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Big Data: Big Significance and Big Opportunities in Oman

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ABSTRACT

This paper attempt to introduce big data, vitality and trends of big data then probe its significance and international initiatives taken so far to accumulate process and utilize the knowledge productivity. Finally, we conclude the paper by focusing upon the need of big data initiative for Oman's development and sustainability.

Keywords: *Big data, Data science, Knowledge productivity, Oman.*

INTRODUCTION

The amount of data generated in today's digital world has been increasing exponentially and evaluating these large data sets—termed now as big data—has become the key for competition, productivity growth, innovation, decision making etc. Furthermore, the data volume exceeding the range of Exabyte and higher is understood as "Big Data" which may not be handled by the available online storages and processing systems (Kaiser et al 2013). There are several search engines available on Internet to answer our queries. It is interesting to note that Google alone processes more than 40 thousand queries from users every second (Sleep et al. 2016). Furthermore, there are several statistics published such as on Facebook on an average 1.8 million Facebook likes are generated and 200,000 photos are being uploaded. We send more than 204 million emails and 278 thousand tweets. Approximately, 100 hours of video are uploaded to video platforms like YouTube, every minute. Quite interestingly, it will take around 15 years to watch all the videos that are uploaded to YouTube, in a single day (Boorman, 2015). It has become very difficult to perform useful analysis on huge data set with the help of the existing traditional techniques (Singh, 2015). Data have emerged from every industry and its function and have encouraged data-driven strategies to innovate, compete, and enhance value from past and streaming information. These data sets are

created by basically three kinds of interactions: people to people, people to machine and machine-to-machine.

Workers	Users	Machines
• Corporate data	• Web 2.0 & Social Media	• Internet of Things

Fig 1.

FEATURES OF BIG DATA

It is very interesting to note that we can create even more than 90% of all data available on earth in less than two years period these days. Furthermore, whatever data we have generated since 2003 till today can be created in less than 2 days. It is worth mentioning here that industries are capturing and storing huge amount of data and it is being double almost every year. Katal et al (2013) reported on the recommendations of the industry experts that the amount of digital information that exists in the present time will grow from 3.2 zettabytes to 40 zettabytes, by 2020 (Katal et al 2013) such is the volume, velocity, value, veracity and variety (5 V) of big data!

Much has been said and read about the 5 Vs of Big Data but with increased research potentials, the dimensions of this concept have also widened (Mallah 2016). A closer look will unveil other aspects too of these big data sets:
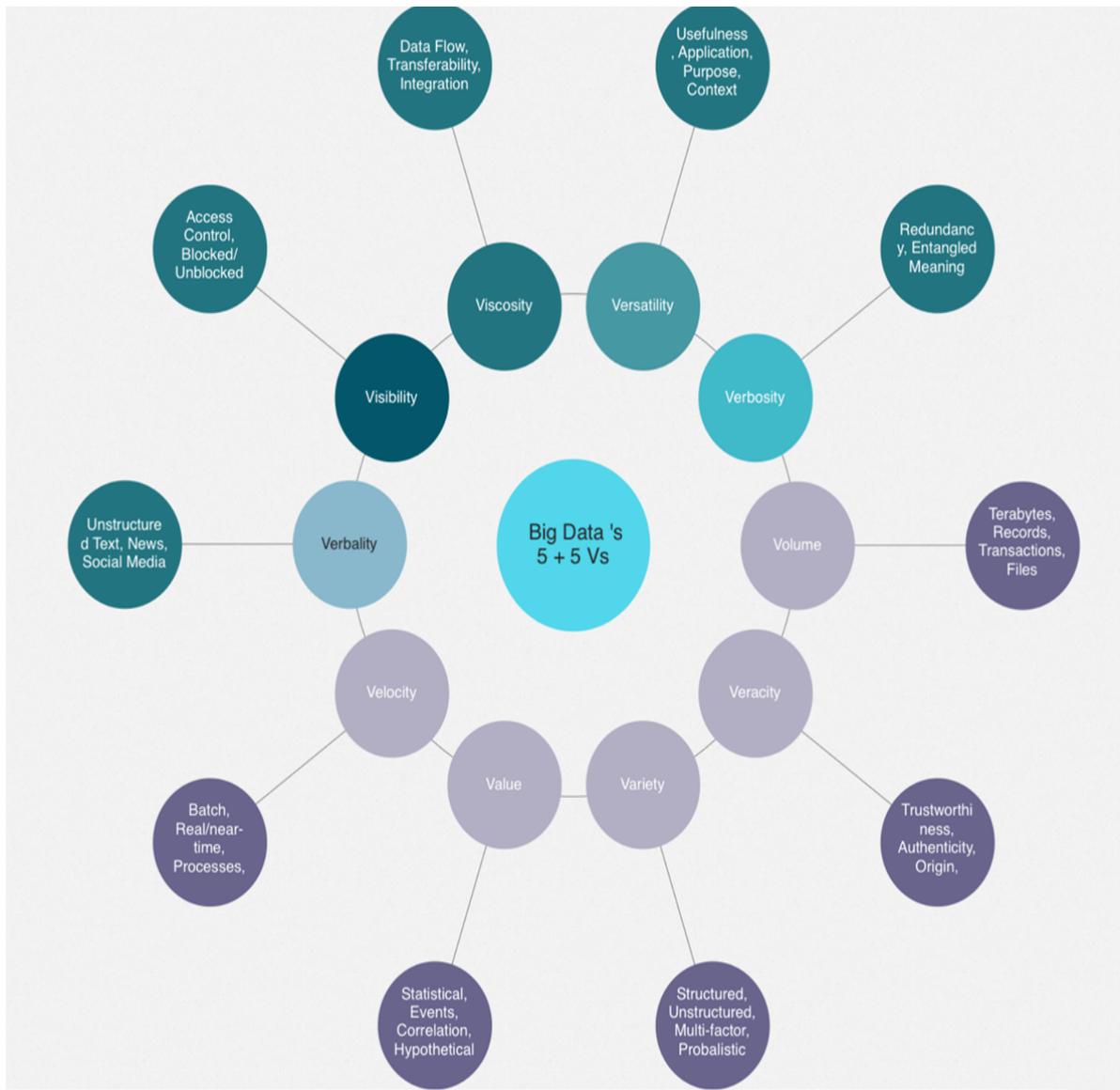
Fig 2.

