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Conceptual Framework for Sustainability in Indian Mining Industry

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Abstract

Sustainability is a key focus area for businesses in today's world. This means that businesses need to provide equal, if not more, emphasis to social and environmental goals as given to economic goals. Performing well economically is a given, however, only those businesses would have a competitive advantage in the times to come which perform well on social and environmental aspects. This study provides a conceptual framework for assessing sustainable business performance in mining industry. It targets mining companies in India and identifies various measurement items from the literature and the interactions with experts of the industry. These measurement items have broadly been classified under four heads, namely, external environment, internal environment, sustainability practices, and organization performance. The external business environment provides the necessary framework for an organization to operate. A favourable environment within an organization is crucial for adopting various sustainability practices. These sustainability practices comprise various initiatives by the organization to lessen the impact of its operations on the environment. Organization sustainability performance focuses on some key result areas of a business across economic, environmental and social dimensions.

Keywords: Sustainability, mining, business performance

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INTRODUCTION

In the last century, manufacturing was increased manifolds to cater to the needs of the growing population all around the world. This huge demand resulted in unwavering focus only on production. The harmful effects that this approach would result in were not taken into account. The world has gradually understood this problem and vowed to address this with utmost sincerity. With this vision, the United Nations convened a meeting of all the major countries of the world to discuss the way forward. Here, the term sustainability was defined for the first time as meeting the needs of the current generations without compromising on the ability of future generations to meet their own needs (WCED, 1987). Thereafter, the world leaders have met at various times to discuss sustainability and work together in reducing the effect of their developmental activities on the planet and the people inhabiting. With the passage of time, the focus on sustainability has increased tremendously, largely owing to the much talked about climate change and global warming.

Countries are coming up with legislations to meet their obligations towards the goals of sustainability. It is easier for developed countries to strive towards sustainability as they have been in business for a comparatively longer period of time and as a result, have earned enough to make a move towards sustainable business practices. For countries like India, which are still developing, the focus on sustainability is a bit challenging as it requires making significant investments in new processes and practices to meet the new standards. This has drawn the attention of business practitioners and the researchers in business management. The mining industry provides raw materials to many other industries. The growth in this sector has largely been driven by an upsurge in the development of various key infrastructures and increased demand for production of automotive components. The initiative by government to provide power and housing to all by the 75th anniversary of the country's independence has also resulted in higher demands from power and cement industries. This has also supported the growth in mining industry. Demand for iron and steel is also on an upsurge due to the strong expectations of growth for both the residential as well as commercial buildings.

India is also among the largest producers of many key minerals like coal (third-largest), iron-ore (fourth-largest), cement (second-largest), etc. Today, it produces 95 minerals with a projected total value to touch \$30 billion accounting for more than 2.5% of (IBEF, 2018). A few days back, India has surpassed Japan to become the second-largest producer of crude steel.

Mining is inherently considered to be environment-damaging because the various minerals are dug up from

beneath the ground. This may also require the removal of the forest cover and the people inhabiting the area around which such activities are to be taken up. Many social and environmental groups draw international attention to various environmental incidents occurring in the country. As a result, incorporating sustainability becomes even more challenging.

Keeping these things in mind, the objective of this article is to understand the factors relevant to the sustainability of the mining industry and to develop a conceptual framework for the same.

LITERATURE REVIEW

The report *Our Common Future* by WCED talked a lot about the importance of economic, social and environmental dimensions under sustainability. These dimensions are woven together into the concept of triple bottom line. This helps operationalize sustainability (Seuring and Müller, 2008). Sustainability embodies a sensible use of economic, social, and natural capital for the continual good of the organization, the planet and the generations to come. It consists of three dimensions which are the environmental, the social and the economic dimensions also known as “People, Planet and Profit” (Elkington, 1998). The intersection among the three brings a long-term economic and competitive advantage for the firm.

According to Bagheri and Hjorth (2007), sustainability is a significant driver of innovation and long-term competitive advantage. This is because it boosts both bottom line and the top line proceeds by minimizing costs as a result of lesser use of inputs, generating supplementary incomes from upgraded products and creating new businesses. This has made sustainability an area of focus in the field of supply chain management. As a result, a new area, sustainable supply chain management (SSCM), emerged within supply chain management which incorporated this concept of sustainability within itself.

