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*Current state of Precision Agriculture in
Ghana: opportunities and challenges.*

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UNIVERSITY OF
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Outline of the Presentation

1. Introduction to Precision Agriculture concepts
2. Brief History of Precision Agriculture in Africa/Ghana
3. Current state of Precision Agriculture in Ghana
4. Challenges of PA in Ghana
5. Prospects and Way forward

1.0 Introduction to Precision Agriculture concepts

- ❑ Precision agriculture combines information and technological based farm management systems to **identify, analyse and manage variability within fields** for optimum profitability, sustainability and protection of the land resource (Mondal and Basu 2009)
- ❑ *More Recent Definition* : Precision Agriculture is a **management strategy** that gathers, processes and analyzes temporal, spatial and individual data and combines it with other information to support management decisions according to **estimated variability** for improved resource use **efficiency, productivity, quality, profitability and sustainability of agricultural production.”** (ISPA 2018)

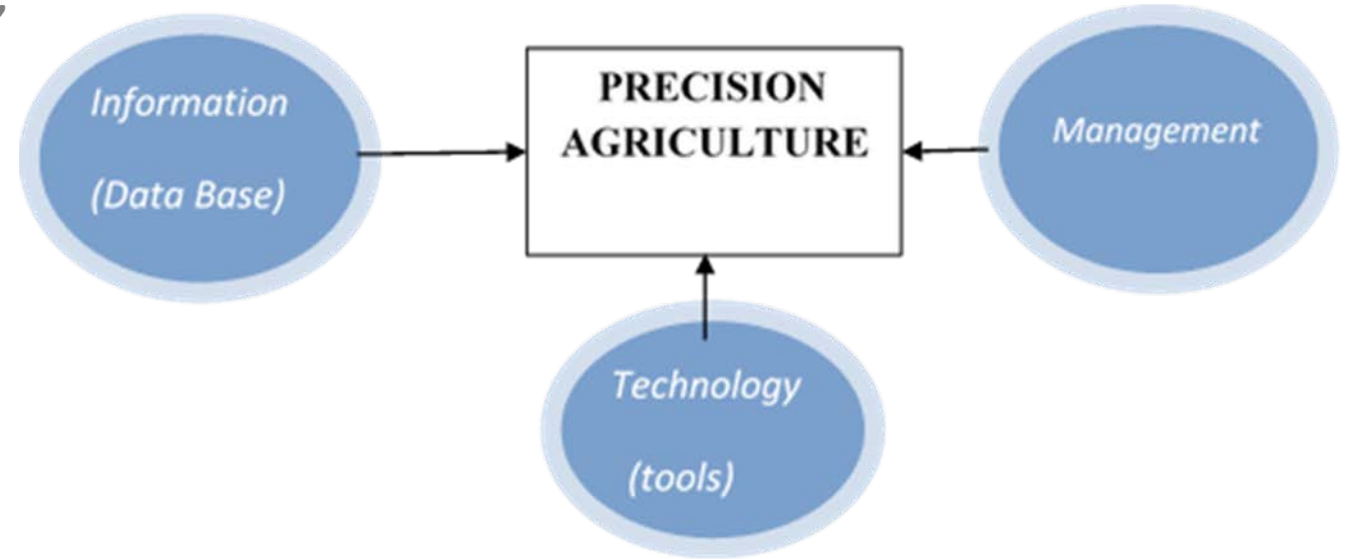
Components of precision agriculture

Three (3) main components of PA namely: (Mandal & Maity, 2013)

