



Exploring role of environmental proactivity in financial performance of manufacturing enterprises: a structural modelling approach



Parag Sen ^{a,*}, Mousumi Roy ^b, Parimal Pal ^a

^a Department of Chemical Engineering, National Institute of Technology Durgapur, 713209, India

^b Department of Management Studies, National Institute of Technology Durgapur, 713209, India

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ABSTRACT

In the backdrop of overwhelming concern for greenhouse gas emission, global warming and overall environmental degradation, many manufacturing enterprises are now integrating their manufacturing philosophy with proactive environmental management approach. It is uppermost in the minds of many whether such environmental proactive approach will also help to improve financial performance of the manufacturing enterprises. This study explores this pertinent issue in the context of manufacturing enterprises of two democratic countries from the east and the west, India and UK respectively. Data collected through a questionnaire validated by invited experts distributed among manufacturing enterprises of India and UK were used to construct the structural model for testing the relationship between environmental proactivity and financial performance. The fitness and robustness of the structural model can be considered adequate. The results indicate positive correlation of environmental proactivity with financial performance, manufacturing based operational performance and non-manufacturing based operational performance. Model equations derived from structural analysis, however, reveal much stronger positive correlation of financial performance with manufacturing based operational practices than with the non-manufacturing based operational practices. The novelty of this research work lies in its managerial implications. It is suggested from the research that the manufacturing enterprises of India and UK should focus more on the manufacturing based operational practices than non-manufacturing based operational practices in order to improve environmental and as well as financial performance.

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1. Introduction

Businesses across the world are undertaking phenomenal change in their production strategies by incorporating the concept of sustainable development. This has become imperative due to deteriorating environmental health owing to emissions of greenhouse gases (GHG) and other polluting substances from manufacturing. Lifecycle analysis of many such products indicates their disastrous footprint on the mother earth. This has necessitated environmental proactive role in running business. Manufacturing enterprises small, medium or large contribute significantly to GHG emission. Environmental quality is further degraded by discharge of solid wastes and wastewater from their operations (Kumar and Pal, 2013a, 2013b; Swain, 2006; Pizer et al.,

2011; Marshall et al., 2013). Energy inefficiency and inefficient supply chain also lead to increased emission and generation of more wastes affecting the environment as well as financial performance of the manufacturing enterprises. There are a number of good reasons to get involved in taking action on climate change from the industrial perspective. Such actions may reduce cost and increase revenue, reduce the risks associated with higher energy costs, develop appropriate strategies for reduction of greenhouse gas emissions, and initiate proactive approaches for both preventive and corrective measures, along with compliance with government-initiated regulations. The manufacturing enterprises all over the world are thus bound to adopt environmental proactive approach (Swain, 2006). But the question of whether such an environmental management approaches will lead to better financial performance or not is arising in the minds of the entrepreneurs. This issue needs to be particularly examined in the contexts of manufacturing sectors of both the developing and the developed countries where India and UK are two fit cases for this study.

* Corresponding author. Tel.: +91 9830562645.

E-mail address: paragbelurmath@gmail.com (P. Sen).

India is a developing economy of the east and UK is a developed economy of the west. Manufacturing is a top priority in both India and UK. India has recently launched a national manufacturing policy that aims to increase manufacturing activity from a current 16% of Gross Domestic Product (GDP) to 25% by 2022 in order to achieve a growth rate of 12–14% per year. Government of UK also announced a series of policy on advanced manufacturing. Apart from manufacturing similarity in terms of technology and operations, both the countries face similar kind of challenges to develop their manufacturing strategies (UK and India Partnership in Advanced Manufacturing Research Challenges, 2012; Shapira et al., 2014). In environmental quality excellence awards, UK ranks just after India (IBEF, 2013). In both the countries, stakeholder's pressure as to cleaner production is a key issue for consideration. The issues of green product design, green manufacturing and green supply chain management including boundary-spanning activities such as green purchasing and practice of reverse logistics are gaining importance in these two countries (Binder and Neumayer, 2005; Kapila et al., 2011; Baud and Dhanalakshmi, 2007).

Thus in this paper, manufacturing enterprises of India and UK have been considered collectively for evaluation purpose with the aim of testing the relationship between environmental proactivity and financial performance of manufacturing enterprises. The relationships of environmental proactivity with non-manufacturing based operational performance are also evaluated (as prerequisites of the main objective). Structural equation modelling (SEM) is used in the study as it applies effective statistical tools for testing and estimating causal relations between latent or unobserved variables allowing both confirmatory (theory testing) and exploratory modelling (theory development). Identification of the constructs and variables from literature with respect to the objective as per hypotheses is essential to successful structural equation modeling (Jabbour et al., 2013; Sambasivan et al., 2013). Information about rest of the paper is organized as follows. Literature review is discussed in section 2. Research methods and data collection are discussed in section 3. Research hypotheses are provided in section 4. Results and discussion are illustrated in section 5 and the conclusions are provided in section 5.

