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**Impact of the Global Financial Crisis  
on the IT Sector in Bangladesh:  
Lessons Learned and Policy Recommendations**

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# **Impact of the Global Financial Crisis on the IT Sector in Bangladesh: Lessons Learned and Policy Recommendations**

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## **Abstract**

The recent global financial crisis seemed to have affected negatively many countries in the world not only directly but indirectly. However, there might be some opportunities created if some countries or sectors could take advantage of relocations of productions of multinational firms seeking for more efficient supply. In this paper, one of the leading and fast growing industries, whose market shares are mostly acquired by those affected countries, the IT sector in Bangladesh is examined in order to measure the impact of the global financial crisis. In order to find out the situation in the sector more closely, we have conducted a survey of 202 IT firms of various sizes in Dhaka in 2009. It is concluded that, to some extent, the negative impact appears in performance measures but in 2008 most SMEs seemed to have recovered. In terms of total productivity, for those firms, which are more than 5 years old, show that E-governance activities contribute to total productivity by 0.8984 percent. Infrastructure development, tax exemption, export promotion and training of engineers are considered to be major concerns among others in IT business operations based on the survey, which can be tackled by policies to support further development of this sector.

## **1. Introduction**

The Sub-prime loan crisis that led to the grave recession in 2007 in the United States seemed to have given negative impact to trading partners all over the world since demand from those

countries decreased. At the same time, some countries might have benefited from this crisis since shifts in locations of productions could have been aggravated by investors seeking for cost advantage. As for the supply side, there might be a case that international investors which rebuilt supply chains in order to hedge the risk from the global financial crisis, could have brought new opportunities. Therefore, it is neither evident whether the effect of the financial crisis was negative in all sectors, nor how severe those effects were. Then, even within the sector, there might be a case where not all the firms are affected by the crisis in a same manner. In South Asia, the IT sector is one of the leading industries whose market shares were captured mostly by the United States. The effects of the crisis may not be avoided but for a country like Bangladesh to which cost advantage and abundant human resources can bring benefit. In this study, the IT sector in Bangladesh, is examined in order to measure the effect of the recent global financial crisis, to identify factors enabling firms to make a good use of opportunities yielded, and to direct to policy recommendations.

In the following, background of the IT sector is outlaid in Section 1, followed by performance assessment of IT firms in our survey presented in Section 2, the analysis of the impact of the global financial crisis and determinants of productivity on the IT sector is provided in Section 3, then, policy recommendations are exhibited to conclude.

## **1.1 Background of the IT sector in Bangladesh**

Bangladesh is a country of population over 150 million with literacy rate more than 50 percent. In the last two decades, the country has fetched remarkable economic progress with GDP growth rate of more than 5 percent. It is argued that there is a tremendous prospect for the country to leapfrog into industrialized economy through the development of the IT sector. Because Bangladesh has high potential to become a huge source of skilled human resources with its cultural adoption capability, English language skills, analytical capability and a large number of educated and energetic youths with bright aptitude, good quality and natural ability in software development. A recent Hossain, Shinkai, Yunus, and Bakht (2010) BIDS (Bangladesh Institute of Development Studies)'s study shows that the wage rate of IT professionals in Bangladesh is almost half of the Indian IT professionals. Despite these favorable conditions, the IT sector has not yet been growing as much as expected. The country obtained US\$ 33 million by exporting software in 2009. Although the export earnings from the software sector increased by eight million dollars in 2009, compared to 2008, the share of software export is only 0.2 percent of country's total export. The IT sector mainly

concentrates in Dhaka, the capital city of Bangladesh. The Bangladesh government supported IT incubator established in November, 2002, where around 50 IT firms are now doing business.

Recently in Bangladesh, large-scale automation projects have been implemented in telecom, banking, finance, pharmaceutical, and garment/textile sectors and domestic demand for software and ITES industries are, therefore, expected to increase rapidly. According to the Bangladesh Association of Software Information Services (BASIS), more than 500 software and ITES companies are registered in Bangladesh. These companies employ over 12,000 IT professionals. Out of 500 software and ITES companies, more than 20 percent companies are exporting their products and services to over 30 countries. About 6 percent companies have been established through joint-venture with overseas companies or as an offshore development center (ODC) by 100 percent foreign capital. Most of these companies started their operations within last five years, indicating that the Bangladesh software and ITES industries have started to be focused by overseas clients. Over twenty companies have already obtained ISO certification and a number of companies are in the process of acquiring CMMI certification and at least six companies have achieved CMMI Level 3.

The size of the IT market in Bangladesh, excluding telecom, is estimated to be around \$300 million (BASIS). A BIDS (2010) study shows that the major export market is North America, followed by EU countries and East Asian countries, especially Japan. The present government of Bangladesh is envisioned to create a “Digital Bangladesh” by 2021<sup>1</sup>. In this context, with government IT supportive policies, more automation projects such as e-government projects are expected to be undertaken, which will increase the demand for IT services as well as will contribute to further development of the sector.

