International Review of Business Research Papers
Vol. 7. No. 2. March 2011. Pp. 56-68

Product-Wise Performance of the Manufacturing Firms Located in the South-West Region of Bangladesh

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This study evaluates product-wise performance of the manufacturing firms operating in the south-west region of Bangladesh. The tiles firms take the top position from employment generation, capacity utilization, target fulfillment and profit perspectives. The performance of iron & steel firms is better from profit perspective, although the performance is not satisfactory from employment generation or sales perspectives. The survey responders mention that gas supply to the region at the earliest convenient time is the most urgent need irrespective of firm size, product coverage, firm age and location of the manufacturing firms. The input sourcing and output destination of the manufacturing firms are highly skewed towards the regional market with some exceptions like iron & steel, printing press, coconut oil and tiles firms. The bakery firms experience the highest change in price, while, printing, wood processing and rice milling firms experience comparatively slower increase of average price. The coconut oil firms spend about two-third of their total operating cost in purchasing raw materials. The brick, tiles and wood processing firms spend less for procuring raw materials. However, they spend more for paying salary & wages. The share of salary & wage in total operating cost is the lowest for rice milling firms because of abundance and poorly paid female workers. The study recognizes that product up-gradation, quality assurance and improvement of investment climate are the main tasks ahead of the manufacturing firms of the region to sustain in competition, to expand, to cross the regional boundary and to earn more profit.

Field of Research: Industrial Economics

1. Introduction

The firms that are using various types of inputs through a sequential process for producing products are defined as manufacturing firms in this study. This study examines ten major groups to analyze the performance of the manufacturing sector in the south-west region of Bangladesh. The groups are Bakery, Brick, Iron & Steel (IS), Coconut Oil (CO), Printing Press (PP), Rice Milling (RM), Tiles, Wood Processing (WP), Wooden Furniture (WF) and Miscellaneous (Misc.). The Khulna, Jessore, Satkhira and Bagerhat districts are defined as the south-west region of Bangladesh.

The performance of the manufacturing firms operating in the region varies significantly. Some firms of the region are doing well while some others are not performing well. The performance changes from time to time even for the same firm. This study tries to address this issue. This study tries to suggest some policy measures based on the product-wise performance analysis findings of the manufacturing firms located in the south-west region of Bangladesh.

This section provides problem statement and organization of the paper. Section two lists a brief literature review related to the research topic. The methodological issues are discussed in section three of the paper. Section four discusses the main results

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and findings of the study. Section five concludes the paper with some policy recommendations.

2. Literature Review

Boardman and Vining (1989), and Dewenter and Mala-testa (2001) find private firms' superiority on others from the performance viewpoint. Wei et al. (2002) also find that public firms are less profitable and less productive compared to domestic private, foreign owned or joint venture manufacturing firms. In contrast, Demsetz and Lehn (1985), and Demsetz and Villalonga (2001) find no statistically significant relation between ownership structure and firm performance. Kim (2006) finds a positive relationship between family ownership concentration and firm performance. In summary, the literatures fail to find out any unique relationship between firm performance and ownership pattern.

Several researchers consider productivity for analyzing performance of manufacturing firms and try to find out the reasons behind that performance. For example, Fariñas and Ruano (2005) find that entry and exit decisions of manufacturing firms are systematically related to differences in their productivity level. Mahadevan and Kim (2003) find that the output growth in the South Korean manufacturing industries is increasingly productivity-driven. Fariñas and Ruano (2005) state that sunk cost is an important source of heterogeneity across firm productivity. Models of industry dynamics also predict lower productivity for firms operating in markets with a higher level of sunk entry costs (Hopenhayn 1992). Fernandes (2008) finds a negative correlation among firm size and Total Factor Productivity (TFP) from a survey on the manufacturing firms of Bangladesh. Fernandes (2008) also states that firm TFP is reduced due to power supply problems, heavy bureaucracy and presence of crime. Therefore, the entry and exit decisions of manufacturing firms, firm size, firm growth, sank cost, access to utility services, red tape and security system are associated with productivity of manufacturing firms.