2. Literature review

Eco-friendly manufacturing is considered as an economically driven integrated approach that seeks reduction and elimination of all waste streams associated with the design, manufacture, use and disposal of all involved materials, and products (Curkovic, 2003). Life cycle assessment is also considered a sustainable tool for environmentally friendly manufacturing that takes into account product design, manufacturing and life cycle activities. Benefits of clean production do not remain confined to reduction of adverse environmental impacts only (Choi et al., 1997) but also lead to better product acceptability. Environmentally conscious customers demand product functional design complying with environmental regulations (Smith and Yen, 2010). Hence development of green processes and products can be a way for manufacturing enterprises to achieve competitive advantage with financial benefits (Porter and Linde, 1995; Dangelico and Pontrandolfo, 2010). Proper environmental management system (EMS) should have an integrated and holistic approach to improve environmental and financial performance (Hui et al., 2001).

Decisions about green initiatives are taken by the top management of the manufacturing enterprises to improve environmental performance by applying the principles of sustainability (Vachon and Klassen, 2008; Kneller and Manderson, 2012; Toke et al.,

2012). Environmental proactivity often gets reflected in the approaches of manufacturers to get ISO 14001 certificates (Jabbour et al., 2013; Sambasivan et al., 2013; Arimura et al., 2011). Many manufacturing enterprises are now considering 'reduce-recycling-reuse' (3R) concept to reduce raw material and water consumption. Reducing raw material and water consumption not only helps to prevent rapid depletion of natural resources, but also helps the manufacturing enterprises to save financially (Jayal et al., 2010; Sarkis, 1995).

However, it is not clear whether the environmental proactivity is positively related to the financial performance of the manufacturing enterprises of India and UK. Particularly, in case of limited financial resources how environmental proactivity influences financial performance, it is found controversial among the researchers (Sambasivan et al., 2013; Iwata and Okada, 2011). Governments of both these countries like many other governments of the developed as well as developing economies have applied increased focus on improving the attractiveness of the location for manufacturing enterprises through the formation of local clusters (IRMA, 2009). Formation of local clusters promotes regional development by providing various opportunities for improving environmental and economic performances of the enterprises (Planning Commission, Government of India, 2013). Researchers like Sambasivan et al. (2013) and Jabbour et al. (2013) have proposed a number of constructs (latent variables) and variables (manifest variables) that can influence the financial performance of the manufacturing enterprises through environmental proactivity. The importance of the variables can vary from country to country depending on the size of the countries. However, in this paper, all major possible variables for the proposed factors have been considered though literature shows that there may be overlapping of the variables. Such overlapping has been avoided in this work by selecting only the proper and exact variables. Five-point scale has been used to measure the degree of the variables as it is easier to mark for the decision makers compared to other point scales (Sambasivan et al., 2013; Jabbour et al., 2013).

Environmental proactivity (EP) deals with 11 variables as found from different literature. EP plays an important role at strategic level environmental decision making. EP involves (i) top management support or manpower involvement, (ii) approach to increase environmental expenditure, (iii) maintain regulations imposed by the governments and stakeholders, (iv) formal environmental management system, (v) total quality management system, (vi) long term sustainable initiatives, (vii) recycling initiatives, (viii) intelligent environmental management, (ix) life cycle assessment, (x) eco-design, and (xi) environmental risk management system. Environmental proactivity can help an enterprise to improve its operational performances based on manufacturing and non-manufacturing activities. Environmental proactivity can also lead to improve the financial performance through operational performances (Sambasivan et al., 2013; Toke et al., 2012; Jabbour et al., 2013).

Manufacturing based operational performance (MOP) involves six variables namely (i) reduction of emission to air, (ii) greener overall manufacturing system, (iii) reduction of energy consumption, (iv) reduction of raw material consumption, (v) reduction of water consumption, and (vi) reduction of wastes. Normally, manufacturing process itself is considered the significant source of environmental pollution because of formation of chips, smoke, dust and application of coolants, different chemicals or hazardous materials. From the variables, it is clear that MOP considers the prevention or controlling activities against environmental pollution or affects occurred during the time of manufacturing or because of manufacturing process (Toke et al., 2012; Setiawati et al., 2013; Sambasivan et al., 2013).

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