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BEST PRACTICE OF FINANCING MECHANISMS IN FARMERS ORGANIZATION IN DENMARK

INTRODUCTION

1. The reforms of the extension systems in the context of financing systems are very important. Focus was on empowering the farmers and their organization, their role in advisory services as well as the innovative financial mechanisms in supporting farmers to produce more in a sustainable environment. In the 1970s and 1980s, large public systems were being implemented by governments of Denmark. The government's support has been viewed as decreasing and 'non-public' providers have emerged.
2. Funding for advisory services in developed countries remain crucial to ensure food security, although delivery has been increasingly transferred to service producers of private sectors.

Funding mechanism changes in order to achieve demand-led extension services.

DENMARK AGRICULTURE IN BRIEF

3. Denmark is a small Nordic country with an area of 43,000 km² and 5.5 million in population, of which 7% are farm owners or employed in the agricultural sector. Agricultural export comprises 12.5% of total exports of the country.

Agriculture contributes 3% of the Danish GDP. Denmark is a highly developed country with a high degree of social equality, trust and quality governance. The country was founded on agriculture. The bad crisis in the 1800's and 1900's have forced Denmark to act for land reform policies which able the farmer-led development of agriculture cooperatives to reach favorable market for livestock and dairy produces. Agriculture has been the best organized sector of the country.

4. Cooperatives were developed since 1870s. The cooperative sector of agriculture has undergone major structural changes over time - 1100 cooperatives in 1870s with only 13 cooperatives left by 2009. Despite the structural changes, the cooperative sector still very strong with estimation of 95% of all the output and input in Denmark are through farmers-owned cooperatives.
5. The Danish successful development of agriculture is based on **knowledge generation and dissemination, along with capacity development**. The characteristics of the agricultural development were partly subsidized by the government, but ALMOST FULLY IMPLEMENTED BY THE FARMERS ORGANIZATIONS (FOs) and funds from production levies and farming taxes to finance both research development and capacity building. The subsidies were gradually phased out, ending 2004.
6. In 2010, 61% of Denmark's total area is cultivated – 2.6 million ha, with 40,000 farms, 1300 horticulture producers. Average farm size is 65ha. The average export is Euro 14 billion including agro industrial products.
7. Characteristic of farming sectors in Denmark
 - a. Farmers are educated - stipulated in Agriculture Act 1978 that requires only farmers from agriculture college could obtain green certificate to run a farm.
 - b. FOs are very strong locally and internationally. At national level, farmers organizations are in the Food Industry that is the Danish Food and Agricultural Council which work both politically and practically with market-related activities and campaigns common good practice to members.
- c. There are clear private and public responsibilities in developing the agricultural sector. The farmers and organizations are responsible in issues of private interests including research and development, advisory and marketing, while the government is responsible for public interest research – environment and health related. The public authorities administer control and inspection task as well as subsidies. There are strong collaboration between public and private in terms of knowledge dissemination and data collections.
- d. Farmers own and operate their own farms. Large majority of farmers are members of their FOs and they buy and sells most produce through farmers-owned cooperatives. They employed only a few technical staff because they use advisory services extensively.
- e. Successful model developed by the Danish was a result of a combination of factors including :
 - i. Early agricultural reforms;
 - ii. Use of new technologies;
 - iii. Education of farmers;
 - iv. Successful market-led transition from grain to more extensive livestock production;

- v. Proximity to favorable markets for livestock products;
- vi. Strong FOs;
- vii. Strong political position of Danish farmers; and
- viii. National priority of agricultural development.

8. The main challenges faced by the Danish since 2008 financial crisis are the demand for continuously increasing productivity and cost control as well as reducing the carbon emission and other environmental impacts.

DANISH AGRICULTURAL INNOVATION AND KNOWLEDGE SYSTEM

9. Knowledge generation in Denmark takes place in three sectors : i. public research institutions; ii. private and cooperative companies and; iii. VFL, The Videncentret for Landbrug (Knowledge Centre of Agriculture). The transfer of innovation to practical use is happening at a relatively fast and efficient speed. Collaborations were established between research Institutes, companies involve in input, fertilizers, pesticides, feed mill, breeding association, farm mechanizations, food industries, agro-technology advisory services, agricultural schools, farmers and their organizations.

