Malaysian Padi & Rice Industry: Applications of Supply Chain Management Approach[1]

by

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Introduction

Largely guided by the ramifications and lessons from the 2007/08 World Food Crisis, which witnessed the tripling of Thai rice prices over that period, a 30% jump in prices in Bangkok in a single day, and rice riots in Ho Chi Minh over a weekend, countries have come to realise that Food Security needs to be addressed with new lenses that take into account new dimensions. Such new dimensions (as elaborated by Wong, 2009a) include regional solutions (ASEAN and East Asian), increasing role of the private sector, traceability and food safety.

Throughout this crisis and beyond Malaysia has essentially stuck to its strategic approach to food security (see Wong, 2009b) and its elected net importer of rice and selected food items as indicated in the Mid-Term Review of the 9th Malaysia, despite some 'politically correct' (but contrary) statements made when the situations demanded at the height of the crisis. This time-tested strategy stems from Malaysia's unique position of a small and very open economy which enjoys a healthy trade balance as well as an enviable trade and international relations with the rest of ASEAN, East Asia and countries which are further afield.

We are also reminded of Ambler-Edwards *et al*'s (2009) contention that future food production and supply are going to be more uncertain and prices more volatile. We also take cognizance of FAO's (2008) prediction the only 10% of future food production increases are likely to come from area expansion, about 20% from crop or farm enterprise intensification, but 70% of increase is expected to come from R&D, innovation and policies. Consequently, and guided by the Conference Theme of 'Strengthening Food Security through Sustainable Rice Production', we have elected to consider the applications of Supply Chain Management beyond merely the Padi and Rice Industry in Malaysia to also explore its relevance to the Technology and Innovation Supply Chain so as to stimulate discussion at this Conference, and follow up action subsequently.

This paper is organised such that after this introduction, the next Section recounts the increasing relevance of Supply Chain Management in the Malaysian context. Section 3 provides an overview

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of the Malaysian Rice Supply Chain, including Supply Chain Development in Malaysia (Peninsular Malaysia, Sabah and Sarawak) and further afield (Myanmar) as well as highlight the existing strengths and weaknesses in Malaysia and its implications for future research, particularly those with a policy slant. Section 4 presents a case for the consideration of a Technology and Innovation Supply Chain for padi and rice. Subsequently, we consider the way forward and the need to get the basics and balance right before the conclusion in the final Section.

Increasing relevance of Supply Chain Management

Supply Chain Management (SCM) has, in recent years, attracted the attention of a cross-section of academics, researchers and practitioners alike. It has spawned text books and even dedicated journals like '*Supply Chain Management*, *an International Journal'*. The development of the idea of supply chain owes much to the emergence from the middle of the last century of systems theory and the associated notion of holism. It has been contended (for example Boulding, 1956) that the behaviour of a complex system cannot be understood completely by the segregated analysis of its constituent parts. New (1997) has suggested that despite the undisputed importance of financial services, electronic communication and media industries, the economy still resolves around the production, processing, moving, buying and selling of 'stuff' and that SCM is about mechanisms and processes by which these activities are organized.

A central tenet of supply chain management (SCM) is that in future, competition will no longer be between firms but rather be between supply chains, comprising groups of companies intricately linked through a series of partnerships and alliances at the various levels of the supply chain. A cursory review of the literature indicates that SCM has been applied from the perspective of an individual firm; related to a particular product or item (such as the supply chain of oil palm, or rubber, or rice); and from the perspective of industry group or sector (such as grains and agri-food).

As all components along the supply chain need not belong to one company or group, varying degrees of strategic alliances can be observed at the operational level: from loose structures (JV "at the door") to dedicated/designated suppliers (as in the case of supermarkets), through to cross investments. At the operational level, there is significant value-adding along the entire supply chain. Furthermore, supply chains can reduce asymmetry of information at interfaces with each subsequent level, thereby reducing transaction costs as well as increasing feedback and improving response rate to changes in consumer preferences and tastes. They thus enable the

capturing of premiums. Of course, this sharing of information is greatly facilitated, enhanced and even revolutionised by recent advances in ICT.