SIGNIFICANCE OF BIG DATA

The collection, organization and analysis of data are an integral and critical part of any industry. The importance of quantitative as well as qualitative data is well assessed in calculating loss, profits, decision making, policy formation etc. To identify the importance of particularly big data, let's ponder over a question - how do companies and countries compete? What makes them decide their huge deals? Dell closed a record setting deal of $67 billion to buy data storage company EMC Corp. Facebook bought Instagram for $1 billion, just after 2 years of its launch and also secured WhatsApp for $19 billion. How are these future collaboration envisioned in present?

The credit goes to huge data resources of these companies and market economy which are studied and analyzed through computational and inferential thinking to produce knowledge strings and to detect missing links. Once these knowledge strings have been

identified and completed, we get strategic algorithms which facilitate accurate decision making (Jordan, 2015). Basic key areas to facilitate the decision making are firm environment, competition, organizational structure, interdepartmental dynamics, and executive commitment (Sleep et al 2016). Moreover, the big data outcomes are being taken by industries to gain edge over their competitors (Assucao, 2015).

All over the world, significance of big data is being recognized and strategic actions are being taken. Toyota's 2015 initiative is to equip all new models with 'Data Communication Modules' and connect them to their 'Toyota Big Data Centre'. Similar plans are announced by Ford as well. While, after successful use of big data for election campaigning, US President Obama has now decided to fight terrorism by same data driven process. Big data analysts along with psychologists are working to reveal the recruits of ISIS and have come up with many surprising profile signatures of the members (Ovenden, 2016).

INTERNET OF THINGS- BIG DATA'S NEXT STEP

The combined technology of big data and internet of things have changed the scenario of this world in such a way that the result is real life experiences of a science fiction movie. Whether the field of Sports or transportation, we can have precautionary warnings of future accidents way before than the impending time, providing us plenty of time to avoid the incidents and saving our resources. According to a software solutions German company SAP, Gulf sector also has huge prospects by the use of big data and internet of things. Mainly five sectors of Middle East should be focused to gain the benefits: smart cities, sport, education, healthcare and oil and gas. To initiate the process, INRIX, a global SaaS and DaaS company, has introduced its car analytics platform in United Arab Emirates with multi- facet approaches to traffic management, city planning, advertisement solutions etc.

MAJOR INTERNATIONAL INITIATIVES- WHAT AND WHY?