Technology level and R&D expenditure are also associated with performance of manufacturing firms. Hasan (2002) finds a statistically significant impact of imported technologies on productivity of Indian manufacturing firms. Wakelin (2001) finds a positive and significant relationship between firm's own R&D expenditure and productivity growth. Bin (2008) finds that inter-industry R&D spillover and foreign technology transfer make significant contributions to both labor productivity and the level of total factor productivity in Chinese manufacturing firms. Huang et al. (2006) find that IT investment has an indirect impact on firm performance. Belderbosa et al. (2004) analyze the impact of R&D cooperation on firm performance. Almeida and Carneiro (2009), and Tsang et al. (2008) also place importance on investment on R&D, technical progress and human capital formation. Kiyota and Okazaki (2005), and Tsai and Wang (2008) find that the technology acquisition policy contributes to improve firm performance.

Managerial capability and financial strength are some other factors associated with performance of manufacturing firms. Li et al. (2007) finds that managerial ownership has a positive effect on firm performance. However, Tosi et al. (2004), and Waldman et al. (2001) find no significant relationship or association between managerial

charisma and firm performance. Wei et al. (2002) demonstrate that a better performance of manufacturing firms requires capital investments up to a certain level for utilizing economies of scale and capacity. Bøckman et al. (2008) highlight on investment size for attaining optimal firm size. Ratti et al. (2008) find that an increased concentration in the financial sector relaxes financial constraints on firm-level investment.

The available literatures describe various aspects influencing firm performance. Ownership pattern, entry and exit decisions of manufacturing firms, firm size, firm growth, sank cost, access to utility services, red tape, security system, technology level, R&D expenditure, managerial efficiency and financial strength are considered as the main factors in understanding performance of manufacturing firms. This study tries to understand the performance for the manufacturing firms of the south-west region of Bangladesh in light of the above discussion. Bangladesh's manufacturing sector related studies are scarce in the literatures. Moreover, an empirical study for linking product type and firm performance is hardly available in the literature. Therefore, this study places special focus on establishing a relationship between firm performance and product dimension of the manufacturing firms.

3. Methodology

This study considers five measures to address performance of manufacturing firms: (i) Average sales growth (S), (ii) Average employment growth (E), (iii) Capacity utilization rate (C), (iv) Target fulfillment rate (T) and (v) Operating profit to sales ratio (P-S). It defines 'sales growth' as the percentile growth in sales (value) of a firm in two successive years, and 'average sales growth' as the average of the growths. Similarly, 'employment growth' is the percentile growth in total employment of a firm in two successive years, and 'average employment growth' is the average of the growths. The 'capacity utilization rate' is the ratio between 'utilized capacity' and 'installed capacity', 'target fulfillment rate' is the ratio between 'targeted production' and 'actual production', and 'operating profit to sales ratio' is the ratio between operating profit and sales of the firms in a year.

In measuring average sales growth, the firms established in year 2008 are not considered due to unavailability of sales growth data. The one-year sales growth (2007-2008) for the firms that were established in 2007, two-year sales growth (2006-2008) for the firms that were established in 2006 and three-year sales growth (2005-2008) for the firms that were established in 2005 or earlier are considered in this study. The same concept is applied for average employment growth measurement. The capacity utilization rate, target fulfillment rate and operating profit to sales ratio are pertinent to the year 2008. A majority of the firms located in the region are small in size and they don't follow the standard practices of information gathering and storing. For the very reason, getting long-term firm-wise numerical data on the variables considered in this study is difficult. In addition, recall data of a longer time period often becomes misleading. Therefore, for greater accuracy of data, this study considers the time period 2005-2008 to measure firm performance.

Energy consumption, input-output market, product price and cost structure of manufacturing firms are also considered in this study for product-wise analysis of the manufacturing sector.