In pursuit of that, the Bangladesh government, in its Export Policy, has formally identified the IT sector including the software industry as one of the “thrust sectors”. In what follows, initiatives taken are exemptions of income tax, value-added tax, and customs duty for the IT industry, formulation of National IT Policy, organizing the IT National Taskforce (the chair is the Prime Minister), establishment of IT incubation centre, enactment of Copyright Law (Trademark Law, 2009), enacting of ICT Act 2006 in the parliament, increase in IT budget allocation by the

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<sup>1</sup> Piazzolo (2001) provides a definition of an “digital economy” as: “an economy where both final output and intermediate input increasingly consist of information and where the modern (digital) IT increasingly provide world-wide immediate access to any information made available. These new technologies might have the potential to enable an increase in the productivity of conventional business practices, but also facilitate the establishment of new processes and products. Consequently, the evolution of the digital economy should not be considered as being restricted to the information sector, but as a far reaching process that might alter and extend the products and production processes within the whole economy” (p 30).

government (targeting 2% of annual development plan expenditure), etc. With the support of the government, the software industry in Bangladesh has started growing since the 1990s. Bangladesh has recently been focused by other countries as an outsourcing target. However, the absence of IT park as well as electricity and internet problems remain as key barriers to expanding the industry at an expected level.

Historically, computer use started back in 1964 by Atomic Energy Center, Dhaka and Universities. The first main frame computer came to Bangladesh in 1964. The Internet came late in Bangladesh, with UUCP e-mail beginning in 1993 and IP connectivity in 1996. By July 1997 there were 5,500 IP and UUCP accounts as estimates<sup>2</sup>. In June 1996, the government decided to allow private companies to act as Internet Services Providers (ISPs) using VSATs. In June 1997, the Government of Bangladesh appointed a Committee to look into the problems and prospects of export of software from Bangladesh. The Committee submitted its report in September, 1997<sup>3</sup>. The government has taken a decision on June, 1998 to withdraw all import duties and VAT from all computer hardware and software. This has brought the prices of computers down to a level affordable by middle income households. Mobile telephone has seen a phenomenal growth in Bangladesh, which is contributing to the growth of the IT sector positively.

**Table 1 IT indicators in Bangladesh, 2006**

Internet users	450,000
Internet users (per 100 people)	0.28
Secure Internet servers (per 1 million people)	0.019
Telephone mainlines (per 100 people)	0.72
Investment in telecoms with private participation (current US\$)	8.93E+08
International Internet bandwidth (bits per person)	7.97
International Internet bandwidth (Mbps)	1244
Mobile phone operators	6
Mobile phone subscribers (as of 2009)	66 million

Source: World Development Indicators, The World Bank and BTRC, Dhaka<sup>4</sup>

<sup>2</sup> [http://www.c2o.org/reports/Report\\_PAN\\_Asia\\_Networking.pdf](http://www.c2o.org/reports/Report_PAN_Asia_Networking.pdf)

<sup>3</sup> <http://www.sdnbd.org/sdi/issues/IT-computer/expartsoft-report.htm>

<sup>4</sup> All the tables were produced by the authors if not specified.

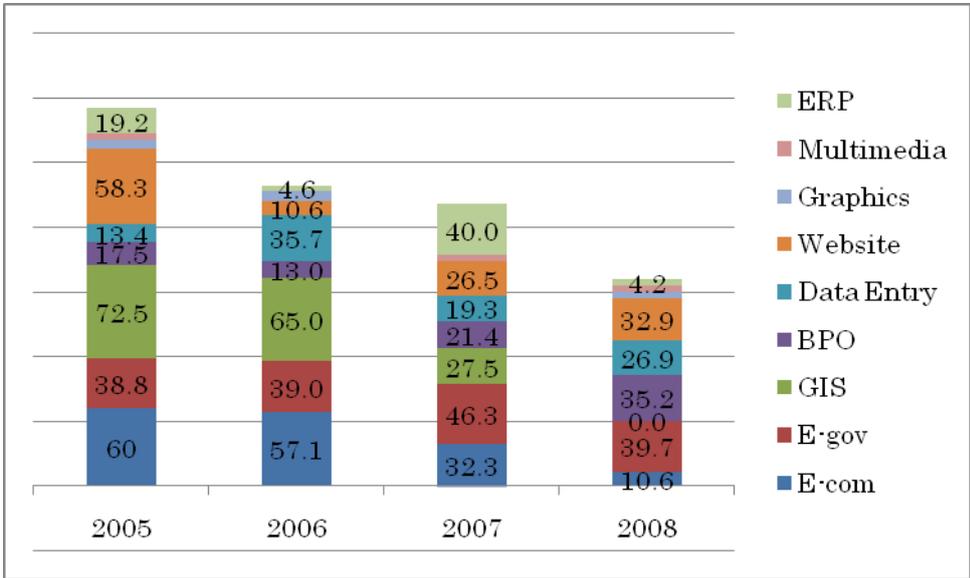
## 2. Performance Assessment of IT firms Surveyed

The IT sector in Bangladesh is one of the fast growing sectors and it is also quite export oriented. However, as it is mentioned in the previous section, the growth of this industry is somewhat lower than expected. In order to identify the causes for straggling and to observe variations of impact by firm, we conducted the survey of IT firms in Dhaka in October and November 2009. Firms were selected based on stratified random sampling in the first stage. In this first stage, all the key commercial areas in Dhaka were covered. In total, 202 software firms were sampled, including some large firms<sup>5</sup>.

