TECHNOLOGY COMMERCIALIZATION: CURRENT ACHIEVEMENTS AND CHALLENGES


MOHD NUR HAFIZ MAT AZMIN
MARDI
WHY AGRICULTURE TECHNOLOGY NEED TO BE COMMERCIALIZED?

- Small Scale
- Own needs

Subsistence Farming

- Big scale
- Low productivity
- Less technology adaption

EXTENSIVE FARMING

- Business entity
- High productivity
- Specialization
- More technology adaption

INTENSIVE FARMING

FFTC-MARDI 2016
FACTORS INFLUENCING CHANGES IN THE AGRICULTURAL COMMERCIALIZATION

- THE RAPID GROWTH OF THE WORLD ECONOMY
- MARKET LIBERALIZATION
- THE RAPID INCREASE IN DEMAND FOR FOOD (SSL 71.6%-2014)
- URBANIZATION PROCESS
- AGRICULTURE IS BUSINESS
FACTORS INFLUENCING VIABILITY IN AGRICULTURAL BUSINESS

- Product Safety
- Production Efficiency
- Quality
- Conservation of Biodiversity
- Price

BUSINESS VIABILITY {FULL DEPENDENT TO TECHNOLOGY}
THE PROCESS OF TECHNOLOGY GENERATED AND COMMERCIALIZATION

IDEA → RESEARCH → FINDINGS → SCREENING → EVALUATION → UPSCALING → PACKAGE → MARKETING → SALES
### STAGE GATE MODEL: SEQUENTIAL MODEL

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
<th>Gate</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea Creation</td>
<td>Research ideas of value</td>
<td>Head of Research Program at Research Centers</td>
<td>Research Project Title</td>
</tr>
<tr>
<td>Project Proposal</td>
<td>Literature review and complete research project proposal write-up</td>
<td>Technical Expert Committee in the Research Centers</td>
<td>Project Proposal approval for funding</td>
</tr>
<tr>
<td>Basic Research &amp; Technology Development</td>
<td>Research Activities</td>
<td>Science-Fund Technical Evaluation Committee</td>
<td>Proof of concept (POC) / Invention / Novelty / Prototype</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assessment Committee (Research Center)</td>
<td></td>
</tr>
<tr>
<td>Technology Verification &amp; Evaluation</td>
<td>Technology screening and evaluation</td>
<td>TC’s Technology Evaluation Committee (IP &amp; Business Analysis)</td>
<td>Recommendation of potential technology / Viability and feasibility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology’s Evaluation &amp; Enhancement Committee (JPPT)</td>
<td></td>
</tr>
<tr>
<td>Technology Disclosure / Endorsement</td>
<td>Research findings presentation</td>
<td>MARDI’s Corporate Management Committee (JPKM)</td>
<td>Endorsement for IP registration &amp; commercialization evaluation</td>
</tr>
<tr>
<td>Technology Packaging and Marketing</td>
<td>Business model and plan development. Business matching and negotiation</td>
<td>Targeted clientele such as GLC, PLC, SMEs’, limited and private limited companies.</td>
<td>Pre-commercialization / Licensing, J/V, or OEM, spin-offs companies, profit sharing etc.</td>
</tr>
</tbody>
</table>
CURRENT
ACHIEVEMENTS
TECHNOLOGY TRANSFER / COMMERCIALIZATION

International

• Average only 5-7% from over all technologies being created and commercialized. For example in Brazil, only 5.1% technologies were being adopted and commercialized successfully (MOSTI, 2012)

National

• Average only 5-8% from over all technologies being created and commercialized. (MOSTI, 2012)

MARDI

• In 10th Malaysia Plan, 14% of the technologies created by MARDI were being adopted and commercialized
GOVERNMENT SUPPORT ON TECHNOLOGY TRANSFER / COMMERCIALIZATION

1.5% GDP
- R&D

RMKe-9
- Allocated RM5.3 bill for R&D (MOSTI)

GTP
- 6 NKRA

ETP
- 8 incentives
EXPENDITURE FOR R&D ACTIVITIES

Expenditure (RM Million)

