

Use of connected objects (IoT) in the agricultural sector in Burkina Faso: approaches and perspectives

Abstract

The connected revolution is the great revolution of the beginning of the 21st century; it involves much more significant upheavals than the arrival of smartphones and tablets. “Measure”, “calculate”, “monitor”, “report”, “control” and finally “understand” and “correct” become personal reflexes in the same way as branches of business activity. It is a new way of understanding the world and interacting with it that is available to current generations. These connected technologies undoubtedly have a major role in the competitiveness of human actions in their social and organizational life. Companies, administrations and public services are concerned, given its place in the economic performance especially of Burkina, where 80% of the population is agricultural and agribusiness is increasingly emerging. These technologies called IoT, give an arrangement of interconnected gadgets and sensors for the industry that collects and share information. IoT can be inserted in soil, crops, apparatus, and animals to screen temperature, stickiness, soil dampness, supplement levels, and creature behavior. Encourage, this assembled information is at that point analyzed & utilized for making educated choices around water system, fertilization, illness avoidance, and in general cultivate administration. For occasion, agriculturists can presently get to real-time information from their smartphones or tablet and screen soil conditions and edit wellbeing. Exact experiences empower productive decision-making to maximize fertilizer utilization and optimize cultivate vehicle courses.

Keywords : use, connected objects (IoT), agriculture, digital fracture, communication for development, Burkina Faso

Introduction

Today's world is dominated by very advanced technological discoveries which are the results of binary combinations, 0 and 1, the conceptual basis of all technology that surrounds us as well as the various inter-human exchanges. Semantically, the term Technology means "discourse about technique" is used in place of "technique", which is a tool supporting information processing and communication. In the world of development where everything is digitized through the use of information and communication technologies (ICT), the capacity for processing data, their possibility of storage, their accessibility and the speed of their transmission have experienced an increase. great boom. The value of information is therefore something very difficult to quantify and which depends on several parameters (reliability, exclusivity, passage of time, recipient, etc.).

To promote these means of communication, we are participating in several revolutions: First of all, the development of servers which are large computers capable of physically storing data (Big data) and centralizing it. Then related technologies were born consisting of developing nomadism: mobile phones (smartphones), laptops, the Global Positioning System (GPS) or global positioning system... They therefore allow access at any time and place to the information that help to understand and analyze information. Finally, the development of large high-speed networks, which gave rise to that of image and video, the transfer and sharing of large files via the global web has favored the implementation of videoconferencing over the Internet, training and remote maintenance etc. Newspapers or radios in the past were limited to writings, today they offer high quality videos and images through websites. Managers in the world of technology today have made it possible to link all equipment that can use the network to facilitate the synchronization of data and contacts. This interconnection constitutes a transfer mesh for information and objects also called connected objects.

According to the International Telecommunications Union (ITU), the Internet of Things (IoT) is “global infrastructure for the information society, which provides advanced services by interconnecting objects (physical or virtual) using technologies of existing or evolving interoperable information and communication”¹. And in the Internet of Things, “object from the physical world (physical object) or from the world of information (virtual object), which can be identified and integrated into communication networks”².

¹International Communication Union, ITU Telecommunications Standardization Sector, Series Y: Global Information Infrastructure, Internet Protocol and Next Generation Networks Y2060, Next Generation Networks – General Framework and Functional Architectural Models; General presentation of the Internet of Things 06/2012, Accessed on 04/11/2023

²[b-ITU Report] ITU Internet Reports (2005), The Internet of Things.

The generation that grew up with black and white television nowadays has humanoid robots at home that help in their daily lives. Regarding these robots, “the operational versatility of humanoid robots makes them the ideal platform for a wide range of applications when teleoperating in a remote environment. However, the complexity of humanoid robots imposes challenges for teleoperation, particularly in unstructured dynamic environments with limited communication”³

Objects today are endowed with an embryonic intelligence which will continue to become more complex. Activity trackers are only the first epiphenomena of a mass revolution where man will have to reinvent his place in society, rethink his consumption patterns or his way of working. Thus, we notice today the presence of large communication networks having deployed the fourth generation of mobile networks (4G) and the fifth (5G) in full deployment, using optical fiber for rapid data transfer and cloud computing which is a technology used by several thousand companies around the world to solve problems related to the storage and rapid transfer of data . These technologies available to developed countries have enabled these researchers to make considerable progress in experiments such as the development of robots for precision agriculture and drones for the management and monitoring of agricultural production.

1. Research methodology

Burkina then being a developing country and the economy being almost entirely based on agro pastoral production, our central question would be how the use of connected objects could improve agriculture in Burkina Faso?

The answer to this question leads us to make assertions, the first of which is: connected objects are “means” for improving agriculture, the second the wise use of connected objects is a sure factor in the development of agriculture. agriculture in Burkina Faso. This invites us to study what we call “connected objects”, their importance or place in the socio-economic activities of Burkina Faso and would make it possible to explain the notions of use and appropriation of connected objects. Our research work will therefore be more explained on the theoretical study which consists of contextualizing the term connected object and demonstrating their place in human activities, but we will also discuss the state of the art of IoT in Burkina Faso in the field of agriculture and finally make a sociocultural assessment of connected objects.