### 2.1 Sales revenue and profit

Based on the data of 202 surveyed firms, different indicators of performance of IT firms are examined. The IT firms in Bangladesh showed a staggered growth of sales revenue over the years, 2005-2008.

Figure 1 Average growth of sales of IT firms by major activities, 2005-2008 (%)



Global economic recession in 2007 has impacted Bangladeshi software firms to some extent. Figure 1 shows that Bangladeshi software firms have faced downturn in product sales growth for some activities during 2006 and 2007 and there is a sign of rebound in 2008. The above picture is also confirmed from respondents' opinion. Whereas, about 55 percent firms were affected by the

<sup>5</sup> This survey was supported by Grant-in-Aid for Scientific Research, Japan Society for the Promotion of Science, No. 20402027 and No. 21530259.

global recession through drop in sales, about 12 percent firms were reportedly benefitted by the global recession through increase in sales.

Table 2 shows that gross profit of firms is reported to be around 18 percent of the total revenue on average in 2008. As expected, profit declined slightly in 2008 for most of the firms except for the medium-sized firms.

**Table 2 Gross profit as % of sales revenue**

Gross Profit as % of revenue by size (the number of employees)	Micro (<10)	Small (10-49)	Medium (50-99)	Large (>100)	All
2008	17.3	18.7	19.4	12.2	18.1
2007	28.8	20.1	17.0	26.2	21.1
2006	27.0	17.5	17.4	20.6	18.8
2005	20.6	18.1	20.8	28.3	19.7
2004	52.4	32.6	16.2	20.4	31.9

**2.2 Skill level and Labor Dynamics**

In view of the theoretical and empirical evidence, skill level is positively associated with the performance of firms. As mentioned earlier, an important prerequisite for the development of IT sector is the availability of skilled workforce with cheaper wage rate. Table 3 shows that highly skilled or skilled workforce is necessary for all the services, but particularly for E-commerce, website/web-analytics, Enterprise Resource Planning (ERP) and graphic analysis.

**Table 3 Skill level for particular activity**

Level/Section	E-commerce	E-gov	GIS	BO	Data Entry	Website	Graphic	Multimedia	ERP	Call centre	Internet service
Highly skilled	30.2	11.9	6.9	14.9	16.8	47.5	29.2	16.3	23.3	5.9	28.7
Skilled	16.3	9.9	7.4	12.9	13.4	15.3	10.4	7.9	15.8	5.9	16.3
Semi-skilled	5	4	1.5	5	6.9	4	3.5	1.5	3.5	4.5	6.9
Unskilled	0.5		2	2.5	2	0.5	1	2	2	3.5	3

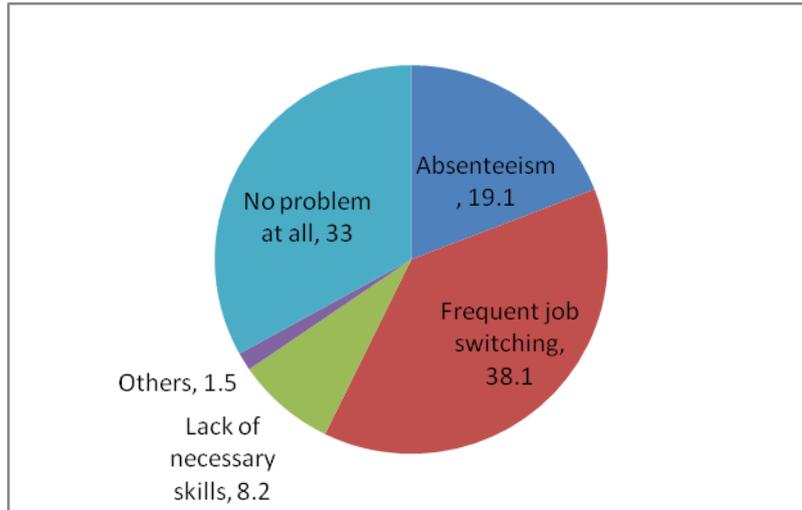
About 90 percent of IT firms are highly satisfied with the level of skill of their employees. Skill appears to be an important factor for the industry, and thereby firms are willing to pay higher salary for high skilled employee (Table 4).

**Table 4 Willingness to pay for better skilled employee**

	Satisfied	Willing to pay higher salary for skilled employee
Micro	88.2	75.8
Small	87.7	77.5
Medium	93.3	80.0
Large	85.7	85.7
All	88.5	78.2

However, frequent job switching (38%), absenteeism (19%) and lack of required level of skill (8%) are the major problems that firms often face (Figure 2). High mobility of IT professionals is observed in the cases of those who have expertise in E-commerce, website development and ERP software. Fierce competition in these areas and relatively low wage rates are the main reasons for job switching of employees (Table 5).

