Vol. XVII & Issue No. 06 June - 2024
INDUSTRIAL ENGINEERING JOURNAL

EXPLORING PRODUCTION CAUSES OF INDUSTRIAL SICKNESS – EVIDENCE FROM PAPER INDUSTRY

Porag Pachoni
PhD Scholar, Department of Commerce, Dibrugarh University, Assam
Email Id: parag.academia@gmail.com

Prof. Ashit Saha
Professor, Department of Commerce, Dibrugarh University, Dibrugarh – 786004, Assam
Email Id: ashitsaha@dibru.ac.in

Abstract

The study attempts to find out the production causes of sickness of the paper mills of Assam through a structured questionnaire method randomly circulated among the sample respondents. The exploratory factor analysis of the multivariate statistical technique, the principal component analysis with varimax rotation was applied over nine items of production causes. The result shows that the final factor solution is explained by the first factor as "inadequate production means and input" which consists of PC-3: shortage of raw material due to non-availability at source, PC-2: old and obsolete plant & machineries due to timely renovation, PC-5: inadequate availability of coal as an energy source, and PC-4: problem in procurement of production input due to poor connectivity with the highest factor loadings. Factor 1 explains the 47.416% of production causes. Then, the second factor is entailed of item PC-7: low-capacity utilisation of plant and termed as "Poor Productivity". This factor along with the first factor explains up to 67.90 % of the variance. The final factors are depicted in scree plot and path diagram. Thus, the 67.90 % of the variance in production causes of sickness in paper mills of Assam is stated by the inadequate production means and input and poor productivity. Though, there might be some other production causes which are not covered by the study due to the limitation of the sample.

Keywords: Industrial sickness, sample demographic, production causes, principal component factor

INTRODUCTION

Industrial organisation confronts sickness in its course of operations. Industrial sickness is an alarming issue hindering industrial development of a particular state or nation. Industrial organisation meet sickness due to manifold reasons. The industrial sickness is a gradual process of continuous decline in production or profit or both or cash losses leading to closure of industrial units which is not arise overnight. Because of its rising occurrence in awful proportions, the issue of sickness in industrial organisations is nowadays wide-ranging in India. It requires immediate attention from policymakers who believe in the effective and efficient application of resources. Rapid industrial growth has been contributing effect on the prevalence of sickness in the industrial segments. The emerging competitive market economy style and dynamics of the business environment stands as challenge for industries. The sickness is widely spread in both in public and private sector establishments. In a vibrant industrial set up, business units those are peaceful, economical besides productive turn into sick and halt as soon as new and more productive units arrive to outplace. In India, during the last decade, the occurrence of industrial sickness has been increasing. It is not only confined around the traditional industries such as textiles, jute, sugar etc, but also some other significant industries (i.e., engineering, chemicals, rubber, cement, electrical and paper) have been affected. Enormous funds of the public and the Government has been blocked in sick industries. Consequently, there is loss of employment and livelihood, revenue and effect on ancillary industries.

The existing literatures in the domain have been gone through for depth understanding of the problem. The good number of studies have been made in this field. The study made by Narayana (1994) observed that mismanagement, government policies, labour problems, and time and cost overruns as the four major reasons of the sickness in the companies. Another study of Kachhwah (2014) identifies two types of reasons as internal and external of industrial sickness which affected Indian small-scale sector. Similarly, Singh (2011) recognizes the causes of sickness as internal and external which are related to production, personnel, marketing and finance. Besides, the major corporate management causes include improper corporate planning and control, resistance to change, state in top management and lack of management. Gupta (1988) identifies the managerial inability and corruption, lack of adaptability to long term environmental changes, defect of financial structure, and inappropriate project. Anubhai (1988) finds that the management of textile mills suffered from steady perceptions of concerning raw materials, products, technology and market. Rao and Rao (2012) studies the reasons of sickness of Co-operative sugar factories of Andhra Pradesh and identifies the originating factor for industrial sickness is management inefficiency.

