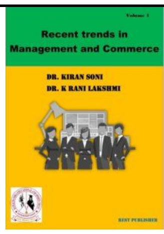
Recent trends in Management and Commerce
Vol: 1(2), 2020
REST Publisher
ISBN: 978-81-936097-6-7
Website: http://restpublisher.com/book-series/rmc/



Evaluation of Smart Farming Agriculture Using COPRAS Method

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Abstract

Smart Farming Agriculture. Smart farming is the use of new technologies that emerged in the fields of agriculture and livestock production at the beginning of the Fourth Industrial Revolution to increase the quantity and quality of production and maximize the use of resources to minimize environmental impact. It is only through information management that crops can be profitably converted modern agricultural advances are causing smart agriculture to expand tremendously and become a vital component, which will be important for producers' decision-making. Smart farming is a management concept that focuses on providing the agricultural industry with the infrastructure to use advanced technology including big data, cloud, and the Internet of Things (IoT). Network of things a promising technology exists that offers effective and dependable solutions for upgrading numerous domains. Web-based solutions are being created primarily to monitor and autonomously maintain agricultural farms with the least amount of human intervention. The article discusses a number of Internet of Things applications in agriculture. This explains its key elements are smart farming. COPRAS (Complex Proportional Evaluation is proposed to evaluate the possible maintenance strategy. Linguistic terms are used to evaluate the ratings and weights. The rankings of the alternatives are COPRAS Name of Fruit or Vegetable, Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), and Potassium (mg). Soybean, Apple, Rice, Corn, Cucumber.Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), Potassium (mg). Soybean, Apple, Rice, Corn, Cucumber. Apple got the first rank whereas the Soybean has the lowest rank.

Keywords: Precision agriculture, Agricultural innovation, COPRAS Method.

Introduction

The Internet of Things concept received attention in 1999 from the Auto-IT Center at MIT and related market research publications. Basically, the Internet of Things is the integration of many communicating devices, sensing, and embedded technology through internal and external states. Numerous applications, including smart health care, smart cities, security, retail, transportation, and industrial congestion control. With continuous growth in world population, resource-wise utilization becomes a problem as available resources diminish. In the area of food production and soil exploitation, it is crucial. Optical and multispectral techniques are frequently employed in agriculture for investigation and assessment to ensure optimum resource use and productivity These methods enable evaluation of the state of agriculture; for instance, the presence of chlorophyll in leaves indicates light absorption. This is an important and critical phase because it affects the decisions at this phase decisions are made on interventions on soil nutrition and protection from insects/fungus or other countermeasures. This type of analysis is more frequent, more responsive, and more accurate countermeasures. On the other hand, if this type depends on manual and satellite time, this operation can be a time-consuming technology. The agricultural industry is undergoing a revolution as a result of new technologies, which are assisting in elevating this fundamental industry's production and profitability. The third wave of the contemporary agricultural revolution (the first was automation and the second was with the green revolution and its genetic modification), precision agriculture uses inputs as needed (on demand), and it is currently creating upheaval in agricultural knowledge systems. It is the data volumes that are not available on a large scale. ICT use in farming is referred to as "smart farming" (SF). ICT Technologies collect and analyze data to help production operations. 5 Encourage commercial and public entrepreneurs, as well as scientists and practitioners, to work toward the development and promotion of the aim. Utilizing cutting-edge technology should aid above-ground farmers. According to the European Union (EU), the 10 most relevant technologies and techniques used are satellite images, agricultural application robots, and high sensor nodes that make use of the aggregation information and capabilities. Those signs are the subject of smart European agriculture and rural and 15 sustainable digital future cooperation announcement.

