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Analysing Disruption in Operational Practices and its Impact on the Efficiency of Handicraft Firms

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ABSTRACT

The Aesthetic values of Indian manufacturing industry especially handicraft sector has fascinated world towards Indian culture, crafts and art. The Handicraft sector is an important and apt alliance of manufacturing sector which is much famous for its efficiency and proficiency. The sector is one of the promising sectors of economy, which is prospectively full of employment and income opportunities. For the escalation of national income the sector has assisted the nation as a key resource of export and significant source of employment. However, growing global competition and advancement in machine technology at present time has unfavourable consequence on the handmade crafts. The sector is facing adversities and sluggish growth due to its insufficiency to compete with modem industries and the inattention attitude of the sector of coop with modern technology. The purpose of this article is to provide insights about the factors cause disruptions in the operational activities of the handicraft sector. The study will emphasize on the indicators which are substantially imperative for the measurement of performance, further we will analyse the statistical association between factors causing operational disruptions and the indicators of performance. The study uses regression analysis relationship between proposed dependent and independent variables. The evaluation and analysis will provide a moral outlook of the performance and the disruptions in the operational activities.

Keywords: Handicrafts, Operational Disruption, Efficiency, Performance.

1. INTRODUCTION

The artistic values of Indian manufacturing industry especially handicraft sector has devote world towards Indian crafts and attracted global attention towards Indian culture. The Handicraft sector is an important

and apt alliance of manufacturing sector which is much famous for its efficiency and proficiency. In developing countries generally and especially in India small-scale business has enormous potential to provide opportunities for employment, revenue generation, and foreign investment. For the escalation of national income, the underpinned contribution of the sector has boosted national income and became key resource of export and significant source of employment. Though the era of industrialization is growing and is blooming in India but it is unidirectional and unifacial, by unidirectional and unifacial we mean only those of big firms are growing which have enjoyed sensation earlier, while small sector industries/ firms (especially handicraft sector) are deteriorating due to degradation of raw material supply, neglecting artisans and delinquency of government towards the sector. Further, growing global competition and advancement in machine technology in present time have engendered expulsion and ejection of the handicraft business due to the genre of deficient competition and negligence of liaison with modern technology.

2. LITERATURE REVIEW

The sector of handicraft is deteriorating due to neglecting artisans and delinquency towards the sector, the death of Artistic is like a wood falling down tree after tree: master after master makes no sound but the diminution in performance of the sector, which is clearly showing the unheard roar and the desert of experiences (Osto, et. al., 2009). Since more than twenty years the flaws and weaknesses of the handicraft sector has been addressed and searched by the researchers the numerous factors that have found relate to the sickness of the sector are availability raw material, transportation facilities, lack of tourism, mechanical tools, financial support, middlemen exploitations, government delinquencies, stiff competition, marketing & distribution, machine-made goods and many more (Goldman, Nagel, & Preiss, 1995, Fisher, 1997, Davenport & Prusak, 1998, Driese, 2000, Chatur, 2005).

Every factor mentioned above is important for the manufacturing process and is widely important for the survival of craftsmen including artisans and workers. Besides the above-said factors the production process passes through several steps, beginning with the requirement of raw material, and ends with post-sale services, research has found since the downfall of the sector each and every step of production faces problems (Yeung, 2008). The links in the supply chain of handicrafts have been discussed for the problem searching and problem addressing in recent times in different research works. The supply chain development of any sector can be designed through the interactions between stakeholders (consumers, providers, brokers), the interaction will maintain the long-time bond for commercial activities (Giovannucci et. al., 2008). As supply chain is based on multi-agent paradigm it proposes a procurement process. The chain doesn't only shows the relation between links of the chain but also targets potential suppliers negotiates between different stakeholders and finally facilitates the buyer with best with less cost (Seungsup et. al., 2013). The chain also develops a conceptual framework for problem-solving at instant needs; it targets to reduce complex and uncertain risks in business. Further, it facilitates the immediate action for everyday dealings such as inventory failure, delay in deliveries, abrupt increase or decreases in demand (Sadeh et. al., 2003). Even researchers found poor administration inefficiency in the firm sets and defective management among the artisans and the handicrafts firms are also causing of sluggish growth (Zhou and Wu, 2010).