Year | Expenditure (RM Million)
-----|-------------------------
2008 | 6,071
2009 | 7,200
2010 | 8,511
2011 | 9,422
2012 | 10,613
TECHNOLOGY COMMERCIALIZATION IN MARDI

<table>
<thead>
<tr>
<th></th>
<th>9th MP</th>
<th></th>
<th>10th MP</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-R&amp;D</td>
<td>880</td>
<td>320</td>
<td>475</td>
<td></td>
</tr>
<tr>
<td>R&amp;D</td>
<td>270</td>
<td></td>
<td>320</td>
<td>(67.3%)</td>
</tr>
<tr>
<td>Pre-Commercial</td>
<td>16</td>
<td></td>
<td>3</td>
<td>(0.9%)</td>
</tr>
<tr>
<td>Public Good</td>
<td>23</td>
<td></td>
<td>45</td>
<td>(14.0%)</td>
</tr>
<tr>
<td>Commercialization</td>
<td>880</td>
<td></td>
<td>475</td>
<td></td>
</tr>
</tbody>
</table>

Achievement Report for MARDI 9th and 10th Malaysia Plan

FFTC-MARDI 2016
TECHNOLOGY COMMERCIALIZATION IN MARDI

- 94 TECHNOLOGIES COMMERCIALIZED
- 84 COMPANIES
- 14% YEARLY

*660 TECHNOLOGIES EVALUATED

RM 8m
MARDI INCOME
(TLF, MF, Royalty, Consultation fees)

RM 50.217m
TECHNOLOGY VALUE

RM 341.07m
BUSINESS VALUE

UNTIL 31 AUGUST 2016

FFT-MARDI 2016
**PADDY**

**ISSUES:** LOW PRODUCTIVITY, PESTS PROBLEM, WATER SCARCITY, LABOUR SHORTAGE, HIGH-VALUE PRODUCTS

<table>
<thead>
<tr>
<th>TEKNOLOGIES:</th>
<th>COMPANIES/USER</th>
<th>IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MR 219, MR253, MR263, MR269</td>
<td>MADA, KADA, IADA, FARMERS</td>
<td>&gt;90% paddy fields value: RM500 mil</td>
</tr>
<tr>
<td>2 MR220CL1 &amp; MR220CL2 Clearfield</td>
<td>BASF International</td>
<td>Overcome weedy rice problem Value: RM50 mil</td>
</tr>
<tr>
<td>3 Foundation seeds</td>
<td>12 Certified Seeds Producers</td>
<td>High Quality paddy seeds Value: RM 160 mil</td>
</tr>
<tr>
<td>4 Special Rice (MRQ74/MRQ76)</td>
<td>5 Anchor Companies</td>
<td>High Value rice Value: Import RM700 mil</td>
</tr>
<tr>
<td>5 Auto Row Seeder</td>
<td>Oryza Mechanique Sdn. Bhd.</td>
<td>Mechanized paddy farming Value: RM2 mil</td>
</tr>
<tr>
<td>6 Paddy Aerob MR1A</td>
<td>FELCRA, Farmers</td>
<td>Outside paddy fields, wasteland, Intercropping Value: TBD</td>
</tr>
</tbody>
</table>

**TEKNOLOGIES:**
- MADA, KADA, IADA, FARMERS
- BASF International
- 12 Certified Seeds Producers
- 5 Anchor Companies
- FELCRA, Farmers

**IMPACTS:**
- >90% paddy fields value: RM500 mil
- Overcome weedy rice problem Value: RM50 mil
- High Quality paddy seeds Value: RM 160 mil
- High Value rice Value: Import RM700 mil
- Mechanized paddy farming Value: RM2 mil
- Outside paddy fields, wasteland, Intercropping Value: TBD

**FFTC-MARDI 2016**
### TECHNOLOGIES:

<table>
<thead>
<tr>
<th>#</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Producing Liquid Fertilizer For Paddy</td>
</tr>
<tr>
<td>8</td>
<td>Zeolite Based Fertilizer</td>
</tr>
<tr>
<td>9</td>
<td>Rice Based Products</td>
</tr>
</tbody>
</table>

