



Review Article

APPROACHING GREEN MANUFACTURING IN IRON AND STEEL INDUSTRY

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In this paper we will discuss about green manufacturing and its socio-economic aspects in steel and iron industry in current scenario of India. Challenges and opportunities will be discussed by taking example of a Chinese steel industry named Jinan Steel and Iron Group Corporation. Quantitative analysis was used to illustrate the effect of green manufacturing. Results show that measures of green manufacturing taken by in iron industry are effective and it is feasible and necessary to practice green manufacturing in iron industry as it shows a remarkable improvement in economic profits in spite of being eco friendly.

Keywords: Iron and steel industry, Green manufacturing, Social responsibility, Economic aspect

INTRODUCTION

India is the 4th largest crude steel producer of steel in the world and it is the largest producer of sponge iron in the world with the coal based route accounting for 76% of total sponge iron production in the country (20.37 mt in 2011-12; prov.) (<http://steel.gov.in/overview>). The production of steel accounts for approximately 5% of total CO₂ emissions. It is the largest industrial emitter and a prime focus for governments. Iron industry is one of the biggest industries of resource consumption and pollution emission (Iron and Steel Industry in India, 2012). Relevant data show that, in iron

industry, the total energy consumption amounts to 14.71%. In the past five years, the comprehensive energy consumption per ton of iron has reduced by 179 kgce/t, but there is still a large gap to achieve the level in developed countries that is between 12% and 15%. Corporate social responsibility for Iron Industry should contain the duty for environmental protection, resources protection and rational utilization. As the basic industry of national economy, iron industry must bear both economic responsibility and social responsibility. Traditional manufacturing mode that practicing in iron industry of India is one

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important factor that caused above problems. Green manufacturing mode is developed in recent years. Some researches show that two advantages of practicing green manufacturing can be presented. On one hand, sustainable development strategy could be guaranteed. On the other hand, considerable economic benefits could be gained for enterprises. The cycle of “material—production—flotsam—material” can be constructed in industry enterprises with saving energy, reducing loss and reducing pollution (Tang Jianwen, 2006). If green manufacturing can be put into practice successfully, the contradiction between environmental pollution and sustainable development will be effectively solved. So it is feasible and necessary for iron industry in India to adopt the green manufacturing mode. Studies Discussion on green manufacturing by scholars are widely, but yet not in-depth in practice application.

GREEN MANUFACTURING AND ITS SOCIAL ECONOMIC ASPECT

Green Manufacturing and its Advantages

The term “green” manufacturing can be looked at in two ways: the manufacturing of “green” products, particularly those used in renewable energy systems and clean technology equipment of all kinds, and the “greening” of manufacturing—reducing pollution and waste by minimizing natural resource use, recycling and reusing what was considered waste, and reducing emissions. Compared with traditional manufacturing mode, it has some obvious advantages to practicing green manufacturing. In addition, there exists some indivisible

relations between green manufacturing and corporate social responsibility, namely, green manufacturing, economic and social benefits can be simultaneity gained with the enterprise’s value to be improved. It has been proved that energy consumption and pollution brought by applying traditional manufacturing mode is so high. That social sustainable development would be threatened. Meanwhile, pollution problem is considered fully in green manufacturing (Yin Ruiyu, 2002). Some scholars pointed out that human-oriented development is principle in the green manufacturing mode and various advanced techniques and modern management methods are major means, enhancing economic benefits, improving social benefits and increasing ecological benefits are objectives.

Relationship Between Green Manufacturing and Corporate Social Responsibility

Corporate social responsibility is to answer why social responsibility should be taken, whether it should be taken, for whom it should be taken and what moral criterions should be based on (Shen Hongtao and Shen Yifeng, 2007). Corporate social responsibility gives consideration to not only social benefits, but also economic benefits. So long as undertaking corporate social responsibility insistently, both capital return from society and all kinds of support from stakeholders can be aroused. Compared with small-sized enterprises, stakeholders in large and medium-sized enterprises do well in undertaking corporate social responsibility. As a result, the operating performance and organizational performance in large and

medium-sized enterprises are better than that in small-sized enterprises. So there is positive correlation between undertaking corporate social responsibility and operating performance.

EXAMPLE OF PRACTICING GREEN MANUFACTURING IN CHINA

Green manufacturing as an advanced manufacturing mode has been considered as an effective guarantee for sustainable development and enhancing international competitive position now in China. Moreover, some evidences of its effects on environmental protection and corporate social responsibility are provided constantly. Nowadays, most of iron industries in China is aware of its development bottleneck, and make efforts to improve their traditional manufacturing mode and management mode. In these years some Chinese iron enterprises, such as Bao Steel, Shougang, Jinan Steel and Lai Steel, have already started to practice green manufacturing and get benefit from it. And this can be proved by Jinan Steel Company in Shandong Province. It is taking green manufacturing to put into effect, and enterprise performance and corporate social responsibility have come true gradually.