(a). Information or data base,

(b) Technology/Tools

(c) Management of information



Source: Bosompem (2015),

A. Information or data base

Properties of soil, crop information and the climatic conditions in the specific

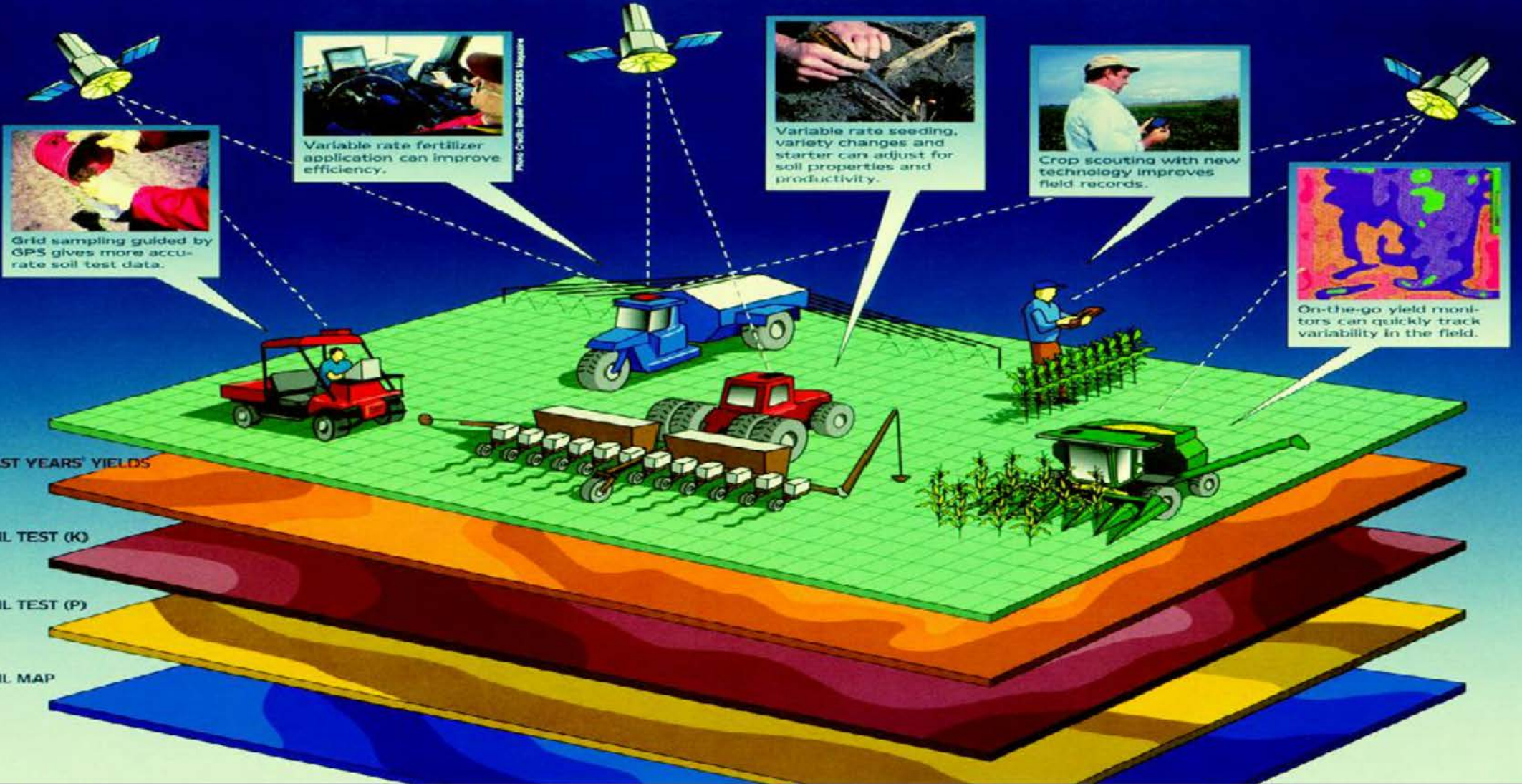
B. Technology and Tools:

- Global Positioning System (GPS) Receivers*
- Differential global positioning system (DGPS)*
- Geographic information systems (GIS)*
- Remote sensing:*
- Variable rate applicator*
- Drone*

C. Information management and Decision support system (DSS)

- spatial analysis, Big Data Analysis, Machine learning and Artificial intelligence

HIGH-TECH TOOLS FOR SITE-SPECIFIC CROP NUTRIENT MANAGEMENT



2.0 Brief History of Precision Agriculture in Africa/Ghana

- ❑ Farmers in developed countries have been using PA technologies for over two decades now, however, *its use are limited in sub-Saharan Africa including Ghana (Blackmore et al., 2003).*
- ❑ Few yield monitors in South Africa and some VRA fertilization in isolated plantation enclaves, adoption of PA technologies was virtually unknown in Africa (Swinton, 2011).
- ❑ Current Legislations : Kenya, Uganda, Nigeria, Ghana on the use of Drones (UAVs)
- ❑ By 2013 GPS services provided by TomTom company now covers all 54 African countries with maps that are 3D and interactive (African Business, 2014).

