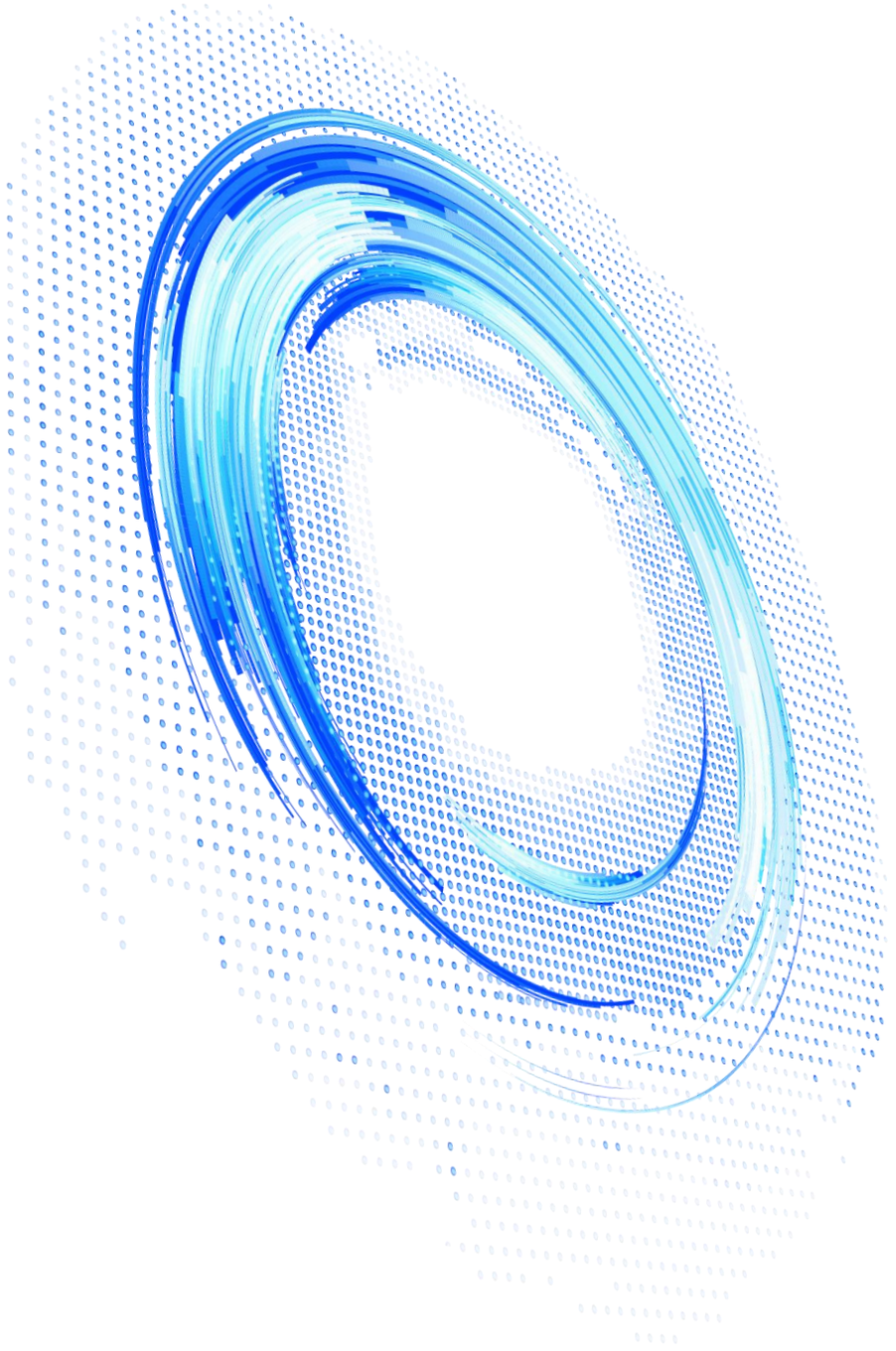

Big data solutions for micro-, small- and medium-sized enterprises in developing countries

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INTRODUCTION

Gartner**'s** definition:

"High-volume, high-velocity and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making".

SAS has suggested two additional BD dimensions:

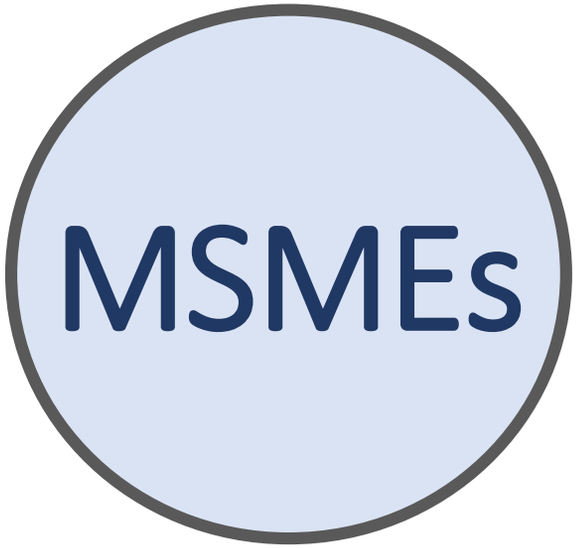
Variability

Complexity.

