Economics and Management
ISSN: 2367-7600; 1312-594X
Volume: XVII, Issue: 1, Year: 2020, pp. 108-119

E-AGRICULTURE STRATEGY: PARTNERSHIPS AS BUSINESS MODEL FRAMEWORK

Ivo Paunovski[1], Dimitar Kovachevski[2], Goran Vasilev[3]
Krum Efremov[4]

Received: 26,03.2020 Accepted: 15.02.2020

Abstract

The main driver of global demand for agricultural products over the next decade will be growth of population. The need to increase production on same volume of arable land with less water is a priority. In recent decades, agriculture has faced the implementation of various technologies such as IoT and Cloud that enables increased agricultural yield. Keeping in mind that products from different manufacturers are not mutually integrated, farmers are faced with information from different sources that cannot bring additional value. The aim of this paper is to allocate adequate marketing strategies needed for introducing an open agricultural platform as alternative approach for implementing new technologies in agriculture. Therefore, a practical framework mapped to Osterwalder business model was developed. First focus is on win with partner strategy for creating IoT products. Second focus is on creating partner network that will act as indirect sales network for off the shelf products.

Keywords: *Cloud, IoT, Agriculture, Osterwalder business model framework*
JEL Codes: *M10, M11*

1. Introduction

The main instigator of global demand for agricultural products over the next decade will be population growth. Agriculture sector will have to be much more efficient and resilient to ensure global food security. OECD-FAO (2016) states that the world's population is foreseen to expand from 7.4 billion in 2016 to 8.1 billion in 2025. The UN Food and Agriculture Organization states that population growth will lead to increased

[1] University American College Skopje, School of Business Economics and Management, Blvd. III Makedonska Brigada 60, 1000 Skopje, MBA graduate, E-mail: ivo.paunovski@uacs.edu.mk
[2] University American College Skopje, School of Business Economics and Management, Associate Professor, PhD, E-mail: dimitar.kovachevski@uacs.edu.mk
[3] University American College Skopje, School of Business Economics and Management, Assistant Professor, PhD, E-mail: vasilev@uacs.edu.mk
[4]University American College Skopje, Assistant Professor, PhD, E-mail: efremov@uacs.edu.mk

production of food by 70% in 2050 in comparison with 2006 (Meola, 2016). It will be crucial to increase the level of agricultural productivity in order to increase the production on less land with less water

Today, there are many new technologies available to farmers that can help them to increase the yield. Plenty of agricultural industries start to embrace adoption of Cloud and IoT technology in order to enhance efficiency, productivity and global reach while reducing the initial cost and time. With the deployment of IoT, using smart phones, farmers can monitor the agricultural sector by obtaining data from the field. IoT applications for agriculture provide soil, plant and livestock monitoring, greenhouse environmental monitoring, food traceability and etc. Information from the ground IoT devices like weather station, combined with the information received from satellites data feeds, can take into account crop conditions and adjust the way each individual part of a field is farmed—for instance, by spraying when is needed where is needed (Chui, Loffler and Roberts, 2010). IoT is seen as an enabler of precision farming which makes farming more controlled and accurate. Precision farming allows decisions to be made per square meter or even per plant/animal rather than for a field. Pinpointing on promising IoT-based novelties in agriculture is the answer to challenges that agriculture is currently facing.

2. Cloud

Cloud computing along with the IoT has recently become buzzwords in information technology vocabulary. According to Vaquero et al (2009), "Cloud Computing represents a large pool of easily usable and accessible virtualized resources (such as hardware, development platforms and/or services). These resources can be dynamically reconfigured to adjust to a variable load (scale), and to allow optimum resource utilization. This pool of resources is typically exploited by a pay-per-use model in which guarantees are offered by the Infrastructure Provider (by means of customized SLAs)". Buyya (2008) states that "Cloud is a type of parallel and distributed system consisting of a collection of interconnected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers". In a study prepared by Dhar, (2012), Cloud computing is the latest trend to outsource some or complete IT operations to run a business.