Besides the required facilities research work suggests trustworthy relation between the all stakeholders and dependence on every links of the chain process are important for the survival of the sector it is not only the physical and financial facilities which case success/failure to any sector but each link from supply of raw material till the post-purchase services are immensely significant for the growth/decline of any firm/organization. However, a deep analysis would be needed to carefully examine the causes that cause disruptions such as drastic reduction of the handicraft activities, work de-motivation towards the sector and most important efficiency & performance degradation. Despite numerous causes disruptions and demoralization have an immediate and inevitable effect on performance and efficiency of the sector our research aims to focus factors which are presumed the root for production disruptions and cause of performance efficiency degradation in the sector.

Conclusion and Essence of Literature Review

Table 1
Showing the summery of operational disruptions being selected for the research analysis

Particulars	*Source*
Availability of Raw material is reducing	(Khan & Amir, 2007), (Fisher, 1997)
Non availability of finance	(Aziz, 1990) (Nagel, & Preiss, 1995)
Delay in orders from Clients/middlemen	(Korhonen & Niemelä J, 2005).
Climate influence	Din and Mir, 2005)
Alternative source of employment	(Jawanda, 2016), (Chandra & Jain, 2007)
Availability of working facilities (machine men and assets)	(Ghouse, 2010) (Shah & Patel, 2017) Chatur, 2005).
Efficiency	
Order processing time	(Carrozzino, et. al., (2011).
Creation of brand loyalty	(Davenport & Prusak, 1998)
Range in production	
Maximum utilization of available (source)	Dangayach, & Deshmukh (2007)
Reduction in cost.	

Source: Prepared by author.

Theoretical Framework of the Model

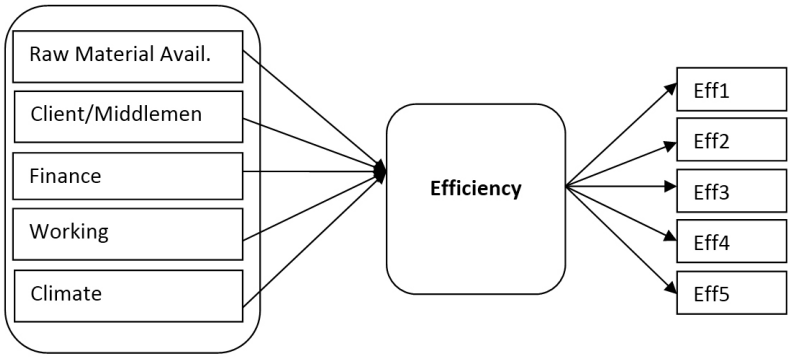

Figure 1: Theoretical framework of the model
Source: Papered by author

3. RESEARCH METHODOLOGY

The focus of this study is to analyze the impact of operational disruptions on the performance efficiency of the handicrafts sector. To determine the precise impact of chosen factors on the performance efficiency the steady has selected most influential factors of operational disruptions and the key factor for measuring efficiency of handicraft sector. The overall approach that was developed to determine the steady flow is shown in Figure 1. The target population identified for gathering information regarding this concern is Indian manufacturing firms especially handicraft sector. The variables ware measured using a Likert scale ranging 1 = strongly disagree to 5 = strongly agree. A questionnaire survey was employed and the sample was drawn from the different workers and artisans working as labourers and artisans. The questionnaire requested details relating to operational disruptions while manufacturing the crafts and most important questions related to the present performance efficiency of the handicraft sector. The replies to the initial questionnaire were received from 53 respondents. After two follow-ups the total replies gathered increased to 400. However, some respondents giving less response rate and were excluded from the study and finally 341 respondents were valuable respondents for the further studies. The Mann–Whitney and chi-square Non-parametric tests were used to compare early and late responses and there was no evidence of non-response bias found. Using the SPSS toolkit principal component factors were extracted and according to the procedure they were named as operational disruptions, and performance efficiency. The measurements used as proxies for the contingent factors extracted are detailed below.

