

SOME EMPIRICAL EVIDENCE ON THE RELATIONSHIP BETWEEN INVENTORY MANAGEMENT AND SOCIAL RESPONSIBILITY

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Abstract

Despite the crucial role that inventory plays in supply chain management (SCM), research that examines the relationship between inventory and corporate social responsibility (CSR) is rare. This is surprising given the evidence that inventory represents a huge source of cost, a matter that is often reported as a major impediment in practicing social responsibility in SCM. As such, this paper fills this gap in literature by examining directly the effect of inventory management on CSR. Maximum-likelihood ordered logistic regression was performed on a sample of 38 Egyptian listed firms during the period from 2007 to 2010. The results demonstrate that inventory management exerts a positive and significant coefficient on CSR. Further analysis shows that inventory management cannot be safely dropped from model of analysis. Rather, inventory management does add something unique in explaining differences in CSR. For practitioners interested in optimizing their firms' values, thinking in managing supply chain imperatives, and specially inventory, in terms of social responsibility may guide them to build up a stock of reputational capital that can be used, in turn, to increase the cost of their rivals. This study, to the best of knowledge, is the first one that offers empirical evidence regarding the effect of inventory management on CSR. Moreover, the paper adds to both SCM and CSR literature by providing empirical evidence from Egypt as an emerging market, where much of the existing evidence reflects experience from developed countries.

Keywords: Corporate Social Responsibility; Egypt; Inventory Management; Supply Chain Management

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Introduction

The possibility that firms can develop a competitive edge by investing in social responsibility has been made increasingly likely by changes in different stakeholders' behavior and attitudes towards the society (McWilliams and Siegel 2000; Elsayed and Paton 2009; Tate et al. 2009; Cruz 2011). This makes the concept of corporate social responsibility (CSR) is ever more on the agenda of business organizations. Despite literature suggests different definitions of CSR, generally, it refers to "a continuing commitment by an organization to behave ethically and contribute to economic development, while also improving the quality of life of its employees (and their families), the local community, and society at large" (Lindgreen and Swaen 2010:3).

Owing to the evidence that the concept of CSR is dynamic and has often a "local-specific context" (Welford et al. 2008; Wahba 2008), and the field of supply chain management (SCM) is not only still

evolving, but also facing a variety of challenges, such as globalization, outsourcing, short-life products, and cultural differences, (KarKKainer 2003; Storey et al. 2006; Tencati et al 2010; Abbasi and Nilsson 2012; Goffnett et al. 2012), it can be argued that orientation towards social responsibility may be even more challenging to SCM than to other organizational contexts.

This may explain why, notwithstanding the influence of SCM on a firm's overall success, literature, until recently, has largely overlooked the potential opportunities that may result from involving social responsibility in SCM framework (Carter and Jennings 2004; Carter 2004; Eltantawy et al. 2009; Klassen and Vereecke 2012). For instance, in reviewing of 774 papers that have been published in the *Journal of Supply Chain Management (JSCM)* over 35 years, Carter and Ellram (2003) found that less than 10 articles are classified under the theme of social responsibility. In a similar vein, Giunipero et al. (2008) reviewed 405 articles that cover SCM in

nine academic journals during the period from 1997 to 2006 and found that only 12 articles are categorized under the topic of social responsibility.

Fortunately, researchers and practitioners, lately, have reconsidered SCM from a much broader perspective than before and focused on various social issues (Xia and Tang 2011). For instance, the results of Giunipero and Handfield (2004) revealed that practitioners in SCM recognize ethics as a first priority, something that was never brought up in Kolchin and Giunipero (1993) as an earlier and similar research (Eltantawy et al. 2009).

In the vogue of CSR, researchers have sought to establish a link between SCM and various social issues. Examples of these issues include the impact of purchasing social responsibility (PSR) on supply chain relationships (Carter and Jennings 2004; Carter 2004), the relationship between CSR and supply network conditions (Roberts 2003), ethical issues and decision-making in SCM (Beamon 2005), communicating operations and supply chain strategies in CSR reports (Tate et al. 2009), supplier's pressure and environmental disclosure (Huang and Kung 2010), and sustainability and SCM (Xia and Tang 2011).

In this context, although inventory has been a central theme of SCM (Neale et al. 2004), "there are only a few relevant studies on the inventory effects of SCM" (Chikan 2007: 61). More interestingly, no research has been identified that has tapped inventory management with CSR. The only exceptions are Huang and Kung (2010) and Chikan (2011). Although both studies did not aim mainly to explore the relationship between inventory management and CSR, they reported contradictory findings. While Huang and Kung (2010) revealed that inventory turnover, as a proxy for supplier's pressure, does not affect environmental disclosure, Chikan (2011) pointed out that respondents in his survey admit CSR as a key business trend that influences inventory.

This omission is surprising given the evidence that inventory represents a huge source of cost (Neale et al. 2004; Chikan 2007), a matter that is often reported as a major impediment in practicing social responsibility in SCM (Carter and Dresner 2001; Mont and Leire 2009; Walker and Brammer 2009; Melo 2012). This is because the incurred costs, and hence the amount of resources that are available to the firm will determine its orientation towards corporate social responsibility (Waddock and Graves 1997; Elsayed 2006; Lopez-Gamero et al. 2008).