The Cloud concept is changing over time. In about a decade, cloud computing has evolved from an initial idea for outsourcing to a widely accepted separate branch of IT industry. The goal of the Cloud is to provide users with on-demand service based on virtualization technology, and the providing form is divided into Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS) (Singh, 2011). De La Hera (2013) determined that the primary driver for using cloud computing is the reduction of infrastructure costs.

3. Concept of IoT

The Internet of Things (IoT) represents a network of various interconnected devices thru internet. The internet is evolving from a network that connects computers into a network of various devices that includes home appliances, toys, cameras, medical instruments and industrial systems. All devices shared information on an internet based or predefined protocols in order to achieve smart real time online monitoring, online software upgrades, manipulation and administration (Vermesan, Friess, 2013 and Vermesan, Friess, 2014).

Major IoT transport technologies include radio frequency identification technology, sensor technology, sensor network technology and internetwork communication (Hong, 2011). The definition of IoT is evolving with the emergences' of Cloud. Nowadays, IoT can be defined as a sum of Cloud, ubiquitous network and sensor network. Cloud platform is central system that provides management of IoT application, computing and processing power. Ubiquitous network includes 3G, LTE, 5G, NB IoT, WiMax, RFID, Zigbee, NFC, Bluetooth and other wireless communication technology. It also includes optical cable and other wire communication protocol and technology (Cai, 2012).

The Internet of Things (IoT) provides many applications for different industries, such as energy monitoring, medicine, building and home automation and agriculture. In agricultural domain, machineries, fresh products and even the farmland equipped with smart chips, thru network connectivity and Cloud, become an integral part of completely new "agricultural infrastructure". Most commonly used IoT applications in agriculture incorporate food traceability, soil, plant and livestock monitoring, monitoring of machineries, etc.

4. E-agriculture strategy and emerging technologies

In recent decades, agriculture has witnessed the deployment of various sophisticated technologies in machinery and deployment of different IoT equipment which represents a step forward in the process of transition to higher quality and efficient agriculture. In a study prepared by Teye et al (2012), adoption of new technologies in Agriculture in Europe is highly related to local challenges. Availability and accessibility of (broadband) Internet in rural areas is an issue in most countries. In East and South parts of Europe, the costs, connectivity and demographical issues (aging of farmers) are often mentioned as key inhibitors for adoption of new technologies in Agriculture. In more economically active agricultural countries (like Denmark and The Netherlands) the standardization of new technologies presence a big issue (Teye et al, 2012).

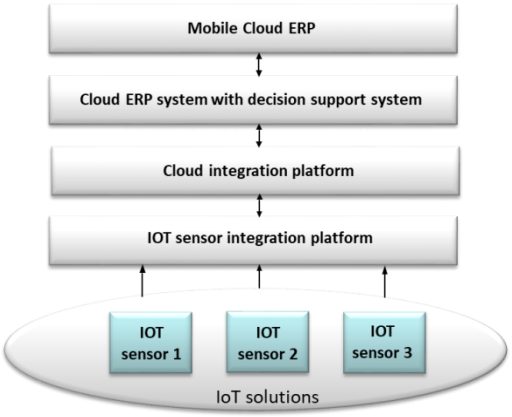
It seems that besides the availability of broadband Internet in rural areas, the biggest drawback of the agricultural IoT market in all countries is the lack of integrated products and solutions. Namely, today farmers are faced with a huge amount of data coming from the fields, but all data comes from a different source through a different

interface. In other words, there are different products/ applications from which users / farmers cannot get added values because they are not integrated. In order to avoid vendor lock in, there is a need for an open agriculture platform based on open standards. The platform will provide interface with recommendations for future actions based on information from different sources (devices) from different vendors. The openness of the agricultural platform should be designed to ensure the smooth integration of any product or service. The farmers will not be limited to choose vendor of equipment. Open standards has to be published under a public domain or licensed to creative communities in order to enable collaboration and support within industries. The central part of the platform should be a farming Cloud ERP system provided as SaaS, equipped with the Decision Support System. The platform should enable integration of multiple sensor systems and to have integrated mobile application that will enable data entry into the central system from where they are generated (as provided in picture 1).

