

BIG DATA VALUE ELEMENTS EXTRACTION FOR MANAGING CHANGE DISRUPTION IN FUTURE ORGANIZATIONS

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Abstract: Digitization has opened a new era of information system which has the potential to extricate worthwhile value for the businesses. In this digital age, the organisations can gain competitive advantage by undertaking important decision regarding the cost, the technology and data handling tools. The right balance between minimum time to access to data, the cost of investment in scalable technologies and avoiding data vulnerabilities against threat opens a new way to extract consumer needs and preferences and increment in overall value for the organisations. For the organisational understanding of important factors towards value extraction from data sets analytics platform, the paper adopts a three-tier approach, starting with the definition of big data and its genesis, its role and use in an organisation, and characteristics of big data, The second level addresses the concept build up from extensive literature review. Finally, the third tier highlights factors need to address by organisations, a prerequisite before extracting value. The value extracted eventually discusses the implications for further research directions and the use of value elements for managing change disruption, towards future organisations.

Keywords: Big data, Organizational Performance, Change Management, Value elements.

Introduction

Due to advancement in technology, especially the evolution of Web 2.0 and internet expansion, the era of information age begins, resulting in a huge generation of consumer data. Data has been called the main engine of the digital economy. The vast amount of user-generated data helps in knowing about the customers regarding what they feel and behave. The digital world is opening a new window for analysing the market in real time. However, it poses a great challenge for businesses to analyse the market and to gain competitive advantage in real time. It plays a central role in improving organisation decisions, maintaining customer relationship, enhancing customer experience, personalising products, solving customer problems, attractive pricing and extracting value in real time.

The extant research in academia and industry shows that retailers can achieve up to 15-20% increase in ROI by putting big data into analytics (Perrey et al., 2013). Mckinsey and Company found that “collecting, storing and mining big data for insights can create significant value for the world economy, enhancing the productivity and competitiveness

of companies and the public sector and creating a substantial economic surplus for consumers” (Manyika et al., 2011).

However, despite the excitement and recent interest in big data, little is shown about what factors are important while undertaking the analytics platform in businesses to extract value. Organisations are struggling to understand the concept better and capturing value from data sets.

The paper is organised as follows: **Section 1** defines big data and its genesis. Section, its role and use in an organisation, characteristics of big data, need of study, the scope and the objective of the study. **Section 2** describes the extensive literature review. **Section 3** highlight factors need to address by organisations before extracting value, important variables of the study and instruments. **Section 4** discusses the implications for research, limitations and suggestions for future research.

1. Big Data Defined

Big data is a new commodity for businesses in the hyper-connected digital world. Big data is generating tremendous attention worldwide. It can unlock new opportunities and can deliver operational and financial value (Morabito V., 2015). With the development of information age, data has entered into the age of big data; online activities and transactions could create 5 billion GBs of data within merely 10 minutes in 2013 (Chandani A *et al.*, 2015). Some scholars and practitioners have considered ‘big data’ as data coming from various channels including sensors, satellites, social media feeds, photos, video and cell phones and GPS signals (Rich., 2012). There is a need to develop advanced skills in analytics to extract value from user-generated data and understanding the current market needs in the digital era. Framing new strategies and technological advancement in businesses is a challenging task. Successful implementation would result in enhanced customer relationship management; develop new marketing mix strategies, personalisation and maintaining privacy and security.

1.2 Genesis of Data Generation

The history of data gathering started way back in 1910 when Parlin gathered data on markets to help in advertising and other business practices. In 1923, A.C. Nielson founded the market research company for measuring product sales in stores. The next decade saw the increased use of telephone surveys. In 1940s consumer purchases were recorded and resulted in a huge volume of data collection. In 1972 with the introduction of Universal Product Code and IBM's computerised Point of Sale scanning devices in retail marked the capturing of automated data started. In 1981 the personal computer help marketer's in storing data of the current and potential users.