As such, this paper takes a step toward tackling the need for more research that investigates the effect of inventory management on corporate social responsibility. The paper also adds to literature by conducting research on a sample of listed firms from Egypt as a developing country, where much of the existing evidence reflects experience from developed countries. Presenting evidence from other less developed countries assists in expanding existing

theories of supply chain management as well as corporate social responsibility, as it may not be appropriate to generalize conclusions from prior research on other organizations that work in different institutional contexts (Goonatilake 1984; Mady 1991; Wahba 2008; Elsayed and Wahba 2013).

The rest of this paper is structured as follows. The second part is devoted to review prior work and present the hypothesis to be tested. Sample and variable measurements are found in the third part. Empirical findings are introduced in the fourth part. The final part is dedicated to depict conclusion and discussion of the main findings.

Literature Review and Hypothesis Development

Social Responsibility and Supply Chain Management

The relationship between business organisations and social responsibility has taken various outlines. It started with the traditional economic view argument that society/environment must be exploited to serve the human needs. The implicit rationale here is that business organisations win, but at the expense of the society. The relation went to the other side when the Club of Rome published its book "*The Limits to Growth*" in 1972 to expound the idea that we live in a world of finite resources and growth must be controlled to conserve our community. The assumption here is that business organisations lose but the society wins. Later on, some researchers such as Porter and Van der Linde (1995) argued that more stringent regulations and voluntary action towards the society could solve this trade-off. Thus, a large number of studies (see, for example, Waddock and Graves, 1997; Elsayed and Paton, 2005) have argued that social responsibility concern for many firms represents an opportunity to increase profit through different ways, such as gaining a competitive advantage over competitors, reducing production costs and increasing consumer satisfaction and sales.

The CSR debate have extended to involve various organizational functions, specially, purchasing and supply management (Carter 2004). In this context, researchers have sought to examine the relationship between corporate social responsibility and various issues in SCM. For instance, using a sample of firms that belong to consumer products industries, Carter and Jennings (2004) has introduced the concept of purchasing social responsibility (PSR) as a second-order construct that involves five first-order dimensions: the environment, diversity, safety, philanthropy and community, and human rights; a finding that was supported later by the results of Carter (2004) using a large sample of manufacturing and service organizations. Boyd et al (2007) revealed that monitoring supplier's performance not only hinders CSR implementation in the supply chain

context, but also damages the extended buyer-supplier relationships. In a related research, Cramer (2008) revealed that the way the firm adopts in organizing CSR in international product chain depends on diversity and complexity of product chain, the power of the firm in the chain, and the level of ambition set. In small and medium size enterprises (SMEs) context, Ciliberti et al. (2008) found that companies often employ various strategies, management systems and tools to transfer socially responsible behavior to suppliers a long their supply chain.

Moreover, the findings of Eltantawy et al. (2009) showed that supply management ethical responsibility has an indirect impact on performance through its positive relationship with perceived reputation. Salam (2009) found that individual values and people-oriented organizational culture are the most important drivers of PSR; a finding that is also supported by the results of Miao et al (2012). In the context of global companies, Tate et al. (2010) concluded that firm's social, environmental, economic responsibility along supply chain varies with industry type, firm size and geographic location. In addition, the results of Paulraj (2011) demonstrated that internal resources and capabilities, and rather purchasing function only, play an important role in activating social responsibility in SCM. Moreover, while Ciliberti et al. (2011) found that social responsibility helps in overcoming the principle-agent problem between chain directors and partners in supply chains, Cruz (2011) pointed out that socially responsible supply chain networks affect product demand positively.

Inventory and Supply Chain Management

The theme that inventory has a passive role in business organizations has dominated the research agenda over the past decades. This perspective was constrained by three assumptions: inventory can be managed and optimized separately from other organizational entities, used to smooth internal and external operations, and evaluated according to its related replenishment and holding costs. These assumptions came directly from economics literature, which emphasizes the principles of profit maximization, economies of scale and linear organizational structure (Chikan 2007). However, the emerging of new economic imperatives, such as business networking, social responsibility and globalization, have altered the research agenda to recognize the vital or the active role of inventory in formulating and implementing the firm's strategy. Specifically, the new paradigm considers inventory as an active contributor in attaining value creation, flexibility and control (Chikan 2009).

Inventory plays an important role in supply chain management. This is not only because any extra

inventory is an indicator of inefficiency through the entire chain, but also because it affects both cost and service (Neale et al. 2004). As a result, the shift from a passive to an active view of inventory has its consequences on studying inventory in the context of SCM. Critical examination of literature indicates that despite the crucial role that inventory plays in SCM (Ganeshan et al. 2001; Looman et al. 2002; Neale et al. 2004; Dooley et al. 2010), prior work that examined various imperatives of SCM paid less attention to inventory (Chikan 2007). For instance, prior work has tried to establish a link between inventory and different realities of SCM that encompass, for example, change in demand (Dooley et al. 2010); forecasting systems (Fildes and Beard 1992), design of distribution networks (Jayaraman 1998), supply chain costs (Looman et al. 2002); control systems (Buxey 2006), ownership structure (Elsayed and Wahba 2013), managerial perception (Chikan 2009 & 2011), liquidity and financial constraints (Corbett et al. 1999; Buzacott and Zhang 2004), stock market (Lai 2006), and risk aversion (Chen et al. 2007).