Empirical evidence suggests that there can be amicable/sustainable sharing of margins along supply chains, including the transmission of prices back to farmers/producers. Consequently, an appealing strategy is to hook up (or integrate) small farmers/producers to increasingly sophisticated local supply chains (involving supermarkets) and more lucrative overseas markets, especially niche markets. In Malaysia, supply chains can and will speedily exploit advances in biotechnology and its impending convergence with ICT as well as innovations. Similarly, there will be exponential growth, if and when interconnectivity of supply chains was exploited, as is already happening with telecommunications (telcos) and multimedia superhighways.

From a policy and institutional standpoint, most government interventions and programmes in Malaysia have invariably been overtly "production-centric" so much so that the farming/production subsystem is not well linked or integrated (and often "out-of-sync") with the post-harvest subsystem. As can be gleaned from the big picture of a generalized agri-food supply chain depicted in Figure 1a, the power of supply chains is the value-adding potential at each level of the chain when agriculture is viewed in its broader and more holistic, agribusiness perspective. This will offer the basis for agriculture to drive overall development by leveraging on inherent advantages and potential of nations at the inputs, processing, wholesale and retail trade as well as international trade levels. In so doing, agriculture via its linkages in the supply chain, will also contribute to overall national economic growth from agro-based industries and value adding as well as agro-based services and consultancies at all levels of the supply chain.

This underlying rationale, to the authors' minds, forms the cornerstone of Malaysia's (re)emphasis of agriculture as an engine of growth. A key challenge, however, is to ensure or facilitate the orderly and balanced development of supply chains, for as with all chains, its strength (or competitiveness) is invariably determined by its weakest link. The potential economic activities and avenues for value adding along the entire agri-food supply chain, from "seed to shelf" are depicted in Figure 1b.

