Total Quality Management (TQM) in Plywood industry in West Bengal and Major Effects of Critical Factors Contributing in Such Practices

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Abstract: Plywood industry is one of the basic and old industries in West Bengal. The prime raw material used in this industry is timber and obtained from mostly Northern part of West Bengal from available forestry etc. and also along with this there is use of large human resource and also capital. Against the present day practices of "go green" and sustainable development, the bulk use of timber, the forest resource and also other resources as mentioned, require absolute optimization in its regular industry level consumption for production and manufacturing practices.

The plywood manufacturing industries require high level modern plant and machinery utilization, higher manufacturing efficiency, technological competence and use of updated management norms and practices with use of different advanced shop floor management systems and practices.

Total Quality Management (TQM) is such a practice being implemented for enhancing all round growth and development needs that a plywood industry requires. Just a formal introduction of TQM in plywood industry is not enough, it requires specific objective and achievement oriented approach towards these direction so that this basic conventional and old industry may retain its good practices and procedures and may do away with the old evils of this old conventional industry possessing several orthodox obsolete processes and system.

Hence it requires effective TQM characteristics which may be called key factors to be applied in TQM practices in this industry and identify the effectiveness and outcome of these key measures. The existing research work is an effort towards this end.

Key words: Total Quality Management (TQM), Key factors, sustainable development, obsolete process

1.0 Introduction

Plywood industries in West Bengal are mostly using old and conventional processes. Quality consciousness is no major criterion in such industries. Around forty (40) Plywood manufacturing production units in West Bengal undertake manufacturing of Plywood. and mostly all follow conventional manufacturing process. The industries in this sector are mostly located around in North Bengal, Assam etc. where availability of major raw material 'timber' is available in plenty.

However, along with spread of technology and modern production and operation management practices and techniques in industrial sectors and also improved quality expectations of customers industries are in an all-round effort to implement and incorporate updated management practices. Plywood industries in such case are not an exception. Also the owners, authorities and entrepreneurs of the plywood industries in such cases are not exceptions and since they need to undergo cutthroat competition evidently there is no exception left for them but to go for quality consciousness and quality improve.by use of different relevant advanced process like Statistical QualitY Control, quality assurance etc and

consequently all these had promoted the use of Quality Circle (TQM) in plywood manufacturing sector.
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From such standpoint and necessities the plywood industries had initiated the implementation of different updated modern production and operation management processes. Hence it had been evident that quality concept is presently inherent In Plywood industries and these all had been behind the inclusion and introduction of Total Quality Management practices (TQM) in Plywood industries.
An effort is made in this work to identify the scope, prospects and spread of the concept and practices of implementation of Total Quality Management in Plywood industries in West Bengal and the outcome there of. This work tries to explore and identify the critical elements of TQM related with Plywood industries and the outcome, benefits and contributions of the elements of Total Quality Management in Plywood industries in West Bengal.