The methodology that will be adopted in this research work will be more qualitative than quantitative. Qualitative research is adapted to our study, in fact, it is a set of investigation

³Kourosh Darvish, Luigi Penco, Joao Ramos, Rafael Cisneros, Jerry Pratt, et al. Teleoperation of Humanoid Robots: A Survey. IEEE Transactions on Robotics, 2023, 10.48550/arXiv.2301.04317. hal-03931966

techniques whose use is very widespread. It gives an overview of people's behavior and perceptions and allows us to study their opinions on connected objects in more depth than in a survey. It emphasizes complete or “holistic” knowledge of the social context in which the research is carried out. Social life is seen as a series of interrelated events, which must be fully described in order to reflect the reality of everyday life. It generates ideas and hypotheses that can contribute to understanding how an issue is perceived by the target population and makes it possible to define or identify options related to the issue of connected objects. The documentary review will allow us to provide adequate information to researchers in the technology field in Burkina in order to guide them on the state of the art and existing techniques and solutions related to IoT and agriculture. For the part concerning the state of the art we returned to the case of existing projects, such as SimAgri, which aims to be modern and studies carried out by certain teacher-researchers showing the level of progress of this technological insertion into habits of agricultural production.

2. What do we expect by “connected object”?

It is interesting to note that the etymology of the word object comes from the Latin “objectum” meaning “to throw, place, present before”. The object is the tangible, perceptible, concrete thing. We can analyze it with all our measuring instruments, define it, capture its image. ⁴This technology, already being adopted, is at the confluence of intelligent connectivity systems and Big Data. A connected object is a device enhanced with the capacity to exchange information. It knows how to send, receive and communicates with other objects as well as with the web directly, accessing it through cloud computing. Wireless technologies, Wireless Fidelity (Wi-Fi), Bluetooth, fourth 4G and fifth generation 5G, have largely contributed to the development of connected objects and will continue to promote their expansion. These objects can be utensils (oven, case of the Maid-Oven, watches, televisions, vehicles, tractors, etc.) from our daily lives which have been given a “connectivity” function, such as a watch, or new objects. There are three types of objects depending on their functionalities and the method of information management. We can then cite the communicating object, the intelligent object and the object system.

The communicating object in its simple version, it exchanges information with a master object or with a network. It simply transmits the data it collects, without reprocessing, and allows itself to be fed by instructions, which are sent to it via the network or by the master object and which it executes. In general, it is linked to an application which allows you to formulate these commands. A sensor or a system of sensors, a connected bracelet or even a

⁴<http://www.joeldehasse.com/articles/a-francais/corpsobjet-corpssujet.html> consulted on 02/11/2023

wireless speaker are examples of communicating objects. This is the case for robots used in agricultural production.

As for the intelligent object, it has a capacity for reprocessing or preprocessing the information they connect. In one direction or the other; a smartphone or a connected watch are, for example, objects capable of alone capturing the direction in which a user is moving, then displaying a route oriented in the right direction, from cartographic data, increasingly connected, have now intended to assist the user and considerably simplify their life. They do not just exchange data but interact more and more closely with consumers. Nowadays, several objects are being put in place, for example, the intelligent oven, the Maid Oven ⁵, GPS systems which are mounted on vehicles, and other machines. Indeed, trucks transporting substances (waste, goods, fuel) must be followed in order to ensure the path taken, therefore to have certain traceability. When such objects communicate without going through the internet we speak of a system of objects.

Indeed, the system of objects is therefore composed of several objects which exchange the various information that they each collect and a collective regulation effect is triggered whenever necessary. In these situations, the most promising applications of these intelligent systems are found in complex and sensitive systems such as planes and boats. However, what is man's perception of these connected objects?

3. The affection between Man and “connected object”

Functional digital objects are objects that facilitate daily life and exchanges. Three dimensions of the digital object that is felt are not dissociated in this configuration. It can therefore be a terminal (with its interfaces and data), an interface (with its data) or only data.

With 4.76 billion of active social media users in 2023, “social networks all have a goal of bringing different people together for chats, and also to go job hunting, to put it simply, to have access to information. We can name a few such as Facebook, WhatsApp, YouTube, Instagram, WeChat, Reddit Telegram, QQ, Tiktok, Pinterest Twitter and others” (Kabore, 2023) ⁶.

