

# Impact of Big Data Analytics on Organisational Performance of Manufacturing Companies in Chennai

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**Abstract-** Big data relates to analysing a huge data that deluge in the regular affairs of business. These data are scrutinized by computation to understand and to revile the pattern; association and its trends dealing with human behaviour and their interactions are called as big data analytics. The organizations that use analytics of big data are mostly the hospitality, industry, health care companies, manufacturing industries, public utility services and in regular trading. The analytics of big data are however conducted with data base and statistical methods namely mining of data and text, Hadoop and analysis based on prediction of data.

**Keywords – Big Data, Organisational Performance, Technology, Data Efficiency**

## I. INTRODUCTION

### 1.1 Origin of Big Data

Records show usage of data way back from 7,000 years ago to track and control the accounting transaction that was introduced in Mesopotamia to record the growth of crops and herds. In 1663, John Graunt recorded and examined all information about mortality roles In London. A computing machine was used in 1887 by Herman Hollerith which could decipher the pin holes into paper cuts in order to identify the data of census. As early as 1937, Franklin D Roosevelt created a major data project for effective implementation of an act for social security. During Second World War the data processing machine could read the Nazi codes. In 1943, the British developed the first data processing machine to Decipher Nazi Codes. In 1952, the National Security Agency (NSA) collected and processed intelligence singles automatically. The US Government during 1965, decided to build the first data centre to store over 742 million taxable returns and 175 million of finger prints and converted these records into computerised magnetic recorder and saved it in one place. The www was invented by Tim Berners to share information through “Hypertext” process unit. In 1995, the first super computers were built to complete the tasks which would have otherwise needed longer period.

The word “Big Data” was created in 2005 by Roger Mouglar who called it as web 2.0. It deals with huge data which would difficult to handle by applying the traditional business approach.

### 1.1 Significance of Analytics of Big data

The start-up organizations use analytics of big data due to its significance relating to the following key areas:

- Prediction of the patterns, drifts, movement and behaviour.
- Creation of meaningful data

- Record, analyse and dissect data in order to present the finding in simple terms.
- To enhance the productivity of the business and
- To instil effective decision making.

### *1.2 Kinds of Analytics of Big Data*

The five analytics of big data are:

- Analytics on the basis of prescription: it is the area of data analytics that focuses on finding the best alternative for a given data.
- Analytics on the basis of diagnosis: it identifies the reasons for any event by applying the methods such as discovery of data, mining of data and correlating the data.
- Analytics on the basis of description: it deals with analysing the back ground of any data collected to state its impact in the business world.
- Predictive Analytics: Varied tools of statistics like data mining, predictive modelling and machine learning are used to study the decisions about future course of action.
- Outcome Analytics: it is the process by which the results of a therapeutic procedure are formally assessed.

### *1.3 Big Data Analytics and Its Importance*

- It enables to identify in real time the root causes of failures.
- It provides a platform to fully design the process and actions for data driven marketing.
- It encourages to attract customers with varied tastes, preferences and buying habits.
- Big Data enables to have the loyalty of customers and also provides the platform to build employee engagement. . It provides sufficient information to re-evaluate the risk portfolios quickly.
- The advanced analytics give the decision-makers the insight they require to build up the competency of the companies.
- It helps to curb down the expenses.
- It enables competitive advantages.
- It enhances productivity.
- It helps to detect errors and frauds.

### *1.4 Drawbacks of Analytics OF Big Data*

- Large volume of data collected are unstructured, making it a cumbersome for the users.
- Big data analysis isolates principles of privacy.
- It succumbs to manipulation of customer records.
- It may lead to increased social stratification.

## II. REVIEW OF LITERATURE

Big Data deals with the voluminous data and the methods to manage these in different applications like agriculture, banking, mining, education, chemistry, finance, cloud computing, health care etc. It also considers the hidden data which enables us to look for incomprehensible relationship and also take enhanced decisions. Its widespread application and fast development has made it an important concept which people lookout for expanding their interest. There have been various studies on big data analytics with reference to its application, usage, risk involved, etc.