Over time, many researchers have recognized the growing significance of sustainability in the literature on supply chain management. Some researchers have also termed this as green supply chain management (GSCM) because of its primary focus on environmental performance. Many researchers have used both these terms quite interchangeably. However, Ahi and Searcy (2013) analysed various definitions of green supply chain management and sustainable supply chain management through a systematic literature review and concluded that the definitions for GSCM were focused more narrowly than those for SSCM. It used several dimensions in business sustainability and SCM. The dimensions of business sustainability were social, environmental, economic and long-term focus and those of supply chain management were efficiency, coordination, flow and relationship with stakeholders.

Many studies (Zhu and Sarkis, 2004; Zhu et al., 2007; Vachon and Klassen, 2008; Holt and Ghobadian, 2009; Kumar et al., 2012; Wu et al., 2012; Prasad et al., 2018a) have confirmed the achievement of superior performance particularly in financial and environmental dimensions by implementing green practices in various manufacturing industries. Mining companies are also catching up as the government makes stricter regulations for environment.

Gonzalez-Benito and Gonzalez-Benito (2006) analysed many logistic firms and concluded that not only the government pressure, but also the pressures from various non-governmental stakeholders can lead to the

execution of environmental practices. Sarkis et al. (2010) found that training the employees on various environmental aspects facilitates the association between stakeholder pressures and environment practices. Xu et al. (2013) compares various forces leading to the adoption of GSCM.

Esfahbodi et al. (2016) found that the external driving forces of governance are the antecedents to the successful implementation of SSCM practices. It suggests that the implementation of sustainable supply chain management has an encouraging effect on the performance across the environmental dimension. It also proposes that the implementation of SSCM does not essentially cause enhanced performance across the economic dimension. This is because the economic performance was affected only by sustainable procurement.

Melnyk et al. (2003) found a positive association between sustainability practices and performances on the environmental and operational fronts. Gonzalez-Benito and Gonzalez-Benito (2005), similarly, iterated the positive relationship between environmental proactivity and performance of the business. Klassen (2000) found that a higher investment in JIT systems is associated with improved environmental performance.

Akhtar et al. (2016) opine that an adaptive leadership is a key to non-financial sustainability which in turn leads to financial sustainability. It also posits that the leadership plays a direct role in the financial sustainability of a firm. The adaptive leadership basically means the role of top management in encouraging employees towards using sustainability practices and providing the right kind of environment for taking up such initiatives.

Kuei et al. (2015) identify various factors that influence the adoption of sustainable practices in Chinese firms. It shows that external environment factors are among the most important in adopting sustainable practices. Verma et al. (2016) opine that proper communication of benefits to various stakeholders helps in mobilizing public support and thus helps get a sort of social license for operating.

RESEARCH METHODOLOGY

The literature review yielded several factors which influence the adoption of sustainability in industries and thus result in a better performance across dimensions of economic, social and environmental sustainability. Once these factors were identified, we set out to discuss these factors with the experts in the area of mining. The experts were primarily the senior management personnel from coal (two) and iron ore (two) mining. Each of these experts had a professional experience of more than twenty years in their company across various functions in the mining and production. Two experts from academia having experience of more than fifteen years in teaching and research in mining and associated management subjects were also a part of the expert panel.

The factors identified from the literature were discussed at length with these experts. They made some modifications to the identified factors. They also helped us with certain factors that were not listed earlier, but were considered important for the mining industry. Upon discussion with experts, we have divided the factors into heads like external environment, internal environment, sustainability initiatives, financial performance, operational performance, environmental performance and social performance. This work

builds upon the framework proposed by Prasad et al., 2018b. The experts also tweaked some of the factors so that they resonate better with the Indian context and are easily understood by the practitioners and academicians.

These factors along with the primary literature from where they have been taken are listed below along with their categories.

EXTERNAL ENVIRONMENT

Capacity for growth of industry	Expert
Complexity of industry	Expert
Government support	Kuei et al (2015)
Regulatory pressure	Kuei et al (2015)
Social pressure	Gopalakrishnan et al (2012)

INTERNAL ENVIRONMENT

Top management commitment	Akhtar et al (2016)
Financial health of organization	Expert
Employee training and preparedness	Faisal (2010)
Focus on health and safety	Expert
Investment in resources and technology	Cao and Zhang (2011)

SUSTAINABILITY INITIATIVES

Just-in-time logistics	Kuei et al (2015)
Compliance programs	Kuei et al (2015)
Supplier selection strategy	Grimm et al (2014)
Monitoring emissions	Esfahbodi et al (2017)
Efficient transport vehicles	Expert
Research and development	Expert

FINANCIAL PERFORMANCE

Return on investment	Chan et al (2017)
Acquisition of new customers and businesses	Chan et al (2017)
Market share	Akhtar et al (2016)
Savings on improvement initiatives	Expert
Inventory reduction	Expert