Graphical presentations of the descriptive statistics on product-wise firm performance measurements are reported. The influence of product on firm performance is also evaluated using the following regression analysis (Eq. 1).

$$Y_i = \beta_0^i + \sum\beta_j^i D_j + u^i \text{ ....} \quad (1)$$

where, Y refers to performance indicating dependent measure.

D refers to product dummy. For ten product groups, nine dummies were created considering 'Other' as a reference group.

i = Average sales growth (S), Average employment growth (E), Capacity utilization rate (C), Target fulfillment rate (T) and Operating profit to sales ratio (P-S).

j = Bakery, Brick, Iron & steel (IS), Coconut oil (CO), Printing press (PP), Rice milling (RM), Tiles, Wood processing (WP), Wooden furniture (WF) and Miscellaneous (Misc.).

The study has used both secondary and primary data. It considers database of Bangladesh Bureau of Statistics (BBS), local business forums and groups such as Khulna City Corporation (KCC), Khulna Chamber of Commerce and Industries (KCCI), Khulna Development Authority (KDA), Tax office and product-wise exporter's associations to identify population of manufacturing firms operating in the south-west region of Bangladesh. This study follows a stratified sampling procedure in selecting sample manufacturing firms from a population of 875 firms employing 10^+ employees. Product is the main stratum of this study. The initial target was to cover 30% of the total population. However, physical inexistence of some firms at the registered addresses, unwillingness of some firms to provide data and information, under sampling/over sampling of some product groups to make them representative, replacement and finally dropping the firms which have incomplete and inconsistent information fixed the sample size to 335. A formal questionnaire is used to collect primary data from the sample firms.

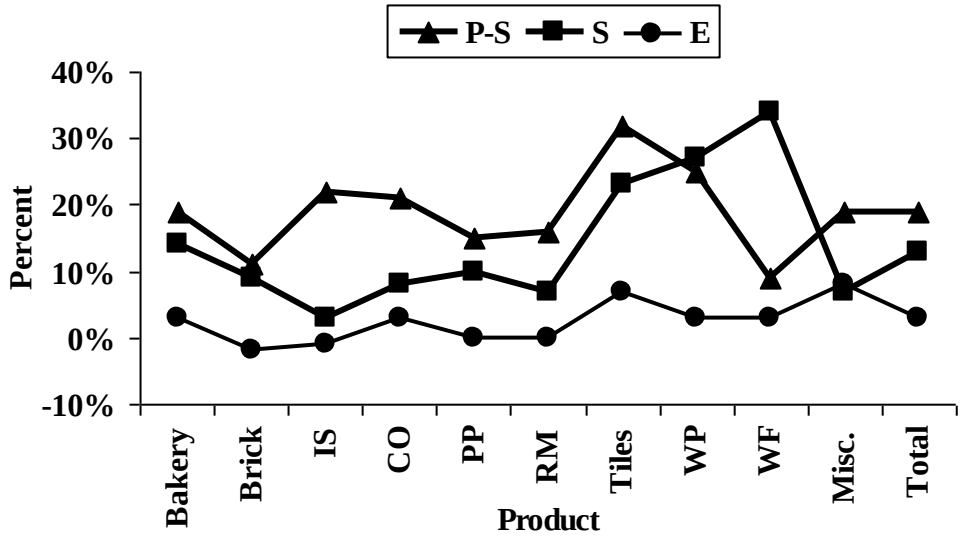
4. Results and Discussion

4.1 Product-Wise Firm Performance

The Wooden furniture occupies the highest rate of yearly average sales growth rate (34%) followed by wood processing (27%) during 2005-2008 time periods (Figure 1). The sales of wood and iron & steel are moving in the opposite direction over time. A comparatively cheaper price of wood after SIDR in the south-west region and price hike of iron explain the trend. Being these two products (wood and iron & steel) are substitutable to some extent, some consumers have been diverting toward wood from iron in making home furniture. The average operating profit to sales ratio for all products is 19%. The lowest ratio holder is wooden furniture, only 9%. Tiles firms have performed well making good score in operating profit to sales ratio. This could be an impulse to attain higher capacity and target fulfillment rate. Yearly average employment growth rate is the highest in tiles firms. The sequential expansion of tiles business over time claims more production and employment in this sector. Brick, iron & steel, and printing press experienced negative employment growth rate. The

seasonality concept of brick firms, price hike of iron and inauguration of computer shops as alternate to printing press mostly explain the shrinkage of the concerned firms.