For an individual, a functional digital object can be their smartphone which contains all of their digital photos stored in the cloud; or his computer with his work files, his email account with all of his correspondence, etc. As their name suggests, these objects are valued for their practical function. Therefore, sentimental attachment could exist. Indeed, users have more secrets of their life in phones via social networks, thus, the object will change configuration

⁵The smart Oven by Maid, coach and chef .<http://www.objetconnecte.net/smart-oven-maid-cuisinier-1218/> (last consulted June 2015)

⁶Wendpanga Rodrigue K ABORE, 2023. “Uses of Digital Social Networks (DSN) by learners in educational settings in the cities of Ouagadougou, Koudougou and Bobo Dioulasso of Burkina Faso”. *International Journal of Current Research*, 15, (06), 24933-24940.

and become a human object, because its factors of trust, of lack in case of forgetting to your phone in a specific location or touching your phone every time even while seated. Some people will often feel the phone vibrating in their pocket, but this is an illusion. Indeed, in line with the configuration, the individual accumulates multiple digital data over time (generally associated with interfaces – online or offline). A mass of information (digital photos, pages of a personal blog, social network accounts) gradually becomes the reflection of a part of oneself (hence the terminology used). For example, emails placed end to end make it possible to trace the genesis and represent the existing relationship between two people. Note that for online objects, this self-presentation is partly standardized through the *templates* interfaces like social networking sites. By reasoning at the data level, we can then speak of a collection of objects. However, the collection of data as a whole can be considered as an object in its own right: this is the case of the Facebook account or even the products *apple*. Our results show that sentimental attachment can be linked to the quantity of data, the financial investment (the library *iTunes* for example) or in time (the number of hours spent playing an online game, the time spent on the Facebook account). This appropriation happens little by little and more or less unconsciously.

These findings are consistent with sociological and anthropological reflections on the redefinition of the concept of memory. In the eyes of sociologists and historians of the coming centuries, we will probably be the sincerest generation in history as it is difficult for us to control the multiple digital traces of ourselves left on the internet. Managing all our digital objects sometimes proves complex and individuals are often overwhelmed by the scale of the task. For example, people are sometimes overwhelmed by having to sort through thousands of digital photos, so much so that they eventually give up. An additional difficulty lies in the fact that as in the previous configuration, legal ownership is not necessarily established, particularly if the data is linked to interfaces governed by the right of use. Since there is nesting of dimensions, the feeling of ownership initially relating to the terminal can be transferred to the data it contains. In this case, this perception is not always justified under the law, particularly when this data is stored with an external service provider (data on an online interface such as documents stored in the cloud). User concerns then shift to the notion of data control. Therefore, the notion of trust is decisive. It is embodied at two levels: organizational trust towards service providers, particularly for experts, and interpersonal trust towards peers - other users of the digital community - who would report possible problems. In this sense, our research makes it possible to contribute to the research stream which highlights the importance of trust in digital uses (Lobet-Maris et al., 2009).

4. The connected object and agriculture

Geo-localized media and services refer to processes that allow the distribution or communication of content, text or multimedia messages, based on the geographic position of the user. “Everyday life objects would allow a reappropriation of the mode of interaction with our daily lives, the environment and objects becoming the main interface with the world and being the entry point with computing” (Nicolas Nova 2009) . We mainly distinguish two types of services which are single users, such as spatial navigation services, such as car GPS, and community services, used by users to collect information on other individuals, such as knowing their spatial location, or even actively contribute to the service.

4.1) The state of connected objects in the world

With a population of 8.01 billion according to the data report on digital global overview on 2023 ⁷, global mobile users cover 5.44 billion, 5.16 billions of internet users and 4.76 billions of active social media users. BI Intelligence survey expects that the adoption of IoT devices in the agriculture industry will reach 75 million in 2020, growing 20% annually. At the same time, the global smart agriculture market size is expected to triple by 2025, reaching \$15.3 billion ⁸. These forecasts have been seen on the rise with the latest IoT Analytics “ State of IoT—Spring 2023” report shows that the number of global IoT connections grew by 18% in 2022 to 14.3 billion active IoT endpoints. In 2023, IoT Analytics expects the global number of connected IoT devices to grow another 16%, to 16.7 billion active endpoints. While 2023 growth is forecasted to be slightly lower than it was in 2022, IoT device connections are expected to continue to grow for many years to come ⁹. And the president of Silicon Laboratory added: “We continue to secure major greenfield design wins, even amid macro uncertainty. The IoT market has incredible potential, with thousands of new applications on the horizon”. ¹⁰IoT-based savvyagribusinessalludes to applying IoT innovationwithin theagrariandivision for optimized cultivatingforms. It coordinating sensors, actuators, and other savvygadgets to empowerinformation collection, examination , and computerized decision-making in cultivating operations. The use of the IoT on the agriculture domain has many advantages as: improving data collection, optimizing the resource use, make easy the end to end control, reduce wastage and makes processes automated by providing clean environment as shown on the next figure.

⁷<https://datareportal.com/reports/digital-2023-global-overview-report> Accessed on 04/11/2023

⁸<https://www.iotsworldcongress.com/iot-transforming-the-future-of-agriculture/> consulted the 31st October 2023

⁹The insights from this article are based on the recently published “State of IoT – Spring 2023” report, a 137-page research report on the current state of the Internet of Things, including a market update and forecast, a discussion of the latest trends , and much more.

