

LA IMPORTANCIA DE LAS TI STRAUSS EN LA AGRICULTURA SOSTENIBLE

THE IMPORTANCE OF IT STARTUPS IN
SUSTAINABLE AGRICULTURE

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Mátyás Bence Gyorgy

Docente en la Universidad Politécnica Salesiana

Quito – Ecuador

Doctor en Ciencias Ambientales

bmatyas@ups.edu.ec

<https://orcid.org/0000-0003-2694-1848>

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Resumen

El número de estudios que investigan nuevas herramientas tecnológicas está aumentando debido a su efecto en la agricultura sostenible y la calidad ambiental. Gracias a los programas de inicio de mentores e incubadoras en Ecuador, recientemente surgieron muchas soluciones innovadoras en el mercado global e internacional. Estas nuevas empresas contribuyen a mejorar la productividad agrícola y minimizan el impacto negativo en el medio ambiente. El objetivo de este estudio es presentar algunas empresas de TI orientadas por el programa Coworking StartUPS y discutir su importancia en la agricultura sostenible. Dos factores principales se destacan en el estudio que afectan estas empresas de TI: la fertilidad del suelo y el rendimiento de los cultivos. La mayoría de estas soluciones innovadoras se dirigen a la prevención de enfermedades de las plantas al monitorear las macetas y aumentar la fertilidad del suelo mediante el desarrollo de herramientas de apoyo a la decisión

Palabras Clave: Startups, informática, agricultura sostenible.

Abstract

Number of studies investigating new technological tools is increasing because of their effect on the sustainable agriculture and environmental quality. Thanks to the introduced startup mentor- and incubator programs in Ecuador, many innovative solutions appeared recently on the global and on the international market. These startups contribute to improving agricultural productivity while minimizing negative impact on the environment. The objective of this study is to present some IT startups mentored by Coworking StartUPS program and discuss their importance in sustainable agriculture. Two main factors are highlighted in the study that these IT startups affect: Soil fertility and Crop yield. Most of these innovative solutions target the prevention of plant diseases by monitoring the pots and increase soil fertility by developing decision support tools.

Keywords: Startups, IT, Sustainable agriculture

Introducción

Agriculture is undergoing a significant transformation in the data collection and data use in order to making smarter farming decisions. “Precision agriculture has brought a heightened degree of competition for input supply firms, forcing greater interactions among friends and foes” (Pham and Stack, 2017). In 2015, \$661 million were invested into 84 agricultural startups (Burwood-Taylor et al., 2016). The main difference between precision agriculture and commercial agriculture is the way of collecting and utilizing data. The precision agriculture in the sustainability’s ideal utilizes and combines different technological solutions (such as geographical positioning systems, geomapping, sensors, variable rate technology etc.) to increase crop yield while minimizing negative impact on the environment. This study aims to introduce two Ecuadorian startups mentored by Coworking Startups program having great potential to improve the precision agriculture.

Materiales y Métodos

The Coworking Startups is an innovation and entrepreneurship ecosystem established by Salesian Polytechnic University. The main objective of this initiative is providing business mentorship and incubation program primarily for the university students. Working with People (WWP) model, Project Based Learning (PBL) processes, standards of the International Project Management association and ISO 21500 protocol are applied and/or combined in the program. “The technical-entrepreneurial component integrates the competencies for the formulation and evaluation of entrepreneurship projects, such as technical and business instruments that allow the generation of goods and services for society” (Salgado et al., 2017).

The first phase of the startup mentorship is based on PBL and project management processes. (Fig.1).