With the inception of the World Wide Web in 1995, the volume of data generation increased by many folds. In 1998 Google started capturing the search data. In 2004 Facebook opened up an era of social network data which is usually unstructured. In 2005, the advent of YouTube and in 2006 twitter became the main source for unstructured data for behavioural targeting. The E-Commerce sites, Smartphone's, Internet of things devices and global positioning satellite all became the major source of data generation in

today's data-driven world. The exponential rate at which data is generated from online sources and different sensors and devices is termed as "Big Data".

1.3 Role and Use of Big Data Analytics

Big data plays a major role in analysing customer behaviour in today's uncertain digital world. It also opens a new urge for organisations to modernising their structural system and adopting new innovative technologies in there to sustain and gain competitive advantage. Some important applications of using big data analytics in organisations are-

- **Customer Segmentation**-Big data analytics helps in creating specific clusters of customer based on shared attributes like common interest, likes and dislikes etc.
- **Enhanced Loyalty**-Big data analytics gives marketers the freedom to develop reputation index which is an important yardstick to customer loyalty.
- **Personalised Marketing Strategy**-It shifted the focus from mass marketing to one to one marketing by capturing data from every possible touch points to understand their behaviour and intent.
- **Increased Profitability**-By recommending possible offerings in real-time using analytics helps not only in gaining a competitive advantage but increased profitability.
- **Improved Visualization**- Big data analytics provide a more holistic view of customers by continuously monitoring the behaviour in real-time. Thus a 360-degree view of consumers is visualised by marketers and accordingly helps in altering marketing strategies.

1.4 Characteristics of Big Data

Volume- The volume is defined as huge data sets that are difficult to handle. This volume of data can vary from terabyte to petabyte to zettabyte. Scholars like Russom (2011) define "Volume as a large amount of data that either consumes huge storage or entail of a large number of records data".

Velocity-The velocity is defined as the speed at which data is generated. Russom (2011) defines "Velocity as the frequency or speed of data generation or frequency of data delivery". As with the growing population and digitisation, internet users are substantially rising.

Variety- The variety is defined as the type of data being generated using different sources through online and offline mode. The variety of data is categorised into structured, semi-structured and unstructured data (Doug Laney., 2001). Retention of unstructured data in the form of user-generated images, video or music files, word processing documents, spreadsheets, and presentations is a leading cause of the data glut in organisations, accounting for some 60 per cent of the total volume of big data.

Veracity-The veracity is defined as the accuracy, precision, truthfulness and meaningfulness of data. Any data is worthless and meaningless if it is not accurate (Eileen McNulty., 2016).

Value-The value in big data set is defined as extracting meaningful insight from the data. The value of data can be extricated by revealing hidden patterns and uncovering useful information from the data (Ahmed A and Patgiri R., 2016). The value of big data depends on the quality of the data.

1.5 Need for the Study

The main agenda of this paper is to provide a brief history of big data, various analytics framework for analysing big data and the challenges in the era of big data. Without a complete sense of value from data, the organisations would not deploy resources to extract meaningful insight from it. So the paper prerequisites, the importance of key parameters for organisations to consider before handling big data sets and to extract knowledgeable insights from the huge data chunks.

1.6 Scope of the Study

The study reflects the need to incorporate technologies required to extract knowledge from huge data chunks. It also highlights some key parameters firms should consider before deploying the big data analytics capabilities in order to extract meaningful insight from the data sets. Thus the study is limited to pre-decision, which the firms should undertake, before investing in big data technologies.

1.7 Objectives of the Study

The study opens a new frontier of applying big data in today's hyper-competitive environment. It also focuses on the value-creation aspect of analysing big data. The paper highlights some important factors which play a major role in extracting value from big data analytics. The organisations need to tap on to these factors before analysing big data sets.

