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Relationship Between Technology and Industries Becoming Sick: Bangladesh Perspective

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Abstract

The performance of public sector enterprises in Bangladesh seems to be very poor. Various combinations of factors are responsible for industries to become sick. Old machineries and technology is one of the important factors among them. Ultimately the industry gives continuous loss and it becomes sick and finally brings down the closure. This paper points out and shows how the sick industries can be improved their condition by applying application of technology. The overall objective is to overcome sickness and thus survive.

1. Introduction

Before 1947, a few numbers of industries were established in this territory, presently known as Bangladesh. During the period 1947 to 1970, limited heavy industries were established like sugar, cement and steel etc. Though the implementation of some industries was started before 1970 but some of them were completed before 1980.

For lengthy period of completion, they were already born sick industry. Many small industries were also established in private sector before 1970 for producing cotton, jute and textile. As government wants to accelerate industrialization many small industries have been established in several industrial area for producing garments, shoes, pharmaceutical appliances, and different machinery parts etc. (Hoque and Biswas, 2013).

After independence of Bangladesh some abandoned property took over by the government as nationalized industry. Many of the industries both in government and private sector became sick and have been closed down. Thus, industrial sickness is a severe problem not only in Bangladesh but other countries also. 225 numbers SOE (state owned enterprises) enterprises were privatized in between 1975 to 1981. In 1991, 42 enterprises were also identified for privatization (Privatization Commission, 2007).

When an industry cannot perform its normal activities properly, incurs losses for several years and often defaults in its debt repayment obligations. A sick

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industrial unit may be defined as one when it fails to generate surplus on a continuous basis and completely depends on external funds for its survival.

If the industry continues to exits this loss for few years, it brings closed down within short time. In this situation financial institution may come forward to regain this loss which is given as loan.

If the industry is an SOE industry, in that case government first gives option for BMRE (Balancing, Modernization, Rehabilitation and Expansion) in case of failure to recover and ultimately starts processing for sell it to private parties (Hoque, 2015).

Number of sick units among the micro, small and medium enterprise (MSME) is increased day by day. Investment is blocked in sick MSME has also increased year after year resulting locking of funds of the lending institutions, loss of scarce material sources and loss of employment. When the problems arise, the diagnosis and treatment would be easier. However, when sickness reaches an advanced stage, it becomes difficult and takes longer time to diagnose the reason and makes it more costly and expensive to bring the units back to normal. So, there is a need to identify sickness in initial stages and initiate remedial measures before the sickness takes place (Goyal *et al.*, 2012).

In small scale industries(SSI), the functional areas of sickness are related to field of marketing, production, finance and infrastructure, high cost of production, lack of proper demand, forecasting methods, obsolete machinery, insufficient working capital, complicated procedure of fund lending, unavailability of raw materials, improper quality control mechanism and lack of research and development, etc. Keeping in view, it was recommended that SSI's need to take care of their internal issues and government need to provide full assistance and support for the development of sick units by getting funds, subsidies and measures to control supply of power (Jain, 2014).

Causes of sickness are classified into internal causes and external causes. Internal causes are financial problem, management problem, demand forecasting, defective plant and machinery, labour problem, etc. External causes are demand and credit restrains, power cuts, government policy, etc. They recognized bank, business people, government and other financial institution must be careful to deal with concept of industrial sickness (Sunitha & Navulla, 2016).

Some industries are sick due to weakness in planning, faulty project appraisal, and lack of vision. The opined that concerned authority should come forward with different measures to reduce the risks by removing the causes of sick as much as possible in industrial units (Deepak & Arundhati, 2019).

She identified among the several factors, the most significant ones include bad management or ineffective management, inadequate initial planning, a lack of marketing expertise, etc. In addition, improper industrial location, incorrect capital cost estimation, delays and cost escalation, improper formation of inventory

requirements, labour unrest, outdated machinery and production technology, lack of research and development, delay in sanctioning loans by commercial bank. A significant industrial sickness might have an impact on the economy as a whole as well as affected the business (Hegde, 2022).

Industrial sickness is multifaceted issue stemming from a combination of internal and external factors. A comprehensive understanding of the causes is essential for crafting targeted strategies to address this pervasive problem. Achieving industrial resilience requires collaborative efforts, where the government, businesses, and other stakeholders work in tandem. By addressing the root causes, fostering innovation and implementing strategic policies, state can unlock the potential for sustained industrial growth (Ravikant & Pritam, 2024).