Inventory and Corporate Social Responsibility

Previous discussion shows that although the importance of both inventory and CSR to SCM, studies that investigate the relationship between inventory and CSR, in SCM context, are rare. For instance, Huang and Kung (2010) examined the drivers of environmental disclosure in a sample of 759 Taiwanese firms and found that inventory turnover and environmental disclosure are not correlated. In contrast, Chikan (2011) used a sample of 138 Hungarian managers to explore managers' view of inventory and revealed that respondents reported CSR as a key business trend that affects inventory management.

In fact, the scarcity of research that examines the relationship between inventory and CSR is surprising given the evidence that inventory represents a huge source of cost (Neale et al., 2004; Chikan 2007), a matter that is often reported as a major impediment in practicing social responsibility in SCM (Carter and Dresner 2001; Mont and Leire 2009; Walker and Brammer 2009; Melo 2012). This is because the incurred costs, and hence, the amount of resources that are available to the firm will determine its orientation towards corporate social responsibility (Waddock and Graves 1997; Elsayed 2006; Lopez-Gamero et al. 2008), or as it is argued in prior work, "doing well by doing good" (Waddock and Graves 1997: 312).

If the above assertion is valid, the relationship between inventory management and corporate social responsibility is expected to be positive. The underlying assumption of this argument is that inventory reduction, as an indicator of efficient

inventory management, is not a target in itself. Rather, it is a consequence of implementing some appropriate supply chain initiatives (Yao and Dresner 2008; Looman et al. 2002). Moreover, efficient inventory management leads to more available resources (Oliver 1999; Cook et al. 2001), which, in turn, drive or determine corporate social responsibility. This argument will be tested empirically through the following hypothesis:

H1: Inventory management affects corporate social responsibility positively

Sample and Variables Measurement

Sample

The sample of this study includes Egyptian firms that are listed in the S&P/EGX Index for corporate social responsibility (ESG Egypt), which is prepared and published by the Egyptian Corporate Responsibility Center (ECRC). The S&P-EGX/ESG index determines annually the ranking of 30 best Egyptian firms according to their social programs, initiatives and activities. The sample covers all the firms that are included in the index from 2007 to 2010, as the index was first published in 2007. Thus the total number of firms in the sample is 38 firms with 149 observations during the period 2007-2010 and covers 12 different industrial sectors. Thus, the sample represents 14.15% of the total listed firms in 2010 (the total number of listed firms in the Egyptian Stock Exchange (EGX) is 212 firms in 2010).

To test for whether the sample of the current study represents all listed firms in the EGX, the average of the total market capitalization during 2007-2010 for all companies listed in the EGX, as well as for those firms constituting the sample, is computed. The average for all listed firms was LE 487.13 billion and reached LE 204 billion for the sample. Given that the sample accounted for 41.8 percent of the total market capitalization of the entire market, it can be argued that sample does represent the population (i.e., all firms listed in the EGX).

Dependent Variable

Corporate social responsibility (CSR), as the main dependent variable, is expressed, as explained above, by the ranking of Egyptian firms in the S&P/EGX Index for corporate social responsibility (ESG Egypt). The S&P/EGX index assigns ranks from (1) to (30), as lower value means a better social responsibility. For ease of presentation and explanation, annual ranks are reverse coded, as a higher value denotes a better CSR.

Independent Variable

Inventory management (IVM) is the main independent variable in this study and is measured by

the ratio of inventory to total assets. According to Modi and Mabert (2010: 84), inventory to total assets is a good proxy for efficiency of supply chain management as it “allows one to capture the efficiency of material flow with respect to firm assets... Organizations that manage their supply chains more efficiently will have less inventory and hence a lower inventory-to-asset ratio.” In fact, using of inventory to assets ratio, first, enables us to take into account financial resources that are devoted to inventory and cannot be used in other purposes (Fullerton et al. 2003). Second, it emphasizes “more on the long run determinants of inventory holdings than on the short run dynamics of inventory adjustment” (Corbett et al. 1999: 51). In regression analysis below, the inventory to assets ratio is reverse coded, as a higher value refers to a more efficient inventory management (Please note that using of sales to inventory ratio does not alter the results that are reported in this paper).