Figure 1a: Agrifood Supply Chain

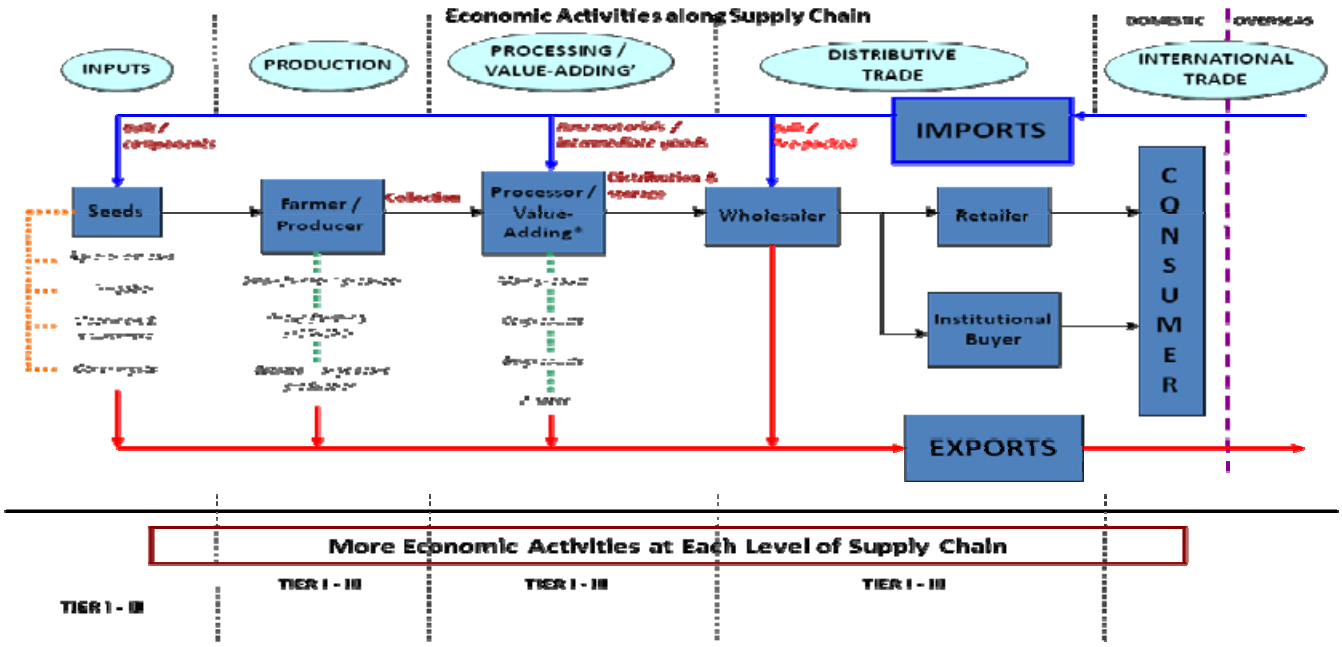
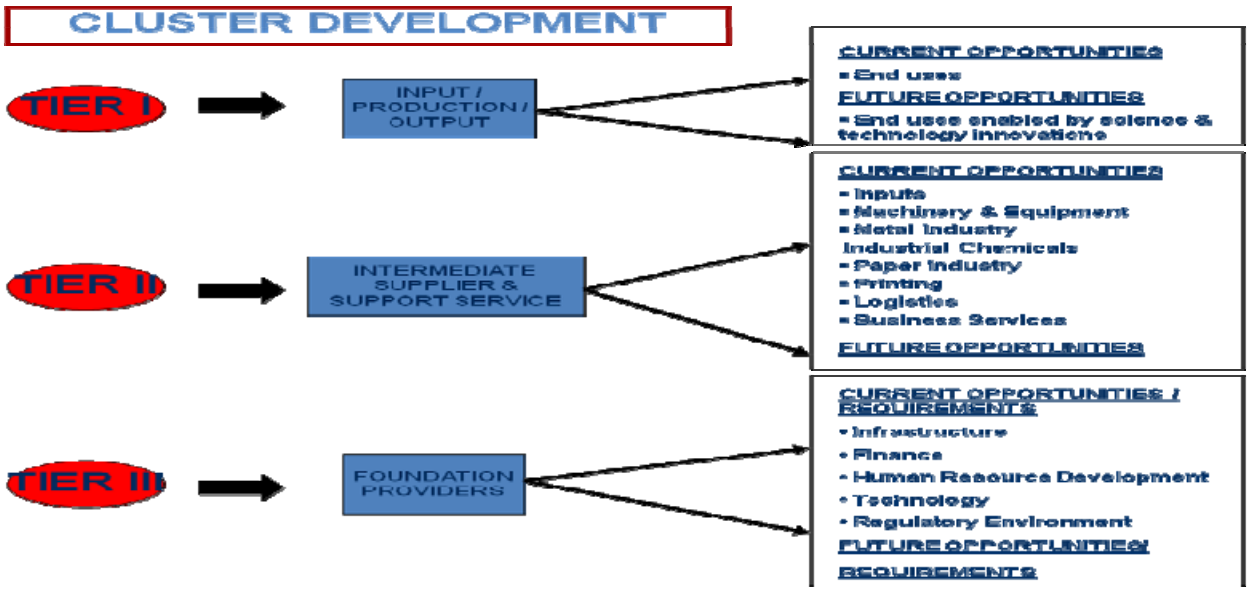


Figure 1b: Cluster Development



Overview of Malaysian Rice Supply Chain

Using data sourced from both MoA and BERNAS, Figure 2 depicts the rice supply chain in Malaysia in 2007. The movement of padi, rice and rice-products along the supply chain can be detailed as follows:

a) In 2007, there were 14 seed centers (both public and private), supplying seeds to approximately 138,000 farmers (subsidy figure).