**Figure 2 Human capital related problems for the IT industry**



Firms tend to overcome these problems by increasing salary (63%) or providing promotion (40%). In other words, the situation indicates scarcity of appropriate human capital required for the further development of the industry.

**Table 5 Labor mobility and reasons**

Activities	High mobility (in 1 month)	High mobility (in 3 month)	Reasons for mobility			
			Many competitors	Job is not interesting	Low salary	Others
E-commerce	6.9	8.4	40.0	6.7	46.7	6.7
E-gov	1.5	4.5	50.0		37.5	12.5
GIS	0.5	2.5	20.0	20.0	40.0	20.0
BPO	3	5	40.0	10.0	40.0	10.0
Data Entry	3	0	20.0	20.0	50.0	10.0
Web site	11.9	11.4	30.0	15.0	45.0	10.0
Graphic	5.4	3.5	18.2	9.1	72.7	
Multimedia	3	2	40.0		60.0	
ERP	7.4	6.9	25.0	18.8	43.8	12.5
Call centre	0	0.5	100			
Interest serv.	5	10.9	26.9	15.4	50.0	7.7

Next table shows the salary structure of IT professionals for the year 2008. It shows that family workers receive slightly higher wages than those of other staff. On average, the monthly salary of managers is about Tk. 40,000 (US\$ 575), Tk. 32000 (US\$465) for engineers and about Tk. 10,000 (US\$150) for operators. This wage rate is cheaper compared to India (BIDS, 2010).

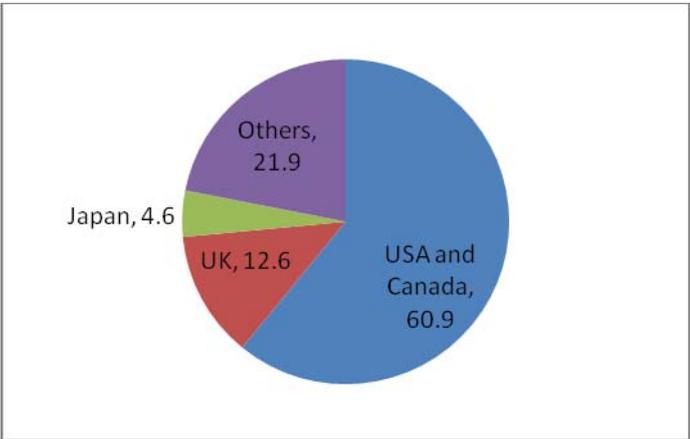
**Table 6 Wage structure of IT Professionals**

	Family worker	Permanent staff	Contractual staff
Senior/mid level manager	41,500	38,000	32,500
Engineer	56,700	32,000	32,500
Operator	7,000	10,000	8500

**2.3 Marketing and Promotion**

Another important aspect of the software industry is to have better marketing strategies in place. Exploring new markets, building network and alliances with TNCs, obtaining certificates of standards and membership of IT leaders, such as Microsoft and IBM could facilitate their entrance into the global value chain, and thus the performance of software firms. About 40 percent firms are exporting software services. It is observed that the United States and Canada remain the major export market for Bangladeshi software firms. While the US and Canada account for 61 percent, UK accounts for 13 percent, Japan 5 percent and the rest 21 percent.

**Figure 3 Export market structure of the IT industry**



As already mentioned, establishing network and alliances could be an important business strategy for better market access. Respondents suggest that one of the ways to build a network is to be a member of a software association (62%). Other ways are to attend market development program (36%), to visit foreign countries as a part of delegation (25%), and to achieve different quality certificates such as CMMI and ISO (14%) etc.

**Table 7 Strategy to build marketing network**

	Percentage
Become a member of association	62.4
Attended in marketing development program	35.6
Went abroad in a delegation on market promotion	24.8
Achieved quality certificates	14.4
Attended exhibition expo	42.6
Others	5.4

**2.4 Access to finance**

During the survey, it has emerged that lack of access to finance has been important barriers to the performance of IT firms in Bangladesh. Another barrier is related to the infrastructure, such as the lack of electricity supply (Table 8).

