FACTORS INFLUENCING PRODUCTIVITY: A STUDY OF THE LISTED CEMENT COMPANIES IN BANGLADESH

Md. Musa[1], Atikur Rahman[2], Ripon Chatterjee[3]

[1]*Assistant Professor, Department of Business Administration, Port City International University, Chattogram, Bangladesh.*

[2]*Assistant Professor, Department of Business Administration, Port City International University, Chattogram, Bangladesh.*

[3]*Senior Lecturer, Department of Business Administration, Port City International University, Chattogram, Bangladesh.*

ABSTRACT

The main objective of the study is to find out the key factors influencing the productivity of cement industry in Bangladesh. The respondents include 100 executives and officers of different levels selected randomly from different listed cement manufacturing firms of Bangladesh. Finally the data have been tested with 20 variables collected from literature review and discussion with expert people. Factor analysis was used to reduce a large number of variables into fewer numbers of factors. The study identified five factors i.e. Material and Labour related factor, Efficiency related factor, Servicer factor, Supply chain related factor and Systematic factor are significantly influencing the productivity of cement industry in Bangladesh. The study suggests to focus on the identified factors in order to achieving greater productivity and maximizing the market value of the cement manufacturing firms in Bangladesh.

Key words: *Factors, Cement Industry, Productivity, Bangladesh*.

Introduction

Cement industry is playing a significant role in the economic development of Bangladesh. According to the data from Bangladesh Export Promotion Bureau (EPB), the cement industry earned export revenue of $14.39 million in the first nine months of fiscal year 2023-2024. Bangladesh Cement Industry has been showing a stable growth in last few years driven by steady pace of urbanization and construction of large infrastructure projects. In the world of cement market, Bangladesh's current position is fortieth (Cement industry in Bangladesh) but the country has huge potential in the days ahead as 14 companies are exporting cement. The market is on growth where until the first half of the 1990s, around 95% of total demand for cement in Bangladesh was covered by imports (Tuhin, 2019). In the last 7 years, the cement industry of Bangladesh grew at almost 11.5% CAGR (Compound Annual Growth Rate) due to the doubling of demand from 14.5 million metric tons per year to almost 31 million metric tons per year with the cooperation of the government, several multinational manufacturers and local entrepreneurs entered the industry in the late 1990s (EBL Securities Ltd., 2019). At present, Bangladesh cement industry is operated by the leading global performers like Lafarge Holcim Bangladesh Limited along with 30 other local and Multinational manufacturers (Cement in Bangladesh: Building a Concrete Future – Light Castle Partners, 2020). Dhaka Stock Exchange (DSE) and Chittagong Stock Exchange (CSE) currently enlisted seven cement companies (Company Listing by Industry, 2020). Currently, the annual demand for cement is 33 million tons, while the industry's installed capacity is 78 million tons with another 11 million tons to be added by the next three years, according to Bangladesh Cement Manufacturers Association

(BCMA). About BDT 42,000 crore has been invested in this sector. Additionally, an export target of USD 15 million has been set by the Export Promotion Bureau (EPB) for the FY 2023-24 (Bangladesh revises export target for cement in FY 2023) and the cement industry earned export revenue of $14.39 million in the first nine months of FY 2023-24.

In recent years, demand for cement has been increasing massively to support the megaprojects. Bangladesh has undertaken some large infrastructure projects to upkeep its huge economic growth. 7 mega infrastructure projects including bridges, rail lines, power plants, and a metro rail have been allotted with more than USD 3.5 billion in FY2019 (Cement in Bangladesh: Building a Concrete Future – Light Castle Partners, 2020). Budget allocation to transportation and communication system has faced immense growth over time and therefore, the contribution of the development projects of the government towards the demand for cement has been identified as the highest in recent years overtaking the contribution of individual home-builders (Rezina, 2020).