IoT Sensor integration platform is layer responsible for gathering data from IoT sensors and devices.

Cloud integration platform is PaaS based Cloud platform that provides the cloud infrastructure resources based on applications demand, interoperability requirements and automatic execution. Cloud infrastructure includes Storage, Compute power and Networking. Furthermore, this layer should include adapters, which adapt the management requests toward in-house OSS/BSS systems and to specific vendors and providers.

Picutre1. High level example of open agriculture platform



Source: Own work

Cloud ERP system with decision support system is classic farming ERP system enhanced with decision support system. Decision support system is a form of Business Intelligence (BI) system that is using various methods for analysis of gathered data from

various sensors. This system can generate planning and recommend daily scenarios which are based on predefined algorithms.

There might be a several candidates that can be found as providers for such a platform. One of the potential investors might be the Telecom operators. Telecom operators already have Cloud platform and billing in place, have financial power to provide IoT devices as a service and also have an access to large customer base. With adopting of open based IoT platform for Agriculture, Telecom operators may introduce new revenue stream that can improve ROI of the Business Case for development of 5G or broadband internet in rural areas. Other potential vendors of open based IoT platforms for Agriculture can be found in consortium of smaller independent software development companies. No matter who the platform provider will be, there is a need for detailed market analysis and introduction of an appropriate business model framework for market entrance considering that large players dominate the IoT market. Provider of the open agricultural platform (in the further text Provider) has to developed new competences for better position on a new agricultural market.

According to Quèlin (2000), there are three possible way of building internal competences. Description of the paths for developing and acquiring competences is given in the Table 1.

Table no.1-Three strategic ways of building the internal competences.

Paths for developing and acquiring competences	**Implication**	**Limitations**
Internal growth based on existing competences	The new competences must be accessible and disseminated	Limitation of the learning process Intrinsic limitations of the learning process Slow time to market
Mergers and Acquisitions	Development of new bundled products as a resulted of internal and acquired competences	Difficult integration Clash of cultures
Partnerships	Internal knowledge for partnerships	Risk associated with partnerships Capacity for learning

Source: Adopted from Quèlin (2000)

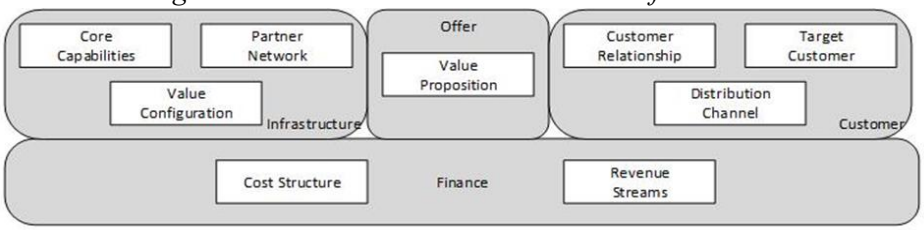
Most of the companies that aspire to get a quick way to gain internal competencies are focused on Mergers and Acquisitions. In this way, a market share is also achieved.

But Agriculture is a niche market. According to Quèlin (2000), partnerships are seen as an alternative to internal growth or merger and acquisitions processes.

5. Business model framework - mapping to Osterwalder business model framework

There are numbers of different models introduced in the literature. They describe the logic behind generation of profit from new business streams. Bouwman, De Vos, and Haaker, (2008) propose STOF (Service, Technology, Organization, Finance) business model framework for analyzing the innovations in delivering mobile services. Faber et al. (2003) propose a likewise framework that includes four characteristics of an acknowledged business model. Leem, Jeon, Choi, and Shin (2005) advocate four phases methodology for development of a business model in computing environments. It is consisting of planning a business model, design, implementation and management. Each phase is consisting of 14 activities and 26 detailed tasks. Most well-known is Osterwalder's (2004) industry generic business model framework that includes nine components organized in 4 major building blocks: 1) Product/Offer (value proposition), 2) Customer Interface (target customer, customer relationship, distribution channel), 3) Infrastructure Management, (value configuration, capability, partner network), and 4) Finance (Revenue and Costs structures) as shown in Figure 1.