**Table 8 Impediments to development of the IT industry in Bangladesh**

	1 <sup>st</sup> Obstacles	2 <sup>nd</sup> Obstacles	3 <sup>rd</sup> Obstacles	4 <sup>th</sup> Obstacles
Access to finance (availability & cost)	23.8	7.7	8.1	5.7
Access to land	4.5	6.7	3.2	4.6
Business licensing & permits	5.4	5.7	1.6	2.9
Corruption	9.9	10.8	7.0	6.9
Crime, theft & disorder	3.0	4.1	3.8	4.0
Customs & trade regulations	5.4	7.7	2.7	2.9
Electricity	26.7	20.6	14.5	8.6
Inadequate skilled labor	5.9	8.2	12.9	4.6
Labor regulations	2.0	1.5	3.2	1.1
Political stability	3.5	11.3	10.8	9.7
Tax administration	2.0	4.1	4.3	4.6
Tax rate	2.5		3.8	5.1
Transportation		1.0	10.8	10.3
Access to market	3.5	7.2	6.5	14.3
Access to technology	1.0	1.0	2.7	11.4
Copy right	1.0		2.7	2.9

It is observed that very few IT firms have access to formal financial institutions including the Equity Entrepreneurship Fund (EEF), a venture capital fund provided by the Bangladesh Bank (Central bank). Most of the IT firms claimed that high interest rates and tangible collateral assets are the most important obstacle for their access to finance since interest rates are higher, particularly for micro firms. Average interest rate ranges between 14 and 21 percent (Table 9).

**Table 9 Average interest rates for borrowing fund from financial institutions**

Firm size	Short term	Mid term	long term
Micro	25.0	30.0	16.0
Small	18.6	18.0	14.0
Medium	15.1	19.0	13.8
Large	0	14.5	17.0
All	17.4	21.0	14.2

Table 11 shows that in most cases, software firms use land or building and other personal assets of owner as collateral for loans since most of the firms do not have tangible assets.

**Table 10 Types of collateral needed**

Collateral type	Short-term loan	Mid-term loan	Long-term loan
No	42.9		25.0
Land/building	14.3	60.0	30.0
Machinery & equipments including movables	14.3	20.0	20.0
Accounts receivables and inventories		20.0	5.0
Personal assets of owner	14.3		5.0
Others	14.3		15.0

### **3. Impact of the Global Financial Crisis and Determinants of Productivity**

#### **3.1 Impact of the Global Financial Crisis**

As discussed in the previous section, in Bangladesh, the development of the IT sector has been supported by the Bangladesh government during the period starting from 2002. Recent sectoral progress shows that the efforts are coming into effect. As the domestic environment is becoming favorable with the increase in demand for the IT sector, the external factors have been recently

looking severe. When the global financial crisis initiated from the US in 2007, another South Asian country, which is the leading country in this sector, India, was prone to the decrease in revenue and performance. Among those IT firms, especially SME firms were affected (Hossain, Shinkai, Yunus, and Bakht (2010)). For the case of Bangladesh, this crisis might have affected those firms dealing with the US and Europe mostly if the demand from those countries dropped. At the same time, we have observed some calling centers from the US were established due to the increase in the cost of operations in India. If the shift in demand into Bangladesh of the multinational companies in this sector surpasses the decrease in existing demand from those companies, there might be a chance that this crisis might have worked positively for the IT sector in Bangladesh. In this section, the impact of recent global financial crisis is examined using several performance indicators of IT firms. In addition, the determinants of those performance indicators are investigated.

It seems that the age of owners is mostly concentrated in the 40s and somewhat in the early 50s whereas in India, the average age of owners is found in the late 30s. This could be resulted from the reallocation of business between sectors due to the support of the government in terms of tax incentives, the positive prospect in the market, the increase in graduates of polytechnic institutes and engineering departments. Some of the owners even said that the impression of handling business in the IT sector is better than other sectors since the IT sector has the image of modern industry and advanced technology. The fact that there are quite a few owners in the 50s may also imply that there might be some cases from early retirement of their former jobs in the public or private sectors. These owners are young in this sector although they are not new in doing business as shown in the distribution of age of owners. The average experience of the owners in doing business is 16.59 years whereas the age of companies in the IT sector is mostly less than 8 years with peaks in 3, 5, 7, and 8 years. (Figure 4).

Figure 4 Age of owners



Figure 5 Age of companies



The average size of firms measured by the number of total employees is 40.10 and 11 firms have more than 100 employees. Next, several performance indicators and the influence of the recent global financial crisis are considered. First, the rate of profit (gross profit expressed as earnings before interest and taxes) to revenue is investigated.

Changes in profit rates are presented in Table 11. Among those firms which reported profit rates each year, the effect of the global financial crisis is not found. On the other hand, when firms are restricted to those which reported sales figures in 2004, the profit rates seem to have been affected negatively by the global financial crisis. This ambiguity of the impact of the crisis measured by profit rates could be caused by some new entrants, which joined after 2004, are relatively performing better. As more details are examined later in the section where determinants of productivity are discussed, first the rate of engineers, which is given frequently in the analysis of the IT sector, is explored.