2. Methodology

The research starts with a detailed literature review of sickness of industries that requires a general understanding about sickness. Then, the research expected to provide a good guideline for the sick industries that can be applied to SOE industries as well as private industries also. This can be done by identifying the common causes of sickness. To identify the causes collected data and other information from several industries. Analyze the data using the performance analysis, productivity analysis, ratio analysis and break-even analysis. Finally, tested (validation) by multiple regression model and have drawn our conclusion.

3. Causes of Sickness

Sometimes industries start its journey with loss as initial cash loss due to the delay of feasibility study, delay in project completion, high bank interest, over estimation of project cost. Due to such cash losses the project cost generally affects in liquidity position (Jahirul, 2003).

Various problems may arise due to several factors like man, material, machine, method etc. are not managed properly. For the survival the industry depends on factors concerned to these. Thus, the causes can be classified (in major groups) as :

1. Management, 2. Financial 3. Environmental and 4. Technology, etc.

Technology is the application of scientific knowledge for practical purposes or applications. Technology uses scientific principles, and applies them to change the environment in which humans live. Technology can also use scientific principles to advance industry or other human constructions.

Technology consist of two primary components: 1) a physical component which comprises of items such as products, tooling, equipments blueprints, techniques, and processes; and 2) the informational component which consist of know-how in management, marketing, production, quality control, reliability, skilled labour and functional areas (Kumar *et al.*,1999).

Technology is always connected with obtaining certain result, resolving certain problems, completing certain tasks using particular skills, employing

knowledge and exploiting assets (Lan & Young, 1996). The concept of technology does not only relate to the technology that embodies in the product but it is also associated with the knowledge or information of it use, application and the process in developing the product (Bozeman, 2000; Lovell,1998).

As technology issue is relevant to our discussion, so we are discussing only technology related issues:

Technological: (relating to production)

a) Improper, location, layout and material handling systems, poor project planning,
b) Inappropriate capacity planning method,
c) Inappropriate use of Inventory management and supply chain management (Hoque and Biswas, 2013),
d) Technology Management principles are not maintaining properly,
e) Quality control techniques are not applying properly and delay in implementation of Quality Management System,
f) i. Scientific methods of Production Planning and Controls are not applying,
ii. Material Requirement Planning and JIT (Just in Time) principles are not applying properly,
g) Decision making and optimization theories are not applying,
h) Time and motion study are not followed properly, faulty process planning,
i) Reengineering' principles are not applying to adjust the changed in product.

4. Symptoms and Types of Sickness

Sick industries can be classified as born sick, become sick, and made sick (Singh, 2011). The industries which are ill conceived project, inadequate market survey, poor planning and inadequate project appraisal, wrong choice of location and product selection, delay in implementation of project that are called born sick. Industries are said to be become sick due to the poor management, poor deliberate diversion of funds, wrong recruitment policies, faulty management policies etc. Industries which are sick due to external causes like frequent changes in government policies, changes of technology, social, political and economic problems etc. produce thrust or made sick industries.

Whatever be the reason behind sickness a few important symptoms of industrial sickness are as follows (Jahirul, 2003):

i. shortage of working capital, reduce sales/profit, increases the loan, eliminate capital reserve,
ii. high turnover of managerial person, labour unrest,
iii. increase complaint from customer and staffs,
iv. increase in finished product inventory,
v. reduces productivity,
vi. due to shortage of revenue delay in payment of salaries, bills, loans, taxes, bank interest etc.,

vii. improper distribution of dealer and product.
viii. reduction in the utilization of capacity,
ix. reduction in technological advancement.

Performances of some of the SOE industries have been studied based on data obtained from the brochures and other sources. Analysis showed that the conditions of the industries are not so good at all.

5. Impact of Technological Factors on Sick Industries

If proper planning and proper steps is taken on due time, it is sometimes possible to overcome financial and management problems. We think, technological factors have an important role for the industries becoming sick.

Due to overstocking of inventory working capital is blocked generally. When production planning and control ensure efficient schedule, keep inventory at optimal level, finally increases productivity and reduces loss of the enterprise.