Figure 1: Product-Wise Employment, Sales and Profit Scenario



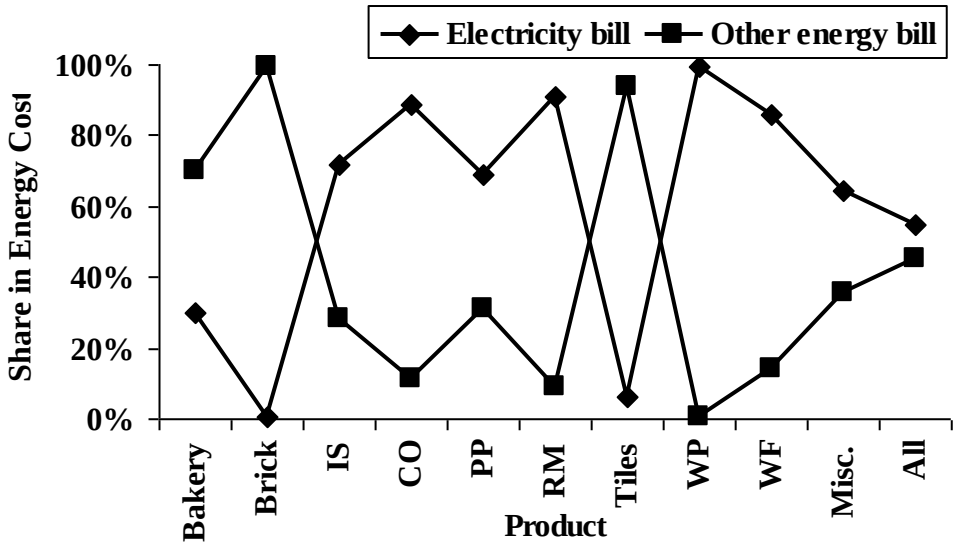
Source: Field Survey (2008-09).

The average capacity utilization rate is about 64% for all sorts of firms. The tiles firms hold the highest position in utilizing capacities scoring 81% followed by brick (65%). In contrast, rice milling, coconut oil and printing press firms are unfortunate in utilizing capacities. Most of the surveyed tiles and printing press firms have been doing better in fulfilling target. Iron & steel, bakery and wood processing firms are less efficient in fulfilling target.

4.2 Energy Consumption

Electricity is the main source of energy for the manufacturing firms due to the absence of gas supply in the region. The wood processing, rice milling and coconut oil firms are highly dependent on electricity for energy. However, the brick and tiles firms have less electricity consumptions, which use wood, coal etc. as alternate energy sources to burn the product (Figure 2).

Figure 2: Energy Cost: Product-Wise Analysis



Source: Field Survey (2008-09).