**Table 11 Changes in profit rates**

Changes in Profit rates (all obs.)				Changes in Profit rates ( for sales in 2004>0)			
	Obs.	Mean	Std.Dev		Obs.	Mean	Std.Dev
2008–2007	77	0.0054	0.0890	2008–2007	39	0.0144	0.0889
2007–2006	69	0.0107	0.0762	2007–2006	37	–0.0095	0.0831
2006–2005	62	0.0060	0.0377	2006–2005	37	0.0003	0.0363
2005–2004	50	0.0037	0.0497	2005–2004	36	0.0003	0.0495

It can be concluded that when the rate of engineers goes up, if the scale economy works in a positive manner, the performance of firms may improve. On the other hand, if the cost disadvantage of hiring engineers prevails over the scale effect, the performance of firms may deteriorate. Next,

the relationship between profit rates and the rate of engineers are examined. Table 12 presents the correlations between these two variables. In the given five year period, except for 2004, other years show negative relationships. In 2007 and 2008, especially, the negative correlations are significant. Therefore, there might be a chance that the cost burden of hiring engineers overcomes the scale effect. This tendency did not change much when large firms are taken out from the analysis. Then, next questions will be how the shares of engineers changed over time and whether firms adjusted the global financial crisis by cost adjustment and/or by the reduction of engineers. In order to answer these questions, the movement of shares of engineers is examined next by different categories of firms.

**Table 12 Correlations between profit rates and shares of engineers**

	Profit rates				
	2004	2005	2006	2007	2008
Share of Engineers					
2004	0.0653 (0.6629)				
2005		-0.0562 (0.667)			
2006			-0.0647 (0.6032)		
2007				-0.1907* (0.0989)	
2008					-0.2473** (0.027)

Note: \*\* significant at 5% level, \* significant at 10% level

Table 13 shows changes in shares of engineers overtime. A decrease in the share of engineers is observed between 2006 and 2007 for SMEs with less than 100 employees. On the other hand, this

decrease between 2006 and 2007 is not detected for large firms with more than or equal to 100 employees. This probably coincides with the view that the scale effect might work better in large firms rather than in SMEs, thus large firms tend to keep hiring more engineers despite the downturn of the economy. Alternatively, for SMEs, the cost disadvantage might be stronger and they reserve hiring engineers in difficult time.

Next, another performance indicator, productivity of firms is investigated.

**Table 13 Shares of engineers**

Share of Engineers

	Obs.	Mean	Std. Dev.
2008	191	0.4888	0.2526
2007	187	0.4820	0.2549
2006	170	0.4704	0.2517
2005	136	0.4622	0.2417
2004	102	0.4493	0.2444

**Table 14 Changes in shares of engineers**

Less than 100 employees				Less than 100 employees			
Changes in Share of Engineers				Changes in Share of Engineers (for sales in 2004>0)			
	Obs.	Mean	Std. Dev.		Obs.	Mean	Std.Dev.
2008–2007	174	0.0109	0.0793	2008–2007	73	0.0125	0.0688
2007–2006	159	-0.0038	0.0549	2007–2006	71	-0.0050	0.0415
2006–2005	127	0.0037	0.0556	2006–2005	71	-0.0036	0.0566
2005–2004	94	0.0079	0.0706	2005–2004	69	0.0117	0.0711

More than or equal to 100 employees				More than or equal to 100 employees			
Changes in Shares of Engineers				Changes in Shares of Engineers (for sales in 2004>0)			
	Obs.	Mean	Std. Dev.		Obs.	Mean	Std.Dev.
2008–2007	12	-0.0374	0.1331	2008–2007	5	0.0254	0.0304
2007–2006	11	0.0012	0.0245	2007–2006	5	0.0055	0.0237
2006–2005	9	0.0175	0.0476	2006–2005	5	0.0046	0.0280
2005–2004	8	0.0050	0.0470	2005–2004	5	-0.0102	0.0243

Productivity here is measured by Total Productivity (TP) defined as the Hicks neutral efficiency term in the production function.

$$\ln TP_{it} = \ln Y_{it} - LS_{it} \ln L_{it} - CS_{it} \ln K_{it} \quad (1)$$

when Y represents sales, L is labor, LS is labor share, CS is capital share, and K is capital respectively. i represents a firm and t represents year. Capital was constructed by reported Capital in 2008 and investment each year. Capital share was calculated from the replacement cost and sales. Labor share was computed from wages and the number of employees and sales<sup>6</sup>. Total Productivity here resembles Total Factor Productivity (TFP). However, more strictly speaking, Value Added instead of sales/output should be used to calculate TFP. For IT firms, materials may not be a major component, such that TP and TFP may not differ much. Nevertheless, in order to differentiate the method to lead the difference in results, here we call Total Productivity following Hulten, Bennathan, and Srinivasan (2006). Productivity growth between 2004 and 2008 is presented in Table 15. The negative growth rates in the 2005-2006 period and the 2006-2007 period are observed for SMEs. When firms are restricted to those, which reported sales in 2004, the same tendency remains but the negative growth in the 2006-2007 period is larger. In contrast, in large firms, the negative growth rates were found both in the 2006-2007 period and the 2007-2008 period. This might be partly from the retaining the input structure as much as possible in the downturn, whereas SMEs seem to have adjusted input structure in those periods more quickly. In the following section, total productivity is revisited in order to find out the sources of the productivity.

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<sup>6</sup> Here, capital was calculated from the average investment rate and depreciation rate in the data. For input shares, reported figures in 2008 were used to calculate shares of inputs. Then, the average of those figures was used for all firms and all years.