OPERATION PERFORMANCE

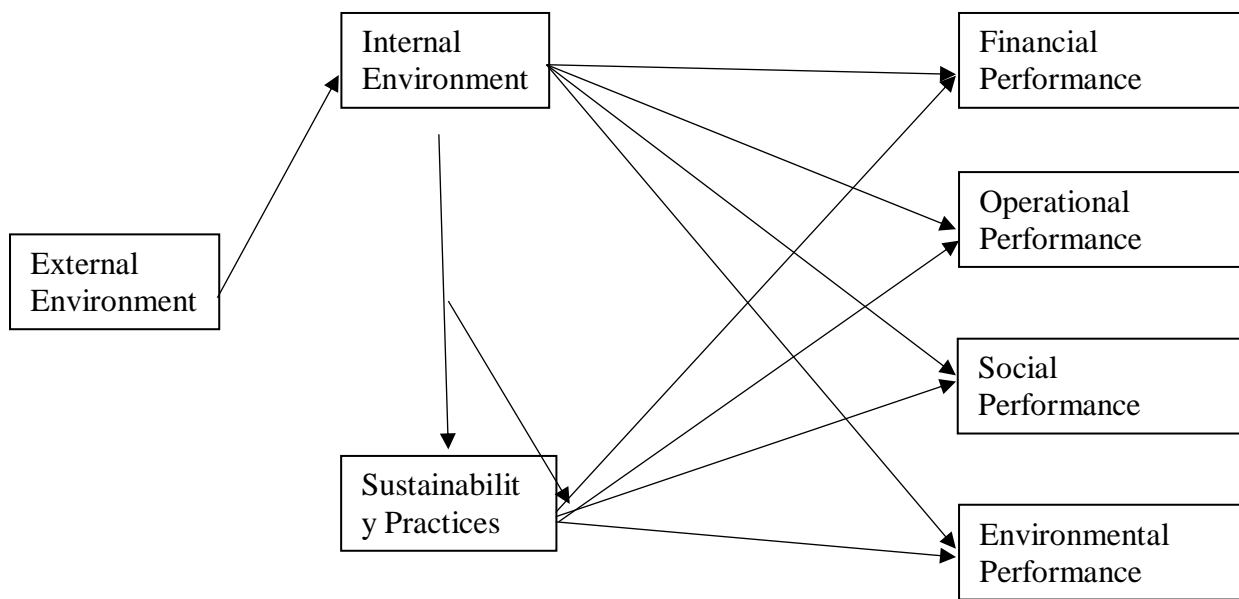
Cycle Time	Chan et al (2017)
Productivity improvement	Chan et al (2017)
Delivery dependability	Li et al (2006)
Product quality	Govindan et al (2016)
Cost reduction	Govindan et al (2016)
Number of innovations implemented	Day et al (2015)

ENVIRONMENTAL PERFORMANCE

Power consumption	Akhtar et al (2016)
Reduced air emissions	Lai et al (2015)
Reduction in impacts on natural habitats	Kuei et al (2015)
Waste reduction	Lai et al (2015)

SOCIAL PERFORMANCE

Community Benefits	Expert
Safety	Mani et al (2016)
Equity	Mani et al (2016)
Ethics	Mani et al (2016)



The conceptual model has seven constructs with at least four variables in each of them. The model postulates the following hypotheses for further investigation:

- External environment has a positive impact on internal environment.
- External environment has a positive influence on sustainability practices.
- Internal environment has a positive influence on sustainability practices.
- Internal environment has a positive influence on financial performance.
- Internal environment has a positive influence on operational performance.
- Internal environment has a positive influence on environmental performance.
- Internal environment has a positive influence on social performance.
- Sustainability practices have a positive influence on financial performance.
- Sustainability practices have a positive influence on operational performance.
- Sustainability practices have a positive influence on environmental performance.
- Sustainability practices have a positive influence on social performance.

This framework has been derived from literature spanning across various industries. Although the view of industry experts from the area of mining has been taken to arrive at the framework, the authors believe that the same can be applied to many other similar industries with slight modifications.

Future Scope

The framework presented here is just a theoretical model which has been constructed on the basis of survey of the relevant literature and the discussion held with the experts from the industry. Although this hypothesized model helps understand how the performance of an organization can be enhanced, it needs to be empirically tested using questionnaires to validate as to whether the results are in consonance with what the model espouses. The future work, therefore, is targeted in this direction.

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