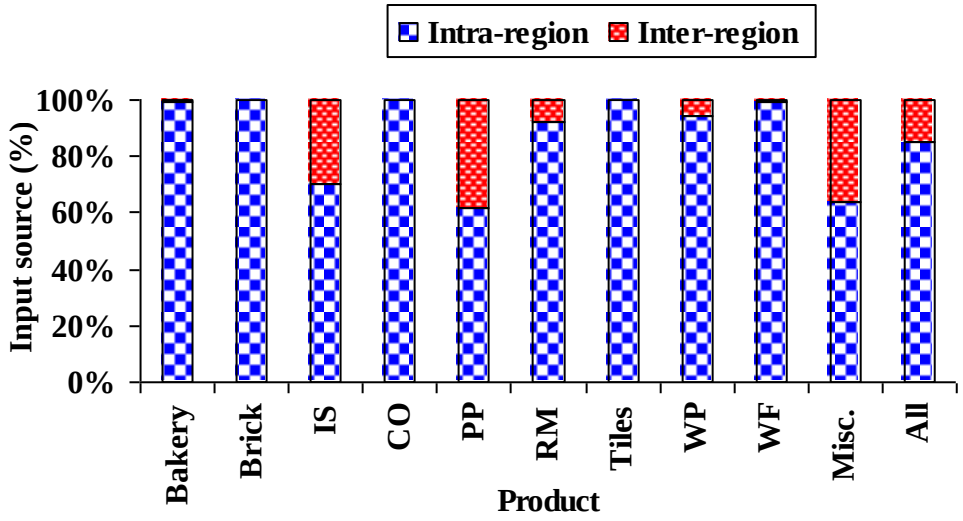
4.3 Input-Output Market

The input source of the manufacturing firms is highly skewed toward regional market. The brick and tiles producers collect 100% raw material from intra-region sources (Figure 3). The sample firms collect around 85% of their main raw materials from intra-region sources on an average. The iron & steel and printing press firms collect approximately one-third of their raw materials from other regions. This is due to unavailability of the desired quantity and quality of inputs in time.

The product destination of the surveyed manufacturing firms is also highly local market oriented (Figure 4). For example, bakery, brick, printing press, rice milling, wooden furniture and iron & steel firms sell more than 90% of their manufactured products to the regional markets. The limitations originated from available infrastructural facilities needed to export or sell in other regions of the country bind the manufacturers to sell in regional markets. The product nature, especially shorter expiration time of food products, heavy weight of soil, wood and iron based products and lower quality of printing firms also partly explain the skewed selling pattern.

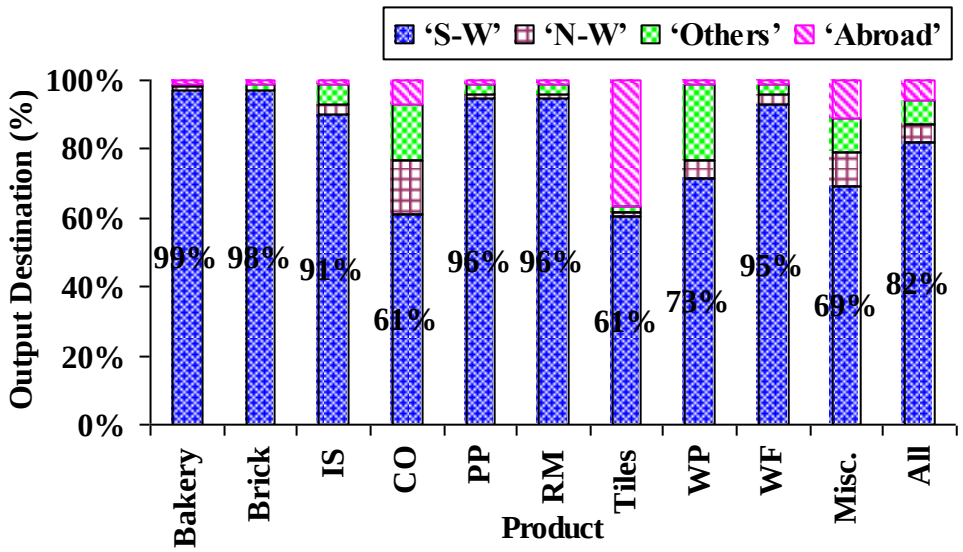
More than one-third of the products manufactured by tiles and coconut oil firms are sold outside of the region. The tiles firms are increasingly penetrating in the foreign markets, while, the oil firms are trying to enter markets of the other regions. The study recognizes that product up-gradation and quality assurance are two prime tasks ahead of the manufacturing firms of the region to sustain in competition, to expand and to earn more profit.