2. Literature Review

Businesses are relying on innovative technologies to compete in the data-driven world. Information technology has greatly facilitated interaction between customers and firms in creating value (Saarijarvi H., 2012). Internet intensifies market competition and increases the difficulty for firms to maintain strategic competitive advantage (Zwick D et al., 2006). The increasing use of IT and big data technologies enable firms to sense, capture and respond to market changes (Elliot S., 2011 and Zhao X, *et al.*, 2012). Value creation in the digital age has become value co-creation between firms and customers (Bettencourt LA., 2014). The emergence of big data has been the primary driver for this disruptive change (Jagdish H *et al.*, 2014 and Jobs C.G, *et al.*, 2015). Thus to excavate customer data and

TIME FACTORS			
FACTORS	AUTHOR	YEAR	STUDIES
ORGANIZATION CHANGE AND TALENT	MANYIKA et al	2011	Big Data: the Next Frontier for Innovation, Competition and Productivity
TIME	PAUL P.TALLON	2013	Corporate Governance of Big Data: Perspectives on Value, Risk, and Cost.
DECISION MAKING	THOMAS H DAVENPORT	2014	How strategists use big data to support internal business decisions, discovery and production.
RISK FACTORS			
FACTORS	AUTHOR	YEAR	STUDIES
RISK	Paul P.TALLON	2013	Corporate Governance of Big Data: Perspectives on Value, Risk, and Cost.
QUALITY OF DATA (REDUCES RISK)	WAMBA, S.F et al	2015	How 'big data' can make a big impact: Findings from a systematic review and a longitudinal case study
DATA POLICIES(PRIVACY,SECURITY,INTELLECTUAL PROPERTY,LIABILITY)	MANYIKA et al	2011	Big Data: the Next Frontier for Innovation, Competition and Productivity
RISK	ELISABETTA RAGUSEO	2018	Big data technologies: An empirical investigation on their adoption, benefits and risks for companies.
TRANSPARENCY	FIELD et al	2009	Omics data sharing
	LAVALLE	2011	Big data, analytics and the path from insights to value
	BOYD AND CRAWFORD	2012	Critical questions for big data: provocations for a cultural, technological, and scholarly phenomenon
	SMITH	2012	Big data privacy issues in public social media
COST FACTORS			
FACTORS	AUTHOR	YEAR	STUDIES

TECHNOLOGY AND TECHNIQUES	JACOBS	2009	The pathologies of big data
	DAVENPORT	2012	The Human Side of Big Data and High-Performance
	BOJA	2012	Distributed parallel architecture for “big data”
ACCESS TO DATA	GORTEN	2008	Data-intensive computing in the 21 st century
	BUGHIN	2010	Are you ready for the era of ‘big data’?
	FISHER	2012	Interactions with big data analytics
	LEE	2013	Behaviour scoring model for coalition loyalty programs by using summary variables of transaction data
IT INFRASTRUCTURE	BARTON AND COURT	2012	Making advanced analytics work for you
COST	PAUL P.TALLON	2013	Corporate Governance of Big Data: Perspectives on Value, Risk, and Cost.
TECHNOLOGY (STORAGE COMPUTING, ANALYTICAL SOFTWARE,	BEATH, C., et al	2012	Finding value in the information explosion

Analyse potential demand in advance of competitors have become a fundamental requirement for firms in the fiercely competitive global market (Bhimani A, 2015 and Chakraborty G, *et al.*,2007). Big data offers firms the opportunities to track customer behaviour and measure outcomes of competitive strategies, which demand significant organisational changes (Clarke R., 2016 and Tirunillai S, *et al.*, 2014). Big data has provided both significant challenges and unprecedented opportunities for firms (O’Leary D.E., 2013). Havens et al., 2012; Jacobs, 2009; Manyika et al., 2011; Rouse, 2011 emphasise the storage and analysis requirements when it comes to dealing with ‘big data’. Boyd and Crawford (2012) propose a more holistic definition of ‘big data’ that entails: technology (e.g., storage, computation power), analysis (e.g., patterns identification for economic, social, technical and legal claims), and mythology (e.g., the widespread belief that ‘big data’ offers a higher level of generating valuable insights).