¹⁰Matt Johnson – President & CEO, Silicon Laboratories (February 1, 2023)

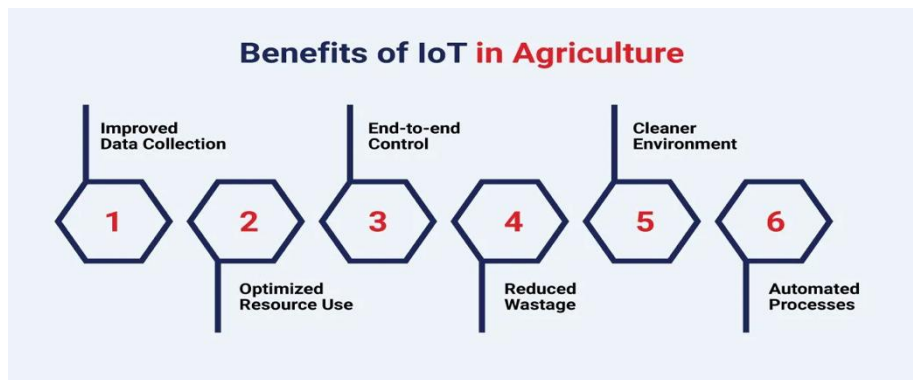


Figure 1: Illustration of the benefits of IoT and Agriculture, proposed by iotsworldcongress

4.2) Digital accessibility in Burkina

Private operators deployed 6001.2 km of optical fiber (61.2%), while the public sector deployed 3,803 km for public institutions in 2021. Also, the installation of the wire network called resina over all cities in Burkina make easy the network access. The rollout of fiber optics and Resina, and the increase in mobile network coverage rates, especially with 4G, which is expanding rapidly in Burkina, are making it easier for Internet users to access the Internet and use social networking platforms

An area without coverage means that a certain proportion of the population will have difficulty connecting, and therefore using, the telephone. In this case, we speak of a digital divide. Technically, it remains an obstacle to economic development (Kabore, 2018). According to author S. Balima, to overcome this digital impasse, four challenges need to be met: technological challenges, regulatory challenges, financial challenges and social challenges. The technological challenges need to be put in order to “move towards the implementation of connectivity devices that are within the reach of families in rural areas, and that can be repaired locally by technicians trained in this field ” (Balima, 2004).

As a reminder, Burkina Faso shares its telecommunications management market with three telecommunications operators such as Orange, Onatel and Télécel and more than ten internet providers. According to the Arcep market observatory on mobile telephony market data and national internet and capacity rental market data show that there are more than eleven million (11,240,886) people with a mobile subscription, more than seventeen million (17,001,473) having an internet subscription out of a total population of more than 22.1 million in 2023 according to the World Bank. The total volume of 4G traffic is more than seventy-six million (76,021,256) gigabytes. The graphs below are detailed:

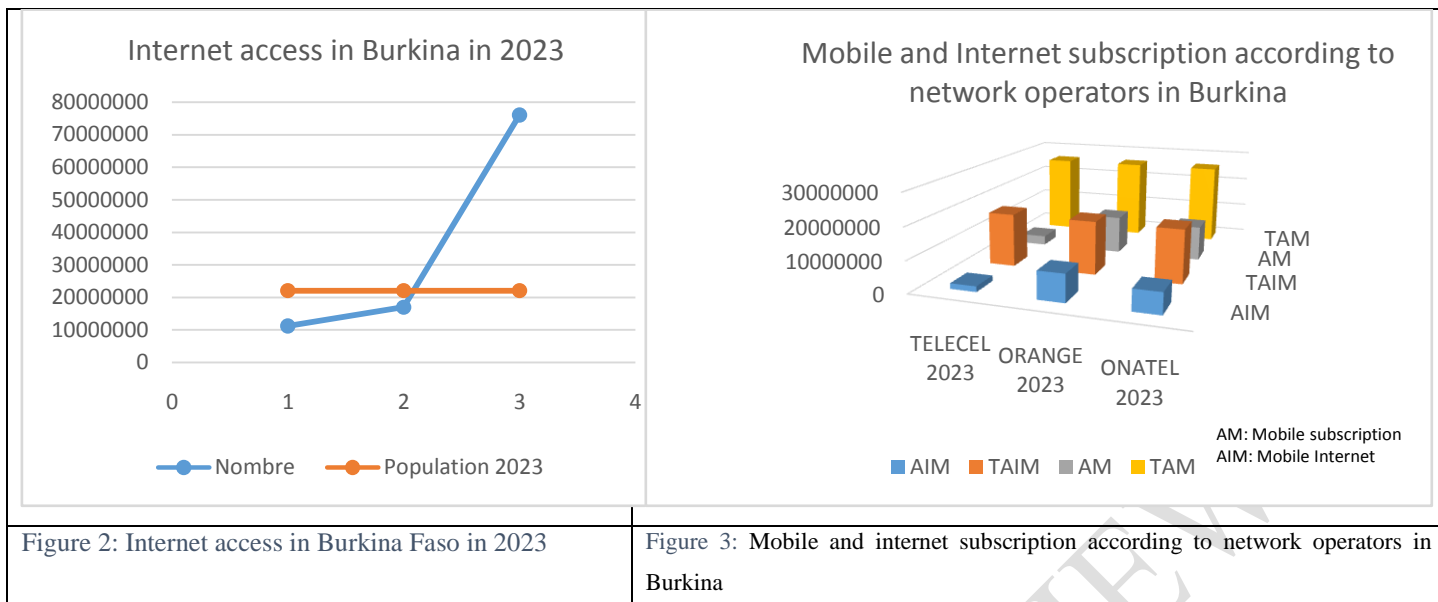


Figure 2: Internet access in Burkina Faso in 2023

Figure 3: Mobile and internet subscription according to network operators in Burkina