Table 2
Showing the factors extracted from principle component analysis

Operational disruptions	*Performance Efficiency*
1. Availability of Raw material	i. Order processing time
2. Availability of finance	ii. Creation of brand loyalty
3. Delay in orders from Clients/middlemen	iii. Range in production
4. Climate influence	iv. Maximum utilization of available sources
5. Alternative source of employment	v. Reduction in cost.
6. Availability of working facilities (machine men and assets)	

Source: Papered by author.

4. HYPOTHESIS

H_1: There is a significant and positive relation between Availability of raw material and performance efficiency of the handicraft firms

H_2: There is a Negative statistical Association between alternative work availability and efficiency of handicraft business.

H_3: There is a significant and positive relation between financial support and efficiency of handicraft firms.

H_4: There is a significant and positive relation between continue orders deliverance and the performance of the handicraft firms.

H_5: There is a statistical Association between Climate influence and efficiency of handicraft business.

H_6: There is a significant and positive relation between Availability of working facilities and the performance efficiency of the handicraft firms.

Analysis (Using the SPSS Toolkit)

Table 3
Showing Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	*Cronbach's Alpha Based on Standardized Items*	*N of Items*
.783	.796	12

Source: Papered by author with the help of SPSS.

Table 3 shows the overall reliability of the variables taken for the purpose of analysis. We have devised a twelve question questionnaire to measure the disruptions and performance efficiency. Each question was a 5-point Likert item from "strongly disagree" to "strongly agree". In order to understand whether the questions in our questionnaire all reliably we measure the reliability of the items taken in the questionnaire. A Cronbach's alpha was run on a sample size of 340 respondents with twenty four questions and the value of Cronbach's alpha was .783, which is above the normally accepted value of Alpha.

Table 4
Showing KMO and Bartlett's test for the analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.763
Bartlett's Test of Sphericity	Approx. Chi-Square	3.552E3
	df	276
	Sig.	.000

Source: Papered by author with the help of SPSS.

Table 4 shows the KMO and Bartlett's test while running the Factor analysis the KMO table is important for the interpretation. The KMO test is a used to measure of how suited and appropriate our data is for Factor Analysis. The test measures sampling adequacy for each variable in the model and measures the proportion of variance among variables that. For the KMO test, the rule of thumb is KMO values between 0.8 and 1 indicate the sampling is adequate. KMO values less than 0.6 indicate the sampling is not adequate and that remedial action should be taken. And the value above 0.7 is middling and states data is adequate to factor analysis. In our case, we got value .763 which is acceptable for extracting components in factor analysis.

Regression Analysis

Using the SPSS program kit in the case of multiple regressions we have come to the following results. Regression analysis is a method by which the Independent variables (IV) are chosen for entry to find the level of significance with the dependent variable (DV) (Armstrong, 1965, Thompson, 1995).

Table 5 showing Descriptive Statistics of the data.

Table 5
Descriptive Statistics

	Mean	*Std. Deviation*	*N*
Efficiency	2.8149	.40850	341
Availability of Raw material	3.72	.859	341
Working choice	2.27	.815	341
Climate influence	2.24	.826	341
Client/middlemen orders	2.26	.878	341
Non-availability of finance	3.68	.904	341
Physical facilities	2.27	.872	341

Source: Papered by author with the help of SPSS

Table 5 is the First, table in the output, it provides the usual descriptive statistics for all seven variables including dependent and independent. Before interpreting anything let us be clear multiple regressions use only the participants who have complete data for all the variables. In the above case, *N (no of participants)* is 341 and none of the participants are missing as we already deleted such cases where scores were missing. Further, the table shows mean, and Std. Deviation. The variables shown in the table include six independent *(availability of raw materials, working choice, climate influence, client/ middlemen orders and non-availability of finance)* and one *(efficiency of handicraft firms)* is the dependent variable.