Productivity means the ratio between input and output which ensure the proper utilization of factors of productions in relation to output. Productivity can be classified into partial productivity (PP) and total productivity (TP). Partial productivity includes the capital productivity, labor productivity and material productivity (Schumacher, K. & Sathaye, J. 1999). In this context it may be noted that the labor productivity as well as capital availability has in recent past increased considerably in industrial sectors while the overall growth rate of the economy stagnated at low levels (Ahluwalia, 1991). In such a context concerned has increased as to the efficiency of resource use and the researchers started investigating productivity growth and input factor substitutions for aggregate manufacturing as well as various industries. Considering capital and labor productivity one should keep in mind that conceptually, in situations where capital intensity is increasing over time, the analysis of partial productivity changes may overstate the increase in labor productivity and understate the increase in capital productivity (Ahluwalia, 1991).Taking above factors into consideration in context of cement industry such investigation as to important aspects of productivity may be worth evaluation as this industry has bright prospects. It has challenge too which can to a significant extent may be faced through enhancing productivity.

The results of different studies at the firm level indicate that factors such as R&D expenditure of firm, the level of information technology in the Firm (IT), export intensity of firm, the size of firm and several other factors reveal to be most important factors which affect the overall productivity of firm. Capacity utilization, effective use of raw materials, maintenance, rework, competition, motivation, and skilled labor are also reported as productivity factors of cement industry in India (Burange and Yamini, 2009; Kumar, 2009; Krishna et al., 2013). Shu-Hwa Lin, et al. (1994) have studied the productivity and production in apparel industry using descriptive statistics and found that technology and product type are the important factors for improving productivity. The present study might be justified by focusing on previous literature.

In this study, we tried to find out the key factors that influence the Productivity of listed cement companies in Bangladesh as the contribution of this industry to our GDP is increasing day by day. So the findings of this article will be an appropriate guideline to the stakeholders, policy makers and will help business leaders to take necessary actions to develop this sector and kick off foreign market.

Objectives of the Study

The objectives of this study are:

1. To identify the factors influencing productivity of cement industry in Bangladesh.

2. To analyze the determinants of productivity of cement industry in Bangladesh.

Review of the Related Literature

Extensive literature was reviewed to understand the theoretical concept of Productivity, to identify the various factors affecting the Productivity of cement companies and to examine the impact of these factors on Productivity of cement companies in Bangladesh.

Acharya and Nair (1978) conducted a study with reference to the measurement of the total productivity index using Cobb- Douglas production function for 1959-71 proved no monotonic trend; coefficient of capital was larger and statistically more significant than labor coefficient. There could be increasing returns to scale indicating higher returns in future by expansion.

Mehta (1980) showed that the productivity for cement industry grows at 6.1 percent for the period 1953-65 from the estimation of Cobb- Douglas production function.

Nair N.K. (1991) focused the productivity aspect of Indian Cement Industry. This study emphasized that cement, being a construction material, occupied a strategic place in the Indian economy. This study has revealed that, in 1990-91, the industry had an installed capacity of 60 million tons with a production of 48 million tons. In this study, the cement industry was forecasted to have a capacity growth of about 100 million tons by the year 2000. This study has also analyzed the productivity and financial performance ratios of the cement industry with a view to identifying the major problem areas and the prospects for solving them.

Padhi (1999) measured productivity growth in index form and found a negative correlation between increase in rate of investment with labor productivity and with capital productivity. Demand shock related inefficiencies led to this lower productivity growth as indicated by the Solow residual index.

Coito et al. (2005) revealed that production schedule, plant operations, and maintenance, product quality, energy consumption as well as efficient utilization of resources significantly affect the productivity of California cement industry.

Avami and Sattari (2007) showed that the productivity of Iranian cement industry is greatly affected by energy consumption, production management, and new technologies.