### COMPANIES/USER

<table>
<thead>
<tr>
<th>Technology</th>
<th>Company</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producing Liquid Fertilizer For Paddy</td>
<td>Nutri Biotech Fertilizer Sdn. Bhd.</td>
<td>Agriculture input Value: RM10mil</td>
</tr>
<tr>
<td>Zeolite Based Fertilizer</td>
<td>Hipotech Sdn. Bhd</td>
<td>Agriculture input Value: RM2.4mil</td>
</tr>
<tr>
<td>Rice Based Products</td>
<td>Jabi Rice Sdn. Bhd.</td>
<td>Breakfast cereal, rice based snacks Value: TBD</td>
</tr>
</tbody>
</table>

**FFTC-MARDI 2016**
### TECHNOLOGIES:

1. Exotica Papaya
2. Josaphine Pineapple
3. Minimal Processing (Jackfruit, Durian)
4. Starfruit Under The Insects Proof Structure
5. Growpine Fertilizer - Pineapple
6. Vegetables and Rock Melon Under The Rain Cover Structure
7. Steam Distillation Machine-Essential Oils

### COMPANIES/USER

<table>
<thead>
<tr>
<th>Technologies</th>
<th>Companies/User</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exotica Papaya</td>
<td>Exotic Star &amp; Far East SB</td>
<td>Value: RM20mil – China</td>
</tr>
<tr>
<td>Josaphine Pineapple</td>
<td>South Fruit Sdn. Bhd.</td>
<td>Value: RM8mil – Singapura, Hong Kong</td>
</tr>
<tr>
<td>Minimal Processing (Jackfruit, Durian)</td>
<td>PASFA</td>
<td>Value: RM200,000</td>
</tr>
<tr>
<td>Starfruit Under The Insects Proof Structure</td>
<td>Sri Balakong Sdn. Bhd.</td>
<td>Value: RM 30mil - Exported to Europe market</td>
</tr>
<tr>
<td>Growpine Fertilizer - Pineapple</td>
<td>PK Fertilizers Sdn. Bhd.</td>
<td>Value: RM 400,000</td>
</tr>
<tr>
<td>Vegetables and Rock Melon Under The Rain Cover Structure</td>
<td>Melonaires Sdn. Bhd.</td>
<td>Value: RM 0.5mil</td>
</tr>
<tr>
<td>Steam Distillation Machine-Essential Oils</td>
<td>Polysage Engineering Sdn. Bhd.</td>
<td>Value: RM 0.5mil</td>
</tr>
</tbody>
</table>

### IMPACTS:

- Exotic Star & Far East SB: Value: RM20mil – China
- South Fruit Sdn. Bhd.: Value: RM8mil – Singapura, Hong Kong
- PASFA: Value: RM200,000
- Sri Balakong Sdn. Bhd.: Value: RM 30mil - Exported to Europe market
- PK Fertilizers Sdn. Bhd.: Value: RM 400,000
- Melonaires Sdn. Bhd.: Value: RM 0.5mil
- Polysage Engineering Sdn. Bhd.: Value: RM 0.5mil
LIVESTOCK
ISSUES: LOW RATE OF COW GROWTH, HIGH PRICE OF FUNCTIONAL (IMPORTED) EGGS, HIGH COST OF FORAGE, INCREASE IN DEMAND FOR AYAM KAMPUNG

TECHNOLOGIES:
1. Brakmas Cow
2. Omega 3 Chicken Eggs
3. OPF as Forage
4. Pure Breed Indigenous Chicken (Ayam Kampung)
5. OTOSIL
6. Custom RFID Chip Design

COMPANIES/USER | IMPACTS
--- | ---
FELDA, PPNP, LKPP | Value: RM2.5mil
LTK Bhd | Value: RM50mil
FELDA | Value: RM10mil
Breed Producer, Breeders | Value: RM302mil
Choon Heng Engineering Sdn. Bhd. | Value: RM 300,000
Veterinar Department – Breeders | Value: RM 200,000
## HIGH VALUE PRODUCTS