2.1. Brief History of Precision Agriculture in Africa/Ghana : continued

- ❑ Syecomp Business Services Ltd (Private Company): Train Mango farmers in Trimble Juno 3B Handheld GPS device and the TerraSync mobile application for farm GPS mapping (collection of geo-reference farm data) (Allavi, 2014). –Funding from **GIZ, Germany**.
- ❑ Training of Cocoa Extension Agents in the use of GPS device and Measurement of Cocoa Farms using GPS devices. (COCOBOD. 2013)
- ❑ Prospects and Challenges of Precision Agriculture in cocoa production in Ghana (Bosompem 2015)

3.0. Current state of Precision Agriculture in Ghana

A. The use of Drones/UAVs in Precision Agriculture

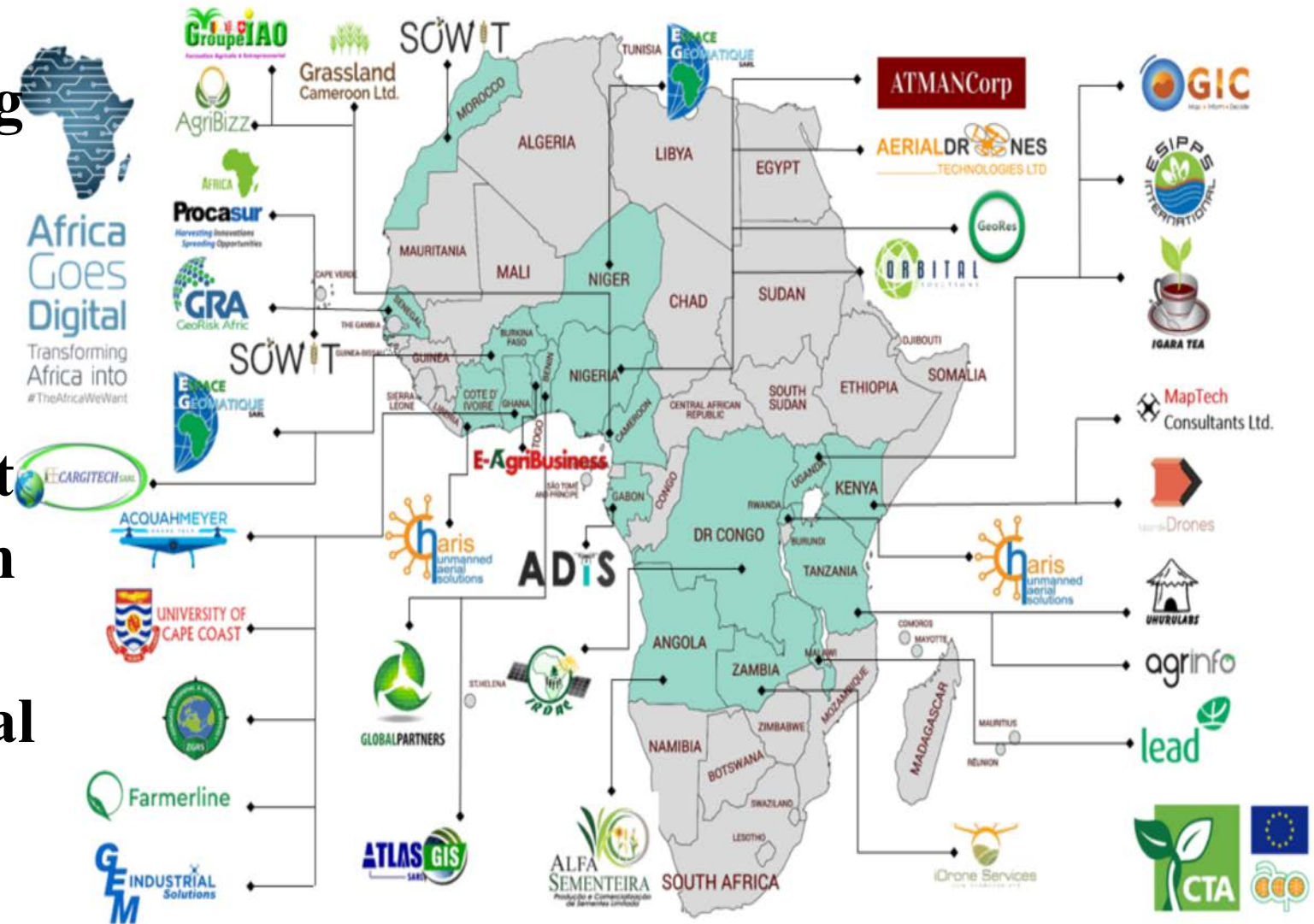
B. Satellite imagery/NDVI/NIR

C. The use of NIR for detecting food Adulteration

3.1. The use of Drones/UAVs in PA in Ghana

1. DAEE benefited from CTA support on capacity building on drone piloting, data acquisition and processing

- The Department is now part of a pan-African consortium of digital entrepreneurs known as Africa Goes Digital



3.2. The use of Drones/UAVs in PA in Ghana

2. Department of Agricultural Economics & Extension

University of Cape Coast: Hosted Unmanned Aerial Systems and Services Training . 2-5th October, 2018

- ❑ The training workshop was organised in collaboration with :
 - Technical Centre for Agricultural and Rural Cooperation (CTA)
 - Parrot Drone, Paris.

Focus:

- Fly drones to capture
- transmit data into usable documents to enhance agricultural production



CTA

UNIVERSITY OF CAPE COAST

Parrot
BUSINESS SOLUTIONS

*Training on the use of Unmanned Aerial Systems (UAS) for Service Delivery
Mission Planning, Piloting & Image Acquisition*