In most of the papers regarding sick industries gives less importance on efficient and effective production methods. The important factors which related to application of technology are discussed below:

5.1 Location, Layout and Material Handling

Selection of proper location, layout and use of efficient material handling system is directly related to the cost of the product. Best layout provides smooth flow of materials and minimizes the material handling cost and also minimizes the labour requirements. Efficient material handling system improves operational efficiency, contributes to cost savings by minimizing operational expenses (Hoque & Biswas, 2013).

5.2 Inventory and Supply Chain Management

Inventory control enables the maximum amount of profit from the least amount of investment in stock without affecting customer satisfaction. The supply chain management is the lifeline of organizations. It needs to be efficient to keep the operations running. A streamlined supply chain management can enhance customer relationships, low down operational cost. Supply chain management also manages the flow of raw materials, goods and services to the point where the company or customers consume the goods (Hoque & Biswas, 2013).

5.3 Technology Management

Technology management plays a vital role in the success of businesses. Effective technology management thus allows businesses to continuously adapt to new demands, requirements, and expectations in the market. This management activity is designed to ensure the smooth running of the process that includes the technological element of the enterprise to meet consumers demand for its goods and services.

5.4 Total Quality Management (TQM) and Quality Assurance (QA)

TQM is characterized by its principles that emphasizes upon continuous improvement in quality, increased involvement of employees, employee empowerment, teamwork, leadership, feedback and relationship with suppliers. It also increases satisfaction of employees and customers and finally leads to organization performance in financial dimensions.

5.5 Re-engineering

Reengineering means to change and improve the design of a product or system. So, production planning and design of a product cannot run for long time. Production planning and control activities changes with time due to technology change (Chase & Acqualino, 1993). So, the redesign of business process, work flows in the organization and appropriate changes are to be made with the technology change and new invention.

5.6 Ergonomics and Motion and Time study

Ergonomics aims to increase efficiency and productivity, optimize human well-being and boost performance. Proper ergonomics can prevent the majority of workplace injuries by adjusting tools to suit the user. Product and process are to be designed in consideration with the user's characteristics, health and safety measures.

Time and motion study is an analytical method that monitors operational activities to identify opportunities for increasing productivity or output with the same or fewer resources. It is necessary to improve the procedure of doing work and maximize the utility of resources (man, machine, materials). Time study provides us information for planning and scheduling.

5.7 Capacity of Manpower Requirement Planning

Manpower planning enables organizations to effective plan and allocates their workforce requirement. Managers face problems of deciding if the organization has one large facility and/ or have several small industrial production facilities. Where excess manpower is utilized, reorganizing might be done if production declines. So, by determining the right number of employees' organizations can minimize the labour cost by avoiding overstaffing. Some big local industries suffered from over manpower problem and the industries became sick as they are not maintaining manpower planning properly.

5.8 Scheduling and Production Planning

Production scheduling specifies the requirement of number of finished products or items and due delivery date. With the change of orders received production schedule may be adjusted. The plan includes considering factors such as customer demand, machine availability, labor capacity, and inventory position etc. Production Scheduling helps to evaluate the best options for production considering available

stock and labour capacity and also save the time. It also aims to optimize efficiency and streamline workflow (Hoque & Biswas, 2013).

5.9. Application of Optimization Principles

The aim of every organization or company is to make profit that will guarantee its continuous existence and productivity. Optimization principles brought benefits for the organization and it helps to minimize the costs in the production and maximize profits.

5.10 Productivity Analysis and Planning

Productivity gives information about performance of the industry. Since the productivity is related with the labour, capital and management as input whereas output are goods and services. So monitoring is required for the improvement of productivity as the industry may survive. So far, we discussed only some important factors related for industries not to become sick but there are some other factors to be discussed like doing break even analysis, trend analysis and drawing product life cycle graph to know the present condition are very important factors besides analysis of some other important environmental and final factors etc.

When productivity of an industry declines then arises many problems, ultimately reduces the profit margin and it becomes sick (Hoque & Biswas, 2013).

Some of our traditional industries such as sugar, jute, textile, chemical and steel etc. did not carry out replacement and modernization in time. As a result, they were saddled with obsolete plant and machinery.