Material and methods

Precision agriculture

Despite being known for millennia as "variety in the field," precision agriculture has made significant advances in the agricultural sector in the final decade of the second millennium. Farmers now have the capacity to take geographical considerations into account thanks to the satellite-based Global Positioning System. Topic & technology runs' and many engineering developments are underway, biological understanding of retrogressive processes at the local scale. Over the past few years, new trends have emerged department of agriculture. Thanks to developments in field networks with wireless sensors and the miniaturization of sensor boards, precision agriculture has begun to evolve. Precision agriculture focuses on providing monitoring, evaluation, and control of agricultural practices. It covers day-to-day farming from herd management to field crop production through horticulture. It applies to both pre-and post-production work aspects of agricultural enterprises. In addition to agricultural testing, we need to collect Information and statistics about the behavior of the wireless sensor networks in real-world tests. Also, we want to test the robust and energy-efficient T-MAC protocol developed by our team. The rest of this article describes our experimental setup and plans to collect statistics. Physical organization, information collecting, data processing, and data analysis are these four key elements. The most crucial precision component for preventing farming-related unwanted events is body structure. The whole system is designed with sensors, drivers, and control devices. Accuracy agriculture is a conceptual framework based on software-defined structures and Internet systems. The website's contents are mostly for precision agriculture applications that involve monitoring and control, such as soil types, insect and crop disease monitoring, irrigation, and the best times to grow and harvest crops. Precision agriculture consists of when and where it is used, it is also needed, and it is also the knowledge of producers in the field of digital systems that increase management by adding improved e-science data-based to the farm; It is called Agriculture 4.0 or Digital Agriculture. The overall idea is known as "Agriculture 5.0" as these data-driven farms include robotics and AI algorithms in their systems. According to certain studies, AI-enhanced agricultural robots may be able to complete various chores more quickly than people. Robotics offers a huge potential for numerous applications in agriculture and the developing economy, even though other studies dispute this conclusion.

Agricultural innovation

This chapter examines agricultural innovation in light of the Scope by considering it as a co-evolving process that incorporates technology, social, economic, and institutional change. Therefore, the only requirements are invention as there is no production or transfer of (technical) information. Policy, law, infrastructure, finances, and market developments are a few other key ones. Therefore, agricultural innovation involves more than just implementing new technology; a balance between new technological practices and alternative organizational structures is required. Perspectives under fluency on how agricultural innovation systems are designed to conceptualize, operate, research and intervene in different ways. The actors and variables integrating innovations are aided by a broad perspective, which also helps to comprehend the issue of agricultural innovation. Its fullness, however, leaves a gap that can be filled with a variety of meanings. This makes it more difficult for this research topic to develop with a clear focus. Each agricultural innovation system expert has a different interpretation of what this idea means. According to the definition, innovation includes businesses, organizations, and people who seek out and provide knowledge and technologies, as well as organizational principles, rules, and practices that influence how various agents interact, share, access, exchange, and use knowledge and technologies. Now there is a rapidly growing literature on agricultural innovation systems. There are two main motivations for my work. First, a series of case studies were used to explore that framework and approach different interpretations of agricultural innovation that helped us validate the idea of an innovation systems analysis framework. A second thrust lies in operationalizing the concept, in the sense of using it to strengthen discovery capacity for diagnosis to help design interventions. More about it for source text requirement additional translation information. Studies innovation literature excels in the characteristics of different types of agriculture innovation, and this, attempts at different development approaches with practitioners led to identifiable periods or paradigms of agricultural innovation. The debates between agriculture that the above-mentioned scientists and writers like myself represent is a "this or" dichotomy, whether it is agriculture systems research or is it farmer participatory research. Although there may there seems to be some consensus and the need for connections throughout the densely growing networks of society, the resistance that innovation does not mean, has disappeared. However, those who follows that argue that agricultural innovation is capable of "isolated islands of scientific excellence" see the future of agriculture as, in many senses, more than it already is.