### ISSUES: DEPENDANCY ON IMPORTED HUMIC ACID, LOW EXPLOITATION ON LOCAL BIO SOURCES

<table>
<thead>
<tr>
<th>TECHNOLOGIES:</th>
<th>COMPANIES/USER</th>
<th>IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Nitrohumic Acid</td>
<td>CCM Fertilizers Sdn. Bhd.</td>
<td>Value: RM12 mil</td>
</tr>
<tr>
<td>2  Effective micro-organisms - GENKIMO</td>
<td>MARDI Klang</td>
<td>Value: RM50 mil</td>
</tr>
<tr>
<td>3  Composite Polymer Kenaf</td>
<td>KPC Manufacture Sdn. Bhd.</td>
<td>Value: RM2 mil</td>
</tr>
<tr>
<td>4  Ligno Tiger Milk Mushroom</td>
<td>Ligno Biotech Sdn. Bhd.</td>
<td>Value: RM3.5 mil</td>
</tr>
<tr>
<td>5  Clinoptilolite Organic Fertilizer-Natural Based</td>
<td>ABH Mega Sdn. Bhd.</td>
<td>Value: RM20 mil</td>
</tr>
<tr>
<td>7  Salmonella Kit@MicroTEZ</td>
<td>OPHL Sdn. Bhd.</td>
<td>Value: RM 4 mil</td>
</tr>
</tbody>
</table>

FFTC-MARDI 2016
AGRO-BASED INDUSTRY

ISSUES: LACK OF PRODUCT, HEALTH PRODUCTS FROM LOCAL RESOURCES & UTILIZATION OF BY-PRODUCTS

- Technology: Sparkling drinks
  - Value: RM4 mil

- Technology: Moola Granola Bar
  - Company: Agro Jerneh SB
  - Value: RM3 mil
  - AEON & export to Oman

- Technology: Smoked fish
  - Value: RM4 mil
AGRO-BASED INDUSTRY

ISSUES: LACK OF PRODUCT, HEALTH PRODUCTS FROM LOCAL RESOURCES & UTILIZATION OF BY-PRODUCTS

- Technology: Fish Fillet (Cobia)
  - Value: RM4 mil

- Technology: Glazed Whole Tilapia
  - Value: RM5 mil

- Technology: Prawn Tempura
  - Value: RM0.5 mil
AGRO-BASED INDUSTRY

ISSUES: LACK OF PRODUCT, HEALTH PRODUCTS FROM LOCAL RESOURCES & UTILIZATION OF BY-PRODUCTS

• Technology: MVCO
• Company: Biotropics Malaysia Bhd
• Value: RM20 mil

• Technology: EVCO
• Company: EVCO Sdn Bhd
• Value: RM5 mil

• Technology: Nutrima Just Great
• Company: UNB Sdn. Bhd.
• Value: RM4 mil

FFTC-MARDI 2016
AGRO-BASED INDUSTRY

ISSUES: LACK OF PRODUCT, HEALTH PRODUCTS FROM LOCAL RESOURCES & UTILIZATION OF BY-PRODUCTS

- Technology: Pink Guava Dietary Fibre Powder
- Value: RM1 mil

- Technology: Essential Oil
- Value: RM0.3 mil

- Technology: VitAto Based Product
- Company: AFS Enterprise
- Value: RM0.2 mil

FFTC-MARDI 2016
MALAYSIA COMMERCIALIZATION YEAR (MCY) 2016

- 26 Institutions
  - 13 agencies / RI
  - 5 RU
  - 8 technologies development agencies

- 150 products
  - Commitment from various categories

- Product Awards
  - November 2016
  - (RM 1.0 Million)

Product Awards (RM 1.0 Million)
**Name of product**  
Rice varieties MR 220- CL 1 and MR 220-CL 2 plus onduty clearfied rice production system

**Current Status**  
BASF (M) Sdn Bhd is actively promoting CL1 and CL2 seeds by giving explanation to farmers in order to promote CL1 and CL2 seeds and informed the farmers to adhere to the management standards. This paddy production system is able to solve the weedy paddy problem.