Yang et al. (2017) has related the analytics of big data to the torrent of digital data which usually includes information in the form of texts, geometrics, images, videos, sounds and combination of these which is collected from various sources and also encompasses the sensors, digitizers, scanners, mobile phones, internet, emails and social networks. Jens, christoph loroque, Benjamin Oeser, Anders skoogh and Mukund Subramanian (2018) Analytics relating to big data revolves around specialisation in many industries but is identified with certain limitations like ignoring the concepts of factory, industry 4.0” and so on. It need to be more explanatory as to its utilisation in the practical situations like organisations decision making process, purchase plans, finance disposition and other areas of management. Das&Kumar (2013) Technological changes have given various tools and made it possible for huge data

concerning semi structural and unstructured data in a short period The task is now to analyse these data systematically for improving the effectiveness and also for obtaining better knowledge. Usage of mining algorithms to extract knowledge from the structured data was suggested and the steps to convert the semi structured data into structured data was laid down as the standard procedure. The authors also indicated the standard framework to analyse the data to get the desired results. Borne K.Top (2014) Studies have pointed out that 3vss will not be able to explain the big data which companies are collecting and storing. Thus validity, veracity, validity, variability, value, vocabulary, venue and vagueness were to be considered for sufficient data interpretation and analysis of big data. Tawfiq Hasanin, Taghi M. Khoshgoftaar, Joffrey.L, Leevy&Richard A Bauder(2019). The study tried to use six data sampling approaches for addressing the effect that class imbalance has on big data analytics and it was reasoned out that adequate efforts were required for the professionals to have proper usage and for the benefit to be derived out of big data. It was noted in the study that RUS was the best choice as it helps to evaluate the results with limited sample and also reduces the training time. Inclusion of performance metrics such as area under precision, recall curve (AUPRC) and the use of big data in other domains also was considered in their study. Russo and Fouts (1997) in their study identified that utilising the existing resources and capabilities to achieve the desired objectives is a must and the need of the hour. Organisations should be prepared and be adaptive to work systematically for good decisions to be taken. Sasa Batistic and Paul Vander Laken studied about the Big Data Analytics performance relationship and the need to explore detailed perspectives about data interpretation. They also indicated the relationship of culture and climate for efficient use of Big Data. Organisation strategy according to their study indicates coordination with BDA and the need for better provision of information for decision making process. Venkatesh Naganathan(2018) stated that the major concern with regard to data management is the security and integrity. Organisations should follow strict rules regarding the security issues and maintaining the confidentiality of the data , as the data is huge and needs caution while use and storage. Consumer privacy should be the topmost concern and the companies which shun from the application of big data will be seen fading away from their business.

Manufacturing companies have been quite apprehensive about the usage of big data due to the huge volume of information they need to acquire and systematically save. They have always found the technical information storage to be quite scientific and also coding and decoding to be a troublesome affair

Very few studies have concentrated on use of big data in manufacturing companies and what impact it would create on organisational performance with the usage of big data.

### III. OBJECTIVES OF THE STUDY

1. To study the existing Big Data analytics of manufacturing companies.
2. To find the relationship between the big data analytics and organizational performance in the domain of manufacturing companies.

### IV. HYPOTHESIS

There is no significant relationship between Big Data analytics and organizational performance

### V. RESEARCH METHODOLOGY

This empirical study completely encounters with primary data derived from employees in different manufacturing companies of greater Chennai. Questionnaire was used to obtain responses, which consisted of three parts, namely

1. Personal and organizational variables
2. Statements regarding Big Data analytics and organizational performance
3. Variables pertaining to performance indicators of organization

The question is composed of optional type questions as well as statements as Likert's 5 points scale, which ranges from strongly agree to strongly disagree. The model consists of two important entities namely, components of big data analytics and indicator of organizational performance. These variables are generated from constructive sources of literature reviews in the sense that the findings and conclusions are reflecting the statements. The variables which are taken from a particular review are reframed in such a way, it is more appropriate for the employees of manufacturing companies. The big data analytical components comprises 10 variables and organizational performance indicators can be identified through 10 variables.

### 3.1 Reliability Analysis and Pilot Study

After constructing the research instrument, the researcher intended to check its reliability through the statistical tool. In order to conduct this pilot study, the researcher obtained 100 responses from the top manufacturing companies through convenience sampling method. The researcher meticulously selected Cronbach alpha method, actually this method verifies how far the statements are well understood by the respondents. The required benchmark Cronbach alpha value is 0.75 which actually indicates the percentage of variance. More the variance is, it is an indicator for better knowledge about the employees in expressing their responses. The direct application of Cronbach alpha method derived 0.870 for big data analytics, whereas the 10 statements of organizational performance scored 0.888. Both these values are above 0.75, therefore the researcher come to the conclusion that the constructs pertaining to Big Data analytics and organizational performance is well understood by the employees and able to meet the practical implications prevailing in manufacturing companies.