Control Variables

Different control variables are included in models of analysis to overcome misspecification problem. Firm size (SIZ) is a relevant variable that could determine corporate social responsibility for several alternatives arguments. First, large firms are likely to have more resources and that enhances a firm’s ability to possess and process social information, which in turn gives the firm more competitive advantages (Russo and Fouts 1997). Second, firm size may reflect the legitimacy principle, or to what extent the firm is visible to the public and this is because a large firm is either seen as industry leader (Henriques and Sadorsky 1996), or is likely to have more environmental risk (Cohen et al. 1995). Third, it is argued also that firm size could moderate the relationship between social strategy and stakeholder orientation (Buysse and Verbeke 2003). Finally, firm size has been related to the existence of scale economies inherent in social oriented investments (Chapple et al. 2005; McWilliams and Siegel 2000). Firm Size is represented by the firm total assets (Elsayed and Paton 2005). The natural logarithm is employed to transform firm size, as the Shapiro-Wilk W test for normality is significant ($Z= 7.558$, $p < 0.001$).

Firm age (AGE) is also controlled for as management problems and principles are rooted in time (Greiner 1972). Further, controlling for firm age is becoming important on the base that the more developed the firm, the greater is the likelihood that problems associated with path dependency will hinder strategic change in the firm (Henderson and Clark 1990). It is represented by the time period from the incorporation date and the year of analysis (Elsayed and Wahba 2013). Financial leverage (RSK) is employed in the literature (e.g., Waddock and Grave 1997) as a proxy for the risk. It is used to

reflect management's risk tolerance that influences its attitude towards social activities and measured by ratio of total debt to total assets.

Dividend per share (DIV) is included to reflect available investment opportunities (Wahba 2010), and measured by total dividend paid to ordinary shares divided by number of ordinary shares. Liquidity (LIQ) is added to control for managerial discretion regarding social initiatives and programs (Elsayed and Paton 2009), and proxied by the ratio of current assets to current liabilities. Capital intensity (INT) is also included as a control variable for the expected relationship between capital intensity and social investment decision (Rust and Rothwell 1995). Capital intensity is measured by the ratio between payments in fixed assets and the firm's total assets. Controlling for industry effects (IND) is also important not only because its effect on inventory

level (Mady 1991), but also as product differentiation may depend on the industry to which the firm belongs (McWilliams and Siegel 2001). Consequently, the study supplements the models by experimenting with the inclusion of dummy variables for each two-digit standard industrial classification (SIC) code.

Empirical Analysis

Table 1 presents descriptive statistics for all variables discussed above. To assess whether there is a difference between industrial sectors based on dependent, explanatory and control variables, parametric analysis was performed using the one-way analysis of variance test (ANOVA). The findings (reported in Table 1) indicate that there is a systematic variation across the twelve industrial sectors in conjunction with all variables.

Table 1. Descriptive statistics and analysis of variance

	Mean	Sd	25 th Percentile	Median	75 th Percentile	ANOVA (F)
Corporate Social Responsibility	15.87	8.51	8	16	23	3.50***
Inventory Management	1.175	3.71	0.04	0.07	0.56	3.35**
Firm Size	21.51	2.18	19.87	21.74	23.20	9.84***
Firm Age	26.41	19.68	12	22.5	33	6.73***
Financial Leverage	55.98	40.60	28.65	56.83	71.79	3.81***
Dividends per Share	3.09	20.33	0	0	1	2.92**
Liquidity	3.69	8.18	1.13	1.36	2.92	2.39*
Capital Intensity	20.82	20.29	1.28	14.68	34.56	1.50

*p<0.05; **p<0.01; ***p<0.001

The following model of analysis was used to test for the effect of inventory management on corporate

social responsibility, as it is predicted in the main hypothesis of this study:

$$CSR_{it} = \alpha + \gamma_1 IVM_{it} + \gamma_2 SIZ_{it} + \gamma_3 AGE_{it} + \gamma_4 RSK_{it} + \gamma_5 DIV_{it} + \gamma_6 LIQ_{it} + \gamma_7 INT_{it} + \gamma_8 SIC_i + \delta_i + \omega_{it}$$

Where, (α) is a constant, ($\gamma_1 : \gamma_8$) are the parameters for the explanatory and control variables. The subscript (i) refers to the firm number and the subscript (t) denotes the time period. (δ_i) is the unobservable individual heterogeneity, and (ω_{it}) is the remainder disturbance or the usual disturbance in the regression model that varies with individual units and time.

The Hausman specification test (Hausman 1978), as explained in Gujarati (2003), was applied to test for whether inventory management and corporate social responsibility are considered as endogenous variables or not. The Chi2 statistics for the predicted value of inventory management is not significant (Chi2=0.02, p=0.8754). Thus, it is concluded that both variables can be treated as exogenous variables.

Econometric estimates of corporate social responsibility are reported in Table 2. As the dependent variable is an ordinal variable, the maximum-likelihood ordered logistic regression was used to predict the probability that corporate social responsibility will be determined by inventory management with controlling for other variables as stated above (please note that using of maximum-likelihood ordered probit regression does not alter the findings of this study). Thus, an unrestricted model has been set up in which inventory management is included as an explanatory variable (as well as controls variables). According to results that are reported in Table 2, inventory management has exerted a positive and significant coefficient on corporate social responsibility (0.325, p<0.01). This finding gives supportive evidence for the applicability of the main hypothesis in this study.