**Target Market**  
Farmers/Expansion agents (MADA, KADA, DOA)

**Strategic partner/business**  
BASF (M) Sdn. Bhd.

**Income /Licensing Fees/Royalties**  
BASF (M) Sdn Bhd has paid about RM450,000 in royalty in May 2016.

---

**MCY 2016**

<table>
<thead>
<tr>
<th>Date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Februari 2016</td>
<td>COMPLETED</td>
</tr>
</tbody>
</table>

**Domestic Market:**  
Products can be bought through expansion agencies like Felcra Plantations and Seri Merbok.
<table>
<thead>
<tr>
<th><strong>Name of product</strong></th>
<th><strong>Nutrima™ Cellcode</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Status</strong></td>
<td>Buminiche Sdn Bhd actively promoting Nutrima™ Cellcode and managed in signing the MoU with Saudi Arabia, China, India and Indonesia. This product will enter Watson’s market this June.</td>
</tr>
<tr>
<td><strong>Target Market</strong></td>
<td>Users that has high awareness on health.</td>
</tr>
</tbody>
</table>
| **Strategic partner/business** | 1. Buminiche Sdn. Bhd (market, sell and distribute)  
2. Alpha Active Sdn. Bhd (manufacture, bottling and packaging) |
| **Income /Licensing Fees/Royalties** | Income to MARDI – RM188,000 |

**MCY 2016**

- **NDA**: COMPLETED
- **NEGOTIATION**: COMPLETED
- **DRAFT OF AGREEMENT**: COMPLETED
- **SIGNING AGREEMENT**: COMPLETED
- **LAUNCHING**: COMPLETED
- **PRODUCT AVAILABLE IN MARKET**: YES

**22 Jun 2015**

Domestic: Product is available through Sole Distributor: Buminiche Sdn Bhd and agent: KoMARDI

International: MoU with Saudi Arabia, China, India, Indonesia and Turkey
<table>
<thead>
<tr>
<th>Name of product</th>
<th>Custom Sub-Dermal RFID Identification System for Livestock</th>
</tr>
</thead>
</table>
| Current Status | Identity identification and weight record. 
Received order for 46 sets valued at RM690,000. |
| Target Market  | Farmers/Farmers’ Organization Authority/Veterinar Department/FELCRA |
| Strategic partner/business | KoMARDI |
| Income /Licensing Fees/Royalties | Licensing Fee: RM60,000 
Management Fee: RM5,000 |

**MCY 2016**

- **NDA**: COMPLETED
- **NEGOTIATION**: COMPLETED
- **DRAFT OF AGREEMENT**: COMPLETED
- **SIGNING AGREEMENT**: COMPLETED
- **LAUNCHING**: WILL BE LAUNCHED AT MAHA 2016
- **PRODUCT AVAILABLE IN MARKET**: YES

*31 Mei 2016*

Domestic: 
Order can be made through KOMARDI (licensee)
Name of product | High Value Custom Blend RHC Organic Fertilizer
---|---
Target Market | Farmers, DAO, MADA, KADA, Farmers’ Organization Authority.
Income /Licensing Fees/Royalties | Outright Sale Fee : RM180,000
| Management Fee : RM5,000

Domestic: Orders can be made through Greenearth (Intl) Holdings Sdn. Bhd.

17 February 2016
<table>
<thead>
<tr>
<th>Name of product</th>
<th>Consultation for Commercial Rice Production Project at Ondo, Ogun and Suriname.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Status</td>
<td>Agreement is signed on 21\textsuperscript{st} of March 2016 and currently in the process of documentation to starts the consultation activities.</td>
</tr>
<tr>
<td>Target Market</td>
<td>Paddy plantation in Ogun, Nigeria dan Suriname.</td>
</tr>
<tr>
<td>Strategic partner/business</td>
<td>MARDI Holdings Sdn. Bhd.</td>
</tr>
<tr>
<td>Income /Licensing Fees/Royalties</td>
<td>Total cost of the project USD7.7mil. MARDI received USD400,000 for this project.</td>
</tr>
</tbody>
</table>

Consultation activities has started on paddy plantation.