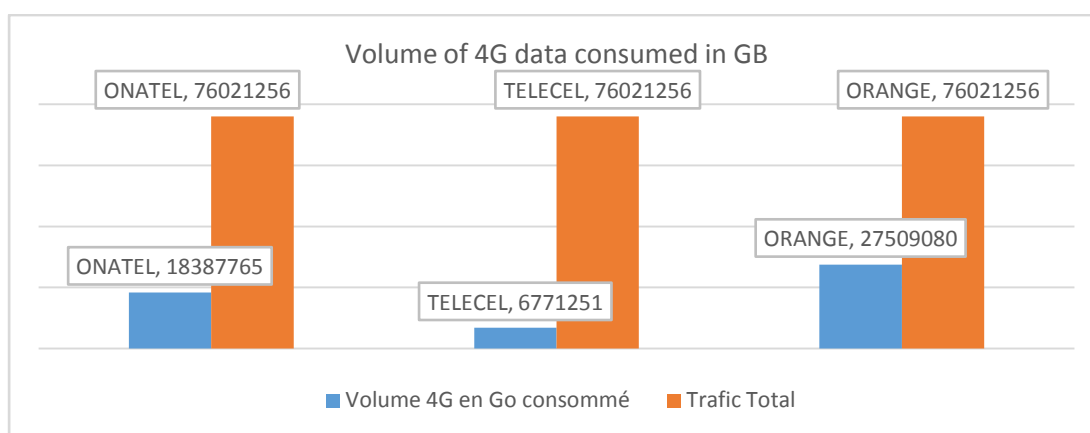


Figure 4: The volume of 4G data consumed in Gigabytes

4.3) The state of the art of IoT in the field of agriculture in Burkina

Some research on the domain of ICT already done some research on how to improve the agriculture domains by doing some test and studies on soils, moisture, temperature and fertilizers. About the case of precise agriculture by using IoT. Indeed, a study about the “design and development of a system for integrated aquaculture based on the Internet of Things”¹¹ is done and the approach proposed in this document aims at reconciling aquaculture and agriculture in a system where they are interoperable. The agriculture part consisted of collecting the moisture content of the soil. When the soil is dry, the system allows watering from the water used for aquaculture if it is no longer conducive to the proper development of the fish. The figure 5 is showing, the conception associated with this study. Other researchers worked on Design of an IoT Platform for a Precision Agriculture (PA) in Burkina Faso¹².

¹¹ BELEM AR. Design and development of an integrated aquaculture system based on the Internet of Things [Master's thesis]. Ouagadougou: Joseph KI-ZERBO University; 2019.

¹² Salifou OUEDRAOGO, Désiré GUEL, Justin KOURAOGO, Yann SANOU, Design of an IoT Platform for a Precision Agriculture (PA) in Burkina Faso, Joseph KI-ZERBO University (U-JKZ), Ouagadougou, Burkina Faso

Producers need to have information on the agricultural parameters of their plantations without having to be on site. The objective of this work is to propose an intelligent agriculture platform or Precision Agriculture (PA) in order to collect soil humidity, air and temperature. The final results were show that their research was carried out as part of the search for a solution for monitoring soil moisture, temperature and air humidity of a field. At the end of our research, we were able to propose a system composed of several sensor nodes which collect data and then transfer them to a processing unit. The processing unit incorporates a gateway to the exterior which allows information to be sent in the form of SMS to the user via the GSM network. We also proposed a power supply circuit allowing our system to be autonomous.

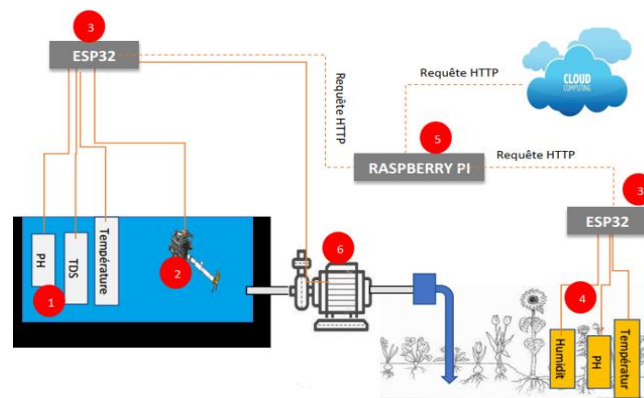


Figure 5: Architecture diagram proposed by the author (BELAM AR) during his design and development work on an integrated aquaculture system based on the Internet of Things