Table 2. Maximum-likelihood ordered logistic regression of the relationship between inventory management and corporate social responsibility

Dependent variable: Corporate social responsibility	Unrestricted Model	Restricted Model
Inventory Management	0.325** (0.118)	
Firm Size	-1.312** (0.484)	0.366* (0.161)
Firm Age	-0.024 (0.017)	-0.002 (0.011)
Financial Leverage	-0.034*** (0.008)	-0.008 (0.005)
Dividends per Share	-0.057 (0.035)	-0.015* (0.009)
Liquidity	-0.156 (0.119)	0.040* (0.024)
Capital Intensity	18.262*** (4.94)	0.055 (0.038)
Industry Joint Effects (χ^2)	29.42***	25.12***
LR (χ^2) model	73.44***	52.16***
Pseudo R2	0.22	0.08
AIC	346.94	352.93
BIC	428.89	432.94
LR (χ^2) test		7.99**

(i) N=38 firms, n =149

(ii) +p<0.10; *p<0.05; **p<0.01; ***p<0.001

(iii) Figures in brackets are standard errors robust to heteroscedasticity

(iv) LR (χ^2) model is the model goodness-of-fit for maximum-likelihood ordered logistic regression.

(v) AIC and BIC are the standard information criteria for model selection, as a lower figure means a better-specified model (Greene, 2003).

(vi) LR (χ^2) test is the likelihood ratio test of the restricted model against the unrestricted model.

As a robustness check, another restricted model, which excludes inventory management, nested within unrestricted model is considered and results are reported in Table 2. Then a likelihood ratio (LR χ^2) test of the restricted model against the unrestricted model has been conducted. The LR χ^2 statistics for nested model is 7.99 (p<0.001). The implication of this is that inventory management cannot be safely dropped from model of analysis. That is, inventory management does seem to add something unique in explaining differences in corporate social responsibility. Further evidence comes from calculating the standard information criteria for the two models: the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) (also reported in Table 2). Remembering that for both AIC and BIC, a lower figure means a better specified model (Gujarati, 2003), both criteria confirm that the “unrestricted model” is superior to the “restricted model” with AIC 346.94 and BIC 428.89. Thus, the general conclusion is that inventory management has a key role in predicting corporate social responsibility.

Conclusion and Discussion

Increasing pressure on firms to be more socially oriented have triggered different streams of literature that want to explore the theme of CSR in various disciplines. Despite researchers in SCM have recently joined the vogue of CSR, establishing a link between inventory management and social responsibility seems to be far from the concern of literature. In fact, this is unjustifiable given the evidence that inventory represents a huge source of cost (Neale et al. 2004; Chikan 2007), a matter that is often reported as a major impediment in practicing social responsibility in SCM (Carter and Dresner 2001; Walker and Brammer 2009). Therefore, this paper fills this gap in literature by examining directly the effect of inventory management on CSR using a sample of Egyptian listed firms. Providing experience from less developed contexts may help in developing theories of both SCM and CSR, where much of prior research presents evidence from developed countries.

Empirical analysis, using the maximum-likelihood ordered logistic regression, demonstrates that inventory management has a positive and significant effect on corporate social responsibility. Further analysis shows that inventory management cannot be safely dropped from model of analysis.

Rather, inventory management does add something unique in explaining differences in corporate social responsibility. This conclusion is robust to use of different control variables that may confound the relationship between inventory management and CSR.

The findings of this paper have some implications for practitioners, policy makers and academic research. For practitioners interested in optimizing their firms' values, thinking in managing supply chain imperatives, and specially inventory, in terms of social responsibility may guide them to build up a stock of reputational capital that can be used, in turn, to increase the cost of their rivals. Moreover, these results may convince policy makers in Egypt to move from "state orientation" mechanisms to "business organization" mechanisms (Gomaa, 1997; Whaba, 2009) in dealing with social issues.

For academic research, the findings of this study open some directions for future work. Future studies are invited to reinvestigate the relationship between inventory management and CSR in other contexts or countries. This becomes very important not only because "socially responsible investment has no universal principles" (McLachlan and Gardner 2004: 20), and CSR has often "a location-specific context" (Welford et al. 2008), but also because inventory problems and characteristics vary with country specifications (Goonatilake 1984). This direction is expected also to add value to our understanding with the increase in the number of integrated global supply chain networks and the adoption of corporate social programs and initiatives. The outcome of such cross-countries studies is more likely to detect possible alternatives that can be applied to encourage companies to be more socially responsible in managing their internal and external supply chains.

Given the significant effect of firm size, financial leverage, and capital intensity on this study, it is worthwhile in future research to investigate the relationship between inventory management and corporate social responsibility over firm life cycle. This is more likely to enrich literature given the evidence that firms in different life cycle stages demonstrate different levels of corporate social responsibility (Elsayed and Paton 2009) and inventory level differs with firm's growth (Gaur et al. 2005). Another related research area that can be explored in future studies is the relationship between inventory and CSR in small and medium size enterprises (SMEs). This is an interesting issue as little research has considered the CSR practices in the supply chain context, especially in developing countries (Ciliberti et al., 2008).