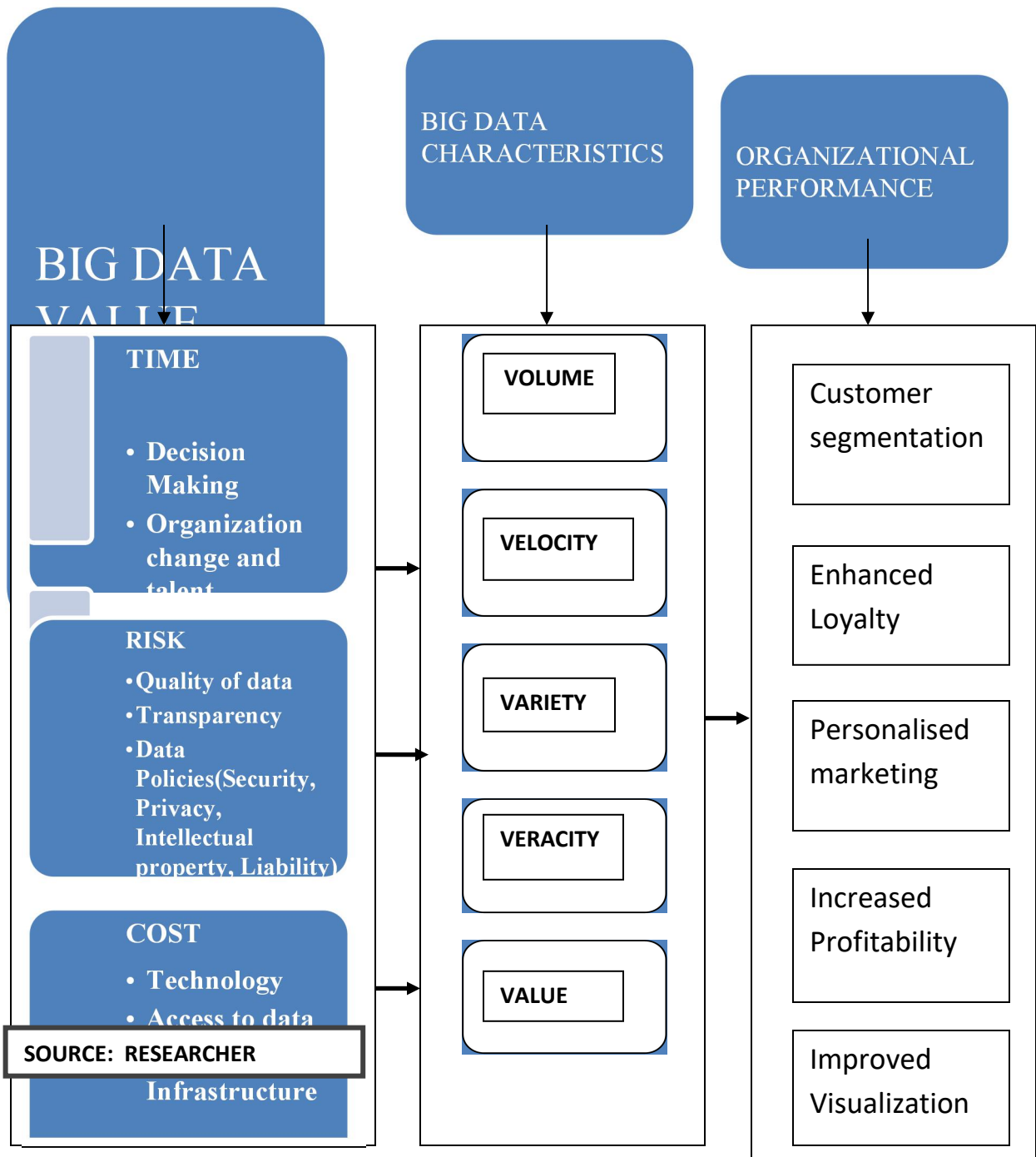
The extant literature on ‘big data’ has recognized the importance of robust IT infrastructure, which is reflected in Barton and Court (2012)'s statement," a clear strategy