COPRAS Method

COPRAS (Complex Proportionality Assessment) is one of the most used Multi-Criteria Decision Making (MCTM) methods, and the ratio of the best solution Determines the solution with the best rate in the set of possible alternatives by Providing a better alternative Bad Solution This technique has Decision-making problems Various solutions used by researchers. The COPRAS-G method requires identifying selection criteria, evaluating information related to these criteria, and developing methods to evaluate Meeting the participant's needs Criteria for doing to assess the overall performance of the surrogate. Decision analysis involves a Decision Maker (DM) Situation to consider a particular set of alternatives and select one among several alternatives, usually with conflicting criteria. For this reason, the developed complexity proportionality assessment (COPRAS) method can be used. In 1996 in Lithuania COPRAS (Complex Proportion evaluation) method was developed. construction, economics, real estate, and management. One of the articles assesses the risks involved in construction projects. The assessment is based on various multi-objective assessment methods. The risk assessment indices are selected considering the interests, objectives, and factors of the countries that influence the construction efficiency and real estate price increase to describe and consider the task model. Complex Proportionality Assessment (COPRAS) Method Similar to any Many other criteria will make the decision (MCDM) tool, first Proposed COBRAS method of several related criteria Basically for alternatives Used to prioritize criterion weights. This method is better and Worst-Best Solutions Best decision considering Selecting alternatives. Cobra's approach is used for device tool choice; Because of this, the triangle Ambiguous numbers are selected for their computational performance. Three area specialists are selected to assign weights and by way of combining the fuzzy cobra's method, System 1 (MC1) and device 2(MC2) similarly are ranked, with machines three and four. -based total approach is utilized in a mixture of fuzzy. COPRAS assesses the complexity of consumer dating management (CRM) performance. A combined choice matrix is obtained from a panel of 20 specialists offered 3 options with the set, and 5 criteria Assessments are done. COPRAS to resolve MCDM issues, wherein the weights of the criteria and Performance ratings of alternatives are absolute Based on linguistic terms are calculated. Comparison of criteria Importance calculated and Cobras method become used to assess renovation strategies. This has a look at ambitions to develop the impact of the latest overall performance metrics in TPM and COPRAS in an ambiguous context Primarily multi-criteria selection based on opinions Use the do method. The looseness of the paper is prepared as follows. Section 1 disturbance and Literature review describes. Section 2 Literature Evaluation and Cobras-G Approach Introducing the basics in sections three and four, Cobras G and the application of the proposed Cobras method. Complex proportional estimation approach with gray c language Numbers (COPRAS-G) approach. Cobras- G's ideal approach is based on standards values expressed in durations, actual decision-making conditions, and programs of Gray Systems Theory. Diploma. COPRAS method changed into The most relevant social media platform Rank and choice are used. Proposed Applicability of the structure We proved and proved the character. COPRAS (Complex Proportionality Assessment) To examine the Cumulative of an alternative Performance, it is essential to become aware of the maximum vital criteria, examine the options, and compare the facts Depending on those criteria to fulfill the wishes of the DMs to compare grades evaluation involves a situation in which a DM must pick amongst several downloaded alternatives given a selected set of commonly conflicting standards. For this motive, the developed complex proportionality evaluation (COPRAS) method can be used in real situations, and alternatives The criteria for assessment are vague is related to the factor, And the values of the standards are real and Cannot be expressed with numbers.

Result and discussions

TABLE 1. DATA SET FOR SMART FARMING AGRICULTURE

Name of Fruit or Vegetable	Water Content (g)	Nitrogen (lb/ac)	Phosphorous (mg)	Potassium (mg)
Soybean	8.54	193	704	1797
Apple	85.25	150	11	107
Rice	11.35	120	115	115
Corn	75	112	80	270
Cucumber	95	130	24	147

Table 1 shows the data set for best employees for COPRAS Method. Name of Fruit or Vegetable, Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), Potassium (mg). Soybean, Apple, Rice, Corn, Cucumber.