Furthermore, examining how the relationship between inventory management and corporate social responsibility may vary with industry type is another promising area for future research. This is because inventory (Mady 1991), and product differentiation (McWilliams and Siegel 2001), may depend on the

industry to which the firm belongs. For instance, in industries such as food and cosmetics where products are highly differentiated it may be more likely to find significant concern with social attributes.

References

1. Beamon, B. (2005), "Environmental and sustainability ethics in supply chain management", *Science and Engineering Ethics*, Vol.11, No. 2, pp. 221-234.
2. Boyd, D.E., Spekman, R.E., Kamauff, J.W. Werhane, P. (2007). "Corporate social responsibility in global supply chains: A procedural justice perspective", *Long Range Planning*, Vol.40, pp.341-356.
3. Buxey, G. (2006), "Reconstructing inventory management theory", *International Journal of Operations & Production Management*, Vol.26, No.9, pp.996-1012.
4. Buysse, K., and Verbeke, A. (2003), "Proactive environmental strategies: a stakeholder management perspective", *Strategic Management Journal*, Vol.24, No.5, pp.453-470.
5. Buzacott, J., and Zhang, R. (2004), "Inventory management with asset-based financing", *Management Science*, Vol.50, No.9, pp.1274-1292.
6. Carter, C. R. (2004). "Purchasing and social responsibility: A replication and extension", *Journal of Supply Chain Management*, Vol.40, pp.4-16.
7. Carter, C.R. and Dresner, M. (2001), "Purchasing's role in environmental management: cross-functional development of grounded theory", *Journal of Supply Chain Management*, Vol.37, No.3, pp.12-27.
8. Carter, C.R. and Jennings, M.M. (2004), "The role of purchasing in corporate social responsibility: a structural equation analysis", *Journal of Business Logistics*, Vol.25, No.1, pp.145-88.
9. Carter, C.R., and Ellram, L. (2003). "Thirty-five years of the journal of supply chain management: Where have we been and where are we going?", *Journal of Supply Chain Management*, Vol.39, pp.27-39.
10. Chapple, W., Morrison, C., and Harris, R. (2005), "Manufacturing and corporate environmental responsibility: cost implication of voluntary waste minimization", *Structural Change and Economic Dynamics*, Vol.16, No.3, pp.347-373.
11. Chen, X., Sim, M., Smichi-levi, D., and Sun, P. (2007), "Risk aversion in inventory management", *Operations Research*, Vol.55, No.5, pp.828-842.
12. Chikan, A. (2007), "The new role of inventories in business: real world changes and research consequences", *International Journal of Production Economics*, Vol.108, Nos.1-2, pp.54-62.
13. Chikan, A. (2009), "An empirical analysis of managerial approaches to the role of inventories", *International Journal of Production Economics*, Vol.118, No.1, pp.131-135.
14. Chikan, A. (2011), "Managers' view of a new inventory paradigm", *International Journal of Production Economics*, Vol.133, No.1, pp.54-59.
15. Ciliberti, F., de Haan, J., de Groot, G., and Pontrandolfo, P. (2011). "CSR codes and the principal-agent problem in supply chains: four case studies", *Journal of Cleaner Production*, Vol.19, pp.885-894.
16. Ciliberti, F., Pontrandolfo, P., and Scozzi, B. (2008). "Investigating corporate social responsibility in supply