Another study completed by Khandwalla (1988) among thirty-six rehabilitation officers through an interview cum questionnaire who are closely connected with sick units confirms that inappropriate management is the main cause of corporate sickness. Chakraborty (2016) The result of the study

shows that improper management, unskilled labour, weak promotional activities, regular theft of material and misuse of financial resources are causes of industrial sickness. Hoque (2007) identifies the causes of industrial sickness related to management, financial, technological, and environmental. Mehta and Harode (1999) the textile crisis in Gujarat makes the inadequacies of present framework glaring. Roy and Basu (2015) reveal that the problems of large units are related with production and labour. Each unit is suffering from frequent labour unrest that hampers production. Navulla, D. et al (2016) finds that the Fertilizer Corporation of India became sick due to poor management decision, inefficient human resource management, outdated technology, problem of power, irregularity in raw material supply and wrong government policies. Goyal and Kumar (2014) finds that the cause sickness of industries is mismanagement, out-of-date technology, surplus manpower, payment delay, resource application and macro-economic factors. Failure of industrial unit creates alarming issues like dissatisfaction among investors, youths and disturbs foreign investment. Thus, in the existing literature the focus has been made on various contributing factors or causes of industrial sickness. But in the present study, the focus has been solely made on the production causes of sickness of paper mills of Assam.

OBJECTIVE OF THE STUDY

The objective of the study is to find out the production causes of sickness of Paper Mills of Assam. Based on the objective research question have been formulated as what are the production causes of sickness of paper mills of Assam?

RESEARCH METHODOLOGY

The study is an exploratory nature conducted through field survey method. The area of study was defunct Nagaon and Cachar Paper Mill of Indian state of Assam which constitutes the paper industry of the state. The primary data was randomly collected from three hundred and two (302) sample respondents of the mills. The sample size was determined according to the Yamane (1967) sample size formula designed for finite population. The questionnaire consists of nine items of production causes appended from the inputs obtains from existing literature studies in the field and pilot survey. The response of the target respondents is measured through seven-point Likert scales i.e., 1 - Strongly Disagree, 2 – Disagree, 3 – Somewhat Disagree, 4 – Neutral, 5 – Somewhat Agree, 6 – Agree and 7 – Strongly Agree. The aim of the Likert scales is to measure the level of agreement and disagreement of respondents on different items of the questionnaire. The scale with more response types up to about seven provides significantly higher reliability, validity and discriminating power. The longer response scales help respondents to express their opinions satisfactorily (Preston and Colman, 2000).

The multivariate statistical technique, the exploratory factor analysis was applied to extract the reduced factor solutions out of the nine items of the questionnaire. The analysis and summarise of collected primary data were done by applying the exploratory factor analysis technique. Before extraction of factors, Kaiser-Meyer-Olkin (KMO) test for sample adequacy and Bartlett test of sphericity is used to measure the fitness of respondent data for factor analysis. The factor extraction and rotation are done through the principal component analysis and varimax method respectively. The SPSS statistics software 20 is used for the purpose of processing the primary data. The processed data has been presented through Table and Figure. The final factor solution is displayed in scree plot and path diagram.

The data fulfills the required criteria for running the exploratory factor analysis. The study runs factor analysis on 302 sample which is ideal and good. Comrey and Lee (2013) sets parameters for sample size as 100 specifies Poor, 200 considered as Fair, 300 shows Good, 500 designates Very good, and 1000 or more implies Excellent.

Sample Adequacy: KMO Test and Bartlett's Test of Sphericity Bartlett is tested to measure the sample adequacy for running factor analysis. Kaiser (1974) suggests KMO value of minimum 0.5. The Bartlett test should be significant if p is less than .05 ($p<.05$) (Hair, J. F., Anderson et al, 1995).

Factor Retention Criteria: The four criteria have been considered as rule of thumb in the study for factor retention. Firstly, the anti-image value of correlation of an item should be more than .6 (Backhaus et al. 2006). Secondly, the eigen value must be more than 1 (Kaiser, H. F., 1974). Thirdly, the communality value of more than .5 is retained. The stricter the comunalities cutoff values provides the better fit of the model in the remaining elements. An adopting smaller cutoff values for item communality may result in models that fit less well than those created with stricter cutoff values (Eaton, P. et al 2019). Fourthly, the factor loading of .50 is considered for final factor. The factor loading cut off of .40 irrespective of sample size (Stevens, J. P., 2012). Comrey and Lee (2013) suggested factor loading of 0.32 as poor, 0.45 as fair, 0.55 as good, 0.63 as very good and 0.71 as excellent.