Figure 1: Osterwalder's business model framework



Source: Adopted from Nesse et al. (2011)

Offer: This block identifies the customer problems that the company's services or products are solving. The relevant issue to address here is the products and services that needs to be provided and the unique selling proposition. If it is decided to go with partners in creation and promotions of new products, a possible problem is the process for electing and engaging the partners for creating IoT solutions.

Customer: This block identifies segmentation of the customers. Relevant issues that need to be addressed here are the sales channels that are going to be used. Should the Provider use internal sales force or partner channels? How to identify the right partner for resale etc?

Infrastructure: This block identifies the key procedures and needed steps that company should undertake for creating new products or services. Relevant issues to address are the capacity and ability needed to execute the business model. Moreover, what are criteria for finding and electing the right partner for solution?

Finance: This block determine the cost structure of the business, refereeing mainly whether the costs are fixed or variable, operational (OpEx) or investments (CapEx) and ultimately the interrelated risks.

5.1. Offer

Relying on outside partners, many of the challenges during the introduction of new IoT products can be overcome. We assume that Provider will not have free internal resources or internal expertise for the development of innovative solutions in the field of Agricultural IoT services that can solve many of the problems of the farmers in most of the domain. The most appropriate way to address this market is based on utilizing the innovative potential of the wider public by creating a partnership framework with many external independent IoT and software vendors. IoT vendors will be motivated to offer their products through another sales network since they will be willing to expand their sales reach. This means that the IoT solution will be charged through the Provider payment system.

In order to reduce the time to market and to create a win-win partnership, Provider should define a procedure for selecting and engaging partners and to define the business model for cooperation.

IoT partners are the companies with specific IoT solutions that are technically capable to be integrated with the open based IoT platform. We are proposing two models (Advanced, Basic) for engagement of IoT partners with different business models of cooperation. Assessment of the potential partner's/ vendors' should be conducted on two levels (Business and Technical assessment).

Business assessment: Initial screening of particular solution. Business assessment should be divided into strategic assessment of the company and the assessment of the solution.

In the process of Strategic assessment (partner company assessment), the following questions with different weighted factor can be used:

- Is there a long-term strategic synergy between partner and Provider?
- Are company resources limited?
- Is there readiness to go for "Win-Win" on both sides?
- Are partner resources/employees qualified?
- Are partner resources experienced in relevant applications?
- Are partner integration capabilities available?

- Is there a long-term business commitment of the partner?

In regards of the assessment of the solution the following questions different weighted factor can be used:

- What is the solution incremental revenue potential?
- How will Provider stand against the main competitors?
- Is there a bundling potential?
- Does the solution cannibalize some of the existing products?

Technical assessment: Technical assessment should provide GO or NO GO decision for particular solution. IoT solutions offer is preferable to be integrated with standard Provider OSS/BSS landscape. Ease of integration and ability of the application provider to comply with OSS/BSS standards is useful in terms of efficient operations and service management functions.

IoT landscape has many complexities. A brief list of questions for technical assessment mainly related to the application part of the IoT, which may be used as scoring checklist for particular IoT solution, are given below:

- Does application design support multitenant environment and how?
- What is the level of parameterized configuration available for users?
- Does Application support different SLAs per tenant?
- Is there a standard set of OSS and BSS functions associated to application management framework?
- What is the Security design?
- Does Application developer agree to utilize standard provisioning events provided by Provider OSS/BSS systems?
- What is the Application Maturity?
- What are the Reporting options and what is the possibility for integration with DWH/BI systems?
- Is there an application performance monitoring and identification of troubled tenants?
- Is there any technical documentation?

5.2. Customer

Many companies are adopting an incremental rather than transformational approach to delivering and selling new products. They are launching new services while still using their legacy sales, implementation, and customer service approaches. However, the nature of IoT services in Agriculture demands that legacy business approaches to be reevaluated. Standard sales teams may lack consulting capabilities needed to help customers generate the greatest benefits with the introduction of IoT especially in agricultural domain were many variable can be found. Therefore, Provider should create

separate ICT Sales department that will include salesperson with IoT or agricultural background and experience. Core sales team should be incentivized for finding Sales prospect, while ICT Sales should be responsible for closing the sales. In addition, ICT Sales department should be able to engage partners who have knowledge that powers the service offerings, business relationships and trust in business segment.