- chains: a SME perspective”, *Journal of cleaner production*, Vol.16, pp.1579-1588.
17. Cohen, M., Fenn, S., and Konar, S. (1995), “Environmental and financial performance: are they related?”, Owen Graduate School of Management Working Paper, Vanderbilt University.
 18. Cook, J., DeBree, K., and Feroletto, A. (2001), “From raw materials to customers: supply chain management in the service industry”, *SAM Advanced Management Journal*, Vol.66, No.4, pp.14-21.
 19. Corbett, J., Hay, D., and Louri, H. (1999), “A financial portfolio approach to inventory behavior: Japan and the UK”, *International Journal of Production Economics*, Vol.59, No.1, pp.43-52.
 20. Cramer, J. M. (2008). “Organising corporate social responsibility in international product chains”, *Journal of Cleaner Production*, Vol.16, pp.395-400.
 21. Cruz, J. M. (2011). “Modeling the relationship of globalized supply chains and corporate social responsibility”, *Journal of Cleaner Production*, doi:10.1016/j.jclepro.2011.09.013
 22. Dooley, K. J., Yan, T., Mohan, S., and Gopalakrishnan, M. (2009). “Inventory Management and the bullwhip effect during the 2007-2009 recession: evidence from the manufacturing sector”, *Journal of Supply Chain Management*, Vol.46, pp.12-18.
 23. Elsayed, K. (2006), “Reexamining the expected effect of available resources and firm size on firm environmental orientation: an empirical study of UK firms”, *Journal of Business Ethics*, Vol.65, pp.297–308.
 24. Elsayed, K., and Paton, D. (2005), “The impact of environmental performance on firm performance: static and dynamic panel data evidence”, *Structural Change and Economic Dynamics*, Vol.16, No.3, pp.395-412.
 25. Elsayed, K., and Paton, D. (2009), “The impact of financial performance on environmental policy: does firm life cycle matter?”, *Business Strategy and the Environment*, Vol.18, pp.397-413.
 26. Elsayed, K., and Wahba, H. (2013), “Reinvestigating the relationship between ownership structure and inventory management: a corporate governance perspective”, *International Journal of Production Economics*, Vol.143, pp.207-218
 27. Eltantawy, R., Fox, G., and Giunipero, L. (2009), “Supply management ethical responsibility: reputation and performance impacts”, *Supply Chain Management: An International Journal*, Vol.14, No.2, pp.99-108.
 28. Fildes, R., and Beard, C. (1992), “Forecasting systems for production and inventory control”, *International Journal of Operations & Production Management*, Vol.12, No.5, pp.4-27.
 29. Fullerton, R., McWatters, C., and Fawson, C. (2003), “An examination of the relationship between JIT and financial performance,” *Journal of Operations Management*, Vol.21, No.4, pp.383-404.
 30. Ganeshan, R., Boone, T. and Stenger, A.J. (2001), “The impact of inventory and flow planning parameters on supply chain performance: an exploratory study”, *International Journal of Production Economics*, Vol. 71, Nos.1-3, pp. 111-118.
 31. Garg, S., Vrat, P., and Kanda, A. (2002), “Trade-offs between multiskilling and inventory in assembly line operations under demand variability”, *International Journal of Operations & Production Management*, Vol.22, No.5, pp.565-583.
 32. Gaur, V., Fisher, M., and Raman, A. (2005), “An econometric analysis of inventory turnover performance in retail services”, *Management Science*, Vol.51, No.2, pp.181–194.
 33. Giunipero, L., and Handfield, R. (2004), *Purchasing Education and Training II*, Center for Advanced Purchasing Studies, Research Report, Tempe, Arizona.
 34. Giunipero, L., Hooker, R., Joseph-Matthews, S., Yoon, T., and Brudvig, S. (2008), “A decade of SCM literature: past, present, and future implications”, *Journal of Supply Chain Management*, Vol.44, No.4, pp.66-86.
 35. Goonatilake, P. (1984), “Inventory control problems in developing countries”, *International Journal of Operations and Production Management*, Vol.4, No.4, pp.57-64.
 36. Greiner, L. (1972), “evolution and revolution as organizations grow”, *Harvard Business Review*, Vol.50, No.4, pp.37-46.
 37. Gujarati, D. (2003), *Basic Econometrics*. 4th Edition, McGraw-Hill, New York.
 38. Hausman, J. (1978), “Specification tests in econometrics”, *Econometrica*, Vol.46, pp.1251–1271.
 39. Henderson, R., and Clark, K. (1990), “Architectural innovation: the reconfiguration of existing”, *Administrative Science Quarterly*, Vol.35, No.1, pp.9–30.
 40. Henriques, I., and Sadosky, P. (1996), “The determinants of an environmentally responsive firm: An empirical approach”, *Journal of Environmental Economics and Management*, Vol.30, No.3, pp.381-395.
 41. Huang, C., and Kung, F. (2010), “Drivers of environmental disclosure and stakeholder expectation: evidence from Taiwan”, *Journal of Business Ethics*, Vol.96, pp.435-451.
 42. Jayaraman, V. (1998), “Transportation, facility location and inventory issues in distribution network design: an investigation”, *International Journal of Operations & Production Management*, Vol.18, No.5, pp.471-494.
 43. Kärkkäinen, M. (2003), “Increasing efficiency in the supply chain for short shelf life goods using RFID tagging”, *International Journal of Retail & Distribution Management*, Vol.10, No.31, pp.529-536.
 44. Klassen, R., Vereecke, A. (2012), “Social issues in supply chains: capabilities link responsibility, risk (opportunity), and performance”, *International Journal of Production Economics*, Vol.140, pp.103-115.
 45. Kolchin, M.G., and Giunipero, L. (1993), “*Purchasing Education and Training: Requirements and Resources*”, Center for Advanced Purchasing Studies, Research Report, Tempe, Arizona.
 46. Lai, R. (2006), “*Inventory and the stock market*”, working paper, the Wharton School, University Pennsylvania, (doi: 10.2139/ssrn.789884).
 47. Looman, A., Ruffini, F., and Boer, L. (2002). “Designing ordering and inventory management methodologies for purchased parts”, *Journal of Supply Chain Management*, Vol.38, pp.22-29.
 48. Lopez-Gamero, M., Claver-Cortes, E., and Molina-Azorin, J. (2008), “Complementary resources and capabilities for an ethical and environmental