**Table 15 Productivity growth between 2004 and 2008**

Less than 100 employees				Less than 100 employees			
TP growth rate				TP growth rate			
				(for sales in 2004>0)			
	Obs.	Mean	Std. Dev.		Obs.	Mean	Std. Dev.
2008–2007	140	0.0065	0.8805	2008–2007	70	0.0692	1.0344
2007–2006	123	-0.0254	0.5668	2007–2006	69	-0.0757	0.4692
2006–2005	89	-0.0456	0.3702	2006–2005	69	-0.0453	0.3386
2005–2004	67	0.0056	0.3915	2005–2004	67	0.0056	0.3915
<hr/>				<hr/>			
More than or equal to 100 employees				More than or equal to 100 employees			
TP growth rate				TP growth rate			
				(for sales in 2004>0)			
	Obs.	Mean	Std. Dev.		Obs.	Mean	Std. Dev.
2008–2007	8	-0.3565	2.0725	2008–2007	4	-1.2902	2.2591
2007–2006	8	0.0355	0.3664	2007–2006	5	-0.0872	0.1077
2006–2005	6	0.0678	0.3319	2006–2005	5	0.0644	0.3710
2005–2004	5	0.0282	0.3035	2005–2004	5	0.0282	0.3035

### 3.2 Determinants of Productivity

In the previous section, total productivity growth and the impact of the recent global financial crisis have been examined for the period between 2004 and 2008. As seen in the trend of total productivity growth as well as in the change of shares of engineers, the difference in firm behaviors

among SMEs and large firms is detected. Whereas some firms stay productive from the beginning, others face difficulties. Firms can also take several approaches during the downturn, such as adjusting cost structures to become more efficient, exploring new markets, building a strategy to emphasize strength and/or lessen weakness etc. In this section, factors which contribute to a higher level of total productivity are investigated. The logarithm of total productivity may be considered as a summation of a factor which affects the whole IT sector and factors which are firm and time specific as indicated above.

$$\ln TP_{it} = \ln \alpha + \beta x_{it} \quad (2)$$

where  $\alpha$  is the sector specific factor and  $x_{it}$  are firm specific factors. Firm specific factors are divided into 4 groups; 1) cost structures, represented by  $\ln$  (the number of engineers) and shares of engineers, 2) market structures, expressed by percentages of outsourcing, export shares, and main market activities, 3) strategies based on strength and weakness, such as participations in external training program (yes or no) and financial access indicators<sup>7</sup>, and 4) other firm specific characteristics, such as years of experience of owners and the age of firms. As strength, human resource management was mostly quoted. On the other hand, as weakness, access to financial resources was the option most heavily cited. In addition, since the behavior of SMEs is a main concern, only those firms with less than 100 employees are included for the rest of the analysis here<sup>8</sup>. Results of regression analyses are demonstrated in Table 16. It is evident that for most firms, the higher the share of export is, the larger total productivity would be. On the other hand, the percentage of outsourcing within the domestic market has a significant negative relationship with total productivity, especially for those firms which are more than 5 years old. This can be due to the fact that those firms, which are less efficient, may outsource tasks to others in the domestic market. As for activities, E-governance tends to increase the level of total productivity for those firms which are more than 5 years old. For younger firms, which established firms less than or equal to 5 years, not a single activity seems to significantly contribute to the level of total productivity. Although whether senior managers had any outside training seems to be positively related with total productivity, the coefficients are not significant. The age of company also seems to have no

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<sup>7</sup> A dummy variable was created based on replies of owners. When owners said interest rates, fees, or collateral are major or severe obstacles, it is indicated as one.

<sup>8</sup> Due to the availability of some of the explanatory variables, total productivity in 2008 is examined only.

relationship with total productivity. Overall, although the signs of coefficients seem to mostly coincide with predictions for those 4 sets of explanatory variables, those variables which represent market orientations and market structures explain total productivity of SMEs in the Bangladeshi IT sector the most.

**Table 16 Determinants of total productivity**

	All firms		Firms more than 5 years old		Firms, less than or equal to 5 years old	
	Coefficients	Std. Err.	Coefficients	Std. Err.	Coefficients	Std. Err.
Ln (Experience of owner)	-0.0962	0.1619	-0.1108	0.2583	-0.0899	0.2333
Ln (Age of firm)	0.1152	0.1329	-0.0450	0.3682	0.2444	0.3028
Ln (Number of Engineers)	0.1105	0.1313	0.1979	0.1638	-0.0132	0.2335
Ln(Share of engineer)	-0.6548	0.5670	-0.7716	0.7963	-0.3501	0.8838
% of outsourcing	-0.6622 *	0.3840	-1.0320 **	0.4756	0.1568	0.6833
% of exports	0.7477 **	0.2878	0.4619	0.4662	0.8127 *	0.3932
E-commerce	-0.0001	0.1984	0.1759	0.2583	0.0368	0.3357
BPO	-0.1301	0.2380	0.3635	0.3296	-0.3898	0.3758
E-gov.	0.1521	0.2477	0.8984 **	0.3268	-0.6259	0.4103
ERP	0.0049	0.2302	-0.1735	0.3080	0.1554	0.4055
GIS	0.5728	0.3692	0.4516	0.4557	0.9682	0.6726
Website	0.3118	0.1866	-0.0058	0.2552	0.4350	0.3105
Call center	-0.1693	0.5590			-0.1837	0.6471
Training	0.1360	0.2229	0.0833	0.2753	0.0223	0.3943
Access to finance	-0.1965	0.2449	-0.3568	0.2824	-0.1983	0.5182
Constant	5.5403 **	0.4932	5.8593 **	0.8758	5.4721 **	0.8287
R2	0.1358		0.2683		0.1861	
Obs.	156		79		77	