On the basis of established year, the age group of public sector enterprise (Table 1) has been prepared. The age group of public sector companies of Bangladesh is shown below:

Table 1: Age Group of Public Sector Enterprises in 2020

Age groups, (years)	No. of Industry
0 - 10	0
11 - 20	1
21 - 30	2
31 - 40	8
41 - 50	7
51 - 60	13
61 -70	3
71 - 80	4

From the above Table, it seems that the conditions of our public sector enterprises are not in a position to run better and give better productivity. BMRE is

essential for maximum industries. Due to the age all industries lost their production capacity due to which productivity is decreased, at the same time maximum machineries are obsolete.

It was also observed from study of authors that most of the sick industries (67%) were established during the 1970's and average capacity utilization of the sick industries was about 60%.

6. Results

In the following some typical industry under govt. control is shown relating to only 5 (Five) variables as a representative case, the conditions are similar in many as this varied by survey results around Dhaka.

6.1 Total Productivity

Productivity is a measure of performance that compares the output of a product with the input, or resources, required to produce it. The input may be labor, equipment, or money. Thus, total productivity measures reflect the joint impact of all the inputs in producing the output (Sumanta, 1984).

Total Productivity = Total Output / Total Input

Year wise productivity of a nationalized company is shown in Table 2.

Table 2: Year wise productivity of local industrial unit in Govt. sector

Description	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017- 18
Productivity	0.62	0.72	0.71	0.60

6.2 Ratio Analysis

Ratio's indicating sickness of a particular company has been shown in Table 3.

Table 3: Ratio Analysis

	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18
Cash Flow /sales	0.21	0.12	0.12	-0.14
Cash Flow / Total assets	0.02	0.01	0.02	-0.02
Cash Flow / Total debt	0.09	0.05	0.04	-0.05
Net income / Net worth	0.02	0.01	0.01	-0.04

Current assets / Current liabilities	5.97	5.95	5.33	5.33
Inventory / Sales	0.63	0.77	0.51	0.67
Wages & Salaries / Sales	0.38	0.46	0.44	0.61

* last two rows –Higher trend indicates sickness

6.3 Inventory Analysis

Inventory of a company is shown in Table 4.

Table 4: Inventory

	FY 2016-17 (crore)	FY 2017-18 (crore)	FY 2018-19 (crore)	FY 2019-20 (crore)
Actual	2.44	2.28	2.75	3.69
Forecasted	2.56	2.77	2.97	3.18

In our opinion seen the inventory is going up in the last year, so it can be said that the company is becoming sick.

6.4 Sales Analysis

Similar results of sales are shown in Table 5, which indicates the sickness.

Table 5: Sales

	FY 2016-17 (crore)	FY 2017-18 (crore)	FY 2018-19 (crore)	FY 2019-20 (crore)
Actual	4.06	3.69	4.20	4.89
Forecasted	3.98	4.15	4.32	4.48

We can say that industries becoming sick are heavily dependent on technological factors rather than other factors.

7. Validation by Multiple Regression Analysis

Multiple regression analysis is also done in our study. The goal of multiple regressions is to model the relationship between several independent (predictor) variables and a response (dependent) variable.

In the current study we have chosen four independent variables. Assuming a multiple regression model with all combinatorial factors for complete all interactions.

If there are n observations on the predicting (dependent) variable Y for a set of input on the independent variables X_1, X_2, ……X_4, then let's define a matrix such that

$$\begin{bmatrix} 1 & X_{11} & X_{12} & \cdots & X_{1k} \\ 1 & X_{21} & X_{22} & \cdots & X_{2k} \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ 1 & X_{n1} & X_{n2} & \cdots & X_{nk} \end{bmatrix} \text{ and}$$

$$\mathbf{Y} = \begin{bmatrix} Y_1 \\ Y_2 \\ \cdots \\ Y_n \end{bmatrix}$$

Given X and Y are known from the data, the set of coefficients of the multiple regression Model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \text{-------} + \beta_k X_k$$

can be computed as:

$$\boldsymbol{\beta} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{Y}$$

Where $\boldsymbol{\beta} = [\beta_1, \beta_2, \beta_3, \beta_4, \beta_{12}, \beta_{13}, \beta_{14}, \ldots, \beta_{134}, \beta_{234}, \beta_{1234}]$;

Multiple regression analysis was done to validate the results obtained. Multiple regression was done considering production cost, inventory, sales/ marketing, total debt as independent variable and profit /loss as dependent variable.

