

Cassava ... Solves World's Crisis

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In 2007, global production capacity of cassava amounted to 228.14 million tons. Thailand was by far the third largest producer at 26 million tons, following the lead by Nigeria and Brazil. Nevertheless, since domestic consumption in Thailand is minimal Thailand is the largest exporter accounting for more than 80% of world trade. Last year, the export generated income to the country more than USD 1,400 million. The export of cassava is concentrated in three product areas: chips, pellets, and starch. Due to Thailand's strong development on breeding, technology and transportation for over 30 years along with more than 200 exporters, it is able to respond any kinds of demand. Its major markets include China, Europe, Japan, Indonesia, South Korea, Australia, New Zealand, Malaysia, India, and Russia.

Thailand is also the leader in breeding, planting, producing and trading of the world cassava. Cassava are one of the crucial trading products of Thailand that are used for human consumption, animal feed, and other products More importantly, in face of the world's food and energy crisis, cassava can be used in the renewable energy industry, as ethanol.

Since food, energy and environment have become the world crisis, has focused on food commodity by helping maintain the price, and negotiating with foreign investors. Long-term strategic solution is still needed; especially in agricultural development and food security. As one of the economic plant for the population of over 600 million, cassava can be a part of the solution.

However, as the world's food and energy shortage are still ongoing, and there is a chance after shock of crisis might occur. Cassava, as a magic plant, which can be used as both food and energy, will definitely be a buffer and alternative in alleviating such shortages. The key to success is the stabilization of the cassava price. Emphasis should be put on the reduction of raw material costs, and policy that advocates the production of bio-fuel. In this connection, price can be stabilized, and new products will be created by higher technologies and innovation.

In this full text will provide the essential five topics and details by following

How to use cassava products in agro-based raw materials both for animal feed and human consumption.

Cassava growing countries worldwide are now stepping up their cassava productions in the wake of the strong global demands for food and energy.

The Cassava is a plant with a lot of usefulness, especially its “root” or generally called “Cassava Root” which is the most importance part of cassava plant. The cassava root, other than being edible as food, it is also used as the raw materials in agro-based industry, animal feeds and industrial purposes as follows:-

Cassava Chips/Pellets : They are used in various industries as follows:-

1. *Animal Feeds*: It is used as the ingredients of animal feeds;
2. *Alcohol*: It is used for producing alcohol for the liquor manufacture and the disinfectant.
3. *Gasohol*: To be used for producing Ethanol and mixed with fuel which is a renewable energy source;

Cassava Starch : It is used in various industries, for instance,

- *Food and Beverage*: The cassava starch will be used in both its original form and its other modified forms, for instance, the instant noodle, sago, seasoning sauce including beverages;
- *Sweeteners*: They are glucose and fructose which are used as the sweeteners in the beverage industry;
- *Textile Industry*: It is used for slipping the thread and to make the thread being without hair during the weaving and to fortify the thread including the cloth printing in order to make the cloth being shining and durable;
- *Paper Industry*: To mix it with the paper in order that the paper pulp to be tough and thick;
- *Glue Industry*: To use it for producing glue including any products whose their mixture is the glue;
- *Plywood Industry*: To use it in form of glue made from cassava starch in the process of plywood manufacture in order to make the plywood become qualified, tough and durable;
- *Medicine Industry*: To use it as the diluent of capsule medicine and pill;
- *Monosodium Glutamate*: To use it for producing the MFG for seasoning food;
- *Bio-Degradable Material Products*: To use the cassava starch to be transformed as product by mean of adding the bio-degradable substance to be in place of plastic.

Cassava Leaf

To be raw material of animal feeds in order to increase protein/color substance in egg