Note: \*\* significant at 5% level \* significant at 10% level

#### 4. Useful policies for the IT Industry

In this section, useful policies for the IT industry are considered. Based on our survey results, infrastructure development and tax exemption seem to be the most preferred policies for the development of the IT sector (Table 17). Export promotion and training of engineers are other preferred concerns of the firms.

**Table 17 Useful policy for IT business (Percent)**

	1 <sup>st</sup> preference	2 <sup>nd</sup> preference	3 <sup>rd</sup> preference
Infrastructure development	64.8	0	0
Tax exemption	21.2	51.7	0
Export promotion	6.7	20.0	34.4
Trade licensing facilitation	2.2	8.3	9.4
Export licensing facilitation	.6	2.5	10.9
Training of engineers	2.8	14.2	43.8
Others	1.7	3.3	1.6

Establishing more IT parks could solve the infrastructure bottlenecks for the IT industry. About 87 percent respondents shared the view that an IT park is necessary for the development of the IT industry in Bangladesh. They suggest that the Park should have the facilities like training institute (41%), uninterrupted electricity (42%), foreign company contact points (20%) etc.(Table 18).

**Table 18 Important facilities for IT park (Percent)**

Facility type	Rank-1	Rank-2	Rank-3	Rank-4	Rank-5
Training Institute	40.6	22.8	13.9	6.8	4.8
University	4.0	9.4	6.7	9.5	11.2
Conference center	4.6	18.7	21.8	18.9	18.4
Library	.6	4.7	9.7	18.2	17.6
Hostels	1.7	1.8	2.4	4.7	5.6
24 hours electricity & other infrastructure	42.3	20.5	18.2	10.8	2.4
Bank		2.9	9.1	14.2	12.8
Foreign companies contact points	5.1	18.1	16.4	14.9	24.8
Other	1.1	1.2	1.8	2.0	2.4

For the overall development of the IT industry in Bangladesh, more IT clusters/parks, more skilled workforce, more infrastructure, more training institutes seem to be required. Moreover, industry-academia linkages and FDI are necessary to reap the benefits of this industry (Table 19). They also suggest that these facilities will further help attract more foreign investments in this sector.

**Table 19 Suggestions for further development of the IT industry**

	Rank-1	Rank-2	Rank-3	Rank-4	Rank-5
More clustering	10.9	6.0	4.0	3.7	6.9
More skilled workforce	35.1	19.9	8.5	6.9	6.3
More training institutes	14.4	21.4	15.6	8.0	6.9
More infrastructure	21.3	18.9	21.1	5.3	2.9
Industry-academia linkage	3.5	10.0	14.1	13.8	8.6
Foreign investment	6.4	10.4	16.6	18.1	11.4
Political stability	4.5	6.5	13.6	23.9	15.4
Reduce corruption	3.0	2.5	2.0	8.5	22.3
Partnership with other companies in the same sector in Bang		2.5	1.5	6.9	9.7
Decrease VAT		1.0	2.0	4.8	9.1
Others	1.0	1.0	1.0		.6

## 5. Concluding remarks

The recent global financial crisis has affected negatively various countries not only directly but also indirectly from the drop in demand. However, some of the sectors might have enjoyed cost advantage owing to the downturn of the economy of international investors, which might have shifted supply system for services. This advantage can overcome the reduction in sales from the demand side. In order to investigate the impact of the recent global financial crisis in one of the leading service sectors in South Asia and detect cost advantage effects, the IT sector in Bangladesh was examined.

It is found that performance indicators measured by profit rates got worsened in 2006-2007. The share of engineers seems to be negatively correlated with profit rates. This fact indicates that firms in the IT sector have adjusted market structures rather than cost structures during the downturn. This tendency is supported by the results from the regression analysis based on total productivity at the firm level. The rate of

outsourcing within the domestic market is negatively and the share of exports is positively related to the level of total productivity in 2008 in this sector. As for firms, which are more than 5 years old, E-governance activities contribute to the higher level of total productivity.

In terms of policies, infrastructure development and tax exemption are more preferred policies by the surveyed IT firms, followed by export promotion and training of engineers. For further development of the IT industry, it would be recommendable to target these factors in supporting this industry.

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