this a sample size of 883 companies was obtained. The sample size was reduced again during the phone interview process as two companies were no longer trading, three calls received no dial tone, two lines were no longer in service and another 13 companies proved to be duplicates leaving us with a final sample population of 863. The number of complete responses received was 156, giving us an acceptable response rate of 18.08%.

Table 1 and 2 show the respondents and the size of the firms by employees and revenue. Companies were from diverse industries: Telecommunications (1 company), Waste Management and Remediation Service (1 company), which account for 1.2% of the total sample in total. Postal Services (2 companies), Couriers and Messengers (2 companies) and Warehousing (2 companies) account for another 3.9% of the overall sample. 3.9% of the sample are construction companies (6 companies), 4.5% categorized themselves as 'Utilities' (7 companies). Total Transportation and Warehousing (10 companies) amounts to 6.4%. Wholesale Trade accounts for 8.3% (13 companies). Retail Trade comprises the second largest category amounting to 18.6% of our total sample (29 companies). The largest category, 53.2% (83 companies), were in the manufacturing sector. There is a high concentration of manufacturing firms, however the manufacturing grouping here comprises of 16 different classes of manufacturing. The sample includes at least one industry from each of the 11 codes ensuring no industry has been omitted.

Table 1: Respondents

Title	%
Directors	8.33
CEO	0.64
Supply Chain, Logistics, Purchasing and Operations	51.92
Other Managers (not in above category)	20.51
Finance	10.90
Other	7.69
Total	**100.00**

Table 2: Company Profile

Number of employees	%	Revenue $millions	%
Under 50	8.97	1-50	35.3
50-100	14.10	51-250	6
101-250	17.31	251-1,000	12.2
251-500	7.05	Over 1,000	19.2
500-1,000	6.41	No response	26.9
1,000-10,000	20.51		
Over 10,000	25.00		
No response	0.64		

Measurement model, validity and reliability
The following discusses the measurement model for the new social sustainability constructs. Table 3 shows the fidelity of the new measures. Reliability is a function of the average correlation among items and the number of items. The reliability of the items were assessed again on this larger scale using Cronbach's alpha as a scale reliability test (Cronbach, 1951). The alpha of every factor was greater than 0.8 (Nunally, 1978). Internal consistency is measured by

the coefficient alpha as well as another measure, average variance explained. The items hold together and fit the data well given the satisfactory fit indices.

The goodness of fit statistics (GFI) were derived from running a confirmatory factor analysis on each of the scales on the table. The chi-square value is the traditional method for evaluating overall model fit (Hooper, Coughlan and Miller, 2008). In most cases the chi-square is significant and although ideally in confirmatory factor analysis you want a non-significant chi square, since smaller chi-square indicates greater fit between hypothesized model and data. We must bear in mind that chi-square is inflated by sample size and in our case rejects the model as a large sample was used (Hooper et. al 2008; Jöreskog and Sörbom, 1993). For this reason, it is recommended that chi-square is complemented with other fit indices (Jöreskog and Sorbom, 1993). In this case CFI (Comparative Fit Index), TLI (Tucker Lewis Index or Non-normed Fit Index (NNFI)), and IFI (Incremental Fit Index). Values approach one in nearly all cases and are therefore deemed satisfactory. [Comparative Fit Index exceeds .93 (Byrne, 1994), TLI is over .90 (Hu and Bentler, 1999) and the IFI also meets the <.90 as recommended by Bollen (1989)]. In all scales the items loaded significantly on the constructs. No modifications were necessary in running the models. In all cases the average variance explained was adequate.

Table 3: Goodness of Fit

	# Items	Coefficient Alpha	Selected Goodness of Fit Statistics				Average Variance Explained
			χ^2 (df)	CFI	TLI	IFI	
Social Measures							
Monitoring	4	0.92	17.285 (2)***	0.97	0.90	0.97	0.75
Management Systems	4	0.90	4.132 (2)	0.99	0.98	0.99	0.70
Supply Chain Innovation	4	0.90	5.518 (2) †	0.99	0.97	0.99	0.70
Supply Chain Strategy Change	4	0.89	3.401 (2)	0.99	0.99	0.99	0.66

***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; †$p < 0.10$

Findings

In the first model, social supply chain sustainability practices and their relationship to operational outcomes are tested. We then enrich this model by introducing customer power, categorized as non-mediated, mediated and reward powers, into the relationship between social supply chain sustainability practices and operational outcomes. Having collapsed the social dimensions, four dependent variables were created: monitoring, management systems, innovation, and supply chain strategy change. In the second model the dependent variable is replaced by financial outcomes.