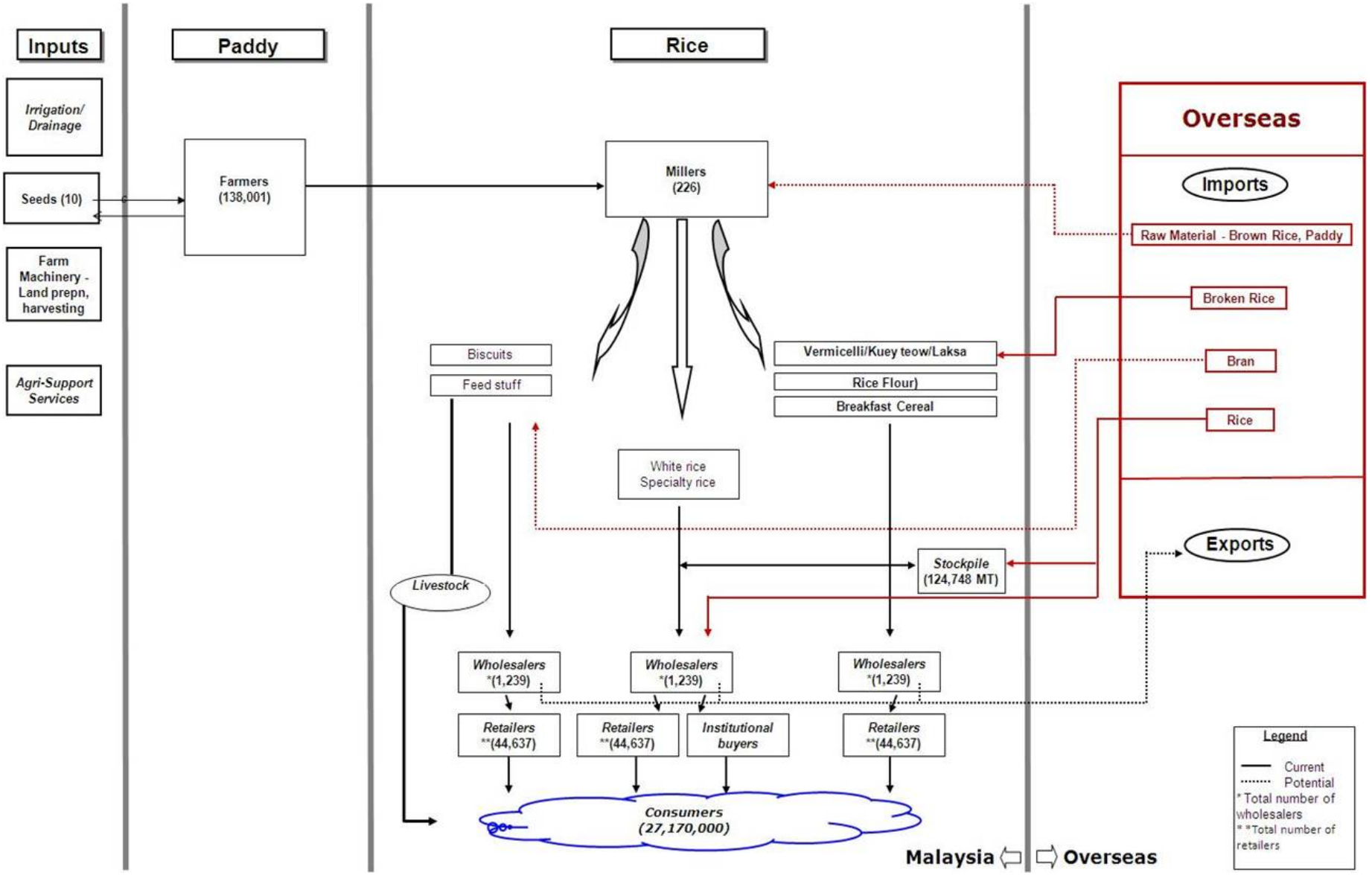
b) The marketed surplus produced by farmers was purchased by 231 mills [174 in Peninsular Malaysia and 57 mills in East Malaysia (28 mills in Sabah and 29 mills in Sarawak)].

c) The output from these mills were sold to some 1,239 wholesalers [927 in Peninsular Malaysia and 212 wholesalers in East Malaysia (144 wholesalers in Sabah and 168 wholesalers in Sarawak)]

d) Local and imported rice were supplied to some 44,637 retail outlets [34,338 in Peninsular Malaysia and 6,646 retailers in East Malaysia (3,237 retailers in Sabah and 3,409 retailers in Sarawak)]

e) 27.17 millions consumers were served in 2007 [21.7 million consumers in Peninsular Malaysia and 5.464 million consumers in East Malaysia (3.06 million consumers in Sabah and 2.404 million consumers in Sarawak)].