We are proposing two basic models for engagement of Indirect Sales partners (Gold and Silver partner) with different benefits and different revenue quota on annual level. Screening of the achieved results should be made on monthly level, while Gold Status review should be performed annually. Partner selection process should be based on business assessment. The business assessment would be conducted based on partner company evaluation from strategic and operational perspective. In the process of business assessment, the following questions with different weighted factors might be used:

- Is there a long-term strategic synergy between partner and Provider?
- Are partner resources/employees qualified (e.g. selling skills, technical competence)?
- Is there a long-term business commitment of the partner?
- Is the partner financially stable (e.g. equity/debt, free cash flow)?
- Are customers of partner satisfied (proven track record)?
- Is confidentiality ensured?

Gold status could be achieved by meeting two main criteria – revenue commitment and good score on the business assessment. Upon filing the Gold status request, partner receives a sales quota that needs to be met in order to achieve the benefits of the distinguished level of partnership. After meeting the specified criteria, partner receives a gold status.

5.3. Infrastructure

Proposed "win with partners" business models requires some core capabilities and competencies necessary to execute the business model. Competencies consist of skills, knowledge, practical behaviors and attitudes. Partnership framework should be developed in order to ensure that employee across the company are working to the same standards so that the current high quality service is consistently maintained. Provider must develop and standardize the procedures for selecting IoT and Indirect Sales partners. Thru the process, the initial goal has to be keep in mind and focus exclusively on those partners that are capable to achieve the targets set initially (mainly financial). Strategic goals review should be made annually.

5.4. Finance

Cost structure for the creation of open agriculture platform should be investment (CapEx) type of cost. Cost structure of the partnership should be variable with operational (OpEx) type of cost. Different types of business models should be developed for different type of partnership. For IoT type of partnership, revenues share model should be applicable. For Indirect sales partners, sales commission is advisable.

6. Managing partnerships

Many software companies are finding that their partners influence a significant percentage of their business growth in certain area. There are also risks associated to partnership, which can be summarized as three pitfalls:

- Selecting the wrong partner;
- Inadequate planning and understanding of needs;
- Inadequate internal capacity for managing a partner relationship;

Criteria for Business assessment should be defined as previously explained in order to minimize the possibility for selecting the wrong partner. They should be revised annually using best practice scenarios and pitfalls. The best choice for a partner is not based only on competencies that meet Provider needs and expectations. Also, the partner should share the same values as Provider. Having a clear understanding of needs and expectations from partners is the first step in reducing misunderstandings and conflict between partners. There are several aspects to determining needs, such as follows:

- Identification of the partner's strengths;
- Identification partner's needs and expectations;
- Setting an achievable and clear targets;

In order to avoid the pitfalls related to inadequate internal capacity for managing a partner relationship, it is important to have a clear understanding of the internal roles within the Provider. This ensures that there will be consistency and agreement from leadership in implementing and sustaining the IoT partnership. There may be a difference in the depth of interaction depending on the type of the partner. Generally, we propose an effective framework to be built around two internal teams responsible for sponsorship and operations.

Sponsorship team: These are top-level executives who are responsible for strategic development of the partnership. In addition, to establishing the vision and mission, their role would include such aspects as:

- Understanding the economic proposition – current and future;
- Conceptualizing future strategic possibilities and alignment;
- Securing resources for the partners;
- Setting expectations;

- Setting priorities;
- Managing internal political issues.

Operational team: This group includes people who interact with partners on a regular basis. This team is responsible for implementing the objectives. They are often from cross-functional disciplines, such as IT, ICT Sales, Finance or core Sales team.