Cassava Root

To burn it to become charcoal generating high heat but without smoke

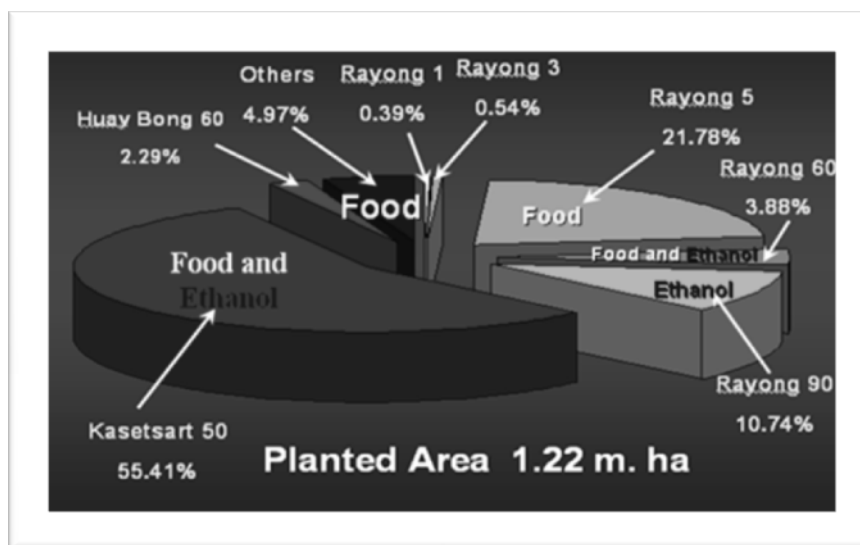


Figure 1 Adopted Cassava Varieties Suit for Food and Ethanol in Thailand 2007

The goal of cassava breeding in Thailand is to increase yields and root starch content, as well as the crop's adaptability to a wide range of growing conditions. Starch yield is a function of starch content and root dry matter yield. There has been no systematic institutional breeding of cassava for improved cooking quality in Thailand. Of the many varieties developed and released only a few are now widely adopted, mainly Kasetsart 50, Rayong 5, Rayong 90, Huaybong 60, Rayong 7 and particularly Rayong 9, which gave high ethanol yield.

Aside from the above important characteristics, the following characteristics are also our breeding and selection criteria:

- early harvest ability
- good plant type (tall and non- or less- branching)
- good stake quality (germination and storage duration)
- good root shape with white flesh
- tolerant to major pests and diseases

Will the cassava production in Thailand sufficient alternative energy in the new century?

As the world is facing energy crisis, cassava is considered as a substantial alternative for the solution.

SWOT of Thai Cassava

Strength - *30 years World 's leading exporter*

The success factor of the cassava export is suitable environment for culture, experience of culture and modern technology. In order to reach a Thailand objective enhance productivity from 20 ton to 31 ton per ha within 5 years, increasing of cassava depend on species and fertilizers.

Weakness - *High cost, Low price and also sell directly or through middlemen*

In Thailand, cassava roots are sold at the farm directly or through middlemen. The price is determined by the market at each market level and also lack of MIS technology transfer to farmers for perform at right plant, right place and right price

Opportunity - **Food and energy have become the world crisis**

- *Increasing demand both of consumption and industrials*
- *Soil, water, climate are suitable to plant cassava both in Thailand and neighbor countries such as Laos, Cambodia, and Vietnam*

Treat - **Diversity of world economic**

- Raising reliance on alternative or renewable energy – solar, hydrogen, high power battery-car and bio fuel seems to be a consensus on this position, views vary as to the desirable extent of that reliance, and at what cost in the medium term, particularly at a time of global economic crisis in next 20 years.
- Increasing volume of land for living due to increase of population

The research outcome has resulted in more cassava growing in Asia, especially in Thailand where productions of cassava and of starch have significantly increased. Most countries grow cassava for domestic use. Thailand, on the other hand, grows cassava mainly for export, and China is our main trader.

At present Thailand government will lead policy of price guarantee for cassava production. It is pave the way the task of a government to secure sustainable plans, identify better frame strategies and policies for the future, look for opportunities and cost competitiveness and support the cassava production sufficient in this century.

How Thailand can apply environmental friendly technology to cassava production

When considered the raw material supply, cassava is recommended to be the most suitable raw material for ethanol production. The crop can be planted all year round with minimal inputs in infertile land where the cultivation of other crops is difficult and costly. Further, Thailand also has conducted continuous research and development on variety improvement and planting efficiency. An average cassava yield is, therefore, expected to be higher. At the production capacity of 20 million tons of root, the total consumption is about 16 million tons (50% for starch industry and the others for chips/pellets industry). The surplus of 4 million tons of roots is available for feed and ethanol industry.

Planting Process, the key success of Thai cassava is

“Continuous development of high yield-improved varieties All year round planting”

Also with, selected good variety, high quality of planting material (good stem, and proper planting method), planting and harvesting at suitable time, good land preparation, soil conservation and amendment, correct planting space, weed control in time and use organic fertilizer.

Processing Process

The main problems of cassava processing are its unattractive visual display and odour. Other forms of pollution can have an impact on the environment but this is generally not as large as might be expected given the magnitude of the visual display. For recommendations, cassava processing should be located in area of adequate water supply, water utilization should be minimized through use of appropriate technology, waste water should be contained in the factory or treated before release, store and manage solid waste properly, reduce cyanide level before disposing of the waste.