We employed models with two control variables. Large companies typically face higher sustainability pressures and are typically required to implement better practices. The control variables are firm size measured by the number of full time-employees (Zhu and Sarkis) and company age. Firm size was significant but age had no significant effect on the model.

The models were tested using hierarchical linear regression analysis. Initially the two control variables were entered into the regression. Then the first dependent variable, operational outcomes, was run in the model, with supply chain sustainability practices in the second step, the three customer powers in the third step, and the interaction of supply chain sustainability

practices and three customer powers in the final step. Our second model followed the same process however this time we tested financial outcomes. The results of the hierarchical regression models are presented in Table 4. Evidence of moderation exists when interaction terms accounts for significant incremental (step) variances in a dependent variable, either individually, as signified by the value of the β coefficients which is displayed in the results below. For example for every one standard deviation increase in social innovation, operational outcomes increase by 0.312 standard deviations (standard deviations are a unit of measurement). This is true for financial outcomes: for every one standard deviation increase in social strategy change, operational outcomes increase by 0.232 standard deviations. The R^2 of the models is shown in Table 5.

Table 4: Results of hierarchical regression

	Operational Outcomes	Financial Outcomes
Controls (Step 1)		
Plant Size	β=.296	β=.26
Company Age	N.S.	N.S.
Independent Variables (Step 2)		
Social Monitoring	N.S.	N.S.
Social Management Systems	N.S.	N.S.
Social Innovation	0.312	0.279
Social Strategy Change	0.268	0.231
Moderator (Step 3)		
Social Non-mediated Customer Pressure	.186	.30
Social Mediated Customer Pressure	-.186	N.S.
Social Reward Customer Pressure	N.S.	N.S.
Interaction Terms (Step 4)		
Social Monitoring*Non-Mediated	-.304	-.306
Social Management*Non-Mediated	N.S.	N.S.
Social Innovation*Non-Mediated	N.S.	N.S.
Social Strategy Change*Non-Mediated	.442	.345
Social Monitoring*Mediated	N.S.	N.S.
Social Management*Mediated	N.S.	N.S.
Social Innovation*Mediated	-.408	N.S.
Social Strategy Change*Mediated	.266	.309
Social Monitoring*Reward	N.S.	N.S.
Social Management*Reward	N.S.	N.S.
Social Innovation*Reward	N.S.	N.S.
Social Strategy Change*Reward	N.S.	N.S.

Table 5: R^2 results

Operational Performance	Step 1	Step 2	Step 3	Step 4
R^2	0.082	0.474	0.505	0.61
Adj. R^2	0.069	0.452	0.473	0.546
Change in R^2	0.082	0.392	0.034	0.105
Financial Performance	**Step 1**	**Step 2**	**Step 3**	**Step 4**
R^2	0.061	0.408	0.469	0.562
Adj. R^2	.049	.383	.435	.491
Change in R^2	.061	.347	.061	.093

Results

Results with non-significant *p*-values are not reported here. The results of the hypotheses tests that are supported or refuted are shown in Figures 1 and 2 and are as follows:

H1c: Innovation is positively related to operational outcomes. There is support for this hypothesis as innovation is positively associated with operational outcomes (β =31, p<.005).

H1d: Strategy change is positively related to operational outcomes. This hypothesis is supported as strategy change is positively associated with operational outcomes (β =27, p<.005).

H2c: Innovation is positively related to financial outcomes. Innovation is positively associated with financial outcomes (β =28, p<.01) therefore this hypothesis is upheld.

H2d: Strategy change is positively related to financial outcomes. This hypothesis is also supported as strategy change is positively associated with financial outcomes (β =23, p<.05).

