
CRITICAL SUCCESS FACTORS OF SPONGE IRON INDUSTRY- A SUSTAINABILITY PERSPECTIVE

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ABSTRACT

Sponge iron has become the preferred raw material for steel manufacturers due to uninterrupted domestic availability and relative stability in prices. The study aims to investigate the Performance Measurement Indices for sponge iron Industries through consideration and impact assessment of seven studied factors- Productivity Improvement, Overall Cost Reduction, Process Performance, Cooperative Business Results, New Technology Implementation, Understand the Market Trends and Strategy Diversification. The survey questions were designed to determine the impact of growth on small and medium scale firm. Data was analysed using reliability analysis, factor analysis and multiple regression analysis. The results of regression analysis suggest the significance of products and services, the way of doing business, technology development and external environment on performance of sponge iron industries. The findings suggest the urgency to lead functions of a sponge iron Industry in all levels to the same directions for achieving the success.

Keywords: Sponge iron industry, Performance Measurement Indices, critical success factor, sustainability

INTRODUCTION

The unfavourable effects of globalization have resulted in increased competition amongst industries. The most successful Industries are those that are able to meet the customer expectations and as such managers are increasingly in search of dissimilar ways for accomplishing the organizational performance and competitive advantage. It is widely recognized that Small and Medium Sized Enterprises (SMEs) form the backbone of the private sector at all levels of developing countries. Sponge iron industry supplies the intermediate product used for the manufacture of steel. The Indian sponge iron industry is the largest in the world accounting for around 1/6th of the global production. The output sponge iron is produced using either coal or natural gas. Since fossil-fuel in the form of coal is in abundance in India, growth of this the sector is largely fossil fuel driven. About 98 per cent of the sponge iron producing units in the West Bengal are Medium and small scale entities (ANAN, 2007). The sector has experienced a steep growth of around 50 percent in its productive capacity between 2005-06 and 2011-12 (enviswb.gov.in, 2010). The key reasons for Mushrooming of Sponge Iron Industries in medium and small scale resorts to low capital investment, high profitability, governmental subsidies and ease in availability of raw material. Effective strategies with regard to market orientation with a long-term perspective strongly propagate the

profitability, market-standing and market share of a firm. Enhancement in earning capability may influence firms to incorporate even better and improved mechanism to ensure sustained future growth and may foster better accountability towards the stakeholders. A good strategy always needs to be implemented in order to result into enhanced business performance from economic, social or environmental dimensions. A market-oriented strategy complemented by innovation-oriented strategy will help to realize sustainability in performance and commitment towards various stakeholders in a congruent manner (Biswas, 2018).

Eventually, a heft of studies have discussed the influences of a variety of organizational traits such as quality of human resources, top management commitment leadership skills, organizational support, organizational culture and organizational sizes as the effort factors leading to the success of the companies. Consequently, if these firms implement quality management the impact on different industries performance and growth will be significant. Although quality management aspects practiced in different industries, the study of quality management practices and their impact on organizational performance is comparatively less explored.

The study intends to provide an understanding of how firm will be looking at all the factors affecting business sustainability in a competitive market scenario to reduce the risk in the context of sponge iron industries through prognostication of the critical success factors of performance measurement that affects the business efficiency of such industries.

1. LITERATURE REVIEW

1.1. Performance Measurement

Performance is a measure of how well a mechanism/process achieves its purpose. In the context of enterprise management, an organization's performance refers to how well the organization is managed and the value the organization delivers for customers and other stakeholders (Moullin, 2003). On the contrary, performance measurement encompasses the process of collecting, analyzing and/or reporting information regarding the performance of an individual, group, organization, system or component. It can involve studying processes/strategies within organizations, or studying engineering processes/parameters/phenomena, to see whether output are in line with what was intended or should have been achieved. Performance measurement results for personnel evaluation, promotion and incentives (promotion prospects, salary, project participation, bonuses); resource allocation (project participation, forming/dissolving teams, assignment of new projects and of resources); control/correction (control, correction, reorganization) and learning/continuous improvement have been widely applied in research (Godener & Soderquist, 2004). Salaheldin (2008) contributed effectively in performance measurement in industrial sector (Doha) by finding out the effect of operational performance on the organizational performance of small & medium sized