Another considerable fact is that in a correlation between two variables, the correlation coefficient (r) less than .3 considered as weak correlation, .3 to .7 measured as moderate correlation, and greater than .7 specifies strong correlation between the variables (Ratner, 2009).

RESULTS AND DISCUSSION

In the questionnaire a demographic profile was included to know the predefined demographic information of sample respondents. The demographic questions related to gender, age, educational status, department where they worked, designation and work experience of the sample respondents. The result of the sample demographic is presented in the following table

Table 1: Sample Demographics

	Frequency	Percentage	Cumulative Percentage
Gender			
Male	296	98	98
Female	8	2	100
Total	**302**	**100**	
Age			
Below 30 years	58	19	19
Between 30 to 40 years	113	37	56
40 years and above	131	44	100
Total	**302**	**100**	
Education			
Vocational (Technical)	82	27	27
Bachelor Degree	135	45	72
Master Degree	85	28	100
Total	**302**	**100**	
Department			
Production	75	24.83	24.83
Finance	75	24.83	49.66
Marketing	76	25.17	74.83
Human Resource	76	25.17	100
Total	**302**	**100**	
Designation			
Executive	48	16	16
Supervisor	75	25	41
Workmen	179	59	100
Total	**302**	**100**	
Work Experience			
Below 10 years	34	11	11
Between 10 and 20 years	101	34	45
Above 20 years	167	55	100
Total	**302**	**100**	

Source: Authors Own

The table 1 shows that there is a highest number of the male respondents i.e., 98%. The age of the respondents comprises of below 30 years – 19%, between 30-40 years – 37%, and 40 years and above – 44%. The 27% of respondents holds Vocational (Technical) education, 45% of respondents possess Bachelor degree and 28% of respondents have Master degree. In case of designation of sampled respondents, 16% are Executive, 25% are supervisor and 59% are Workmen. The 24.83% respondents are from Production and Finance department. While, 25.17% respondents are from Marketing and Human Resource department. Regarding work experience of sampled respondents, it is found that 11% have experience of 10 years below, 34% have between 10 and 20 years and 55% have work experience of above 20 years.

KMO Test and Bartlett's Test of Sphericity is applied to determine the adequacy of sample and the strength of association among variables before going to the further analysis. In the existing study KMO value is .746 which is sufficiently good as per rule of thumb. The Bartlett test is also found significant i.e., p=.000<.05 at 5% significance level (Table 2). Subsequently, the principal component analysis through varimax rotation is performed over nine items of production causes.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.746
Bartlett's Test of Sphericity	Approx. Chi-Square	324.443
	Df	10
	Sig.	.000

Source: Authors Own

In the process, the first factor analysis detects low anti image correlation value of .345 in item 9 but the criteria are more than .6. Therefore, in the next factor analysis, the ninth item is excluded from further analysis. Again, in the next analysis, item 1 is excluded due to less communalities of .442 but criteria are to retain more than .5. Similarly, the item 8 and item 6 are omitted from further analysis due to low communalities and factor loading point.

Table 3: Exploratory Factor Analysis Pertaining to Production Causes

	Component		Communalities	Eigen Value	Cumulative % of variance
	Factor 1 Inadequate Production means and Input	Factor 2 Poor Productivity			
PC 3. Shortage of raw material due to non-availability at source	.854		.730		
PC 2. Old and obsolete plant & machineries due to lack of timely renovation	.782		.618	2.371	47.416
PC 5. Inadequate availability of coal as an energy source	.730		.544		
PC 4. Problem in procurement of production input due to poor connectivity	.704		.537		
PC 7. Low-capacity utilisation of plant		.982	.966	1.024	67.900

Source: Authors Own

Table 3 shows the final rotated competent matrix of items related to production causes. The two extracted factor with eigen value more than 1 or more is considered for analysis. The Factor 1 is comprised of PC-3, PC-2, PC-5 and PC-4 with factor loading of .854, .782, .730 and .704 respectively. This Factor 1 has been labelled as "Inadequate Production Means and Input". The factor loading explained that these four items are highly correlated with the Factor 1 termed as "Inadequate Production Means and Input". The Factor 1 has eigen value of 2.371 and contributes 47.416 % of variance which means that the 47.416% of production causes is described by "Inadequate Production Means and Input". Then again, the Factor 2 is consisted of item PC-7 with factor loading of .982 and eigen value of 1.024 and labelled as "Poor Productivity". This item is highly correlated with Factor 2. This factor along with Factor 1 explains up to 67.90 % of variance. Thus, the result indicates that the 67.90 % of variance in production causes is stated by the "Inadequate Production Means and Input" and "Poor Productivity". The Scree plot (Figure 1) presents the factors component of production causes and their eigen value. The Path Diagram (Figure 2) shows the factor wise grouping of the Items related to production causes.