2.0 Total Quality Management in Plywood Industries

Total Quality Management is concerned with integration of all efforts in the organization towards quality improvement, quality development and quality maintenance to meet full customer satisfaction at economic level.
In a plywood industry where much work over quality development of plywood, the main output of the industry and also specifically improvement of industry specifically from perspective of Total Quality management (TQM) has not undertaken though plywood industry is a basic industry and also an industry involving much of Human resource and timber a major natural resource other than a large amount of economic resource is involved.
In a plywood industry for incorporation of Total Quality Management practices in order to satisfy needs and rationale as above, it requires from the part of management to deal with quality of work, quality of worker, quality of product and services, quality of policy, quality of objects, quality of management, quality of system, quality of assurance, quality of plan, quality of control and quality of all other aspects of management and in such system when all these aspects are taken care of, we call the whole system as Total quality Management. It requires in plywood industry to be conscious over identification and implementation of the above elements of Total Quality Management in order to be a true management in such an manufacturing industry i.e. Plywood Industry. Total Quality Management in plywood industry is an approach to improve the effectiveness and flexibility of the plywood wood industry as a whole. It basically aims to involve every person in every department in this industry to work together to eliminate errors, to optimize product quality and cost involvement to ensure user satisfaction and preventing waste to fulfill industry objectives. It aims to improve the performance of every person in the industry continuously. It turns to be an organization culture to ensure things are done right first time.
According to Ishikawa, “Total Quality means quality of work, quality of services, quality of information, quality of people, quality of company and quality of objecxts”. Simply stated, TQM means activities involving everyone in the in the industry, management and workers in a totally integrated efforts towards improving the performance at every level. This improved performance is directed towards satisfying cross functional goals as quality, Cost, Manpower Development, Quality of Work Life etc. These activities ultimately lead to improved customer and employee satisfaction and delighters.
As defined by International organization for standardization (ISO) – “TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long term success through customer satisfaction and benefits to all members of organization of the organization and to society.” Berry T. (1991), defined the TQM process as, “Total corporate focus on meeting and exceeding customer’s expectation and significantly reducing costs resulting from poor

quality by adopting a new management system and corporate culture. In short, emphasis must be given towards achieving excellence in organizations"

Thus the Total Quality Management may be considered as the method of identifying the precise goal of each functional area and setting objectives for each of these areas to continuously improve the qualities. The motto of TQM is "Do it right the first time. Tqm encompasses all the areas throughout the organization as can be seen from the Wheel of Quality.

In practices and implementation of Total Quality Management (TQM) several essential points which are called characteristics of TQM are taken for consideration and accordingly which are found more suitable in accordance with need and structure of industry and the specifically problem involving situation are used for implementation towards satisfaction industry need objectives. For our present study i.e. "Total Quality Management (TQM) in plywood industry and major effects of critical factors contributing in such practices" some related key factors or characteristics has been taken for necessary consideration and consequent implementation and these are stated as below:

1. Customer Supplier Chain of TQM
2. Total employee involvement and empowerment
3. Continuous improvement
4. Team concept of Total Quality Management
5. Bench marking.

Plywood industry is an old and conventional industry possessing its own cultural heritage and technology specialization. Formally and informally and also consciously and unconsciously there have been inclusion, introduction and implementation of different practices and procedures, some of which also are in area of Quality Management, being desirable and also non desirable. It requires identification and elimination or strengthening such practices depending upon their merit or credibility and weaknesses – to be retained those which are worthy to be retained and others to be removed.

However, on the basis of such consideration it is considered that for TQM practices to be followed and strengthened in plywood industry the above six features are essential to be utilized and implemented.

3.0 Objective of the Study

In the present study related with Total Quality Management (TQM) in plywood industry with the purpose of identifying the major effects of critical factors being contributed in course of following up TQM practices, it requires identification of the probable factors being taken into consideration and the effects of these factors upon the plywood industry.

In this present research work five factors have been taken for consideration as mentioned in previous section and the effects to be studied may be summed up here as below. In facts the effects may be considered to be objectives of following up and implementation of TQM practices in Plywood industry. The objectives of the study are as noted below:

i) Investigating the validity of success factors helping in implementation of TQM
ii) Ranking these factors on the basis of performance and thereby importance
iii) Identifying the achievements obtained because of implementation of TQM.
iv) Developing a relation Model Equation among the success factors/dimensions as stated in objective (i)

4.0 Literature Review

Study and analysis of Work of different authors upon Total Quality Management (TQM) have been done to justify how effective is TQM practice in enhancing the quality management as identified in section 2.0 in this work for being used in Plywood Industries. The work of different authors taken for study may be enlisted as i)Production and Operations Management Authored by S. N. Chary and published by Tata Mc. Graw Hill Publishing Company Limited, ii) Modern Production and Operation Management, authored by E.S. Buffa and Rakesh K. Sarin and published by Willy India India Edition iii) Production and Operation Management, authored by Kanishka Bedi and Published by Oxford University Press iv) Production and Operation Management authored by D. Ganguly and K. Kundu, Aryan Publication v) Production and Operation Management K. Aswathappa and Sridhar bhatt, vi)Production Management by Martand T. Telsang, S. Chand Publication, vii) Opertions Management by Richard B. Chase, F. Robert Jacobs etc. , Published by Tata Mc Graw Hill Publishing Company Ltd. viii) Production Management by C.N.Sontakki being published by Kalyani Publisher