enterprises. Asika & Awolusi (2013) examine the effectiveness of the critical success factors (CSFs) of BPR on both primary (operational) and secondary (organizational) measures of business performance in Nigerian oil and gas industry. A study done by Gupta & Chaudhuri (2012) examines the contribution of the service elements to customer perceived value and explores the service gap model for delivering experiential value across restaurants. Talib, et. al., (2013) developed a conceptual framework of Quality management practices in relation to the organizational Performance of the SMEs in the Food Processing industry in Malaysia.

1.2. Critical Success Factors

Accountable factors for improving effectiveness in industries are the performance measurement factors or effectiveness factors. Usually there exists a relationship between CSF's (Critical Success Factors) and PMF's more specifically CSF's are the input factors or independent variables and PMF's are the output factors or dependent variables. Saraph, et. al., (1989), identified the eight Critical Success Factors in manufacturing Firms in U.S. and relates them with the factors such as Financial Performance, Quality performance which are the effectiveness factors or performance measurement factors. Omran., et., al., (2012) mentioned that Research on the critical success factors (CSFs) is considered to be a means to improve the effectiveness of the construction project and to achieve project objectives. A study done by Chittithaworn et. al., (2011) revealed that CSF's such as SMEs Characteristic, Customer and Markets, the way of doing Business & Cooperation, Resources and Finance and External Environment have significant positive effect on the Business Success of SMEs which is the Performance Measurement factor. On the other hand according to Boidoun (2003), in the model of European Foundation for Quality Management the factors customer satisfaction employee satisfaction and a favourable impact on society are the results achieved through the enablers (leadership driving and strategy, people partnership, resources and Processes), which lead ultimately to excellence in business results.

2. RESEARCH METHODOLOGY

2.1. Sampling and Data Collection

The sample comprised of 50 respondents from sponge iron industries in different parts of the state of West Bengal. Data for analysis was collected from Manufacturer center and estate office through personal interview and structured questionnaires. Exploratory factor analysis, regression analysis and reliability testing was done for identification of the critical success factors and assess the relative and most significant impact of same on business performance in the context of sponge iron industries.

3. RESULTS AND ANALYSIS

The dependent variable for the study is overall firm performance through substantive consideration of 29 items (Table 1) as independent variables.

Table 1: The critical success variables

: Independent Variables :					
1	Capital Available	10	Flexible to adopt new technology	20	Process changes according to Market requirements
2	Cost of Production	11	Competitive Position	21	Production and operational process
3	Expertise in Product Development	12	Competitors information	22	Key support process
4	Government Subsidy	13	Size and growth of Enterprise	23	Supplier's performance
5	Consumer Service Provider	14	Government Regulation	24	Strategy translation
6	Distribution Channels	15	Specified Strategy	25	Labour Skills
7	Manage people and resources	16	Strategies Based on Market environment	26	Key Financial and non-financial performance
8	Understand the Market Trends	17	Innovative Idea by Employee	27	Return on sales
9	New System Improvement	18	New product in exist Market	28	Growth in net profit
		19	Established product in exist Market	29	Investment in new product

An exploratory factor analysis was conducted to derive the underlying dimensions or constructs for the explanatory variables for a more comprehensive regression analysis. Seven factors were derived through conduction of principal component analysis and formation of rotated component matrix (Table2). The total variance explained by the seven factors concurrently accounts to 73.54 per cent. The cronbach's alpha coefficients supports reliability of the scale.