Figure 1: Scree Plot

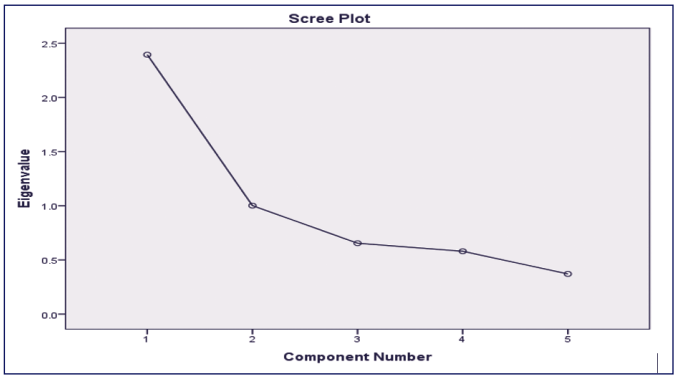
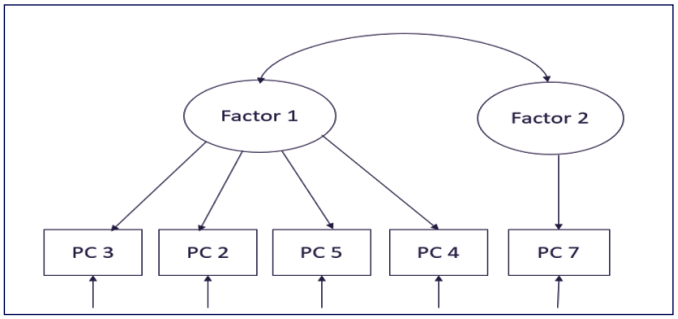


Figure 2: Path Diagram



CONCLUSION

The sickness in paper mills of Assam is influenced by the production causes which can be recognized from the result of the factor analysis done on collected randomized sample data. These production causes are directly associated to production inputs and productivity of the concerned paper mills. The study observed that the findings significantly addressed the research question. The exploratory factor analysis of production causes has extracted two principal component factors. The first factor explains about the inadequate production means and input which is comprised of questionnaire item PC-3: shortage of raw material due to non-availability at source, PC-2: old and obsolete plant & machineries due to lack of timely renovation, PC-5: inadequate availability of coal as an energy source, and PC-4: problem in procurement of production input due to poor connectivity respectively. Whereas, the second factor defines the poor productivity which is contained of one item of questionnaire PC-7: low-capacity utilisation of the plants. The 67.90 % of variance in production causes is explained by the both Factor1: "Inadequate Production Means and Input" and Factor 2: "Poor Productivity". Though, there might be some other production causes which are not covered by the study due to the limitation of the sample.

The problem related to raw material shortage was acute in the study area since the source was stop supplying the same due to some underlying reasons of gregarious flowering of bamboo in the major bamboo catchment areas of Cachar Paper Mill (CPM). However, during the course of study it was observed from the focus group discussion with the employee associations and trade unions office bearers that the raw material is available at source in recent time. In contrast, the plant and machineries of the paper mills becomes old and obsolete due to unused after halt of production. There was also an issue of shortage of coal for energy supplied to the plant which was obstructed as a result of ban on rat hole coal mining at source by the honourable NGT (National Green Tribunal) in 2014 (Majaw, B., 2016). If the coal mining is allowed at source that would be positive move for paper mills revival. Another issue related to poor connectivity of CPM was due to old aged meter gauge rail network and dilapidated road condition to supply required inputs. However, the CPM is well connected by the rail and road network at present time.

Further, the low plant capacity utilisation was occurred as a result of frequent shortage of raw material supplied to the plant. The under-capacity utilisation of plant was also heightened by the halt of coal supply. Thus, the identified production causes of sickness in the study area can be addressed through proper policy measures to revive the paper mills of the state.

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