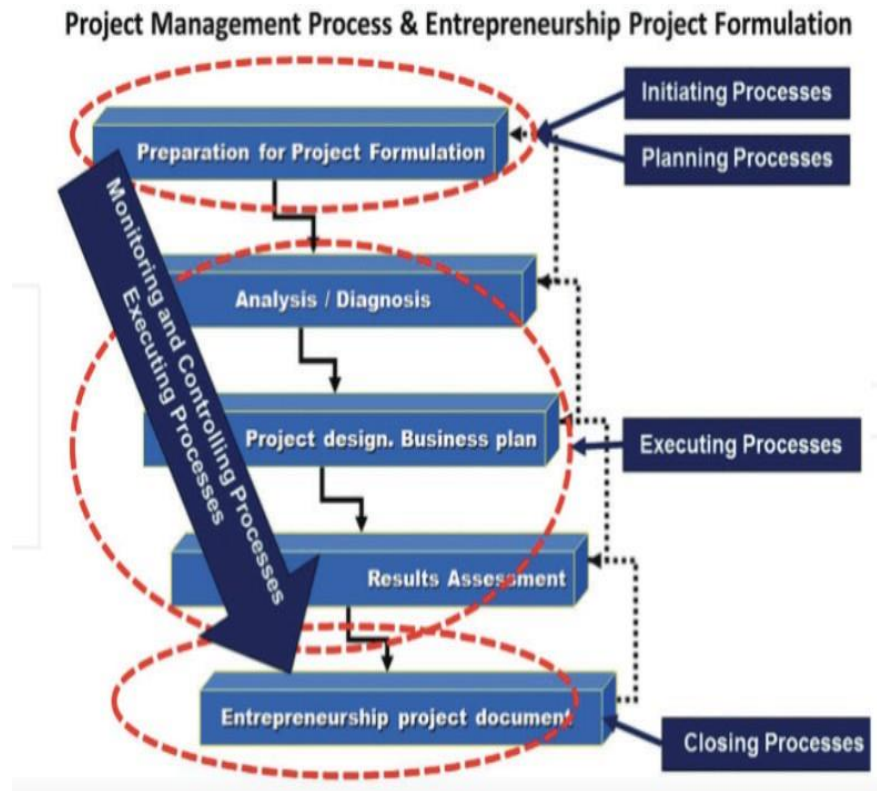


Figure 1. Project phases course with the PBL approach and project management process (Salgado et al., 2017).

After a startup collected the conclusions, a business plan need to be completed. An academic startup can be considered successful when it starts to serving its first clients. In the followings, two successful academic startups will be introduce that contribute to improving the sustainable agriculture on an international level.

Agroscan: is a startup that utilizes drones for making informative maps for the farmers regarding the crop yield. The service provided by Agroscan helps to farmers mapping large pots, drawing attention to the problematic areas and concluding the potential reasons (for example lack of irrigation, exiguous fertilization or pesticide). The service includes the following processes: fly planning, area flying over, mapping, data analyses. Firstly, a mobile application provides an opportunity to planning the flying routes.



Figure 2. Pix4Dcapture mobile application (source: AgrosScan manual)

Pix4Dcapture is the easy-to-use flight planning mobile app that creates automatic and optimized flight plans to map a defined area from your mobile device. Pix4Dcapture is available for Android and IOS devices as well.

Using PARROT SEQUOIA drone's cameras and sensors the mapping can be carried out.

Secondly, the Sequoia multispectral sensor captures both visible and invisible images, providing calibrated data to optimally monitor the health and vigor of the crops. Sequoia captures calibrated wavelength, Green, Red, Red-Edge and Near Infrared to highlight the health of plants.

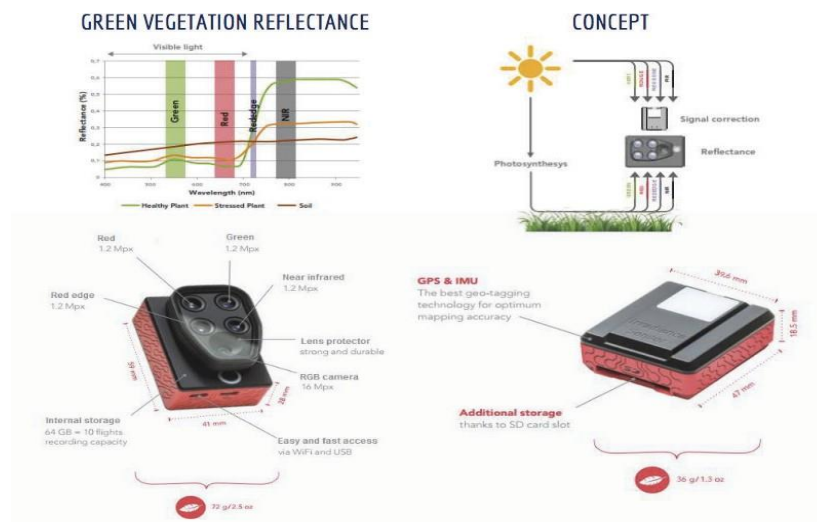


Figure 3. Sequoia multispectral sensor (source: AgrosScan manual)

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To process and analyze the multispectral images of the crops the Harvest Cloud is applied, an agricultural mapping platform in the cloud, effective and easy to use. Just dragging the images to the platform and analysing processes can be completed. Analysing the status of the crops is possible in cloud due to the report of Harvest Cloud that uses the maps generated by the platform where they will indicate the required indices according to the subscription plans.