Figure 2 : Malaysian Rice Supply Chain 2007



Supply Chain Development

BERNAS and the key players at the inputs (seeds), production, processing and distributive levels have been slowly but surely developing various distinct rice supply chains in Peninsular Malaysia, Sabah and Sarawak since the mid 1990s. Unfortunately, none of them have come close to realising the comprehensiveness of the initial BERNAS Comprehensive Supply Chain Model formulated in the late 1990s, as depicted in Figure 3. Nevertheless, the very fact that distinct supply chains are evolving augurs well for the future of the Malaysian padi and rice industry, particularly when we note with interest the variants that are evolving in Sabah and Sarawak, largely to suit their differences in resource endowment and institutional framework in many innovative ways.

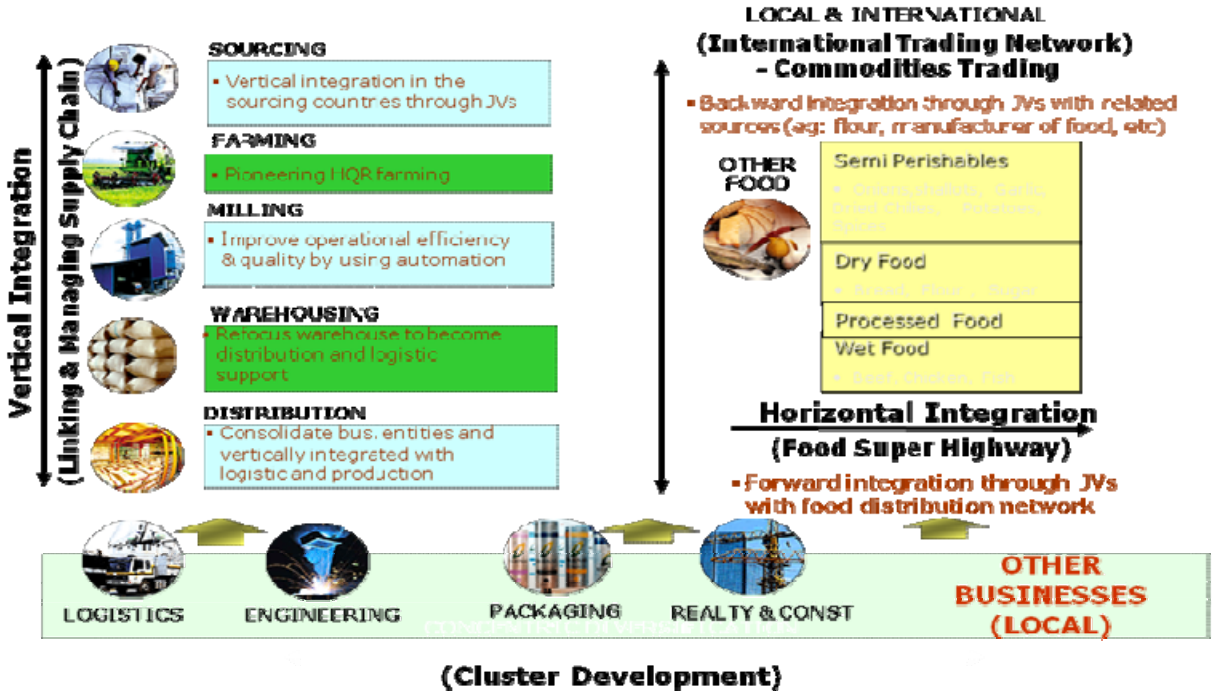


Figure 3: BERNAS' Comprehensive Rice Supply Chain and International Trading Network of the late 1990s.