Table 6
Showing Correlation Matrix

Correlations

		Efficiency	*Availability of Raw material*	*Working choice*	*Climate influence*	*Client/ middlemen orders*	*Non-availability of finance*	*Physical facilities*
Pears on Correlation	Efficiency	1.000	.499	.203	.440	.466	.525	.283
	Availability of Raw material	.499	1.000	.244	.190	.177	.633	.104
	Working choice	.203	.244	1.000	.310	.240	.230	.286
	Climate influence	.440	.190	.310	1.000	.514	.090	.206
	Client/middlemen orders	.466	.177	.240	.514	1.000	.192	.169
	Non-availability of finance	.525	.633	.230	.090	.192	1.000	.194
	Physical facilities	.283	.104	.286	.206	.169	.194	1.000
Sig. (1-tailed)	Efficiency	.	.000	.000	.000	.000	.000	.000
	Availability of Raw material	.000	.	.000	.000	.001	.000	.027
	Working choice	.000	.000	.	.000	.000	.000	.000
	Climate influence	.000	.000	.000	.	.000	.048	.000
	Client/middlemen orders	.000	.001	.000	.000	.	.000	.001
	Non-availability of finance	.000	.000	.000	.048	.000	.	.000
	Physical facilities	.000	.027	.000	.000	.001	.000	.

(*Contd...*)

Correlations								
		Efficiency	*Availability of Raw material*	*Working choice*	*Climate influence*	*Client/ middlemen orders*	*Non-availability of finance*	*Physical facilities*
N	Efficiency	341	341	341	341	341	341	341
	Availability of Raw material	341	341	341	341	341	341	341
	Working choice	341	341	341	341	341	341	341
	Climate influence	341	341	341	341	341	341	341
	Client/middlemen orders	341	341	341	341	341	341	341
	Non-availability of finance	341	341	341	341	341	341	341
	Physical facilities	341	341	341	341	341	341	341

Source: Papered by author with the help of SPSS.

Table 6 is a correlation matrix. The first column of the correlation matrix shows the correlations of the independent variables with Efficiency and that Availability of Raw material, Working choice, climate, client/ middlemen order, non availability of finance and physical facilities positive correlation can be seen between independent variables and the dependent variable. All the variables are significantly correlated with *efficiency*. Similarly, when we observe other variables or the predictor/independent variables we notice there is neither small nor high correlates with each other. The correlation between the predictor variables is low (min 0.10, max 0.63), which is favourable in avoiding collinearity. However, the correlation between, climate influence and client/middlemen order is (.514) and availability of raw material and non availability of finance is (.633). Hence we conclude by there are only low to moderate relationships among the predictor variables in the Correlations table.

Table 7
Displays the Model Summery of the Analysis

Model Summary[b]										
Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*	*Change Statistics*					*Durbin-Watson*
					R Square Change	*F Change*	*df1*	*df2*	*Sig. F Change*	
1	.717[a]	.514	.506	.28718	.514	58.991	6	334	.000	2.061

[a]*Predictors:* (Constant), Physical facilities, Availability of Raw material, Client/ middlemen orders, Working choice, Climate influence, Non-availability of finance.
[b]*Dependent Variable:* Efficiency.
Source: Papered by author with the help of SPSS.

Table 7. Shows the results of statistics, obtained from the experiment. In the column labelled as R in the model, the summary shows the values of the multiple correlation coefficients between the predictors and the outcome that is R-value suggests that the correlation between the dependent variable and the independent variables. While entering all the predictors at once (Enter method), for the regression analysis the R-value is (.717)[(a)]. Further, R^2 gives the square of the change in multiple correlation coefficients. In the above table while using direct method of regression, the value of R^2 is .514 that means 51.4% of the variation of independent variables (operational disruptions) around dependent variable (performance efficiency). Adjusted R^2 value is given for considering the effect of multiple regressions explained in

variances. Standard error gives the standard deviation of e, error between the predicted and observed variables, resulting in the model.

Further, Durbin Watson is statistic number that tests for autocorrelation in the residuals from a statistical regression analysis. The values are between 0 and 4 and Value of 2 means, there is no autocorrelation in the sample. Values approaching 0 indicate positive autocorrelation and values toward 4 indicate negative autocorrelation. In our case it is 2.06 equal to there is no autocorrelation in the model.