About Jinan Steel

Last century, traditional manufacturing mode had been used in iron industry of China. The principal characteristics include mass production, mass consumption and mass disposal, which caused serious pollution, such as smoke, dust, waste water and waste residue. As a result, Jinan Steel bear large cost expense, energy crisis and social and public

pressure. Especially in 1998, the most serious crisis occurred. The crisis came from the great declined price of iron in China which resulted in the loss of 404 million RMB. On the other hand, influenced by financial crisis in Southern-east Asian, steel export had been seriously shrike, which had reduced by 60% compared with that of last year. To deal with this crisis, Jinan Steel began to follow the path of new industrialization road and to practice green Manufacturing

Jinan Steel's Green Manufacturing

Though studying and developing in advanced manufacturing mode during the past 10 years, green manufacturing mode based on its characteristics has been built up. And some new concept has been brought forward, for instance, they think that pollutants are the resources that be placed on the wrong place, and Jinan Steel only manufacture product, but not rubbish. Under the guidance of the mode, Jinan Steel began to adjust process structure, change the economic growth mode, and improve the quality of management. Then enterprise core competence has reinforced, and enterprise development has also been speeded up greatly with a series of potential changes (Huang Enhong and Yan Fengtao, 2006). During the 9th five-year plan period, according to innovation concepts, such as benchmarking and it self's efforts, the purpose of increasing income, and reducing cost was achieved by Jinan Steel. Accomplished the target of energy saving and consumption reduction, the next strategy of strongly promote clean manufacture (precise, strong, beautiful are the key words) was put forward to continuously develop for the purpose of making itself a famous enterprises in China. During

the past 10 years, Jinan Steel has profoundly been aware of the importance of sustainable development. Recycle economy theory is exercised perfectly in Jinan Steel (Cheng Hongwen and Ye Bingji, 2005). According to statistical data, 170 projects of green manufacturing have been brought into effect. Utilization ratio of resource and energy has greatly increased and environmental quality has largely improved. In a word, green manufacturing not only brings the economic, social and environmental benefits, but also improves enterprise’s technical innovation ability.

Analysis on Income Effect Brought by Green Manufacturing in Jinan Steel

Jinan Steel benefits much from green manufacturing. The annual production has greatly increased. Meanwhile, the harmonious development of environment, resource and economy has come true. Thus it will promote the sustainable development of society.

Profit increase of Jinan Steel depends on the improvement of product quality, cost reduction, and the effective use of resource and energy. Related data was described by Table 1. From Table 1, we can see that during the period of practicing green manufacturing, prime operating revenue, income before tax and net income are increased greatly. In 2005 and 2006, the increase of income before tax and net income is less than that of prime operating revenue which shows that cost from prime operation and interrelated expenses are high. In 2007, the increase of net income is more quickly than that of income before tax which shows that Jinan Steel, after practicing green manufacturing for years, has benefited from its mode. By the implementation of green manufacturing, the environment quality of Jinan Steel has been significantly improved. At the same time, total amount of various pollutants has been greatly decreased. And compared with 1995, the amount of industrial dust per square kilometer had been reduced by 53% in 2005.

Table 1: Income Statement of Jinan Steel from 2004-2007

	2007	2006	2005	2004
Prime Operating Revenue	33,612,732,622.46	26,281,347,065.47	24,016,703,495.83	19,146,889,036.73
Growth Rate (%)	26.19	9.42	25.43	
Income Before Tax	2,034,301,456.65	1,361,878,896.69	1,277,813,420.74	1,379,643,160.78
Growth Rate (%)	49.37	6.58	-7.38	
Net Income	1,385,313,754.17	871,555,468.91	828,583,161.94	803,782,949.25
Growth Rate (%)	60.19	5.19	3.09	

CONCLUSION

“High energy consumption and pollution” constrains the development of iron industry. Confronted with such bottleneck, green manufacturing, an advanced manufacturing mode has been considered as an effective

mode to solve such problem. Based on analyzing the present situation of iron industry, it is figured out that the energy saving and emission reduction are arduous, besides corporate social responsibility is default. Meanwhile, study shows that making use of

green manufacturing, the responsibility of environmental protection can be bear. Enterprise's sustainable development can be achieved effectively. By comparing the income data before and after practicing green manufacturing, we can see the necessarily and superiority of practicing green manufacturing in iron industry. Under the mode of green manufacturing, not only has enterprise performance been improved, but also social responsibility has been improved. From the above analysis we may hope that it will be equally effective in Indian Iron and Steel industry as well. 🌀

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