In different work as above elaborate work is done highlighting different areas, needs and usefulness of Total Quality Management. These works state about different aspects and practices related with TQM and its effectiveness in perspective of updated management and production practices. Though from different works as mentioned above elaborate academic and application related information is available over Total Quality Management practices in Industries, nothing elaborate and specific is available related with effectiveness of TQM Practices in Plywood industries as undertaken in this research study.

5.0 Research Methodology

The plywood industry in general and specifically to tell about in West Bengal requires the implementation of Total Quality Management (TQM) practices as is evident from the discussion in Section2.0. In follow-up of TQM practices it is necessary to identify some of the dimensions which are considered to be features of TQM. Once these dimensions are identified, for each dimensions few questions are framed and thus a questionnaire containing several questions are framed. In the present study five critical dimensions of TQM have been selected and for each dimensions 4/5 questions have been framed. The questionnaires thus contain total 22 question and these has been used for respondent's feedback. The respondents had given their feedback in Likert scale having value in between 1 to 5 as below:

1 – Rarely true,
2- To some extent true
3 Almost true
4. True
5. Sufficiently true.

As mentioned in section 2.0 this existing research work is done in the basis of five selected factors or dimensions of Total Quality Management as normally used in Plywood industry.

The dimensions used may be mentioned as below;

Dimension 1: Customer Supplier Chain of TQM
Dimension 2: Total employee involvement and empowerment
Dimension 3: Continuous improvement
Dimension 4: Team concept of Total Quality Management
Dimension 5: Benchmarking

Total number of questions framed upon these five dimensions is 22.

Table-1: The number of questions contained in each dimension;

Serial No.	Dimension	Number of Question
1	D1	4: 1+ 6 +11+ 16
	D2	5: 2+7+12+!7+21
	D3	4: 3+8+13+18
	D4	5: 4+9+14+!9+22
	D5	4: 5+10+15+20

The total number of respondents entrusted for the feedback has been selected is 50. The respondents have been selected on the basis of random cluster sampling. The total score obtained from respondent's feed back by each dimension and corresponding mean score, percentage of score with respect to total score and ranking of each ranking of each dimension is shown in Table: 2 as below

Table2: Score obtained by dimensions from respondents' feedback

Dimension	Score obtained in accordance with feedback of respondents			Ranks obtained by each dimension on basis of respondent's feedback
	Total score obtained from feedback of total respondents	Average Score obtained on basis individual respondent feedback	% of score obtained out of total individual score(5×4=20/ 5×5=25)	
D_1 : Customer supply chain of TQM	959	19.18	95.20	II
D_2: Total employee involvement and empowerment	962	19.24	96.2	I
D_3: Continuous improvement	779	15.58	77.9	V
D_4: Team concept of total quality management	780	15.6	78.0	IV
D_5: Benchmarking	790	15.8	79	III

From above table it is observed that the percentage score of respondents' feedback for the five dimensions on the basis of priority of dimension vary in between 96.2% to 77.95%. The most priority dimension is dimension D_2 followed by D_1, D_5, D_4 and D_3 respectively.

Dimension 5, the Bench Marking is taken as the dependent variable and other 4 dimensions are independent variable, since benchmarking of an industry is outcome of different factors or dimensions.

6.0 Data Analysis;

Reliability analysis

Table: 3

Reliability Statistics

Cronbach's Alpha	N of Items
.914	22

Reliability is high and significant.