INTRODUCTION

Characteristic	Explanation
Volume	Huge amount of data is created from a wide range of sources such as transactions, unstructured streaming from text, images, audio, voice, VoIP, video, TV and other media, sensor and machine-to data.
Velocity (Fast Data)	Some data is time-sensitive for which speed is more important than volume. Data needs to be stored, processed and analyzed quickly.
Variety	Data comes in multiple formats such as structured, numeric data in traditional database and unstructured text documents, email, video, audio, financial transactions.
Variability	Data flows can vary greatly with periodic peaks and troughs. These are related to social media trends, daily, seasonal and event-triggered peak data loads and other factors.
Complexity	Data comes from multiple sources which require linking, matching, cleansing and transforming across systems.

INTRODUCTION



365 million MSMEs

45% Job creation

33% GDP

https://tinyurl.com/y5vffr3p

Big data solutions to improve business processes and market intelligence

Launched by	Big data solution	Key functions
Indonesia's Collective Intelligence Agriculture	Mobile App CI Agriculture	Give advice regarding the best time to plant, fertilize and use pest control based on the analysis of soil condition, weather, and other factors Predict prices and demand of crops Increase farmers' access to low cost loans and insurance
China's Alibaba	Ling Shou Tong for small physical stores	Help store owners make decisions related to product procurement and sales
	Big data-based advertising and other services to online vendors	Provide deep insights into shoppers' preferences
Kenya's FarmDrive	DigiFarm	Help smallholder farmers get low-cost loans combining their records revenues and expenses with other categories of information to generate credit scores

Big data solutions to improve access to key resources

Launched by	Big data solution	Process
Kenya's FarmDrive	DigiFarm. helps unbanked and underbanked smallholder farmers to receive credit.	Smallholder farmers keep a record of their revenues and expenses. An app installed in the phone tracks these records. This information is combined with data generated from other sources such as satellite, agronomic data such as crop yields, pests and diseases and local economic data.
Indonesia's Collective Intelligence Agriculture	Data from satellite, drone and sensors are used to calculate a field's production potential with a higher level of accuracy.	CI-Agriculture provides insurance to farmers, which is based on calculations and schemes on smart farming technology, sensor systems and analysis of other categories of data.

Barrier	Barriers overcome	Barriers that still remain and new barriers that have emerged
Economic	• MSMEs can benefit from open-source software such as Hadoop and Spark. For instance, Hadoop-based applications help MSMEs take advantage of real-time analytics from diverse sources and types of data. These include data from external sources such as social media, machine generated data as well as data from video, audio, email, sensors. • MSMEs are increasingly adopting HaaS (https://tinyurl.com/y23hhj4r)	• Big data solutions provided by big companies are unaffordable and out-of-reach for many MSMEs in developing countries. • In many cases the benefits to MSMEs of so called free big data solutions provided by technology giants are not clear. • This means that these small stores' customers may decide to take advantage of the convenience of online shopping on Alibaba's online marketplace and pick up the products from these stores.
Sociopolitical	• Introduction of data protection laws (e.g., Colombia).	• Local data center requirement and other protectionist measures.
Cognitive	• Big Data in E-commerce solutions are easier to install, maintain and update. • Ability to reduce up-front investments and handle business processes and transaction: increased the confidence.	• Organizations in many developing countries may lack capabilities to organize and manage such multi-disciplinary teams. • MSMEs' lack of human resources to utilize big data effectively. • The lack of strategic leadership and the lack of idea of where to start the implementation of solutions. • There is a severe lack of engineers and scientists in order to perform analytics. • Many analytics consultants lack skills and capabilities to understand, interpret and put the data to work.

CONCLUSIONS AND FUTURE RESEARCH

While only a tiny fraction of MSMEs in the developing world are currently taking advantage of big data solution, such solutions are getting popular among these enterprises. They increasingly depend upon big data. Data-driven decisions are gradually becoming the norm among these enterprises.

There are growing and encouraging signs of big data's positive impacts on MSME in the developing world. Big data-based innovations such as low-cost crop insurance and low-cost loans have benefitted micro enterprises and small holder farmers in the developing world. In addition to access to these strategically valuable resources such as finance and insurance, big data-based solutions have also increased the quality of their entrepreneurial activities with improved business processes and market intelligence.

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