for how to use data and analytics to compete, and deployment of the right technology architecture and capability" and highlighted that the key challenge for using big data is to make big data trustworthy and understandable to all employees. As argued by McAfee and Brynjolfsson (2012) the enormous amount of 'big data' requires cleaning and organising, which necessitates recruiting technically and analytically sound data scientists. Thus organisations need to set the budget for the recruiting process to hire skilled professionals specialised in data handling and visualising. Bose (2009) in this regard argued that this system requires a high initial investment, and substantial change on the organisation processes, vigilant management in applying advanced analytics. So organisations need to transform their entire system so as to make it compatible with the information age. So time, cost and risk are very important parameters that need to be considered before deploying advanced analytics in the organisation processes.

3. Key Parameters to Analyze Value-Creation From Big Data

Data can only create value when it is used. So effective management of data could lead to tremendous opportunities for, but at the same time, they are bound to legal responsibilities to safeguard personal data of users. The most critical factor for leveraging value from data is governed by time, cost and risk variables. These variables could help in deciding whether or not to extract useful insight from data or to retain it. These variables would help managers to take a decision at the right time and help in allocating resources for generating value creation.

Big Data Elements Affecting Change Disruption Management In Future Organizations



3.1. Important Variable

TIME- It is an essential component for organisations in assessing the quality of big data. In the data cycle framework, understanding the length of time or the period over which value rises or falls is crucial in taking a decision. If an organisation fails to extract or leverage knowledgeable insight from data sets within a given time limit, then it would

become obsolete. Value of data changes over time and storage innovation is likely to change the economics of how data can be managed (Tallon, P.P., 2013). The expected life of data can vary widely and accordingly data analyst need to take action in order to get valuable insight from data.

COST- Cost of ownership of data or the storage cost of capturing user's information is expensive. However, with the innovation in technology like cloud computing services, the cost becomes relatively cheaper. Research confirms that the total cost of ownership is approximately five to seven times higher than hardware acquisition cost (Tallon P., 2013). So in today's information age and with the growth in the number of internet users, the cost of managing big data sets is a big question to firms. If the return from big data storage is higher means if the data is of more worth than organisations can make an investment in IT Technologies and vice versa. Weak quality data might arise out of redundant applications and databases, which add to data storage costs and make data more difficult to access and use (Beath et al., 2012).

RISK- It is essential to analyse different types of risk like storage failure, data lost, privacy, security before handling vast chunks of data sets. Any leakage in the system can result in depreciation in the value of data quality and could increase the cost. Before handling huge data chunks, it is essential that organisations should establish transparent data management policies and formulate strict regulations for data security and privacy in order to protect data from theft and lead to distrust. Access to a customer's personal or sensitive data alone increases perceptions of vulnerability, causing customers to feel violated and reduce their trust in the firm (Martin K et al., 2016). Data vulnerability may result in emotional violation and betrayal, resulting in negative word of mouth and switching behaviour and thus shifting business to other firms (Gregoire and Fisher, 2008; Smith, 2014). McAfee and Brynjolfsson (2012) highlighted that privacy concern is becoming more significant in the big data environment and should receive more considerable attention.