Figure 3: Input Market: Product-Wise Analysis



Source: Field Survey (2008-09).

Figure 4: Output Market: Product-Wise Analysis



Source: Field Survey (2008-09).

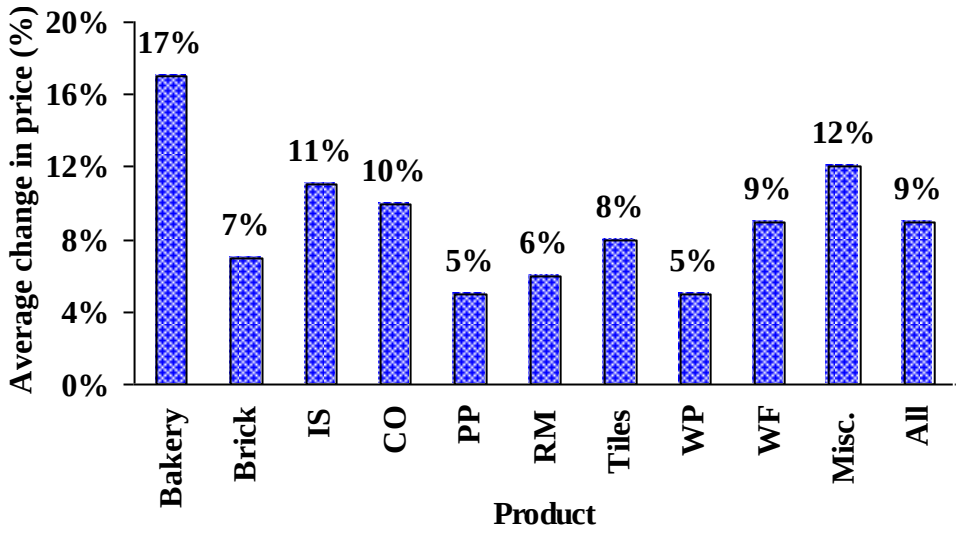
N.B.: 'S-W' stands for 'South and West part of Padma and Meghna River', 'N-W' for 'North-West region of Bangladesh – Rajshahi Division' and 'Others' stand for other regions not included in S-W and N-W.

4.4 Product Price

Figure 5 shows the yearly average changes in price of manufacturing products (from year 2005 to 2008). The bakery products have the highest increase in yearly average price. The increasing demand of the bakery products among the customers

and suppliers initiatives for quality maintenance and up-gradation result the change in price of the bakery industry. The iron & steel, coconut oil, tiles and wooden furniture firms experience around 10% yearly increase in product price. These firms are capable of raising the prices of their products through penetrating new market segments, attracting new customers and upgrading quality. The printing press, wood processing and rice milling firms experience comparatively slower increase of price. The downturn of printing business pressured the printing firms to go slow in increasing price. Similarly, easy availability of wood due to SIDR helped the wood processing firms to keep the wood price hike at a lower level.

