BBEST – Model for Oral Presentation Abstract

SATO, S. A.1; ONO, E.2; MAGALHAES, P. S. G.3; BRAUNBECK, O. A.3; SUZUKI, C. K.2

1 - AREW Systems Ltd., Brazil; 2 – UNICAMP The State University of Campinas, Brazil; 3 - CTBE Brazilian Bioethanol Science and Technology Laboratory, Brazil

Innovation promoted by information exchanges between areas of bioethanol production provided by feedback performance measures indicators built on a Knowledge Management based framework model

Introduction

Today, one of the main challenges of world's energy supply by using renewable sources to produce biofuels and derivates, is to develop a sustainable equation between safety to nature and low cost for a cheap biofuel. One of the options considered is the bioethanol derived from biomass containing significant amount of sugar. In this sense, sugarcane has been the most important feedstock all over the world, mainly in Brazil, which production was 604.5 million tons (2009/2010 harvest), whose demand has been increasing very fast. Considering that sugarcane feedstock represents about 60% of bioethanol final cost, it is highly desirable to attain a higher concentration of sugars for the same amount of sugarcane harvested. As a leading producer, Brazil has been chosen for a case study, and the main input data parameters affecting the harvest yield were considered, such as soil type, fertilizers (type, quantity, and application time), nutrients (nitrogen, phosphorous, and potassium), crop forms, plant generation, weather, and plant stress time before harvesting.

This case demonstrates the high level of inference variables in bioethanol productivity, but it is very important to consider farmer difficulties in absorbing too many changes in short time. In the last ten years, the amount of information about harvest grew up considerably, promoted by a faster Information Systems Technologies evolution. The small farms agriculture has decreased its competitiveness since it can not absorb the technology evolution that today includes databases accessibility based on Internet communications, GPS technology equipments and a modern precision agriculture.
The problem occurs when the farmer needs to integrate the precision agriculture captured data in just one database to get more intelligent information in the form of knowledge. The actual System Information Management available to farmers has a focus frequently in a farm business management and do not have attention to work with agriculture area details. The idea of the proposed model framework is to integrate all of this high information technology in just one environment to attain a knowledge base to increase visibility prediction of bioethanol productivity based on input data model of field parameters, such as soil type preparation, sugarcane plant variety, soil adjustment with fertilizers, cut in the field and ethanol-plant parameters obtained from bioethanol processing performance measures.

Considering the actual technology stage, whether on big city centers or on field, it is possible to implement the proposed framework model because the Internet platform has

all elements that create the perfect environment, so this proposed framework model is a solution to data integration for promoting faster information exchange and an innovation culture.
In the three big areas of bioethanol production process there is some type of data collected but they are local data for each area, agriculture, bioethanol plant and energy. The proposed framework model integrates this data and aggregate another relevant data to generate information to be shared between areas. To solve some problems between areas to increase a bioethanol production it is necessary to discover the causal relations between areas or process and the model gives this tracking possibility.
This case study has an elevated importance because to attain a very high possibility to establish a communication framework model between these areas of sugarcane and receive step by step control performance measures indicators and promoting feedback information in this Internet based for Communication Framework. This input data collected individually using a AIDC (Automatic Input Data Captures) and combined to agriculture precision technologies with GPS (Global Positioning System), GIS (Geographic Information System) and DSS (Decision Support System) were bounded to local databases, and the proposed framework model gave the capability to apply principles of “Knowledge Management” (DAVENPORT and PRUSAK, 1998). To study sugarcane yield it is necessary to cross the performance measures indicators from sensors at bioethanol plant saved in proposed framework model and relating to sugarcane cultivation input data discovering the causal relation and track that affects some increase or decrease in bioethanol productivity.
These supporting or explanatory input data in variables including many features and events during the crop management of sugarcane characteristics are leading factors in explaining site-specific crop productivity, variability, and input application response.

The result was a model that increased the predictability of sucrose level before the sugarcane harvesting, making a more preventing process based on a user friendly software to be used during cultivation and milling based on the Internet platform integrating precision agriculture, system information management, knowledge maps and all these bounded to sugarcane bioethanol performance measures indicators productivity obtained on bioethanol plant, saving output data in a knowledge database relating all data to agriculture sugarcane cultivation to predict productivity through knowledge management.
The sugarcane yield information feedback related to the initial geographic coordinates, turn on soil correction possibility for improved the cultivation that maximize the sucrose on the next harvests, creating the desirable innovation between bioethanol production and a more sustainable agriculture production.

Author Publications

Bibliography

ANGELONI, M. T., ET. AL. **Organizações do Conhecimento**. 1ª ed. ed. São Paulo: Saraiva, 2002.
BINOTTO, E.; ET AL. Criação de Conhecimento no Agronegócio: Estudo de casos. **Revista Administração UFSM**, Santa Maria, setembro/dezembro 2009. 367-384.
BNDES; CGEE; FAO; CEPAL. **Bioetanol de cana-de-açúcar - Energia para o desenvolvimento sustentável**. BNDES; CGEE; FAO; CEPAL. Rio de Janeiro, p. 32. 2008.
BRAMLEY, V. R. G. Lessons from nearly 20 years of Precision Agriculture research, development, and adoption as a guide to its appropriate application. **Crop & Pasture Science**, Glen Osmond, Australia, n. 60, 2009. 197–217.
CGEE. **Bioetanol combustível:** uma oportunidade para o Brasil. Brasília, DF: CGEE, 2009.
CHEM, M. A. C. A. Knowledge management performance evaluation: a decade review from 1995 to 2004. **Journal of Informtion Science**, Taiwan, 2006. 17-38.
COELHO, A. M. Agricultura de Precisão: manejo da variabilidade espacial e temporal dos solos e culturas. **Embrapa**, Sete Lagoas, 2005.
DAVENPORT, T. H., PRUSAK, L. **Conhecimento Empresarial - Como as empresas gerenciam seu capital intelectual.** 3ª ed. ed. Rio de Janeiro: ed. Campus, 1998.
GOLDRATT, E. M. **A Síndrome do Palheiro - Garimpando informação num oceano de dados.** 2ª. ed. 2ª ed., São Paulo: Educator, 1992.
HANEKLAUS, S.; SCHNUG, E. Precision Agriculture and Fertilization. **Encyclopedia of Soil Science**, Braunschweig, Germany, 2006.
LAUDON, K.; LAUDON, J. **Sistemas de informação gerenciais - Administrando a empresa digital**. 2ª ed. ed. São Paulo: Pearson, 2004.
LEBAS, M. L. Performance measurement and performance management. **Int. J. Production Economics**, n. 41, 1995. 23-35.
LIAO, S. Knowledge management technologies and applications - literature review 1995 - 2002. **Expert Systems with Applications**, 2003, 25, 2003. 155-164.
NONAKA, I.; TAKEUCHI, H. **Criação de conhecimento na empresa**. 2a. ed. ed. Rio de Janeiro: Campus, 1998.
SILVA, A. B. **Sistemas de Informações Geo-Referenciadas - Conceitos e fundamentos**. 1a. ed. ed. Campinas: UNICAMP, 2003.
STEWART, T. A. **Capital Intelectual**. 2a. ed. Rio de Janeiro: Ed. Campus, 1998.
UNICA. UNICA - União da Indústria de Cana-de-Açúcar, 10 Abril 2011. Disponivel em: <http://www.unica.com.br>. Acesso em: 10 Abril 2011.
WALKER, G. M. **Bioethanol:** Science and technology of fuel alcohol. Dundee - Scotland: Walker & Ventus Publishing ApS, 2010.