**MCY 2016**

- **NDA**: COMPLETED
- **NEGOTIATION**: COMPLETED
- **DRAFT OF AGREEMENT**: COMPLETED
- **SIGNING AGREEMENT**: COMPLETED
- **LAUNCHING**: WILL BE LAUNCHED IN 2016
- **PRODUCT AVAILABLE IN MARKET**: NO

*21 March 2016*
THE FACTS YOU NEED TO KNOW……

WORLD MOST DEMANDING / VALUABLE PRODUCTS
- Anti-aging - $600M
- Fitness - $300 M
- Slimming - $200 M

WORLD MOST VALUABLE BRAND (FORBES)
- APPLE - $154.1 b
- Google - $82.5 b
- Microsoft - $75.2 b
- Coca Cola - $58.5 b
- Facebook - $52.6 b

WORLD MOST TRENDING PRODUCTS 2016
- Green Tea
- Matcha
- Detox Products
- Coconut Oil Based Products
Elements Of Sustainable Technology Management

Outcome

Policy

Implementation

Innovation → Protection

Wealth Creation

Commercialization

Society Satisfaction
STRATEGIC IMPLEMENTATION

Product Push
- Idea bank
- Manageable Fund
- Attractive Product

Demand Pull
- Sensitive
- Wide networking
- Competitive Personnel
- Promising Deliverable
BUSINESS & TECHNOLOGY EVALUATION
EVALUATION METHODS

i. Financial Analysis

ii. Market Analysis/Research

iii. Main Cluster

iv. Product Life Cycle
I. FINANCIAL ANALYSIS

• Projected Cash Flow Analysis
• Enterprise Budget
• Partial Budget
A) PROJECTED CASH FLOW ANALYSIS

- Net Present Value – Technology Licensing Fee
- Internal Rate of Return (IRR)
- Benefit-Cost Ratio (BCR)
- Payback Period (PBP)
- Break Even Point (BEP)
- Return On Investment (ROI)
II. ANALYSIS/MARKET RESEARCH

- Market Information
- Market Segmentation
- Market Trends

Method:
- Questioning; Qualitative or Quantitative
- Observations; Experiment or ethnographic
III. MAIN CLUSTER*

A) ‘Food Security’ / Main Commodity / Impact (6-8%)
B) Precision Agriculture / Machine / Food / Formulation (5-7%)
C) Biotechnology/ Livestock / IT / Gadget / DIY (4-6%)
D) Crops/ Fruits/ Herbs / Others (3-5%)

* Depending on the focus of stakeholder or current demand
IV. PRODUCT LIFECYCLE*

• How long a product can survive in the market and compete??
• Four phase:
  ➢ R&D (Bleeding Edge)
  ➢ Ascent (Leading Edge)
  ➢ Maturity
  ➢ Decline (Decay Phase)**

* need to clustered the technology and determined the lifecycle
** Avoid by Research Enhancement
CREATE VALUE PROPOSITION
Best Practices of Technology Commercialization

FFTC-MARDI 2016
Commercialization Method

- CONSULTATION
- LICENSING
- ORIGINAL EQUIPMENT MANUFACTURER (OEM)
- OUTRIGHT SALE
- DISTRIBUTORSHIP / AGENT
- LEASING
- SPIN OFF
- JOINT VENTURE
- PROFIT SHARING

FFT-MARDI 2016
Rebranding of TCO
CONCLUSION

TRANSFORMATION OF TECHNOLOGY FROM PUBLIC USE TO SALE

PRODUCE THE EXPECTED OUTPUT (QUALITY & DEMAND) IN THE BUSINESS ENVIRONMENT

GENERATE HIGHER RETURNS WITH SPIN-OFF, OEM AND PROFIT-SHARING

BEST PRACTICE OF TECHNOLOGY COMMERCIALIZATION

FFTC-MARDI 2016
THANK YOU