Figure 5: Average Change in Price: Product-Wise Analysis



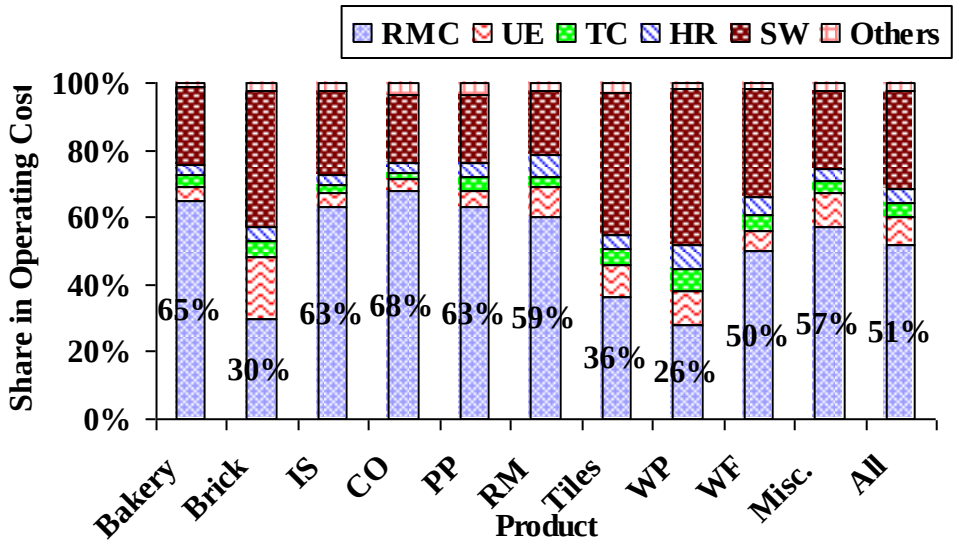
Source: Field Survey (2008-09).

4.5 Cost Structure

Figure 6 postulates the cost structure of the manufacturing firms in the south-west region of Bangladesh. On an average, the firms spend 51% of their total operating cost in purchasing raw materials. The rate is the highest for coconut oil firms followed by bakery. The other extremists are brick and tiles firms that spend around one-third of their total operating cost in purchasing soil, the cheap but main raw material.

The salary & wage comprise larger share in total operating cost for wood processing, brick and tiles firms. As the main raw material (soil) of brick and tiles firms is comparatively cheap, the salary & wage occupy a larger share in total operating cost of the firms. The share of salary & wage in total operating cost is the lowest for rice milling firms because of abundance and poorly paid female workers.

Figure 6: Cost Structure of Manufacturing Firms: Product-Wise Analysis



Source: Field Survey (2008-09).

N.B.: 'RMC' stands for 'Raw material cost'; 'UE' for 'Utility Expenses'; 'TC' for 'Transport cost'; 'HR' for 'House rent'; and 'SW' for 'Salary & wage'.

4.6 Product-Wise Performance Estimation

Average sales growth, Average employment growth, Capacity utilization rate, Target fulfillment rate and Operating profit to sales ratio are the five performance measuring indicators for the manufacturing firms of the south-west region of Bangladesh.

The analyses indicate that the wooden furniture firms are performing better from sales perspective, but the performance of the firms is worse from profit perspective. The tiles firms are doing better from capacity utilization and profit perspectives. The brick firms are performing worse from profit perspective and the rice milling firms are performing worse from capacity utilization perspective (Table 1). The analysis demonstrates the superiority of tiles firms compared to other types of firms operating in the south-west region of Bangladesh.

Table 1: Product-wise Performance of Manufacturing Firms

Performance Measuring Indicators (Y)	Product (D)	Coefficient (β)	p value
Average Sales Growth Rate (%) [N=220]	Bakery	-0.005	0.938
	Brick	-0.031	0.644
	Iron & steel	-0.103	0.125
	Coconut oil	-0.043	0.524
	Printing press	-0.019	0.781
	Rice milling	-0.088	0.191
	Tiles	0.114	0.091
	Wood processing	0.099	0.142
	Wood furniture	0.242	0.000
	Other (reference group)	-	-
Average Employment Growth (%) [N=301]	No statistically significant relationship is found with any product group.		
Capacity Utilization Rate (%) [N=245]	Bakery	-0.070	0.278
	Brick	0.022	0.731
	Iron & steel	-0.024	0.709
	Coconut oil	-0.118	0.064
	Printing press	-0.068	0.286
	Rice milling	-0.176	0.006
	Tiles	0.249	0.000
	Wood processing	0.002	0.978
	Wood furniture	-0.010	0.875
	Other (reference group)	-	-
Target Fulfillment Rate (%) [N=148]	No statistically significant relationship is found with any product group.		
Operating Profit Sales Ratio (%) [N=270]	Bakery	0.019	0.752
	Brick	-0.185	0.002
	Iron & steel	0.061	0.314
	Coconut oil	0.038	0.533
	Printing press	-0.054	0.376
	Rice milling	-0.054	0.378
	Tiles	0.298	0.000
	Wood processing	0.118	0.052
	Wood furniture	-0.223	0.000
	Other (reference group)	-	-