3.2. The instrument of the Study-

With the flood of data availability, companies are turning to analytical tools in assessing the quality of data and extracting meaningful insight from it for improved decision making. This would help firms to gain competitive advantage, improved customer service, marketing strategies and increased revenues. So an important instrument for extracting insight from big data analytics framework is-

- **Descriptive Analytics-** It is defined as the analytics that describes the past. With descriptive analytics, big data can reveal information about the consumer past purchases, their preferences, past behaviours. Marketers can use descriptive analytics using big data to know about the company's production, sales, inventory and customers.
- **Predictive Analytics-** Analytics can predict future outcome based on the data generation. It provides estimates about the likelihood of a future outcome. Big data analytics using predictive method can identify patterns in the data and

- capture the relationship between different data sets. It is an essential tool in forecasting customer behaviour and trends.
- **Prescriptive Analytics-** Analytics that help in giving a recommendation based on available data sets using techniques like machine learning, algorithms and computational modelling procedures. Prescriptive analytics advice the possible solutions from the data sets to the customers in order to delight them by leveraging knowledge about the activities of the customers and optimise the customer experience in an online platform.
 - **Sentiment Analytics-** With the increased usage of online shopping, the internet is replete with reviews, comments and ratings on social media by customers regarding the experience and the quality of product and services. Sentiment analysis can reveal what other people think about a product and thus influence the buying decision of the consumers. Using big data companies can opt for sentiment analysis in analysing the critical attribute of the product for the customer. For example, most of the reviewing websites use rating stars in the range of 1-5.

4. FINDINGS OF THE STUDY-

The paper highlights the importance of big data in today's data-driven environment. It also underlines the critical parameters before analysing big data for value creation. The time factor is essential for firms in deciding at the right time so that data does not become obsolete. The cost factor is essential while allocating resources and the decision to invest in scalable technologies to leverage insights from data. The rate of investment decision in technology is of prime importance as it may affect the future profits of the organisations. The risk factor is also crucial while handling user's data. It guides the firm to be transparent in their data management policies and avoid data breaches.

4.1. IMPLICATIONS FOR RESEARCH AND PRACTICE

The study presents a general conceptualisation of big data and identifies key elements need to address before deploying big data analytics in businesses. It puts forward a grounded contribution that offers managers critical insight into the formulation and execution of big data strategies in the organisation. These factors can be used by companies to address several issues related to highlighting which critical factors receive priority and thus creating a platform for implementing overall significant data initiatives. The study identifies the best practices for managers as well as initiates future empirical research on the topic. Overall, the research findings show that managers can reap full benefits from big data by addressing the critical factors needed before analysing the value from data sets.

4.2. DIRECTIONS FOR FUTURE RESEARCH

The study offers potentially useful factors for decision making investments in analytical technologies. This study only discussed the key parameters before investing in data analytics tools. Future research could lay the foundation for the impact of data management policies on consumer behaviour. The finding shows that the big data revolution is evolving and highlights competitive capabilities for organisations to survive in a data-driven world. The study emphasis on critical parameters required to leverage the information eco-system worth.

The study presents a conceptual framework of the critical parameters. Therefore, future research can focus on developing empirical testing to validate these critical parameters in the success of leveraging big data by adopting scalable technologies.

4.4. LIMITATIONS OF THE STUDY-

- With large data sets, there is a possibility to incorrectly discover patterns due to the lack of analytics knowledge and scalability issue in technology.
- Massive data sets pose a high chance of fraudulent activities of user's data.
- With more access to massive data sets, privacy and security assurance is a threat.
- The problem of storage is a big question as it requires vast storage capacity to store data sets and to build data warehouses is a difficult task.
- Measuring risk is essential to monitor or prevent value depreciation from malfunctioning or failure of software is a challenging task. Risk of data loss is a significant concern.
- Cost of storing massive data sets is a challenging factor as it requires a huge investment. So return from such investment is a risky task as organisations are unaware of the benefit they get for storing massive data sets.
- Time is an important instrument in big data analytics. As time increases data value decreases. Marketers do not know the time limit of holding consumers datasets. Thus Understanding the length of time over which value increases or decreases of the information lifecycle is difficult.
- The big threat to data governance in order to protect consumer's personal information.

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