Table 2: Factor loadings, variance explained and reliability analysis

Variables	Loadings	Variance explained	Cronbach's alpha
<i>Productivity Improvement</i>		14.25	0.89
PI1	0.79		
PI2	0.75		
PI3	0.68		
PI4	0.66		
PI5	0.64		
PI6	0.54		
<i>Overall Cost Reduction</i>		13.39	0.84
OCR1	0.80		
OCR2	0.77		
OCR3	0.76		
OCR4	0.63		
OCR5	0.60		
OCR6	0.55		
<i>Process Performance</i>		11.70	0.89
PP1	0.87		
PP2	0.85		
PP3	0.78		
<i>Comparative Business Results</i>		9.72	0.77
CBR1	0.83		
CBR2	0.79		
CBR3	0.75		
CBR4	0.55		
<i>New Technology Implementation</i>		9.64	0.83
NTI1	0.83		
NTI2	0.78		
NTI3	0.77		
<i>Understand the Market Trends</i>		7.86	0.66
UMT1	0.76		
UMT2	0.75		
<i>Strategy Diversification</i>		7.00	0.60
SD1	0.89		
SD2	0.76		

A multiple regression analysis was performed with critical success factors as the independent variables to measure overall impact on firm performance. The R^2 value of 0.85 suggests the high explanatory power of the critical success factors in assessing firm performance (Table 3). The Variance inflation factor value for all the constructs is less than 2 which suggests the absence of multicollinearity. Improvement in productivity (0.29); upgradation in quality of technology (0.26), improvement in process/ product design (0.24) and cost reduction strategies (0.23) have the highest significant positive impact on the performance of sponge iron industries.

Table 3: Results of Regression analysis

Critical success factors	Standardized co-efficient	t-value	VIF
<i>Productivity Improvement</i>	0.289	3.565***	1.866
<i>Overall Cost Reduction</i>	0.231	3.163**	1.508
<i>Process Performance</i>	0.241	3.483**	1.360
<i>Comparative Business Results</i>	0.247	3.728**	1.244
<i>New Technology Implementation</i>	0.256	3.580**	1.443
<i>Understand the Market Trends</i>	0.075	1.123	1.256
<i>Strategy Diversification</i>	-0.053	-0.860	1.094
R ²	0.85		
F-value	34.45		

4. CONCLUSION

Sponge iron is a rapidly growing industry in India. Undoubtedly, it has brought economic enrichment to the private entrepreneurs; but at the same time it has also brought the curse of environmental degradation in the form of air pollution, pressure on local resources, degradation of land and adverse health impact. The situation is worsened due to non-installation or non-operation of pollution control equipment. Medium and small-scale plants dominate the sector and these do not have sufficient technical competence or the financial capacity to install pollution control equipment or they will fully do not operate them and as a result emit significant quantities of pollutants. Even if they install the pollution control equipment, they don't meet the standard or they don't run it during night. Occupational health and safety aspects in the areas of sponge iron clusters are poor as no one uses hard hats, boots or dust filters. Workers are covered with black dust as are the leaves in the area. The air quality is poor and smells acid. People in the nearby villages complain of deposition of dust on homes and on water. This is a pointer towards inadequate or non-operational pollution control equipment by industries in the cluster. Ash is dumped in ditches near the highway and char is dumped on land belonging to the Asansol Durgapur Development Authority. Thus the environmental sustainability and compliance measures of the sponge iron industries are weak. Most of the sponge iron industries suffer from low technology base, know-how and governmental regulation. These industries typically produce their new product which is irrelevant to the market's requirement, before that they did not measure the quality of the product in outside of the Market.

However, optimality in performance of these industrial units can be augmented through effective determination, evaluation and implementation of the critical success factors. Improvement in production, product and process diversification, effective design, cost-

management, competitive strategies and incorporation of sophisticated clean and green technology in the operational plant design mechanism will help the sponge industries mostly organised in MSME structure to sustain market competition through effective claim and utilisation of governmental subsidies. Effective product, process or technological innovation improves the environmental performance of a firm. By undertaking innovation-orientation strategies, the management should plan to optimize their resource and energy use, reduce emission of pollutants and harmful effluents, resorts to recycling of end-products at the disposal stage and also may plan to implement clean technology mechanism in their operation and production system to minimize the impact on environment.

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