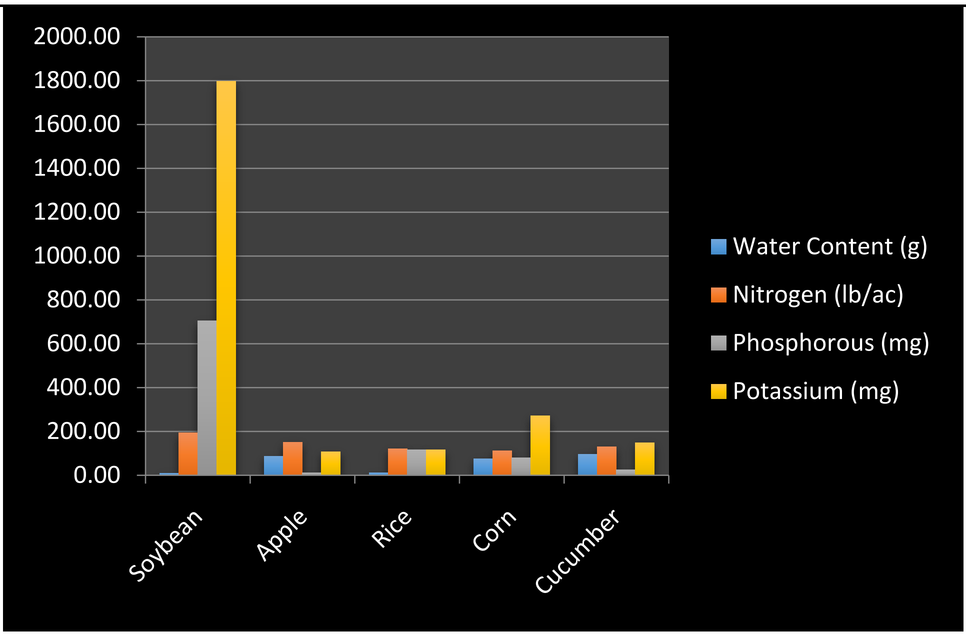

FIGURE 1. Data Set For Smart Farming Agriculture

Figure 1 shows the data set for best employees for COPRAS Method. Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), Potassium (mg). Soybean, Apple, Rice, Corn, Cucumber.

TABLE 2. Normalized Data

Normalized Data			
Water Content (g)	Nitrogen (lb/ac)	Phosphorous (mg)	Potassium (mg)
0.0310	0.2738	0.7537	0.7377
0.3098	0.2128	0.0118	0.0439
0.0413	0.1702	0.1231	0.0472
0.2726	0.1589	0.0857	0.1108
0.3453	0.1844	0.0257	0.0603

Table 2 shows data set for Smart Farming Agriculture Normalized Data. Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), Potassium (mg) Normalized value.

TABLE 3. Weight

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

Table 3 shows Weight used for the analysis. We taken same weights for all the parameters for the analysis.

TABLE 4. Weighted Normalized Decision Matrix

Weighted normalized decision matrix			
0.01	0.07	0.19	0.18
0.08	0.05	0.00	0.01
0.01	0.04	0.03	0.01
0.07	0.04	0.02	0.03
0.09	0.05	0.01	0.02

Table 4 shows the weighted normalized decision matrix for Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), Potassium (mg) is also Multiple value.

TABLE 5. smart farming agriculture bi, ci, min(ci)/ci

	Bi	Ci	Min(Ci)/Ci
Soybean	0.076	0.373	0.0373
Apple	0.131	0.014	1.0000
Rice	0.053	0.043	0.3270
Corn	0.108	0.049	0.2835
Cucumber	0.132	0.022	0.6474
	min(Ci)*sum(Ci)	0.0070	2.2952

Table 5 shows the data set for Smart Farming Agriculture Bi, Ci, Min(Ci)/Ci Water Content (g), Nitrogen (lb/ac), Phosphorous (mg), Potassium (mg) it is sum of minimum value.

TABLE 6. Final Result Of Data Set For Smart Farming Agriculture

	Qi	Ui	Rank
Soybean	0.084	24%	5
Apple	0.348	100%	1
Rice	0.124	36%	4
Corn	0.170	49%	3
Cucumber	0.273	78%	2

Table 6 shows the final result of COPRAS for data set for Smart Farming Agriculture. Qi Name of Fruit or Vegetable is calculated using the Apple is having is Higher Value and Soybean is having Lower value. Ui Name of Fruit or Vegetable calculated using the Apple is having is Higher Value and Soybean is having Lower value.