Table 8
Showing Analysis of Variances

ANOVA[b]						
	Model	*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	29.191	6	4.865	58.991	.000[a]
	Residual	27.546	334	.082		
	Total	56.736	340			

[a]*Predictors:* (Constant), Physical facilities, Availability of Raw material, Client/ middlemen orders, Working choice, Climate influence, Non-availability of finance.
[b]*Dependent Variable:* Efficiency.
Source: Papered by author with the help of SPSS.

Table 8 shows the Analysis of Variance (ANOVA), for the purpose of verification of the usefulness of control variables, the ANOVA test is executed. The most important part of the table is the F-ratio, which is calculated using equation F =MSM/MSR [Mean squares for the model (MSM) and Residual mean square (MSR)]. For these data, when degree of freedom is 6 (degree of freedom = $n - 1 = 7 - 1$) for regressor and 334 (degree of freedom = sample size – observations = 341 − 7) for residual F (6,334) is 58.991. The analysis shows P is significant at $p < .05$. There is strong evidence that null hypothesis are not equal to zero ($\beta 1 = \beta 2 = \beta 3 = \beta 4 \neq 0$). The null (default) hypothesis is always that each independent variable is having absolutely no effect (has a coefficient of 0). Therefore, we can conclude that our regression model results

Table 9
Showing Regression Coefficient of the analysis

Regression Coefficients[a]										
	Model	*Unstandardized Coefficients*		*Standardized Coefficients*	*t*	*Sig.*	*95% Confidence Interval for B*		*Collinearity Statistics*	
		B	*Std. Error*	*Beta*			*Lower Bound*	*Upper Bound*	*Tolerance*	*VIF*
1	(Constant)	1.343	.085		15.724	.000	1.175	1.510		
	Availability of Raw material	.105	.024	.222	4.401	.000	.058	.152	.573	1.745
	Working choice	-.049	.021	-.097	-2.290	.023	-.090	-.007	.814	1.229
	Climate influence	.124	.023	.250	5.386	.000	.078	.169	.677	1.478
	Client/middlemen orders	.111	.021	.239	5.277	.000	.070	.152	.711	1.407
	Availability of finance	.141	.023	.312	6.163	.000	.096	.186	.566	1.766
	Physical facilities	.064	.019	.136	3.340	.001	.026	.101	.880	1.137

[a]*Dependent Variable:* Efficiency.
Source: Papered by author with the help of SPSS.

are significantly better prediction of performance efficiency. Further, the regression model overall predicts the in context of selected independent variables and the performance is significant.

Table 8 gives the coefficient details. The second column of Table gives the non-standardized regression coefficients that are.

$$B \text{ or } Y = 1.343 + 0.105x_1 + (-.049x_2) + .124x_3 + .111x_4 + .141x_5 + .64x_6$$

where, Y = dependent variable (performance efficiency), x_1 = availability of raw material, x_2 = working choice, x_3 = climate influence, x_4 = client/middlemen orders, x_5 = availability of finance and x_6 working/physical facilities. This can be re-written as Y represent the change in the performance resulting from a change in predictors (independent variables) and a predictors are having a significant impact on the ability to predict the performance as Y (dependent). Further the Y values under the B column of the table tell us about the relationship between performance and each predictor. The value of five predictors is positive and one is negative we can infer from it, that five predictors (β-values) indicating positive relationships and one predictor (β-value) indicating negative relationship between independent and the dependent variable. Further, the value of β also tells us the degree by which each predictor affects the performance (effect if other predictors are held constant availability of raw = .105[(1)], working choice (–.049), climate influence = .124, client/middlemen orders = .111, Funding availability = .141 and working/physical facilities = .064.