IoT application development must cover the entire lifecycle of the Internet of Things (IoT) initiatives, from requirement engineering to architecture design and platform & app creation to testing & support. It includes connectivity technologies (Bluetooth, NFC, Wi-Fi, 4G LTE, 5G), protocols & standards (Beacon, Modbus, BLE, TCP/IP & UDP and more), IoT Platforms (Azure IoT Hub, AWS IoT, Arduino, NodeMCU, Beacons, ESP 32), Sensors (Temperature, Humidity, Proximity, Pressure, Motion & Velocity, Accelerometers, Optical, Light, Magnetic, Water Quality, Smoke, Chemical, Infrared, Flow & Gas, Acoustics & Noise) with supportive development frameworks & languages (Node.js, Python, Xamarin, Flutter, and more)¹³.

A technological ecosystem is superimposed on farm life, made up of connected objects in “conversation” with each other¹⁴. There are several Internet of Things technologies in the field of agriculture. Drones promote yield¹⁵,¹⁶ rapid inspection of plots or their measurement,

¹³<https://www.rishabhsoft.com/blog/iot-in-agriculture-industry> accessed on 01/11/2023

¹⁴<http://www.trop-libre.fr/les-jeux-de-l-agriculture-connectee/> consulted on 30th October 2023

¹⁵<https://www.abot.fr/drone-agricole/> consulted on 30th October 2023

instant assessment of game or climatic damage, monitoring of plots and easy spreading ¹⁷. Agribots are small robots designed to perform certain tasks in agriculture. Their uses are numerous: fertilizer injection, crop watering, laser weeding, spraying, vegetable harvesting, etc.¹⁸As for the Carré robot, it is a connected agricultural robot which assists market gardeners in their daily work, from crop maintenance to the summary report of each plot, a hoeing robot which carries out an inter-row and in-row weeding and can be used for many types of market gardening. ¹⁹Finally, weeding robots equipped with GPS and powered by solar energy ²⁰ and intelligent tractors without drivers



Figure 6: example of agricultural drones

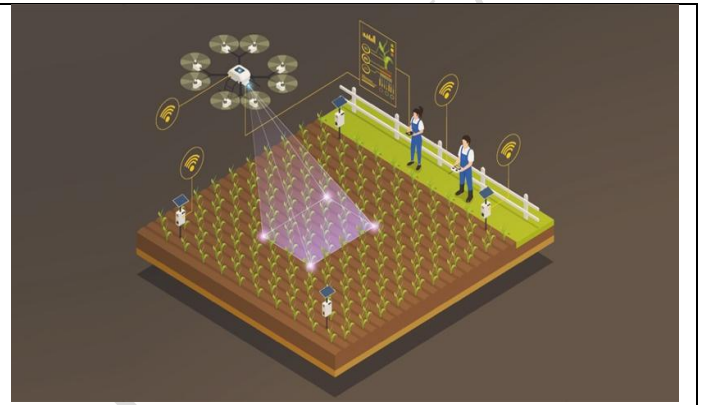


Figure 7: Smart agriculture with pesticide area management



Figure 8: case of square robots



Figure 9: Case of agribots



Figure 10: smart tractors

In details of these main groups of objects, about the IoT, it has the potential to convert agribusiness in numerous aspects and these are the most ones. Data collected by smart agriculture sensors: in this approach of cultivating administration, a key component are sensors, control frameworks, mechanical autonomy, independent vehicles,

¹⁶<https://www.lenouveleconomiste.fr/agribots-les-robots-agricoles-marchent-a-lintelligence-artificielle-76020/> consulted on 01/11/2023

¹⁸<https://www.digitalwallonia.be/fr/publications/smart-farming> Consulted on 30th October 2023

¹⁹<https://www.cioreview.com/news/agribots-revolutionizing-the-farmingindustry-nid-28280-cid-205.html> consulted on 29th October 2023

²⁰<http://www.iotboulevard.com/blog/10-objets-connectes-pour-l-agriculture-et-l-elevage.htm> consulted on 22/10/23

computerized equipment , variable rate innovation , movement locators , button cameras, and wearable gadgets

Agricultural Drones: Ground-based and aerial-based rambles are being utilized in horticulture in arrangement to improvedifferentruralhones : trimwell-beingappraisal , water system , editchecking , trimshowering , planting, and soil and field investigation

Livestock tracking and geofencing: Cultivateproprietors can utilize remote IoT applications to gatherinformationwith respect to the area , well-being, and wellbeing of their cattle. This datamakes a difference to anticipate the spread of illnessjointly brings down labor costs

Smart Greenhouses: A keennurseryplanned with the assistance of IoT scholarly peoplescreens as well as controls the climate, dispensing with the requirement for manual mediation .

Predictive analytics for smart farming: Trim predication plays a key part , it makes a difference the rancher to choose future arrangewith respect to the generation of the trim , its capacity , showcasingmethods and luckadministration . To foreseegeneration rate of the trimfakearrangeusedata collected by sensors from the cultivate . This dataincorporates parameters such as soil, temperature, weight , precipitation , and mugginess .