With the developing global scenario, the big data has emerged as an omnipotent source of productivity growth and innovations. Embracing the fact, Obama government launched the Big Data Research and Development Initiative in March 2012, involving six federal government agencies, with an investment of more than US$ 200million. Similarly, in January 2013, the British government projected a big data plan of £189 million closely followed by the French government in February 2013 which launched the 'Digital Roadmap' by investing €11.5 million to foster seven future projects one of them being the big data. Later in August 2013, Australian federal government announced the Australian Public Service Big Data strategy while the Japanese government also declared their strategies in the same field viz. "The Integrated ICT Strategy for 2020" and "Declaration to be the World's Most Advanced IT Nation", in 2012 and 2013, respectively. Meanwhile, the European Commission also focused on their research and innovation sector and declared 'Horizon 2020' by investing about €120million on big data analysis and application. So what are the vital properties of big data and in which fields that is attracting such international initiatives? Is there significance of big data in

other fields also except market & industry? The specific zones which are facilitated by big data at national level can be summarized as following:

- Significance to National Development

    - Supporting sustained economic growth and enhance their competitiveness

    - Promoting the use of Analysis as a Service (AaaS) in companies

    - National Data Sovereignty besides land, sea, air and outer space

- Significance to Industrial Upgrades

    - Industries will improve their competitiveness by investigating common problems (Integration and Collaboration)

- Significance to Scientific Research

    - Shifting scientific research from experiments and theorems to computational science (simulation-based).

    - Directly access to objects/situation to the researchers is not required any more, information will be available in the data sets.

- Significance to Emerging Interdisciplinary Research

    - Data Science now combines several disciplines (information science, mathematics, social science, network science, system science, psychology, and economics)

- Significance to Better Perceive the Present

    - Abundant societal information present in big data sets can be used to assess the society and its trends (helping us better perceive the present).

- Significance to Predict the Future

    - Combining and analyzing the heterogeneous big data can be used to forecast future shaped by present decisions and its results.

NEED FOR BIG DATA IN OMAN

Complying with neighbours in the GCC region, more than 50% of Oman's GDP accounts to oil and gas production. With the recent collapse in oil prices at worldwide level, talks and discussions to decentralize and diversify Oman's economy from these traditional to other sources are in full swing. While Oman's economy sector is looking for prospective future potentials, big data might hold the answers! Sultanate's logistic capabilities can be restated by the streaming algorithms of various wavelengths.

The concept of 'Big Data for Development' has been supported by UN Global Pulse (2013) which is a leading innovation enterprise of the United Nations Secretary-General on big data. It strives for optimum use of digital data to meet development challenges as

a joint venture of UN agencies, government and private sectors. Following it, data philanthropy between public and private sectors in Oman will enhance forecasting and targeting for efficient production and supply of substituted economy.

In Indonesia, social media analytics are being used to understand the public perception about the inflation in food and fuel sectors and a study of these data together with official statistics helps national planning committee. While, in Colombia, the Ministry of Finance in Colombia analyses their web search and categorizes keywords meaningfully related to the different economic sectors. This collected google trend data is then used to generate leading indicators for economic activity at the sectorial level(The World Bank, 2016)

On similar tracks, Oman's economy can be scrutinized for various sectors viz. government, private, public, and sub divided into areas like healthcare, media, technology, retail, banking, defense and so on. Further these areas can be classified into specific zones as newspaper, social media, web search, Army, Navy reports, clinical logs etc. and then big data from these zones should be captured by analysts to be searched, stored, transferred and categorized into live algorithms. Interactive databases of these algorithms will provide us smart data of this particular zone which when merged with smart data from various other related zones, will have bigger contribution into country's policy making and growth in innovation practice.
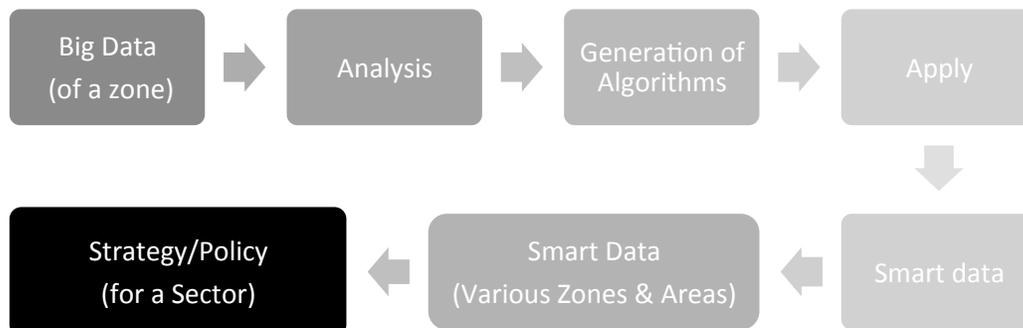

Fig 3.

These policies can be answers for many challenges being faced today – frauds in business sector, safety and protection of citizens, misuse of rights, mass immigration from rural areas to urban settlements, mass low level labour import, MERS prevention etc.