Nicholas Bilalis, et al. (2007) have studied the benchmarking the competitiveness of European textile firms using seven factors namely formulation of strategy, suppliers, customer demand, modern HRM practices, employee recognition programmes and incentives and existence of processes for performance improvement initiatives. Out of these seven factors three factors- existence of processes for performance improvement initiatives suppliers and modern HRM practices have been recognized as more significant as they have highest Crombach Alpha coefficients.

Sharma (2007) analyzed the impact of liberalization and productivity growth of the Indian cement industry for the period 1989-2005 using total factor productivity growth index and the Partial Productivity Indices (PPIs). The results showed a sharp decline in the total factor productivity (TFP) index and PPIs indicating inefficient use of the inputs.

Rajamohan .S and Vijayaragavan T. (2008) have studied the production performance of Madras Cement Limited. It analyzed the comparative production performance of Madras cement and all other cement companies in India. Statistical method Mann-Whitney U-test was applied. The results of analysis indicated that the production performance of selected unit was equal to production performance of all other cement units in India.

Kongkiti Phusavat (2008) has recommended guidelines for measurement of productivity of manufacturing industries in Thailand. He has analyzed the parameters like quality, customer focus, delivery, flexibility, maintenance services and technical knowhow. The analysis was done using descriptive statistics. The paper concludes that delivery, quality and customer focus are the priorities for deciding the operational strategies for improving productivity.

R. N. Joshi and S. p. Singh (2010) have compared productivity growth in the Indian garment industry, both scale wise and region wise. The study was conducted using the variables such as net fixed assets, wages and salaries, Raw material, energy and fuel and gross sales. The study revealed that small scale firms are more productive as compared to medium and large scale firms. Technical efficiency is a major factor affecting productivity of all types of industries.

Muthukrishnan (2011) intended to analyze the productivity factors of cement industry in India and revealed the fact that efficient management, proper capacity, and resource utilization, infrastructure facilities and optimized extraction of labor resource led to higher productivity and better performance.

Graisa and Al-Habaibeh (2011) investigated the factors behind low productivity of Libyan cement industry and found that lack of training and personal development, and low motivation of worker due to lack of a management strategy and reward structure were the main reason behind this problem.

Islam and Khadem (2013) investigated the productivity factors of Oman construction industry and found that professionalism, the fairness of financial transactions, supervisors' skill, materials availability, and availability of complete drawing are most significant factors of productivity.

Saifuddin et al. (2013) studied the supply chain of cement industries in Bangladesh using value stream mapping and pointed out that elimination of wastes and non-value adding activities from cement processing can significantly enhance the productivity.

Hossain and Moudud-Ul-Huq (2014) assessed the financial performance of cement industries in Bangladesh using Altman Z Score Model and revealed the fact that cement manufacturing companies with higher productivity have higher Productivity.

Hoque et al. (2015) examined the relationship between working capital management and Productivity of cement industry in Bangladesh and concluded that working capital management was a critical factor for productivity and Productivity in this industry.

Dasanayaka and Sardana (2017) tried to identify the factors affecting the productivity of small and medium scale rubber manufacturing companies in Sri Lanka. They found that technology adoption, innovation, human factors, cost, and quality of raw materials have a significant effect on rubber manufacturing productivity.

In fact not many researches are found to have been undertaken in the context of factors influencing productivity of cement industry in Bangladesh. This shows a research gap in the area which reveals the importance and rationale for this study.

Materials and Methods

The methodology of the study is based on the primary as well as secondary data. The study adopted non-probability purposive sampling technique to collect the primary data through a well-framed and structured questionnaire to elicit the well-considered opinions of the respondents. By analyzing literature review and conducting focus group discussions with the experts of cement industry, 20 variables have been identified that are the most influencing factors affects the Productivity on cement industry in Bangladesh. The researcher has taken all the listed cement firm in CSE and DSE as sample. A total of 100 questionnaires have been distributed to the different officials of the sample cement firm. Questionnaire comprises of 20 statements and respondents had to give their level of agreement on 5-Point Likert Scale ranging from strongly agree, agree, neutral, disagree and strongly disagree.