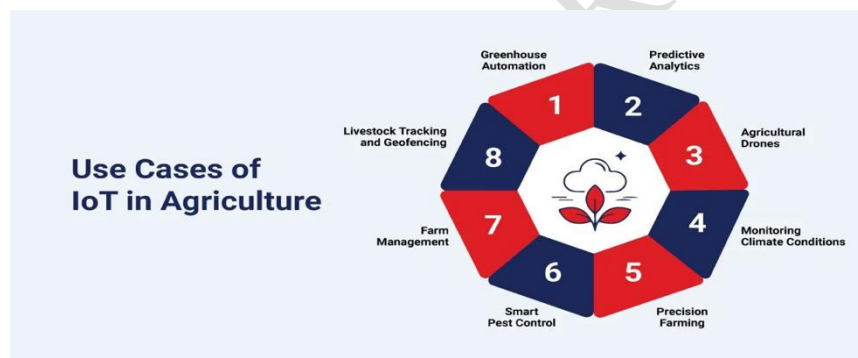


Figure 11: Illustration of cases used in IoT and Agriculture by iotsworldcongress

4.4) SimAgri, system connected to Burkina Faso ?

APROSSA Afrique Verte Burkina, in partnership with the Filière Karité table, offers access to real-time information on the prices of agricultural products, and on which the user can buy or sell said products on the cereal and livestock market. , oilseeds and market garden products via the internet or mobile phone is now possible with the agricultural market information system (SimAgri). The part of use of connected objects concerns satellite guidance which will make it possible to optimize agricultural work in the plots. For example, it will reduce the “player” and “material” needed during certain work, the quantities of seeds and fertilizer. For SimAgri, we will use autoguidance (guidance assistance solution) by RTK (Real Time Kinematic) system, which allows an accuracy of 2cm. A hydraulic servo system is installed on the motorized equipment (tractor, forage harvester, etc.), which is then automatically

guided by the transmitted data. The driver must still be present. Principle: The satellite transmits the position of the motorized equipment to an RTK beacon ²¹. This RTK beacon corrects the data (up to 2cm precision), and then transmits it to the RTK receiver. The RTK receiver, placed on the motorized equipment, receives the information and processes it via a console located in the cabin. The beacon/receiver connection is made at the zone level (which makes up each department). A beacon therefore covers an area.

5. **Sociocultural appreciation of “Connected Objects »**

New technologies have had difficulty integrating into developing countries like Burkina Faso. Indeed, several ideologies went against the benefits of this technology which was seen more as the tool of white people. “ Let the technology take its course. If it is in our interest we will use it, if we do not need it, we will abandon it, like tractors which are covered in cobwebs” (S. Ouédraogo 2003). In fact, developing countries are countries, as they say, which are only moving out of rural areas. Social change through the insertion of new technologies is a source of distrust. Farmers in general are using rudimentary methods because as the writer Sylvestre explained in his magazine 'The Computer and the Djembe' "In any case, the Internet will not transport my sorghum to the walk. It will not cure my bad tooth, nor the malaria that is gnawing at me and will not repay the debt I contracted to buy fertilizer why so much enthusiasm for technology and slogans like “Connect you will be saved” (S. Ouédraogo 2003) this shows how much this insertion of new technologies which nowadays we speak of connected objects showing the level of evolution of its technologies with those of connection links or the establishment of networks. The tool is really seen differently in developing countries, added Chéneau-Loquay: “Technology and particularly ICT are seen in Africa as being at the heart of major maneuvers for the control of markets, ideas and value systems and will be tomorrow one of the main discriminating factors between poor and rich both on an international scale and on an individual scale. In many areas of a North which is overwhelmed with concepts and models of development” (Cheneau-Loquay 1999). The problem of the transfer to Africa of the Western model of development and application of ICT according to this model is recalled by Cheneau-Loquay: "the analysis of the integration processes and the forms of use of these technologies cannot be carried out according to a simple logic of transfer of an imposed model in relation to which Africans would be simple receivers more consumers than actors” (Cheneau-Loquay 2004).

Lacroix for his part “Theories of uses have proposed to approach the phenomena of appropriation by not confining themselves to the study of the sole use of a technical object”

²¹KHOUDJA Ahmed, et al. RTK Real-Time Kinematic GPS Guidance of a Mobile Robot in a Farm <http://dspace.univ-medea.dz/handle/123456789/2707>

(Lacroix et al. 1992). In fact, the equipment is used a little more by the different actors, more than 12,496,391 subscribers according to the Regulatory Authority for Electronic Communications and Posts (ARCEP) in Burkina Faso in 2014. However, it has been studied and how these connected tools are used because as Jauréguiberry and Proulx said “The concept of use allows us to take a deeper interest in “what people actually do with the device” (Jauréguiberry and Proulx 2011). Also, this use must highlight the periodicity of use of these connected objects, Jouët therefore added “This use inserts itself into a practice, a broader daily activity of the individual or group which proposes the use of different devices. (Jouët, 1987). Indeed, poverty in Burkina means that, according to the World Bank, the high cost of internet communication means that it remains a luxury tool.