H3a: Non-mediated power positively moderates the path between monitoring and operational outcomes. The interactions of non-mediated powers and monitoring are negatively associated with operational outcomes (β = -30, p<0.05) therefore the hypothesis is not supported.

H3d: Non-mediated power positively moderates the path between strategy change and operational outcomes. The interactions of non-mediated power and strategy change are positively associated with operational outcomes (β = 44, p<0.000) therefore the hypothesis is supported.

H4c: Mediated power negatively moderates the path between innovation and operational outcomes. The interaction of mediated power and innovation is negatively associated with operational outcomes (β = -41, p<0.05). Therefore the hypothesis is supported.

H4d: Mediated power negatively moderates the path between strategy change and operational outcomes. The interaction of mediated power and strategy change are positively associated with operational outcomes (β =27, p<0.05) therefore the hypotheses is not supported.

H6a: Non-mediated power positively moderates the path between monitoring and financial outcomes. The interactions of non-mediated powers and monitoring are negatively associated with financial outcomes (β = -31, p<0.05) therefore the hypotheses is not supported.

H6d: Non-mediated power positively moderates the path between strategy change and financial outcomes. The interactions of non-mediated power and strategy change are positively associated with financial outcomes (β = 35, p<0.001) therefore the hypothesis is supported.

H7d: Mediated power negatively moderates the path between strategy change and financial outcomes. The interaction of mediated power and strategy change is positively associated with financial outcomes (β = 31, p<0.05) therefore the hypotheses is not supported.
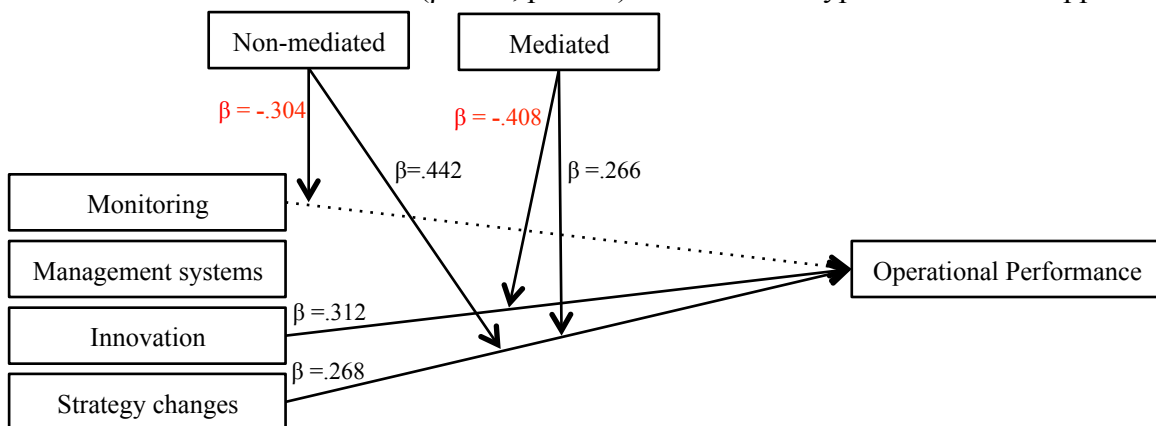
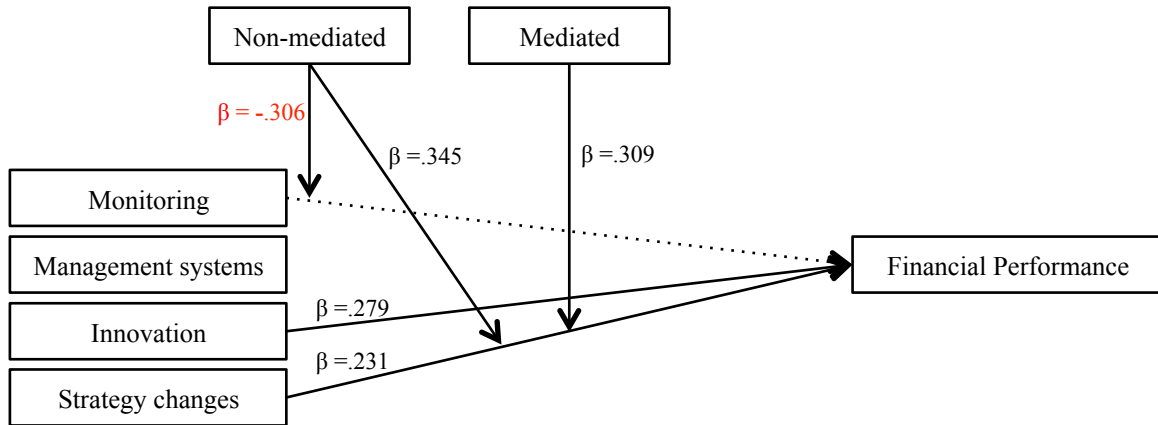