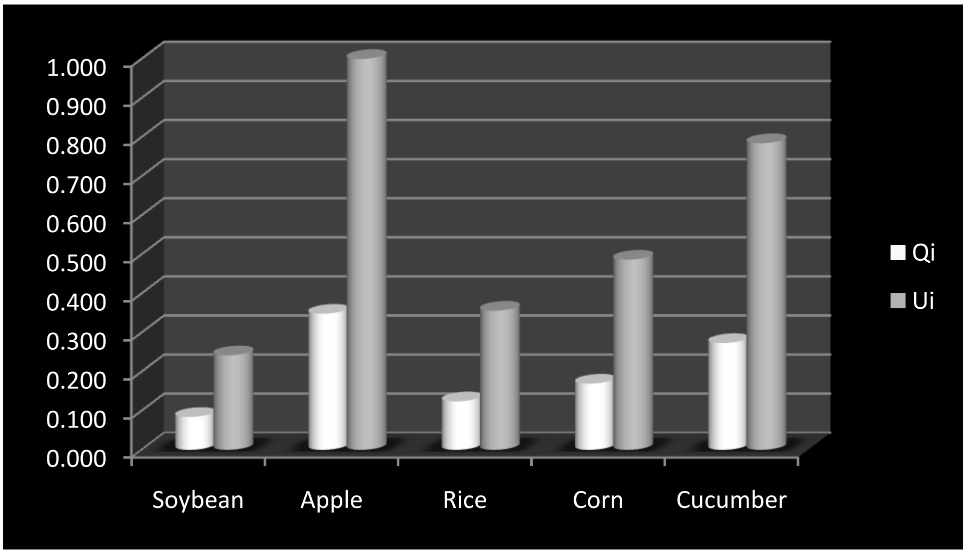

FIGURE 2. Data Set For Smart Farming Agriculture Qi, Ui

Figure 2 shows the final result of COPRAS for data set for Smart Farming Agriculture. Qi Name of Fruit or Vegetable is calculated using the Apple is having is Higher Value and Soybean is having Lower value. Ui Name of Fruit or Vegetable calculated using the Apple is having is Higher Value and Soybean is having Lower value.

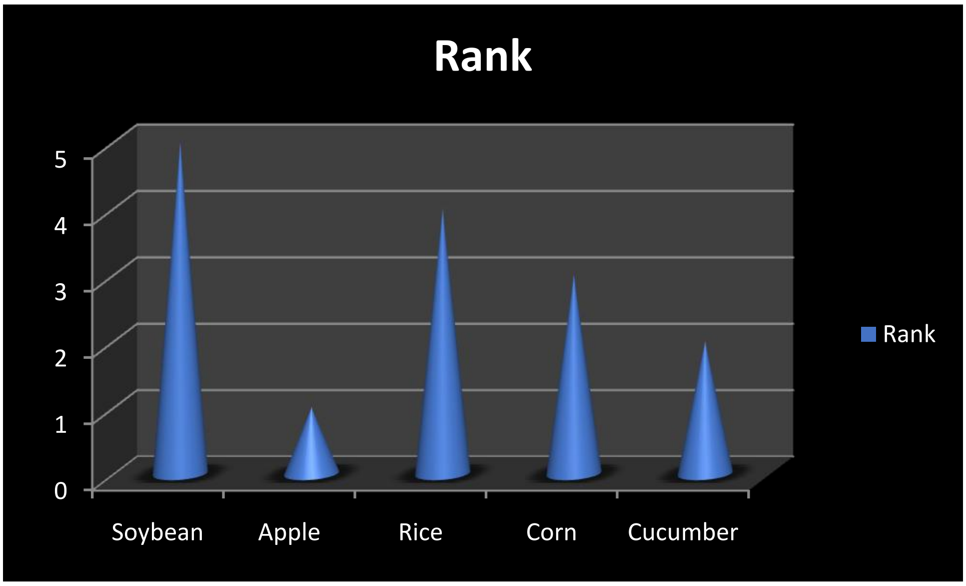

FIGURE 3. SHOWN THE RANK

FIGURE 3. Shows the Rank for The Apple got the first rank whereas the Soybean has the lowest rank.

Conclusion

Key insights into the developing subject of digital agriculture in policy and practice are provided by this review and the opening article in the special issue, which offer an overview of topical collections of research on social science and digital agriculture. This research does not systematically examine, compare, or synthesize from multiple topic groups of community science in digital agriculture because it is a review that summarises prior work. Future research must adopt a systematic review methodology to address this. Researchers around the world are exploring technology solutions through leveraging to improve agriculture productive Internet technology complements existing services. In this article, we provide a detailed review of cutting-edge research agriculture in the Internet of Things. To do this, we are discussing the structure, platform, and architecture of the agricultural network, which permits access to the Internet of Things and allows farmers to boost crop productivity. A thorough overview of recent and future developments in agricultural Internet of Things applications, hardware/sensors, communication protocols, and other cutting-edge technology is also provided in this study. By taking into account several aspects of security agriculture concerns and security requirements, this research contributes to a better understanding of the Internet of smart agriculture. The work that is being presented proposes a method for visual analysis of soil characteristics. The method was specifically utilized to distinguish between different types of tillage, and the answer was tested on that field. The proposed technique as a landscape is feasible, according to experimental findings. This data supports the idea that constant soil knowledge produces the best outcomes. Systems for agricultural management can handle farm data to solve unique farm-specific solutions. This investigation demonstrates that a consistent understanding of the soil produces the best outcomes. Systems for agricultural management can handle farm data to address individualized solutions for every farm. However, to get more benefits in agriculture, users must receive deep training, the best young farmers are keen to learn modern technologies and apply them in agriculture and give updates to the next generation.

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