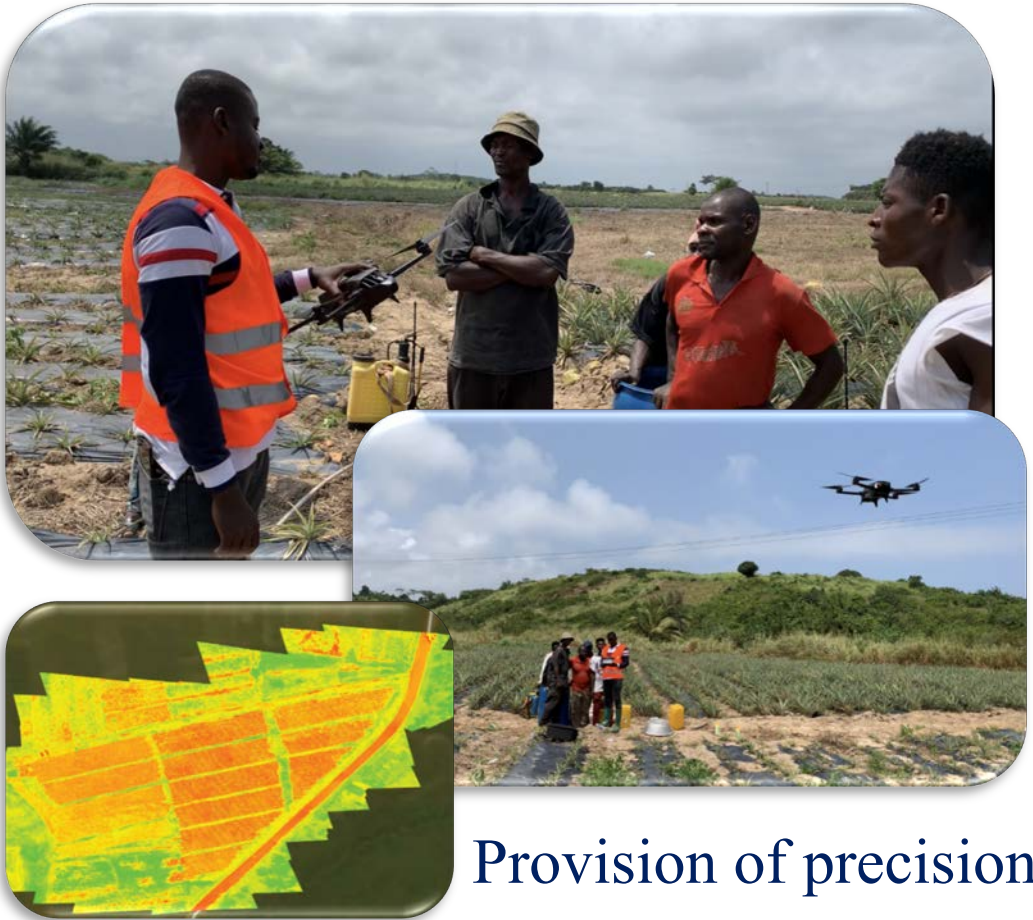
DATE : 2- 5th October, 2018

VENUE : Sasakawa Centre and GreenFields & Foods Ghana Limited, Gomoa Assin

ORGANISER : Department of Agricultural Economics & Extension, UCC

3.3. The use of Drones/UAVs in PA in Ghana

What DAEE is up to?



Provision of precision farming information to farmers



Train students on drone related issues for agriculture

Use of NIR for Food Authenticity

2. The Department of Agricultural Engineering, School of Agriculture, University of Cape Coast in collaboration

- ❑ Institute for Global Food Security,
- ❑ Queens University Belfast through the support from Agilent foundation and MARS technologies.

Using of NIR technology

Developed Rapid handheld spectroscopic technique with mobile phone for **quick on-site non-destructive detection of rice authenticity and quality:**

- **Palm oil**

- **Pineapple**

3.4. The use of Drones/UAVs in PA in Ghana

- ❑ Acquahmeyer's drones check leaf color and soil quality, producing reports on the crop's health.
- ❑ Small-scale farmers check the **health of crops and use pesticide only** where it is needed, reducing pollution and health risks.
- ❑ Acquahmeyer is now working with 8,000 farmers, who pay rent of **\$5 to \$10 per acre, about 6 times a year**, to assess their crops and soil and apply pesticides. **Each drone costs \$5,000 to \$15,000 to build and can spray 10,000 acres a year.**



Source: [cnn.com/2019/10/18](https://www.cnn.com/2019/10/18)

Syecomp Ghana Ltd –Private Company

Unmanned Aerial Vehicles-UAV (Drone) Technology with
multispectral sensors and 4K HDR

- crop monitoring,
- field scouting,
- forest cover monitoring,
- and inventory works

4.0 Challenges of PA in Ghana

1. Five most important challenges expected to have significant impact against any future development of in Ghana (Bosompem, 2016)

(1) Farmer demographic characteristics: **aged farmers, low level of education, small scale farms** etc.