IS OMAN READY FOR BIG DATA

MIT Center for Digital Business answered this question at a general level. It has identified five key areas which define if an enterprise is ready to adopt the data driven approach of big data or not. These key areas are namely: leadership, talent management; technology; decision-making; and company culture (Brynjolfsson & McAfee, 2015). Clearly, Oman is pioneer is all these fields and is the most potential nation to achieve the vision and insight of a culture where future is predicted by a data driven approach.

The growth rate of big data market in Middle East & Africa is 45.30% CAGR (Research & Markets, 2015). Oman has taken the first step by undertaking a few projects driven by big data approach. The Oman Animal & Plant Genetic Resources Centre (OAPGRC) has joined hands with other stakeholders to create a vast database of animal and plant species and the generated big data will be used to conserve the biodiversity of the nation(TOO, 2016).

Hence, the government and corporate leaders have acknowledged the immense scope for big data analysis and a major revolution is on its way.

DOES OMAN HAVE A BIG DATA PROBLEM ?

Organizations in Oman gather data internally and externally, from different sources in different types. These data have great implication in future development of Oman at domestic and international level but for that Oman has to overcome data complexity (diversified types and patterns, complicated interrelationships, and greatly varied data quality), computational complexity (multi-sources, huge volume, and fast-changing, make it difficult in processing) and system complexity (the design of system architectures, computing frameworks, processing modes, and benchmarks for highly energy-efficient big data processing platforms. Businesses struggle also with the growing number of data with plans to terminate them at the age of 10 (BIG WASTE) and adding to it is the growing number of unstructured data that is being generated daily through web logs, clickstream and social media.

Another point to be noted is the lack of national ICT Policy, Data Policy and Information Law. There are legal and governance aspects also which are to be undertaken as most of our government data are scattered and stored in servers and physical archives with no clear plan to utilize it for smart decision-making. There is an immediate need for crucial government interventions to utilize the national resource of big data. While the research community has to come up with new data management models to beat the 10-V characteristics of big data (Mao et al. 2015).

TELECOM SECTOR – HARBINGER OF BIG DATA ANALYSIS IN OMAN?

It has been calculated (Global Big Data Analytics Market in Telecom Industry 2014-2018 Report) that over the next four years, the big data analysis in telecom sector will grow at a compound annual growth rate of 28.28 %. Telecom industry has access to overwhelming amount of real time data whether structured or unstructured thus there is vast potential to grasp the big impact through various data mining techniques. The result will enhance their customer service, predict their market transformation and foretell the industrial demands.

Big data mining and statistical analysis can help telecom sector by studying the call data records and identifying frauds in real time, by facilitating customers, modifying their calling plans according to individual needs, analyzing network traffic to provide quality in service, customizing marketing campaigns according to customer preference & inclination and planning company policies ahead of time.

I. BIG DATA IN HIGHER EDUCATION IN OMAN

Higher education institutions can use big data to improve performance of students along with the effectiveness of instructors. Big data inclusion can reduce the workload of instructors as well as students. In every higher education institution, progress reports of students are being collected in soft copy which can be augmented with demographic profile of students. Let us look into the following three main areas where big data can be implemented for better decision making.

STUDENTS PERFORMANCE

The decision makers in higher education institutions can monitor individual students test performance with his/her previous performance and a group of similar students. This performance can be integrated with demographic and social data. Students specific recommendations can be developed with the help of big data such as small cluster coaching, special guidance based on social or cultural issues or sometimes changes in the section etc.

Students' Retention. This is another key area in many higher education institutions. The number of students are increasing in many higher education institutions which are unable to complete their degrees. The students' performance can be augmented with their financial, demographic and social data to compute the score of leaving institution and providing recommendations to the institutions that allow them to take decision well in time. These recommendations can be measured and compared with the successful efforts in the past. It is also recommended to empower instructor to give their recommendations.

Teacher's performance. It is the key dimension to deliver desired output in all higher education institutions. Now question is how big data can help to measure and improve teachers' performance. Teachers' performance may be measured by expertise in the subject, number of students, demographics of students, social data of students, gender of students, and many more variables may be added to complete the list. Big data may help to give recommendations that right instructor is allotted to relevant students for better outcomes.

CONCLUSION

Big data has made a significant presence in almost every sector of business domain (Jin et al. 2015) In this paper, we have attempted to conclude that big data is Oman's new, renewable natural resource with high potential to revolutionize the economy and meet the challenges of the present market scenario and to strengthen the policy and planning of the development programmes. The nation must develop big data strategies in order to maintain international competitiveness and facilitate its citizens via government policies, economy enterprises, business solutions and academic initiatives. A collaborative big data analyst approach by the government, academics, consumer advocates and industry can ensure a major change in Oman's development as big data has big capacity to generate opportunities and minimize risk quotient (www.ftc.com).

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