

BIG DATA AND ITS BIG IMPACT IN HUMAN CAPITAL DEVELOPMENT

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How Big is the Impact of Big Data?

BIG DATA

The birth of the Fourth Industrial Revolution introduced new technologies. Discussions on emerging and new terminologies became evident. One of the terminologies that is trending today is “BIG DATA”.

While the term “big data” is relatively new, the act of gathering and storing large amounts of information for eventual analysis is ages old. The concept gained momentum in the early 2000s when industry analyst Doug Laney articulated the now-mainstream definition of big data as the three Vs:

- **Volume.** Organizations collect data from a variety of sources, including business transactions, social media and information from sensor or machine-to-machine data. In the past, storing it would’ve been a problem – but new technologies (such as Hadoop) have eased the burden.
- **Velocity.** Data streams in at an unprecedented speed and must be dealt with in a timely manner. RFID tags, sensors and smart metering are driving the need to deal with torrents of data in near-real time.

- **Variety.** Data comes in all types of formats – from structured, numeric data in traditional databases to unstructured text documents, email, video, audio, stock ticker data and financial transactions.

More recently, several other Vs have been added to descriptions of big data, including veracity, value and variability. Although big data doesn't equate to any specific volume of data, the term is often used to describe terabytes, petabytes and even exabytes of data captured over time.ⁱ

- **Veracity** – the degree to which big data can be trusted
- **Value** – the business value of the data collected
- **Variability** – the ways in which the big data can be used and formatted

Big data is a term that describes a large volume of structured, semi-structured and unstructured data that has the potential to be mined for information and used in machine learning projects and other advanced analytics applications.ⁱⁱ

According to digitalocean.com, when dealing with big data there are different approaches, there are some commonalities in the strategies and software that we can talk about generally.

The general categories of activities involved with big data processing are:

- **Ingesting data into the system** - Data ingestion is the process of taking raw data and adding it to the system. The complexity of this operation depends heavily on the format and quality of the data sources and how far the data is from the desired state prior to processing.
- **Persisting the data in storage** - The ingestion processes typically hand the data off to the components that manage storage, so that it can be reliably persisted to disk. While this seems like it would be a simple operation, the volume of incoming data, the requirements for availability, and the distributed computing layer make more complex storage systems necessary.
- **Computing and Analyzing data** - The computation layer is perhaps the most diverse part of the system as the requirements and best approach can vary significantly depending on what type of insights desired. Data is often processed repeatedly, either iteratively by a single tool or by using a number of tools to surface different types of insights.
- **Visualizing the results** - Due to the type of information being processed in big data systems, recognizing trends or changes in data over time is often more important than the values themselves. Visualizing data is one of the most useful ways to spot trends and make sense of a large number of data points.ⁱⁱⁱ

USE OF BIG DATA

Industry influencers, academicians, and other prominent stakeholders certainly agree that big data has become a big game changer in most, if not all, types of modern industries over the last few years. As big data continues to permeate our day-to-day lives, there has been a significant shift of focus from the hype surrounding it to finding real value in its use.^{iv}

While understanding the value of big data continues to remain a challenge, other practical challenges including funding and return on investment and skills continue to remain at the forefront for a number of different industries that are adopting big data.^v As discussed earlier, Big Data can influence various sectors. Here are some of the impact/use of the Big Data in the Education Sector and Government Sector.^{vi}

BIG DATA IN THE EDUCATION INDUSTRY

Education industry is flooding with huge amounts of data related to students, faculty, courses, results, and what not. Now, we have realized that proper study and analysis of this data can provide insights which can be used to improve the operational effectiveness and working of educational institutes.

Following are some of the fields in the education industry that have been transformed by big data-motivated changes:

- **Customized and Dynamic Learning Programs.**

Customized programs and schemes to benefit individual students can be created using the data collected on the bases of each student's learning history. This improves the overall student results.

- **Reframing Course Material.** Reframing the course material according to the data that is collected on the basis of what a student learns and to what extent by real-time monitoring of the components of a course is beneficial for the students.
- **Grading Systems.** New advancements in grading systems have been introduced as a result of a proper analysis of student data.
- **Career Prediction.** Appropriate analysis and study of every student's records will help understand each student's progress, strengths, weaknesses, interests, and more. It would also help in determining which career would be the most suitable for the student in future.

The applications of big data have provided a solution to one of the biggest pitfalls in the education system, that is, the one-size-fits-all fashion of academic set-up, by contributing in e-learning solutions.

BIG DATA IN THE GOVERNMENT

Governments, be it of any country, come face to face with a very huge amount of data on almost daily basis. The reason for this is, they have to keep track of various records and databases regarding their citizens, their growth, energy resources, geographical surveys, and many more. All this data contributes to big data. The proper study and analysis of this data, hence, helps governments in endless ways. Few of them are as follows:

Welfare Schemes

- In making faster and informed decisions regarding various political programs

- To identify areas that are in immediate need of attention
- To stay up to date in the field of agriculture by keeping track of all existing land and livestock.
- To overcome national challenges such as unemployment, terrorism, energy resources exploration, and much more.

Cyber Security

- Big Data is hugely used for deceit recognition.
- It is also used in catching tax evaders.^{vii}

IMPLICATION TO TVET

Similar to other sectors, the term "Big Data" becomes a big deal to TVET, specifically on how this will influence the existing system and how the challenges that it will bring has to be addressed.

1. Philippine TVET has to address the competence needed in handling the Big Data. TESDA as the authority in TVET has to determine the specific requirements for the human resource of the concern industry/sector. Conduct of study and industry consultations to determine the specific skills requirements of the industry for their human resource must be done. This is to make sure that there will be enough supply of workers who can work for the requirements in dealing with Big Data.
2. Big Data may not be new to other countries, and there is a possibility that there are local companies that are engage in conducting training and assessment and certification for the corresponding programs.

TESDA has to explore the opportunity to apply the “adopt and adapt” of existing curriculum. Likewise, recognition of industry certification can be considered. This is to promptly address the requirements of the industry/sector and ensure the availability of workers.

3. Another challenge for the Philippine TVET brought by the Big Data is making its infrastructure aligned to the requirements in handling and processing this information. Infrastructure programs/projects like the ISSP must look into the future impact of the Big Data and consider the procurement of equipment and development of system that is responsive to expected impact of this change.
4. TESDA as an agency cannot also get away of this changes, capacitating its human resources, especially those who are handling data must be given the opportunity to be trained locally and abroad to cope with the requirements.

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