Other factors come into play to better clarify the theory of uses on the observation of the use or rejection of an object. Indeed, social, technical and cultural factors can be part of the reasons for the rejection or poor exploitation of these technological tools. Authors such as P. Flichy, 1995; Proulx 1988 go in the same direction when they say: “Taking into account the mental and social representations associated with the technique, which can strongly influence this choice” (Flichy, 1995); “The social, political and cultural context in which this practice takes place” (Proulx, 1988). This also remains a cause of the persistence of the digital divide. The digital divide is explained in the book by A. Kiyindou entitled “Fractures, mutations and fragmentations” as being inexorably linked to information and communication technologies ICT as well as to society, thus it is a “phenomenon of polarization in relation to the universal dimension of implementation of the “information society”, it [the digital divide] refers to the gap between those who use information and communication technologies (ICT) for their personal or professional fulfillment and those who are not able to exploit them due to lack of access to equipment or skills” (A. Kiyindou, 2009).

Returning to the thinking of A. Kiyindou, he added that fracture can be seen in “four dimensions: physical, cultural, methodological and social fractures” (A. Kiyindou, 2009). In the physical vision of the digital divide, it is more of a quantitative approach. Because at this level it would be more highlighted the presence or absence of the equipment or materials necessary to access and process the information. This involves filling the lack of equipment and access (to the internet network, mobile telephony, etc.) to make access to information possible, understood here as raw material. The cultural divide “refers to the skills required of users so that they can truly appropriate the content of information and online services, or even become the same providers of information or services” (Vendramin P, 2006). Socially, Flichy clearly illustrates the risk of dropping out at both social and technological levels. “ICTs can offer new means to strengthen autonomy and contacts, in a word “affiliation”, [...] but in

many cases, they will reinforce the disaffection of the disaffiliated. The digital divide reinforces the social divide” (FLichy P. 2004)

Thus, several socio-cultural reasons are the basis of this adoption of technological equipment. The social barrier is mentioned by the illiteracy which is rife in our countries. An illiterate population reveals the level of digital divide even if solutions for implementing different communication methods are necessary. Here I will talk more about video and image development. This makes us resort to the semiological aspect of information and communication sciences which explains on the signs used by the appropriate media the method of communication by text, image or other indices while demonstrating the performances . Loïc Collin and Vincent Petit: agronomists with doctorates in sociology of communication and development employed in the NGO Fongs Action Sénégal demonstrate the use of images and videos and underline the communicative force that existed in this method. Collin and Petit 2009 “the projection of the video helped encourage people to express themselves during the meeting. We also learned a lot of things [...]. Without these videos we would never have had such information. Many of us go to meetings but don't understand what's going on. This time when we saw the videos everyone knew what we had to talk about. ". “ Images speak more! [...] on certain subjects instead of spending hours explaining, a few images are enough. » (Sall and Diagne 2009) .

ICT can play an important role for actors in the agricultural world of Developing Countries (DCs) both in the production phase – to ensure institutional communication and the exchange of technical information, for example, and in the marketing phase – to through the creation of “more transparent local marketing circuits, thus limiting speculation and the risks of artificial shortage, improving the distribution of margins between the different links in the value chain of each producer or consumer sector” (Blanchard 2004). Quoted in Eric Ramos Pasquati “Contribution to a sociocultural approach to ICT for socio-economic development”.

CONCLUSION

Burkina Faso is a developing country but is experiencing great growth in the use of ICT. However, the major difficulties of non-literacy, illiteracy and poverty in general are obstacles to the proper use of these technologies. Enormous efforts have been made (laying optical fiber) but much remains to be done; especially based on the availability of the connection, the reduction of connection costs and the awareness of the population about these technologies. Also, facilities for the development of the RTK with SimAgri (as can be done in reality), in order to reduce costs for the player, the management of the GPS will be entrusted to the dealers. They will be responsible for installing RTK beacons, as well as marketing RTK receivers. There will therefore be interactivity between dealers and players. Operation: The dealer will have to hire a GPS technician, who will be responsible for the installation of RTK beacons, as well as the RTK study with players. For the concessionaire, the beacon is free, he will only have to pay a percentage of his turnover generated by the GPS activity (entry fee, rental of receivers, installation, etc.). He can install one RTK beacon per zone, only in his region. The RTK study will allow the player to know the quality of the network offered by their concessionaire, for each plot of their farm . A player can join several RTK networks (if, for example, he has a large hardware fleet). Receivers can only be installed on motorized equipment such as tractors, sprayers, harvesters, forage harvesters, harvesters, and others.

The issues around uses, widely questioned in information and communication sciences - notably through contributions from the sociology of uses - have certain limits with regard to our questioning of the developments of contemporary organizations and the activities of related information and communication. On the one hand, if users are explicitly taken into account, it is above all in that they use tools designed by third parties. On the other hand, appropriation is not addressed as a process constructed over time. These approaches therefore do not make it possible to properly identify the reflexive processes through which prescribed uses and observed uses interact.

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