10. The system collects new knowledge and technologies and transfer of practices. All applied researches in Denmark are managed by the Knowledge Centre of Agriculture (VFL). VFL provides data and professional technical analyses to the government that aid public policy decision and direction as well as facilitate enforcement and legislation.

The new knowledge was then transformed into practices. Active research and development activities were natured. Close collaboration between FOs and universities is a must.

11. Knowledge is passed from source to farmers when the technology and innovations become practical solutions. The advisory service of the FOs provides the best knowledge available through linking research with practical farming.

12. The advisory services cover almost all areas such as production (including organic production), energy crops, environment, finance, management and organization, tax, building and surroundings, human resources, legal matters and technical advice to producer organizations and public authorities. The new areas developed in this arising farming sector are bio-energy production and architecture.

13. The FOs in Denmark have gone through many stages – matching the need of customers with the farmers' current production has made the farmers realized that there is a knowledge gap faced. The central dissemination for information was strengthen to fill in the gap.

14. More than 50% of Danish agriculture advisers today are female. The women farmers has re-entered the scene through establishing the experience-sharing groups for rural women famers. They realized that they are not alone in their situation and as a result they formulate their open opinions, attitudes and values. Deeper understanding made them addressing the conflicts better.

GOVERNANCE

15. The main principles of Danish's governance are:
- Owned and organized by FOs -
 - User paid (subsidized by the government);
 - Officially and universally recognized as impartial; and
 - Has no inspection task on behalf of the government.
16. VFL is owned by the Food and Agriculture Council. The income of VFL is from user fees and sales (60%), project funds (21%), tax reimbursement (16%) and others (3%). It is very important for agriculture to own funds. The advisory services in the local centre provides services to 48,000 farmers and rural SMEs for trades. The income of advisory centre of VFL in 2010 is almost DKK 40 million. Farmers influence priorities of the agriculture research through the governance structure.

FINANCIAL AND REGULATORY TOOLS

17. The sources of financing come from Public financing (support from agricultural advisers, support from education of farmers and advisers, state consultants) and agriculture sector's own funds (from membership and subscription fees and direct user payment) as well as production levies and chemical taxes.
18. In 1947, the government supported 50% of salary and travel expenses, 25% telephone cost and 25% publication of herd books reports. The support was then reduced gradually as the income from operation started coming in.
19. Danish agriculture sector collected agriculture production levies on its own. These are for funding important common tasks for the sectors. The levies were instituted and have its framework in the Law of Agriculture Support. The funds became public funds with the agreement of the sectors; own organizations continued to fix the levy and administered its use. There were three purposes for tax reimbursement funds – i. agriculture; ii. horticulture and; iii. organic agriculture. The rate of taxes are decided by the government with only part of it distributed to the reimbursement fund. Each fund is managed by a Board nominated from various sector organization and appointed by the Minister of Food and Agriculture. The fund main purposes were for market development – 15%, R&D and product trial- 45%, Advisory Services and education – 15%. Disease prevention and animal welfare – 15% and co- financing of projects – 10%.
20. The impact of the funds;
- On the mechanisms for the advisory services:
 - The advisory services were and are farmer-driven;
 - Rapid transfer of knowledge and technology by practice;
 - Facilitating access to markets;
 - Capacity building of farmers organizations;
 - Total privatization changed the role of the advisers;
 - Impact of the agricultural funds for development - the use of the fund effectively by way of using it for R&D that is close to practice. Collaboration between entities were facilitated by the universities address the needs while the

company provides practice-related trial development. This ensure the ownership by sector and strong engagement to ensure maximum added value of the fund.