Results show that it is differ from the data which is obtained from industry. It is due to the interaction of the independent variables which have not been maintained properly.

Such as sales of the company is very less due to poor marketing drive, total debt of the company is too high, etc.

8. Remedial Measures to Prevent Sickness

In Bangladesh the industrial sickness problem cannot leftover as it will bring down contrary reflections to the national economy. Besides, it might also become responsible for technology.

The following steps can be taken to overcome the sickness situation.

1. Try to alleviate the causes, for the sickness of industries,
2. Co-operations of financial institutions regarding loan disbursing and fund releasing,
   (Hoque *et al*, 2013)
3. Old machineries of the industries are to be replaced,
4. BMRE is necessary for the old industries.

5. Latest technology should be implemented for the betterment of the industry, etc.
6. Favorable govt. policy might be introduced in all respect for the interest of industrial business (Hoque, 2015).
7. Assurance of critical inputs like power, water and gas,
8. Organizations must priorities market, brand, and product development. Priorities quality improvement to stay competitive.
9. Proper marketing drive throughout the country to be ensured,
10. Controlling of some extraneous factors like industrial strikes and political instability etc.

9. Discussion

We collected related data for performance from important industries through personal visit, brochures, then analyzed and tested by regression (simple and multiple) analysis and finally have drawn our conclusions.

We can say that in most of the cases large scale industries as well as the small and medium scale industries are becoming sick with a common feature. In this article we meant by "industrial sickness", industries becoming sick or gradually going to lose their capital before being forced to close down.

From our observation, / case study it has also been found that productivity of the state-owned enterprises is not satisfactory. It is also found that machineries of the SOE industries are too old, by which productivity improvement is simply impossible. So, BMRE is very much essential for the enterprises those are sick or becoming sick. Product diversification might also be necessary for those enterprises to survive (Hoque, 2015). We also found that the performance of the nationalized industries in terms of services, production, sales, marketing, and profits were disappointing due to many factors. The public sector enterprises incurred chronic losses and fully depend on state subsidy. Due to losses and low rate of return, it has been found that, most of the state-owned enterprises have sufficient amount of loans from Nationalized Commercial Banks.

Although in our study we mostly considered SOE in general, we are of the opinion that the remarks mentioned above are equally be applicable to industries in non-government sector facing similar conditions of industrial sickness. It is expected that the sick industrial enterprises or rehabilitation will contribute to higher level of growth and development by way of increasing of production of goods and services, enhanced contribution to national exchequer by earnings/ savings foreign exchange and by also employment creation and combating unemployment. So, government should come forward to protect SOE enterprises so that the enterprises may survive and extend their contribution to the nation.

Ratio analysis is an important tool to predict the contributions of a firm/ industry from the point of view of survival /getting sick. From our case study, we found that the overall conditions of the industries considered are not good at all but many of them are trying to survive somehow. So, if proper corrective measures are

taken such industries might survive and will not become sick in the near future ultimately.

From our study /survey we also found that the public sector enterprises are unable to maintain proper inventory planning and inventory control methods. In estimating requirement of inventory many industries considered available sources of raw materials and production target etc. factors. Every industry should use proper inventory control tools like EOQ (Economic Order Quantity) so that owing to excess inventory working capital is not blocked generally.

In general, it can be supposed that governmental enterprises are giving continuous loss due to high production cost and low productivity. Due to continuous loss in production / services in enterprises, overdue loan in banks, etc. and also for some other related reasons the government occasionally decide to sell such enterprises by Privatization Board/ Commission. So, it was found that State Owned Enterprises are decreases day by day and thus the number of SOE enterprises established by the government for the social welfare, employment of mass people and social security of the people are decreasing gradually. Thus, if we cannot protect our state-owned enterprises the public will be deprived from employment opportunity, social status and social security, etc. and this will ultimately affect the pace of development.

Conclusion

The aim of industries or firm is to make profit and produce surplus, but many industries are becoming sick at their life cycle. There are so many examples particularly in underdeveloped countries. In this paper an attempt has been made to find out the causes of industrial sickness, and to show how the industries can produce more specially at minimum cost and attain maximum profit for their survival.

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