Fig. 1: Operational performance model

Fig. 2: Financial performance model

Discussion

Our findings show that social supply chain sustainability practices of innovation and strategy changes have a positive influence on operational and financial performance. This is in line with studies of green supply chain management practices (Zhu and Sarkis, 2007) and where innovative sustainability practices had a positive impact (Pagell and Wu, 2009; Nidulomu et al, 2009. Monitoring and management systems had no significant effect due to the internal process nature of the practices (Vachon and Klassen, 2006).

We also found that non-mediated power sources had a negative impact on the relationship between monitoring practices and both operational and financial performance. As admiration or expertise power was exercised by the customer this reduced the effectiveness of monitoring on operational and financial performance. One explanation could be that the supplier by monitoring the supply chain perceived the customer as overly critical or that their expertise was an indirect criticism of their practices. Another explanation could be the external nature of the practice (Vachon and Klassen, 2006): when companies monitor their suppliers without also changing their own organizations they may not reap the rewards of implementing the social sustainability practices themselves. We then split the sample to see if there was a different between lower levels and higher levels of non-mediated power use. Lower levels of non-mediated power had negative impact on the relationship between monitoring and operational outcomes but higher levels of non-mediated power had a positive impact. Both low and high levels of non-mediated power had a negative impact on the relationship between monitoring and financial outcomes. These results need further investigation.

In this study, non-mediated power positively influenced the relationship between social supply chain sustainability strategy changes and both operational and financial performance. This is in line with previous studies of non-mediated power use (Benton and Maloni, 2005; Zhao et al, 2008) where the admiration and expertise of the customer positively reinforced the changes that the company was undertaking in their supply chain; perhaps seen as a 'gold star' for the organization leading to better market performance and an enhanced operation.

Mediated power had a negative impact on the relationship between innovation and operational changes. Perhaps here using legal threats and punishment created tension between the parties leading to less innovation and subsequent deterioration in operational performance. This is similar to another study that found that design changes to reduce ecological impact, which were below regulatory requirements had no benefits while innovative firms, that linked

sustainability practices to learning reputation and operational legitimacy, benefited (Sharma and Henriques, 2005; Hart, 1995; Sharma and Vredenburg, 1998)

Results that are more difficult to explain are that mediated power (legitimate and coercive power) had a positive influence on relationship between strategy changes and both operational and financial performance. An explanation could be that as the customer threatens the company with legal action or punishment in some form this increases the implementation of the strategy change leading to operational and financial rewards. Baden, Harwood, Woodward (2009) found that for SMEs the pressure to introduce CSR practices came with reward or financial coercion. Perhaps legal threats and punishment have a direct negative effect on the innovative orientation of the company but a positive effect on re-defining the company around social sustainability practices. Investigating further we split the sample and tested high and low mediated power and found that the relationship was negative for both higher and lower mediated power for operational outcomes (which is the result we would have expected to find in line with other studies). We also found that lower mediated power has a negative impact on the relationship between strategy changes and financial outcomes but higher mediated power had a positive impact on strategy changes and financial outcomes. Therefore the only when there is high incidence of mediated power does this impact positively on strategy change and financial outcomes: once the company has been taken to court or had brand or reputation demand this inspires socially conscious behavior throughout the supply chain leading to financial rewards from customers. Again, these findings warrant further investigation.

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