N.B.: N refers to sample size.
The estimated regression equation: $Y_i = \beta_0^i + \sum \beta_j^i D_j + u^i$.
Y refers to performance indicating dependent measure.
D refers to product dummy. For ten product groups, nine dummies are created considering 'Other' as a reference group.
i = Average sales growth, Average employment growth, Capacity utilization rate,
Target fulfillment rate Operating profit to sales ratio.

Source: Field Survey (2008-09).

5. Conclusion

The survey findings indicate that wood products have been gradually occupying the sales share of iron & steel products over time due to input availability and price fluctuation. From a profit viewpoint, tiles firms take the top position through exporting and maintaining product quality. Tiles firms' chronological expansion helps them to intake top position in employment generation. However, impact of seasonality and inception of alternate products cause low, even negative employment growth rate in brick, iron & steel, and printing press businesses. The tiles firms also hold the top position from the capacity utilization perspective due to less use of machineries in the production process. In contrast, rice milling, coconut oil and printing press firms are experiencing lower capacity utilization rate due to lower demand originated from product quality related problems and threats from alternate product suppliers. The tiles and printing press firms target fulfillment rates are also higher due to their commitment to customers and fear of losing the market share and position. However, variation in raw material availability and input price hinders the target fulfillment rate of iron & steel and wood processing firms.

Electricity is the main source of energy for the manufacturing firms of the region. Wood, coal, etc. are used in the brick and tiles firms as alternate energy sources. The survey responders mention that gas supply to the region at the earliest convenient time is the most urgent need irrespective of firm size, product coverage, firm age and location of the manufacturing firms.

The input source of the manufacturing firms is highly skewed towards the regional market with some exceptions like iron & steel and printing press firms. Raw material source-wise consideration indicates that around 85% of the needed raw materials are sourced from the regional sources. The product destination of the surveyed manufacturing firms is also skewed towards the local market. Only the coconut oil and tiles firms are trying to cross the regional/national boundary. The study recognizes that product up-gradation, quality assurance and improvement of investment climate are the main tasks ahead of the manufacturing firms of the region to sustain in competition, to expand, to cross the regional boundary and to earn more profit.

Both the supply and demand side factors are responsible for changes in product price of the manufacturing firms over time. The bakery firms experience the highest change in price, while, printing press, wood processing and rice milling firms experience comparatively slower increase in price. Product quality and quantity, availability and price of inputs, preferences of customers, immense pressure from the competitors, SIDR, etc. are the main economic and social causes for the price fluctuations.

On an average, the manufacturing firms spend 51% of their total operating cost in purchasing raw materials. The rate is the highest for the coconut oil firms followed by bakery firms. The brick, tiles and wood processing firms spend less for procuring raw materials. Salary & wage's come next to raw material in the total operating cost. The brick, tiles and wood processing firms spend more for paying salary & wages. Labor intensiveness and smaller firm size cause higher salary & wage expenditures of

these firms. The share of salary & wage in total operating cost is the lowest for rice milling firms because of abundance and poorly paid female workers.

The product-wise performance estimation finds the superiority of tiles firms compared to other types of firms operating in the south-west region of Bangladesh. The estimation also finds the worse performance of brick, rice milling and wooden furniture firms.

Absence of a complete and updated population list of the manufacturing firms located in the region, physical inexistence of some firms at the registered addresses, unwillingness of some firms to provide information and problems in getting access to financial data of the firms are the main limitations of this study. The author employed fullest effort to overcome the limitations.

Acknowledgement: The author acknowledges International Finance Corporation (IFC) and Economic Research Group (ERG) for financing and supporting this study.

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