- management: a Qual/Quan study”, *Journal of Business Ethics*, Vol.82, pp.701-732.
49. Mady, M. T. (1991), “The effect of type of industry on inventory investments and structure: the Egyptian case”, *International Journal of Operations & Production Management*, Vol.11, No.6, pp.55-65.
50. McLachlan, J., and Gardner, J. (2004). “A comparison of socially responsible and conventional investors”, *Journal of Business Ethics*, Vol.52, pp.11-25.
51. McWilliams, A., and Siegel, D. (2000), “Corporate social responsibility and financial performance: correlation or misspecification?”, *Strategic Management Journal*, Vol.21, No.5, pp.603-609.
52. McWilliams, A., and Siegel, D. (2001), “Corporate social responsibility: a theory of the firm perspective”, *Academy of Management Review*, Vol.26, pp.117-127.
53. Melo, T. (2012). “Determinants of corporate social performance: the influence of organizational culture, management tenure and financial performance”, *Social Responsibility Journal*, Vol.8, No.1, pp.33-47.
54. Miao, Z., Shun, C., and Xu, D. (2011). “Exploring the antecedents of logistics social responsibility: a focus on Chinese firms”, *International Journal of Production Economics*, Vol.140, pp.18-27.
55. Modi, S., and Mabert, V. (2010), “Exploring the relationship between efficient supply chain management and firm innovation: an archival search and analysis”, *Journal of Supply Chain Management*, Vol.46, No.4, pp.81-94.
56. Mont, O., and Leire, C. (2009). “Socially responsible purchasing in supply chains: drivers and barriers in Sweden”, *Social Responsibility Journal*, Vol.5, No.3, pp.388-407.
57. Neale, J., Tomlin, B., and Willems, S. (2003), “The role of inventory in superior supply chain performance”, in Harrison, T., Lee, H., and Neal, J. (Eds.), *The Practice of Supply Chain Management*. Springer, New York, pp.31-59.
58. Oliver, R. (1999), “Real time strategies: the end of inventory”, *Journal of business Strategy*, Vol.20, No.1, pp.8-11.
59. Ornek, M. A., and Collier, P. I. (1988), “The determination of in-process inventory and manufacturing lead time in multi-stage production systems”, *International Journal of Operations & Production Management*, Vol.8, No.1, pp.74-80.
60. Paulraj, A. (2011). “Understanding the relationships between internal resources and capabilities, sustainable supply management and organizational sustainability”, *Journal of Supply Chain Management*, Vol.47, pp.19-37.
61. Porter, M.E., and Van der Linde, C. (1995). “Toward a new conception of the environment-competitiveness relationship”, *The Journal of Economic Perspectives*, Vol.9, pp.97-118.
62. Roberts, S. (2003), “Supply chain specific? understanding the patchy success of ethical sourcing initiatives”, *Journal of Business Ethics*, Vol. 44, Nos.2-3, pp.159-70.
63. Russo, M., and Fouts, P. (1997), “A resources-based perspective on corporate environmental performance and profitability”, *Academy of Management Journal*, Vol.40, No.3, pp.534-559.
64. Rust, J., and Rothwell, G. (1995), “Optimal response to a shift regulatory regime: the case of the US nuclear power industry”, *Journal of Applied Econometrics*, Vol.10, No.4, pp.75-118.
65. Salam, M.A. (2009). “Corporate social responsibility in purchasing and supply chain”, *Journal of Business Ethics*, Vol.85, pp.355-370.
66. Tate, W., Ellram, L., and Kirchoff, J. (2009). “Corporate social responsibility reports: a thematic analysis related to supply chain management”, *Journal of Supply Chain Management*, Vol.46, pp.19-44.
67. Tencati, A., Russo, A., and Quaglia, V. (2010). “Sustainability along the global supply chain: the case of Vietnam”, *Social Responsibility Journal*, Vol.6, No.1, pp.91-107.
68. Waddock, S., and Graves S. (1997), “The corporate social performance-financial performance link”, *Strategic Management Journal*, Vol.18, No.4, pp.303-319.
69. Wahba, H. (2008), “Exploring the moderating effect of financial performance on the relationship between corporate environmental responsibility and institutional investors: some Egyptian evidence”, *Corporate Social Responsibility and Environmental Management*, Vol.15, pp.361-371.
70. Wahba, H. (2010), “How do institutional shareholders manipulate corporate environmental strategy to protect their equity value? A study of the adoption of ISO 14001 by Egyptian firms”, *Business Strategy and the Environment*, Vol.19, No.8, pp.495-511.
71. Walker, H., and Brammer, S. (2009). “Sustainable procurement in the United Kingdom public sector”, *Supply Chain Management: An International Journal*, Vol.14, No.2, pp.128-137.
72. Welford, R., Chan, C., and Man, M. (2008), “Priorities for corporate social responsibility: a survey of businesses and their stakeholders”, *Corporate Social Responsibility and Environmental Management*, Vol.15, pp.52-62.
73. Xia, Y., and Tang, T. (2011), “Sustainability in supply chain management: suggestions for the auto industry”, *Management Decisions*, Vol.49, No.4, pp.465-512.
74. Yao, Y., and Dresner, M. (2008), “The inventory value of information sharing, continuous replenishment, and vendor managed inventory”, *Transportation Research Part E*, Vol.44, pp.361-378.
75. Zakaria, M., Garanca, Z., and Sobeih, A. (2012). “Cultural and legal challenges in implementing code of conduct in supply chain management of mobile phone industries: Sony Ericsson case study”, *Social Responsibility Journal*, Vol.8, No.2, pp.227-241.