T-test Consider assuming $\beta \neq 0$ for each variable

From all the above analysis and tests we can obtain a non-linear relationship connecting an average number of non-zero coefficients in the sparse representation per vector. Then the sig.-value in the table gives the probability that $|t| > t$-stat where t is a t-distributed random variable with 334 degrees of freedom and t-stat is the computed value of the t-statistic which is the coefficient divided by its standard error. Regression analysis compares the t-statistic on variable with values in the t-distribution to determine the P value, which is thing we are really looking presumptuously. The t-distribution describes how the mean of a sample with a certain number of observations is expected to behave. At 95% of confidence the t-distribution is closer to the mean than the t-value on the coefficient we are looking at, at the same time we have a p-value of 5%. The real, underlying value of the coefficient that we are estimating falls somewhere in that 95% confidence interval, so if the interval does not contain 0, our p-value will be .05 or less. Since the p-value of all the four independent variables or predictors is less than 0.05 at 95% confidence level we can state that all six predictors or independent variable has some influence on the values of dependent variable (performance) whether negative or positive. Also from the normalized coefficient values, we can find that variable 5 (availability of finance) have the most impact on dependent variable (performance efficiency) and variable 2 (working choice) least among all regressor which indicates availability of finance, is most significant to analyze the performance of the handicraft firms. One of the important thing to notice in the above table is the working conditions variable second which is significant but negatively significant that means any increase or improvement in variable second will lead decrease or deterioration in the performance efficiency and vice versa.

$H_1, H_5 < H_3 < H_4 < H_6$ = positively significant to the performance efficiency.

H_2 = negatively significant to the performance efficiency of the handicraft firms.