Ethanol process

Biofuels have to guarantee at least a 35 per cent greenhouse gas saving compared to traditional fuels, increasing in 2017 to 50 per cent for existing installations, and to 60 per cent for new installations. In addition, incentives were added in the text to promote second generation biofuels and electric- or hydrogen-fuelled cars. In fact second generation biofuels will count double towards the target. Moreover, areas that contain high carbon stock should not be converted for biofuels. This is to avoid the risk of causing big greenhouse gas losses through the release of carbon stored in the soil and in plants.

Environmental impact of using cassava in ethanol industry is to use of cassava in ethanol industry will have little impact on environment. The yield will be increased by improvement of farm management with preserved existing planting area. Therefore, the national forest will be reserved.

Current National Policy of the Thai government on cassava production

The Office of Agricultural Economics, Ministry of Agriculture and Cooperatives, is in charge for formulating national cassava policies with the cooperation of other organization; and non-profit private organizations. The core of cassava roadmap contains four important strategies including improvement of root productivity, development of value added cassava-based products, cassava market expansion and support of research and development for cassava industry.

(a) *Strategy I*: Improvement of root productivity. The total cassava-planted area remains unchanged as it is reserved to be 6.6 million rai or 1.056 ha. An increase of root productivity can be achieved by implementing good cultural practice including dissemination of good stake of good varieties, soil fertility maintenance, intercropping system, crop rotation, weed control, good soil preparation and good harvest practice. Currently, the root productivity is about 3.0 tonnes per rai and by 2007, the root productivity should be increased to 5 tonnes per rai for promoted area (1.2 million rai) and to 3.4 tonnes per rai for the rest.

(b) *Strategy II*: Value addition of cassava-based products. The estimation of root production and consumption for industrial processing in 2008 are summarized the establishment of fuel ethanol production from cassava is recognized, however the utilization of cassava as the raw material for this purpose should be well-managed so that it will not considerably interfere other current industries. This will be performed by various approaches including contract farming, root and ethanol price guarantee, determined ethanol policy of government. Moreover, since cassava chip market has expanded substantially as they are used as the feedstock for producing many chemicals, the government has promoted the production of clean chips for this purpose. In addition, the government has supported the SMEs for downstream process of cassava either by technology transfer or technology import to rapidly promote cassava conversion.

(c) *Strategy III*: Market expansion. It is very critical that Thai cassava industry has to improve and maintain the quality of cassava-based products. That will make Thailand as the leader in producing and exporting cassava-derived products. Various means have to be implemented to increase cassava consumption, both onshore and offshore.

(d) *Strategy IV*: Research and development. The R & D of cassava as well as the development of human resource in cassava area have to be continued in order to support and strengthen the competitiveness of Thai cassava industry. Many urgent tasks relating to cassava production such as new variety development, weed control technology evaluation, post harvest technology improvement and on-farm machinery development have to be achieved rapidly.

Future direction and challenge of using MIS technology to sustain cassava production in Thailand

Current and future perspective of Thai cassava that nowadays, there are around 73 cassava factories and over 60% of them on the export purpose. And in the next 20 years, cassava farming will increase around 30 million tons. While the development of the Thai cassava chip and pellet export industry was not planned. The Thai industry is instructive of what would be needed to develop new markets for cassava whether it is for domestic or export use.

MIS technology transfer will apply to an organized method of providing past, present, and projection information relating to internal operations and external intelligence. It supports the planning, control, and operational functions of an organization by furnishing uniform in the proper timeframe to assist the decision-making process.

A Strategic Information System (SIS) is concerned to help organization change or otherwise alters their organization strategy and/or structure. It is typically utilized to streamline and quicken the reaction time to environmental changes and aid it in achieving a competitive advantage.