III. National Farmers Organization in Malaysia can play similar role in the same perspective. The role of farmers organization is very important in building the nation and its agriculture sector. Despite

PPP ROME OBSERVATIONS

- I. The approach has proofed rapid speed of transfer of new knowledge and technology by practice which led Danish agricultural sector being on the forefront globally in terms of productivity. FVL model is a joint venture of public support and farmers which formed an extensive institutionalizations of Danish Agriculture. It is a development which rely on self –organization by farmers that at the same time invested massively in education, information sharing and knowledge spreading. The advisory lived in the local communities that they were serving. In the context of Malaysia, following a best practice perhaps would be the best way forward. Collaboration between many relevant parties particularly in exploring sustainable food production is crucial in this demanding future ahead.
- II. Important principles can be drawn from this:
 - i. The government to play a facilitating and regulating role;
 - ii. Supporting self-organization by farmers;
 - iii. Small-scale producer participation is important;
 - iv. Women need to be included

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MECHANIZATION IN AGRICULTURE

- INNOVATIONS OF NO-TILL PLANTING , PRECISION FARMING AND SILO BAG STORAGE IN ARGENTINA

Precision Agriculture in Argentina

1. A few years ago, the development of specific tools such as Geographic Information Systems (GIS) and Global Positioning Systems (GPS), facilitated the advancement of Precision Agriculture (PA). This generated a new way of thinking which enables many agriculture application such as usage of variable rate of seed, fertilizer and herbicide to suit the environment. It transformed extensive agricultural production worldwide.

2. Argentina is now one of the most mechanized country in precision agriculture, thus achieving agronomic, social, environmental and economic sustainability of the countries. It achieved productivity growth and stability in promoting value adding in local development. Precision agriculture management and technology management zones or environments in Argentina have greatly improved for the past 15 years. Most farmers and agribusiness actors have incorporated technologies such as satellite markers “Banderilleros”, yield monitors that generate yield maps, automatic guide tractor which monitors planting, variable dosing to keep record the quality and grain moisture. The technology converged suppliers and service

providers to analyze and advise farmers on the proper use of precision agriculture.

3. An additional benefit of agriculture and precision farming is in facilitating the traceability of processes and agricultural produces by collaborating in the certification of good agricultural practices (GAP) and livestock (BPG).

Mechanization

4. Farm mechanization is a crucial input for improving agricultural production. With the increasing demands for food and agricultural products, mechanization would be able to support the current needs as well as fulfilling the demand that emerged from subsistence farming.

5. The development of agricultural machinery represents a great opportunity for Argentina's job creation, favoring the settlement in small towns especially in adding value. It opens the possibilities of sharing innovation and knowledge in precision agriculture, of which Argentina is a pioneer. Mechanization was applied successfully in production of food, fiber and biofuels. Argentina is the highest percentage of no-till planting worldwide. The country's production capable of providing enough food for its people.

6. Argentine machineries for planting, fertilizing, spraying, harvesting and post harvest were exported to 35 countries. The main manufacturers of these machines are located in Cordoba, Santa Fe and Buenos Aires. Currently, no-till planting covers 92% of arable land in Argentine. They also develop technology and equipment for storage of grain and fodder in silo bags.

7. The Government of Argentina created a National Directorate of Agro-Industrial machinery within the Ministry of Agro Industry of the Nation. The goal is to improve competitiveness of the sector, to bring their machines to the world through transfer of technology and knowledge, to provide best practices machinery to other regions as well as to export an added value and improved machinery ever built.

No-Till Planting

8. No-Till planting (NTP) in Argentina is regarded as an integral system of agricultural production that evolved into the planting of crops without tilling and keeping the residues from the previous crop as ground cover. The technique is based on the cultivation of land without plowing, preventing soil removal. This increases the amount of water infiltrating, nutrient conservation, improved balance of organic matter and a drastic reduction of wind and water erosion.

9. The technique of No-Till Planting, supplements crop rotations and good agricultural practices. It allows sustainable agriculture, preserving soil, reducing fuel consumption and using less machinery which in return resulted less environmental impact compared to normal conventional tillage. The system uses specific machinery that can plant directly without disturbing the soil and thereby maintains a permanent ground cover of crop residue.

10. The benefits of adopting no-till planting is more for sustainable production systems. Crop rotation with different root systems promotes the regeneration of pores, fauna and soil biological

activity. Water usage will be more efficient as it reduces water run-off and evaporation losses.