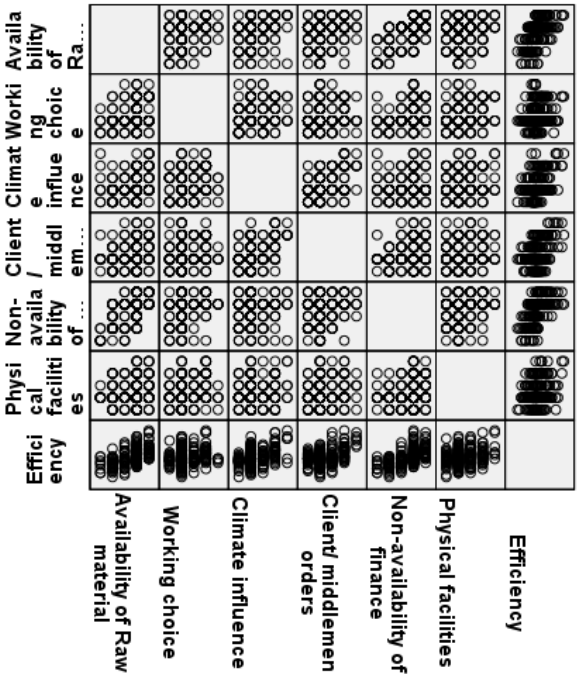

Figure 2: Showing Scatter plot A

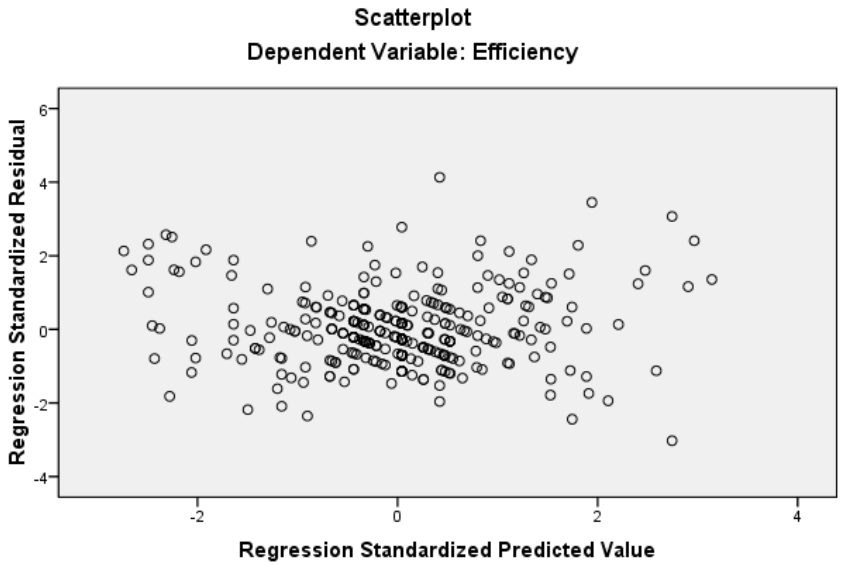

Figure 3: Fig Showing Scatter plot B

The scatter **plot matrix shown above,** which shows that the independent variables are generally linearly related to the dependent variable *of efficiency,* meeting this assumption, one should check the matrix scatter plots to see if there are curvilinear relationships between any of the variables; in this example, there are none. If the variables had not met this assumption, we could have transformed them, aggregated some, and/or eliminated some independent variables. This is good. The other assumptions are checked in the **residual scatter plot** at the end of the output, which indicates that the errors are normally distributed, the variances of the residuals are constant, and the residual is relatively uncorrelated with the linear combination of predictors.

5. DISCUSSION AND CONCLUSION

Small-scale industries/firms are not like others firmss where the inundated indicators to measure performances are available, though the sector is limited with the performance indicators, no such a standard gauge is being established to make it universal for measuring performance. Further, the interest paid by researchers towards the sector is not much, because of its informal and unorganised business nature. This has, however, caused stakeholders serious concern to face the challenges of identifying, and then prioritizing, those measures that are the most appropriate for their strategic. However, we try to elaborate the causations of performance disruptions in the paper. To address these causations of disruptions and to ensure the impact of each of these indicators on the performance efficiency, a comprehensive evaluation model for efficiency performance has been conducted by considering the interdependence and interrelation in the study. The data collected were initially classified into different groups based on type of handicraft work carried by artisans but it was found in the literature that different types of handicraft sectors have almost same types of problems on the basis of common problems assumption questionnaire was formulated so that we can generalize the problems related to the entire sector of handicrafts. The literature identifies various barriers related to the performance efficiency of the handicraft sector, to understanding these difficulties we have chosen some of the most important disruptions where necessary rectification, both from the firm internally and from the external policies. **Table 1** presents the main results found in the literature review regarding the important changes and disruption in performance efficiency of manufacturing, especially handicraft sector. With the help of SPSS, it was found regression model in the table was more satisfactory, as summarized in Table 6 further the main conclusion of the study is as follows.

- Based on the data, shown in **Table 4** we find that the R^2 of our model is .514 this means that the linear regression explains 51.4% of the variance in the data with the adjusted $R^2 = .504$. The Durbin-Watson in the last column of the same table = 2.061, which is between the two critical values of $1.5 < d < 2.5$. Therefore, we can assume that there is no first order linear auto-correlation in our multiple linear regression data.
- The very next thing for analysis is the F-test. Shown in **Table 5**. The linear regression's F-test has the null hypothesis that the model explains zero variance in the dependent variable (in other words $R^2 = 0$) that is not quite true and accepted in our research. The F-test is highly significant, thus we can assume that the model explains a significant amount of the variance in performance analysis of handicraft sector.
- Multiple linear regressions are the important and central subject of the analysis it estimates many important things. In our multiple linear regressions shown in **Table 6**, we find highly significant coefficients for all six independent variables; only work choice (V_2) variable is negatively significant. Further, the information in the table also allows us to check for multicollinearity in our multiple linear regression models. Tolerance should be > 0.2 (or VIF < 05) for all variables, and when we see the information VIF column the range is between this limit, which means there is no multicollinearty in our data.

Summarizing the work we can say the work was sought to answer the following question: What is the relationship between performance efficiency and the disruption causes. How these work disruptions impact the performance efficiency in the real sense. To answer the question, we proposed models for the

estimation of efficiency as well as a model to test the question. These models were idealized to use the cases from work disruptions in handicraft sector (small and medium-sized). The main result found in our work was that performance efficiency seriously and considerably depend on factors taken into consideration in the study, altogether we can say performance efficiency of handicraft sector depend on the links of supply chain and any disruption in the supply chain the firm whether big or small the firm has to face serious efficiency problems. However, there are several limitations of this study. First, the study was conducted mainly based on limited variables and the research was conducted with reference to handicraft sector only. Second, the financial performance of the sector is not taken into consideration as an indicator, though the indicators are much more important than the non-financial indicators, a higher number of indicators could have been incorporated into the online survey with different points of view. Third, more people could be included, both in the survey phase and for the expert group phase.

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