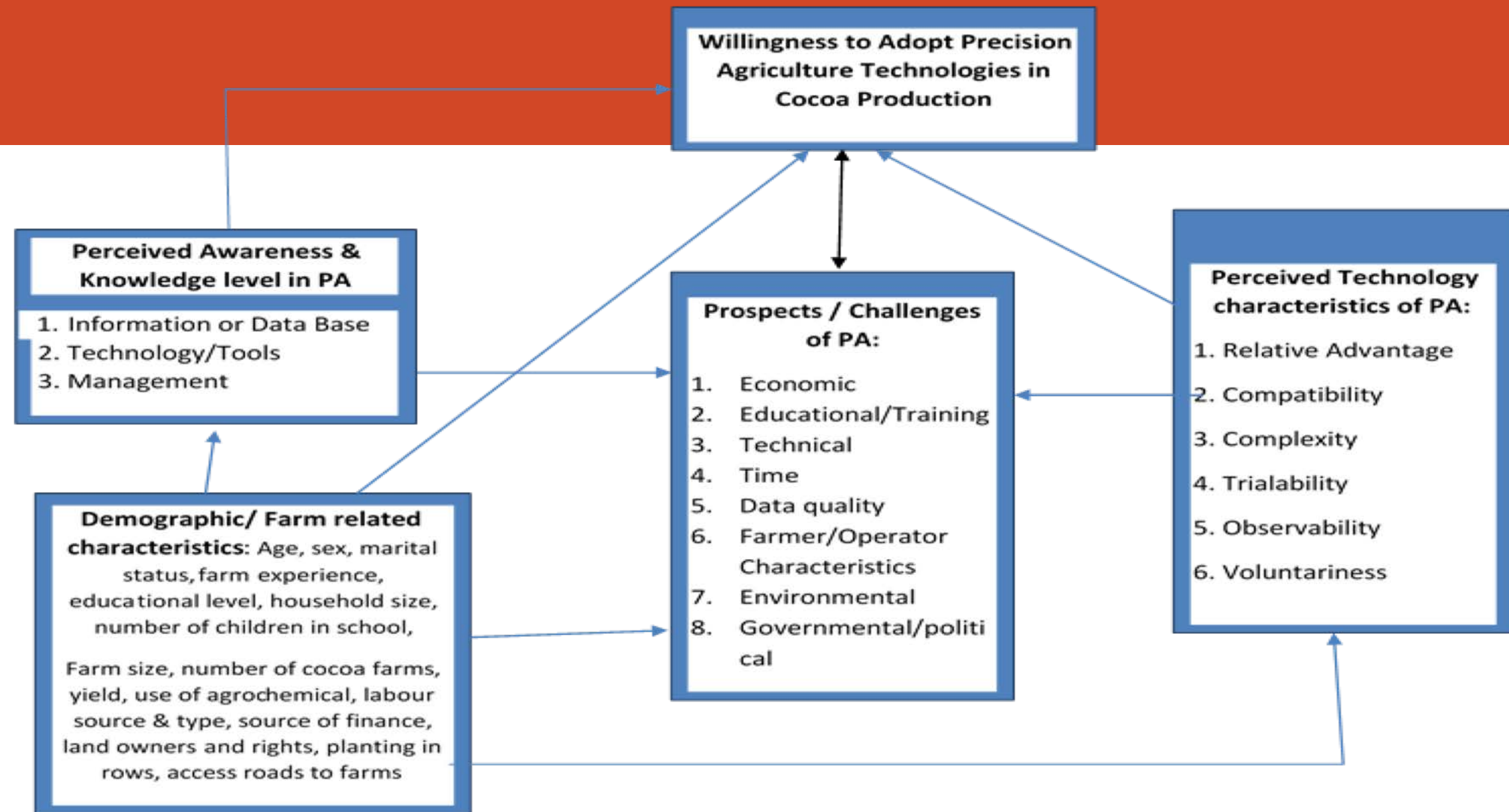
(2) Environmental: **vegetation, undulating topography, rivers/streams, lack of roads to farms.**

(3) Educational: **lack of research and knowledge- Universities and Research institute**

(4) Economic: **high investment**

(5) Technical: **internet connectivity**

2.



Conceptual Framework of Prospects and Challenges of Precision Agriculture in Cocoa Production in Ghana. Source: Bosompen (2016)

5.0. Prospects and Way forward

- 1. Collaborate to introduce precision agriculture topics, courses and curricula.** (universities and technical universities) specializing in agricultural and related disciplines (e.g **mathematics, engineering, crop science, soil science, ICT and physics geographic information systems**)
 - adequate knowledge and practical skills necessary to jumpstart precision farming and research among these **young future farmers and researchers.**
- 1. There should be a collaboration among major stakeholders (e.g. Government, universities to address the potential challenges/explore of PA development in Ghana. Such collaboration is necessary because of the potentially high cost of investments as a result of very expensive equipment and consultancy fees.**

Prospects and way-foward .

3. Creating awareness among stakeholders: Farmers, policy makers, private agribusiness.

4. Systematic Review, mapping or meta-analysis of PA activities in Ghana and Africa-

5. Develop tools and technology –context of vegetation, climate etc.

Or Solve the problems with Martin Bosompem existin tools

Thank

You