11. Benefit of no-till planting includes:

- i. Improves water usage;
- ii. Protects against erosion (90% less erosion compared to conventional tillage);
- iii. Improves the soil balance, organic and biology;
- iv. Reduces the formation of surface crusts;
- v. Increases the planting windows;
- vi. Able to plant even in lack of water areas;
- vii. Prolongs the agriculture cycle;
- viii. Improves yield and sustainability;
- ix. Extends the lifespan of the tractors (usage reduction of 66%);
- x. Saves fuel and decreases the amount of emissions;
- xi. Significant increases the hectares worked per person;
- xii. Reduces the amount of machinery used and 40% of fuel consumption compared to conventional; and
- xiii. Allows a 25-40% increase in crop yields with more stability through the years.

12. Argentina has experienced a marking sustained growth, doubling its production, increasing its cultivable area with increasing returns and enhancing the productive capacities of each environment. These were the result of

No-Till Planting which advances agricultural machinery and farming environment and strengthening of biotechnology.

No-till Planting



Pictures of precision farming





Silo Bag

12. Storage technology in silo bags originated from the need for producers to have available storage in the field at harvest, or complementing installed capacity silos fixed structure. It causes low storage capacity in Argentina. As far as logistics is concerned, it allows cheaper freight from the farm, at a time of year where there is no harvesting activity. The system able to solve the problems of transportation as normally faced during harvesting seasons.

13. In adverse weather conditions such as excessive rainfall, the silo bag helps the crop be stored in suitable location in the farm while waiting to be transported to the buyer or harbor for export. The bag suits for livestock dried grain, wet corn and silage of sorghum or event paddy.

14. Technicians of the National Agricultural Technology Institute (INTA) conducted tests with silo bags for more than 10 years. Since 2008, the silo bag technology took a big leap and reached new frontiers. The adoption of the system in Argentina proved so useful that today more than 40 million tonnes are stored in silo bags every year. The incorporation of the silo bag post-

harvest structure is used both in the field by the grain cooperatives and ports. It is common to see from car routes or from the air large number of silos bags, especially in predominantly agricultural areas. The silo bag can be 5 feet in diameter of 50 meters long with capacity of 60 tonnes of grain, or 12 feet in diameter of 100 meters long with a capacity of up to 500 tonnes of grain. Made of linear low density polyethylene with a thickness of 235 microns, it comprises of 2 and 5 layers. The outer layer is white and has additives, UV filters and stabilizers which improves the ability to isolate the grain from thermal effects (heat and humidity). The inner layer protects the grain against ultraviolet rays and prevent light penetration.

15. The solutions given by silo bags in Argentina has not gone unnoticed by the rest of the world. The flexible storage capacity and its low cost, logistical advantages, reducing losses, storage origin and traceability of goods were the attractions for implementation in other countries. Sustained growth in its use has created conditions for the development of an industry associated with it, such as the manufacture of silo bags of different capacity and the necessary machinery for bagging and extraction. Currently, the technology pack which includes silo bags, baggers, extractors and self-unloading hopper cars is exported to more than fifty countries, mainly Brazil, Uruguay and South Africa.

Pictures of Silo Bag



- c. Perhaps no-till planting technique could be used for crop rotation, maize and fruit vegetables planting, sugar cain, pineapple, banana as well as other crops in Malaysia with minor adjustments in pest control as well as fertilizer application.
- d. Usage of Silo Bag in solving storage and high transportation cost in paddy production would be another good preference to opt for in Malaysia. It can also be used for grain, by-products, solid fertilizers and forage conservation.

PPP ROME OBSERVATIONS

- a. The importance of mechanization is agriculture as tool in improving production must be agreed upon by all. This industry has been successfully treasured by developed countries. Malaysia, as developing country must embrace innovation as a vital element in modernization and commercialization of food production to achieve sustainable production.
- b. No-till planting is not a new agriculture technology. Many countries have adopted this technique and proved that yield increased as expected. It is perhaps could be a compliment to existing paddy planting approach especially for areas with water irrigation issue. This technique improves soil fertility, production sustainability, biodiversity our National Agro Food Policy in achieving 100% SSL in rice production.

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