### 3.2 Main Study Data Collection

Again, the researcher applied convenience sampling method to collect maximum information and transparent notions from the employees of top manufacturing companies in greater Chennai. The researcher circulated 300 questionnaires among the employee and able to obtain 227 filled in responses. Hence the sample size of the research is 227. These responses are systematically tabulated and coded in SPSS package version 23, to automatically analyze the responses from the employees. Data mining process is done at this stage to clean the data and also to verify the existence of variance for reliability as well as the normality of the data. It is found through the application of exploratory factor analysis, Cronbach alpha method and confirmatory factor analysis that two blocks of analysis, namely, Big Data analytics capabilities and organizational performance are respectively 0.820 and 0.891. This shows that all the 227 responses are the employees of manufacturing company's have considerable amount of variance and displayed a wide normality for the rational representation of perceptual difference among the employees.

## IV. ANALYSIS AND DISCUSSION

The subsequent application of exploratory factor analysis and confirmatory factor analysis, the researcher is able to obtain the individual variable loadings to display the importance of variables considered for the research. The following table completely enumerates the individual variable loadings of the variables pertaining to Big Data analytics capabilities and organizational performance.

Table – 1

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.706
Bartlett's Test of Sphericity	Approx. Chi-Square	373.060
	df	45
	Sig.	.000

Table – 2

Rotated Component Matrixa		
	Component	
	1	2
BI9	.735	
BI8	.639	
BI7	.600	
BI10	.545	
BI5	.499	
BI6	.455	
BI2		.814

BI3		.792
BI4		.678
BI1		.541

After these loadings the researcher confirmed those variables through confirmatory factor analysis considered to be a sophisticated tool for the validity of research. In this analysis it is found that all the individual variable loadings are greater than 0.4. The researcher can deduce intellectually that the variables have very good representation to surmount the factors namely Data efficiency and collective approach. After confirming these two independent Big Data analytics factors and the dependent organizational performance factors the researcher intended to establish the nature of relationship between the factors of Big Data analytics and the dependent organizational performance. Therefore, the researcher applied linear multiple regression analysis and following results are obtained.

Table – 3

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.220a	.048	.044	.79510
a. Predictors: (Constant), DE,CAP				

From the above table it is found that r2 value is greater than the required value of significance, which is sufficient enough to prove the validity of the variables that exist between the factors data efficiency, collective approach and organizational performance. It is also confirmed with the results of two way analysis of variance.

Table – 4

ANOVAa						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.955	2	7.977	12.619	.000b
	Residual	314.197	497	.632		
	Total	330.151	499			
a. Dependent Variable: organizational performance						
b. Predictors: (Constant), DE,CAP						

From the above table it can be ascertained that the F value and its probability value are statically significant at 5% level. Therefore, it can be concluded that there is significance influence of data efficiency, collective approach on performance of organization. The individual effect of independent variables further identified in the following coefficient table

Table – 5

Coefficientsa						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.660	.182		14.596	.000
	DE	.113	.032	.158	3.559	.000
	CAP	.125	.044	.126	2.836	.005

a. Dependent Variable: Organizational performance

From the above table it is revealed that the beta values, t-value and probability value are all significant and positive at 5 percent level. As a corollary result, it also revealed that, there is an optimistic impact of data efficiency and collective approach over organizational performance. After establishing the optimistic relationship between the independent variables and a dependent factor the researcher intended to validate the model through structural equation model (SEM). The structural equation model is a combination of confirmatory factor analysis and linear multiple regression analysis. So far both confirmatory factor analysis and linear multiple regression analysis were done as stated in the table no's 1, 2 and 3. These model fit can be verified through the following fit indices namely, goodness of fit index (GFI), comparative fit index (CFI), normed fit index (NFI), root mean square error of approximation (RMSEA). These fit indices and their benchmark values are clearly displayed in the following table

Table – 6

S.No.	Indicators	Value	Benchmark
1.	Chi-Square Value with Significance	3.214, P= .543	greater than 0.05
2.	Goodness of Fit Index (GFI)	0.975	greater than 0.9
3.	Comparative Fit Index (CFI)	0.972	greater than 0.9
4.	Normed Fit Index (NFI)	0.964	greater than 0.9
5.	Root Mean Square error of appropriation (RMSEA)	0.08	less than or = 0.08

From the above table it is identified that all the fit indices are very much satisfied the bench mark proposed by Hair & Black (2001). This implies that the relationship between factors of Analytics of Big Data and organizational performance are positively correlated. This also forces to reject the hypothesis considered by the researcher

#### V. FINDINGS AND CONCLUSION

It is concluded from the research that the augmented technologies encompassing Big Data analytics and its implications are the scientific methods to impart a knowledgeable work environment on the employees. The big data analytics and its efficiencies are able to dispose some of the complexities, management difficulties and hindrances generally arouse in a working environment. It is also believed that the employees are continuously motivated to increase the individual efficiency, through knowledge orientation emanated in the analytics of big data. Actually, the big data analytics diminishes the heuristic and time-consuming activities within the organization and systematically transforms the working environment organization into productive and profitable arena.

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