Dimension to Dimension correlation

Table: 4 – Inter dimension Correlation

	D1	D2	D3	D4	D5

D1	Pearson Correlation	1	.368**	.756**	.446**	.598**
	Sig. (2-tailed)		.009	.000	.001	.000
	N	50	50	50	50	50
D2	Pearson Correlation	.368**	1	.288*	.530**	.318*
	Sig. (2-tailed)	.009		.043	.000	.025
	N	50	50	50	50	50
D3	Pearson Correlation	.756**	.288*	1	.361*	.669**
	Sig. (2-tailed)	.000	.043		.010	.000
	N	50	50	50	50	50
D4	Pearson Correlation	.446**	.530**	.361*	1	.340*
	Sig. (2-tailed)	.001	.000	.010		.016
	N	50	50	50	50	50
D5	Pearson Correlation	.598**	.318*	.669**	.340*	1
	Sig. (2-tailed)	.000	.025	.000	.016	
	N	50	50	50	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Inter-Dimension co-relation coefficient is significant. This justifies the validity of imensions or factors of Total Quality Management (TQM). Consequently the questionnaires given to respondents are also significant.

Regression Analysis

Model Summary[b]

Model	R	R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
				R Square Change	F Change	df1	df2	Sig. F Change	
1	.691[a]	.478	.95143	.478	10.292	4	45	.000	2.002

a. Predictors: (Constant), D4, D3, D2, D1

b. Dependent Variable: D5

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.265	4	9.316	10.292	.000[b]
	Residual	40.735	45	.905		
	Total	78.000	49			

a. Dependent Variable: D5

b. Predictors: (Constant), D4, D3, D2, D1

Table: 6

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.435	1.701		3.783	.000
	D1	.087	.089	.170	.984	.330
	D2	.059	.081	.093	.721	.475
	D3	.397	.131	.501	3.042	.004
	D4	.024	.096	.034	.250	.803

a. Dependent Variable: D5

Model Equation: $D_5 = 0.330D_1 + .475\ D_2 + .004D_3 + .803\ D4$

7.0 Observation and Conclusion

The feedbacks obtained from the respondents are very much specific and significant. The percent score vary in between 96.2% to 77.95%. The variation is very much reasonable and represent able. The most priority dimension is dimension D_2 followed by D_1, D_5, D_4 and D_3 . In respect of prioritization of dimensions a clear feedback is given by respondents. In this respect no ambiguity or confusion is observed.

From this research study and observation it may be possible to come to conclusion that the dimensions of TQM which are selected in this study, in fact, are factors concerned with successful implementation of TQ M. The percent score of each dimension as is observed in Table 2 is significantly high and conclusive towards necessary and successful implementation of TQM in plywood industry.

Ranking of the factor or dimensions of TQM has been done in Table 2 and it is also shown in above paragraph. The dimension 2 has been observed to be most priority dimension or factor

Each factor or dimensions very specifically and categorically state the effect of implementation of TQM. The different factors selected in this research study had been given to respondents for their feedback. The respondents being enough knowledgeable and experienced with necessary adequate skill and expertiseness has given their high score as is observed from Table 2 in section 5 justify the achievement because of implementation of TQM.

The Regression analysis states that the dimensions are very much significant and the questionnaire possesses adequate validity. The Cronbach's-Alpha value with N no. items (22 questions) is relevantly high being 0.914. as is observed in Reliability Analysis. The value of R and R Square is respectively 0.691 and 0.478 also justify the high inter item correlation value.

The Table: 6 shows the significance level among the variables, the variables as taken for consideration in this research study as dimensions or factors are elements of TQM. Out of these variables the dimension 5 (benchmarking) has been taken as dependable variable since an organization achieves benchmarking status out of total contribution of different associated factors. The relation model among the dependable and independent variables has been established on the basis of significance level among the dimensions being observed in Table: 6. The significance level of Dimension 3 as obtained from Table 6 is unique in nature and is considered to be much effective and this adds to weight age of the corresponding predictor dimension "Continuous Improvement".

8.0 Reference:

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