7. Conclusion

Agriculture represents a fertile ground for deployment of various IoT applications. The implementation of new technologies in agriculture is accompanied by different challenges which are country specific. A common challenges for all countries is related to the lack of standards and availability of broadband Internet in rural areas. In order to overcome the challenges related to the lack of standards, an open agriculture platform is proposed. The paper highlights both high-level designs of the platform and the Partnerships as business model framework. The proposed methodology of collaborating with IoT companies is based on the Osterwalder framework, in order proposition to be positively applied in a detailed and systematic manner. Generally, we believe that the applied practical framework can help the potential Provider to arrange or rearrange their product development process and sales activities. In the future, the research framework of the paper can be used in order to assign or prioritize different strategies in marketing mixes, such as price, product and placement.

REFERENCES

Bouwman, T., De Vos, H., and Haaker, H. (2008). Mobile Service Innovation and Business Models, Springer Verlag.

Buyya, R., Yeo, C.S. and Venugopal, S (2008). Market-oriented cloud computing: Vision, hype, and reality for delivering it services as computing utilities. CoRR,(abs/0808.3558), 2008.

Cai. K (2012). Internet of Things Technology Applied in Field Information Monitoring, Advances in information Sciences and Service Sciences AISS, Vol.4, No.12, pp.405-414, 2012.

Chui, M., Loffler, M. and Roberts, R., 2010, The Internet of Things. McKinsey Quarterly, March, 2010. Global ICT Standardization Forum for India. www.gisfi.org

De La Hera, M. (2013). Cloud Computing-Service Models. ezinearticles.com

Dhar, S. (2012). From outsourcing to Cloud computing: evolution of IT services. Management Research Review, 664-675

Faber, E., Ballon, P., Bouwman, H., Haaker, T., Rietkerk, O. and Steen, M.(2003). Designing business models for mobile ICT services, In Proceedings of 16th Bled E-Commerce Conference, Bled, Slovenia.

Hong, L. (2011), IoT and cloud computing: Advance Strategic New Industry" [M].Beijing, Posts &Telecom Press, China, 2011.

Leem, C.S., Jeon, N.J., Choi, J.H. and Shin, H.G. 2005. A business model (BM) development methodology in ubiquitous computing environments. In O. Gervasi et al.(Eds.), ICCSA 2005, LNCS 3483, Springer-Verlag, 86-95.

Meola, A. (2016). Why IoT, big data & smart farming are the future of agriculture. Available on-line at https://www.businessinsider.com/internet-of-things-smart-agriculture-2016-10?IR=T. Access on 31.08.2019

Nesse, P.J., Undheim, A., Solsvik, F.H., Dao, M., Salant,E., Lopez, J.M. and Elicegui, J.M.(2011) Exploiting cloud computing – a proposed methodology for generating new business. In Proc. of the 15th International Conference on Intelligence in Next Generation Networks (ICIN'11),Berlin, Germany, pages 241–246. IEEE, October 2011.

OECD‐FAO (2016). OECD‐FAO Agricultural Outlook 2016‐2025 Special focus: Sub-Saharan Africa. Available on-line at http://www.fao.org/3/a-i5778e.pdf. Access on 25.03.2019

Osterwalder, A. and Pigneur, Y. 2010. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Wiley, 288 p.

Osterwalder, A (2004)."The Business Model Ontology; A Proposition on a Design Science Approach"

Singh, B. N. (2011). Cloud Service Models – SaaS, PaaS, IaaS – Which One is For You? Retrieved 2018, from techno-pulse.com.

Teye,F., Holster,H., Pesonen,L., Horakova, S (2012). Current situation on data exchange in agriculture in the EU27and Switzerland. ICT FOR AGRICULTURE, RURAL DEVELOPMENT AND ENVIRONMENT Czech Centre for Science and Society Wirelessinfo, 2012

Vaquero, L.M., Merino L.R., Caceres J., Lindner, M.A (2009). Break in the Clouds. Towards a Cloud Definition. ACM SIGCOMM Computer Communication Review, Volume 39, Number 1, January 2009

Vermesan, O., Friess, P. (2013). Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems, river publishers' series in communications, 2013.

Vermesan, O., Friess, P. (2014). Internet of Things–From Research and Innovation to Market Deployment, river publishers' series in communications, 2014

Quèlin B. (2000). Core competences, R&D Management and Partnerships. European Management Journal Vol 18 No5, 476-487