Reliability Analysis

In this study, the reliability for the studied 20 variables has been tested through Cronbach's alpha which measures the internal consistency of responses. The reliability co-efficient for the observe items has been found 0.76, suggesting that the variables have relatively high internal consistency.

Analysis and Interpretation

Factor analysis was used to reduce a large number of variables into fewer numbers of factors. Factor analysis extracted maximum common variance from all variables and put them into a common score. As an index of all variables, this score was used for further analysis.

Principal component analysis: This is the most common method used by researchers. Principal component analysis starts extracting the maximum variance and puts them into the first factor. After that, it removes that variance explained by the first factors and then starts extracting maximum variance for the second factor. This process goes to the last factor. Factor segmentation was done and it is explained through the correlation values derived from the communalities table.

Results and Discussion

Factor Analysis

Factor analysis by principal component method, 5 predominant factors has been extracted based on the basis of Eigen values those are greater than one as shown below. The total variance of the 20 items is found to be 62.52% which are significantly greater than the benchmark variance value 60%. The factor segmentation is revealed through the correlation values exhibited in the following table. The variables have correlation less than 0.50 with the extracted factors are ignored.

Table-1: Factor Analysis

Factor name (Eigen values)	Variables	Factor loading	% of variance explained (Cumulative)
Material and Labour related Factor (7.95)	Effective use of Raw material Accountability of Worker Innovation Labour Skill	.781 .747 .718 .653	22.086 (22.086)
Efficiency related Factor (6.35)	Training facility Managerial skill Productivity awareness	.723 .695 .610	17.659 (39.745)
Service Factor (3.98)	Updated technology Morale of worker Machine maintenance	.736 .651 .584 .	11.051 (50.796)
Supply chain related Factor (2.70)	Price of raw material Material Availability Motivation Energy price	.711 .682 .640 .632	7.525 (58.321)
Systematic Factor (1.51)	Political stability Safety policy of firm	.656 .548	4.198 (62.519)

(i) Material and Labour related factor explains 22.086% of total variation existing in the variable set. This factor has significant factor loadings ranging from .653 to .781 on these variables which form a major cluster. This factor is composed of Effective use of Raw material, Accountability of Worker, Innovation and Labour Skill.

(ii) Efficiency related factor explains 17.659% of total variation existing in the variable set. This factor has significant factor loadings ranging from .610 to .723 on these variables which form a major cluster. This factor is composed of Training facility, Managerial skill and Productivity awareness

(iii) Servicer factor explains 11.051% of total variation existing in the variable set. This factor has significant factor loadings ranging from .584 to .736 on these variables which form a major cluster. This factor is composed of Updated technology, Morale of worker and Machine maintenance.

(iv) Supply chain related factor explains 7.525% of total variation existing in the variable set. This factor has significant factor loadings ranging from .632 to .711 on these variables which form a major cluster. This factor is composed of Price of raw material, Material Availability, Motivation and Energy price.

(v) Systematic factor explains 4.198% of total variation existing in the variable set. This factor has significant factor loadings ranging from .548 to .656 on these variables which form a major cluster. This factor is composed of Political stability and Safety policy of firm.

Conclusion

The study identified five factors i.e. Material and Labour related factor, Efficiency related factor, Servicer factor, Supply chain related factor and Systematic factor are significantly influence the Productivity of cement industry in Bangladesh. The cement sector is a vast area, so it is difficult to come to a conclusion from only analyzing the data of listed companies. Further research may be directed to identify the factors that influencing the Productivity of cement industry in Bangladesh with more relevant variables and bigger sample size. As the cement industry of Bangladesh has become one of the fastest growing as well as an emerging sector of the country, the government and all stakeholders should pay their kind concentration to take essential actions regarding the enhancement of financial performance of this industry.

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