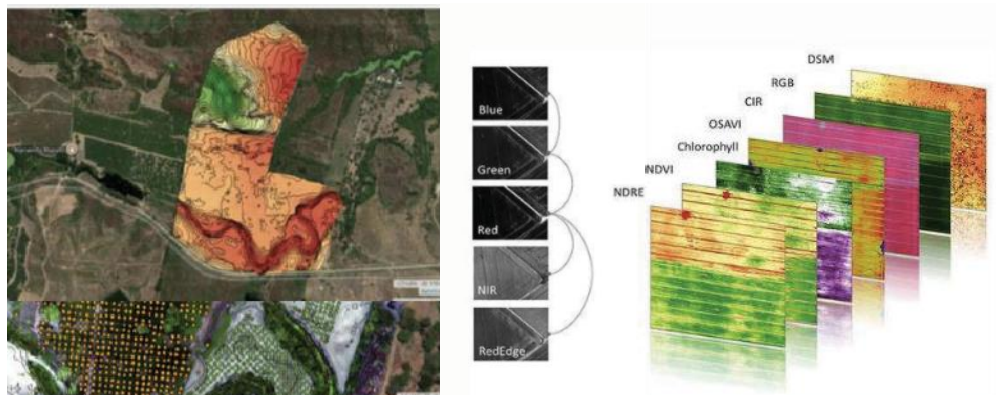


Figure 4. Harvest Cloud (Agroscan manual)

Area coverage possible: 80ha (200ac) in a single flight at 120m flight altitude (400ft) with the following range: up to 2km with Parrot Skycontroller 2, in an unobstructed area free of interferences. Ground resolution: 14.8cm/px (5.5in/px) at 120m (400ft) flight altitude. Automatic flight plan powered by Pix4Dcapture mobile app. Hand launch for take-off Automatic landing.

Weight of the drone: 780gr | 28oz without Parrot Sequoia. Take Off Weight: 940g / 33oz with Parrot Sequoia & mount. Size: 1150x580x120mm (45x22x5in). Wingspan: 1150 mm (45 in). Removable wings for transport. The following sensors are applied: Airspeed sensor (Pitot tube) Built-in GPS + GLONASS Inertial Navigation System Altimeter, Ultrasound, Optical flow camera. Transmission range: Up to 2km with Parrot Skycontroller 2, in an unobstructed area free of interferences Wi-Fi AC-type, 2 bi-band antennas (2,4 and 5GHz). The following resolution can be achieved for images: 14Mpx wide angle camera, Video: 1080p Full HD, Video streaming: 360p / 720p Internal Memory: 32GB. The RGB camera can provides the following resolution: 16 Mpx, 4608x3456 pixels HFOV: 63.9°, VFOV: 50.1°, DFOV: 73.5°. The global shutter single-band cameras provide the following resolution: 1.2 Mpx, 1280x960 pixels HFOV: 70.6°, VFOV: 52.6°, DFOV: 89.6°. The range of the separate bands: Green (550nm BP 40nm), Red (660nm BP 40nm), Red Edge (735nm BP 10nm) Near infrared (790nm BP 40nm) (Agroscan, 2017).

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Grupo Dharma

Grupo Dharma is a startup that deals with Business Intelligence. They can connect any data source (sensors, any database as SQL and NoSQL, Flat files, Excel files, field data, billing systems, etc.). The algorithms they developed integrate the provided information into their platform and through business intelligence and artificial intelligence techniques improve the farmer's decision.

Using the platform the client can: receive predictions of sales, cultivation, production, weather view customer or product sales behaviour map geolocation of Product demand compare the presence in social networks and analysis of emotions of the company versus its main competitors realize Real Time Inventory Control create financial and Sales Analysis

Previously Grupo Dharma used Power BI, Cognitive services on Azure, Asp and Javascript R and DAX for the algorithms. They already developed their own algorithms that permits automate the analysis and predict in real time (Grupo Dharma, 2017).



Figure 5. Cloud based BI provided by Grupo Dharma (Grupo Dharma, 2017)

The platform can make advices to a smarter farmer's decision regarding the crop rotation, irrigation or prize determination. In some cases, if enough data is provided, the system may advise to cultivate another plant in the given area in order to achieving greater profit for the forthcoming season. The platform is available on Windows, iOS, Android.

Conclusiones

Agriculture is undergoing a significant transformation in the data collection and data use in

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order to making smarter farming decisions. The importance of the IT startups is continuously increasing due to their positive effect on the sustainable agriculture and environmental quality. Using AI, BI, and sensors greater yield can be achieved while minimizing environmental impact.

However, it should be mention that there is digital gap between the traditional and precision farmers. To ensure stable market conditions for the rural areas, we must improve the IT knowledge of the traditional farmers.

Recomendaciones

Basically, the Agrosan is designed for the commercial farmers who cultivate large areas. Agrosan is useful for the pots that are difficult to be scan manually.

Grupo Dharma can be utilice for both small and large farmers. It should be mention that, it is more useful when more data are provide.

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