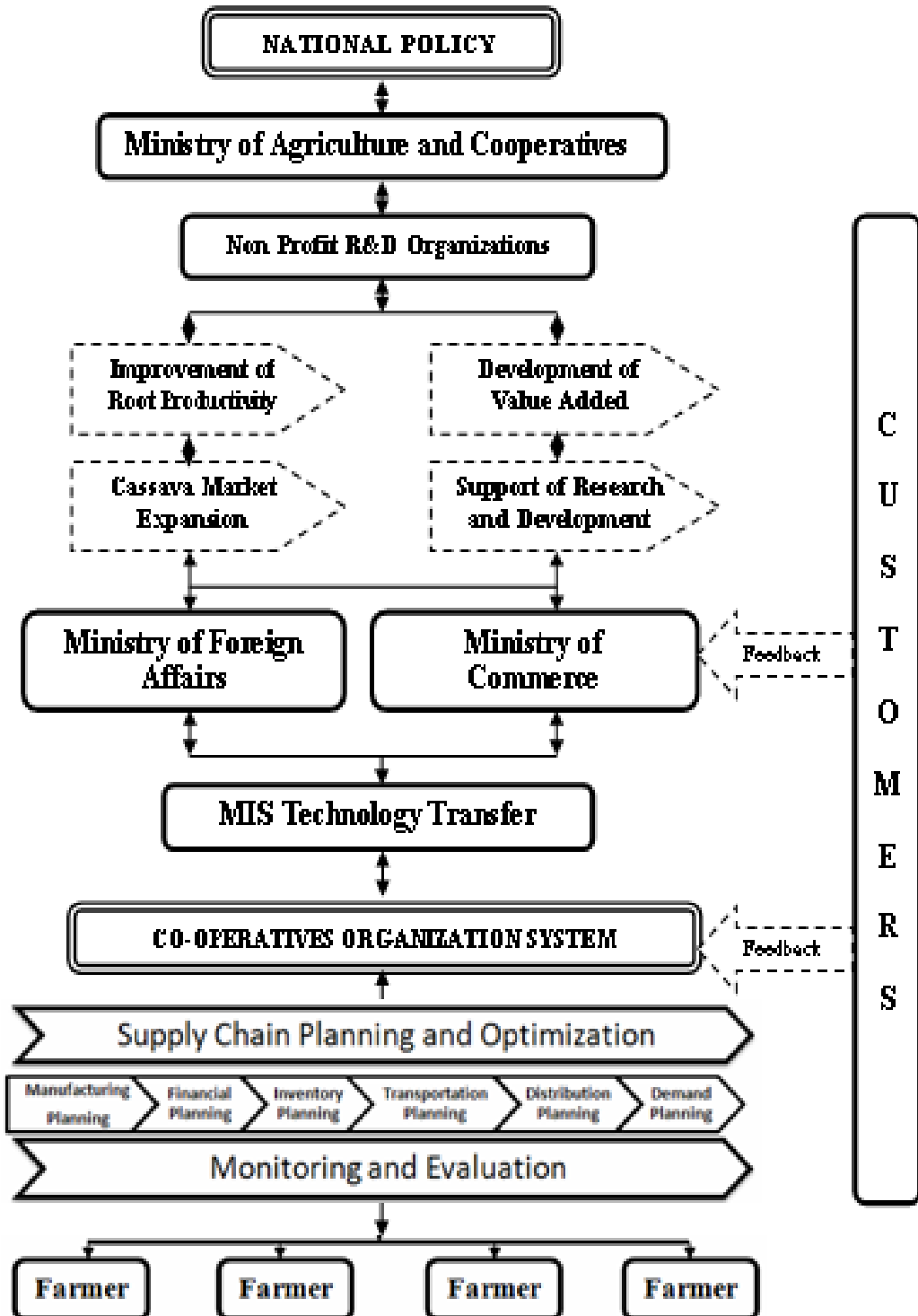
CASSAVA SOLVES WORLD'S CRISIS needs Information Technology Management to concern with exploring and understanding as a corporate resource that determines both the strategic and operational capabilities of the organization in designing and developing products and services for maximum customer satisfaction, corporate productivity, profitability and competitiveness.

Monitoring actions must be undertaken throughout the lifetime of the project. Ad hoc evaluation research might be needed when unexpected problems arise for which planned monitoring activities cannot generate sufficient information.

Key features to sustain cassava production in Thailand are the following:

1. **Government sectors:** -National Policy to identify national frame work and policy
 - *Ministry of Agriculture and cooperative* to strength research and development cassava production in Thailand and also broadcast MIS transfer through both of Co-operative system and Farmer.
 - *Ministry of Commerce and Ministry of Foreign affairs* to make supply chain planning, optimization and monitoring and evaluation for achievement of expand new markets.
2. **Co-operative organization System** to implement an assist both of Government sectors and Farmers in order to apply MIS technology transfer to maximize advantage and profit through Farmers.
3. **Farmers** to acknowledge National policy, Co-operative organization system, performance and fulfill skills to develop cassava production under environment friendly condition.
4. **Customers** to respond and active as indicators of market demand, results and practical implementation mechanisms to effective monitoring and evaluation needs.

Vision of Strategic Information System for
Thai Cassava Sustainable Management



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