As an aside, it is considered instructive to note the development of comprehensive rice supply chains even in Myanmar, where the state encouraged the formation of 27 rice 'leading companies' over the last two years towards increasing productivity, production, quality, traceability, innovation and transmission of prices and benefits back to farmers and the major players along the supply chain.

The most innovative and advanced is perhaps the Ayeyar Hinthar Group and its subsidiary Kithayar Hinthar formed with 48 local partners in Pyay which galvanises the upstream activities in Pyay, West Bago, as shown in Figure 4.

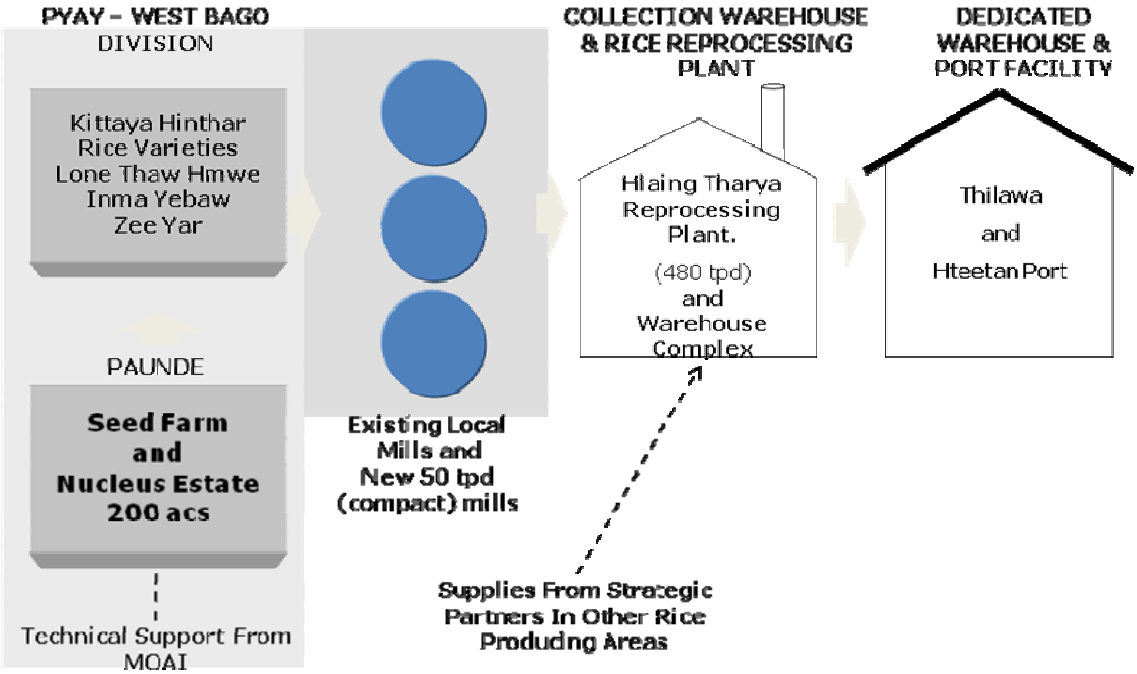


Figure 4: Ayeyar Hinthar Comprehensive Rice Supply Chain

The key components of Ayeyar hinthar's Comprehensive Rice Supply Chain include:

- Paddy seeds – production of good/certified seeds at Paunde with the strategic technical support of Hmawbe (MOA&I) Seed Research Center
- Seed Processing Plant (next phase)
- Paddy farmers training center and field laboratory (Applied R&D) – planning stage
- Commercial Rice Production – nucleus estate and system of out-growers /contract farmers at Paunde (currently involving contract farmers farming some 3,000 acres)
- Milling – upgrading of existing mills around Pyay and construction of reprocessing plant (Hlaing Tharyar) and port facilities (for export) at Yangon.
- Branding/quality control – special brands by rice variety for Pilot Project area rice, emphasizing food safety and traceability.
- Domestic Distributive Trade and Exports – Emata 25% and Emata Special, by variety Inma Yebaw, Zee Yar, Lone Thaw Hmwe, Paw San Hmwe – 5%, 10%, 15%)

Rice Supply Chain developed to date : Strengths & Weaknesses

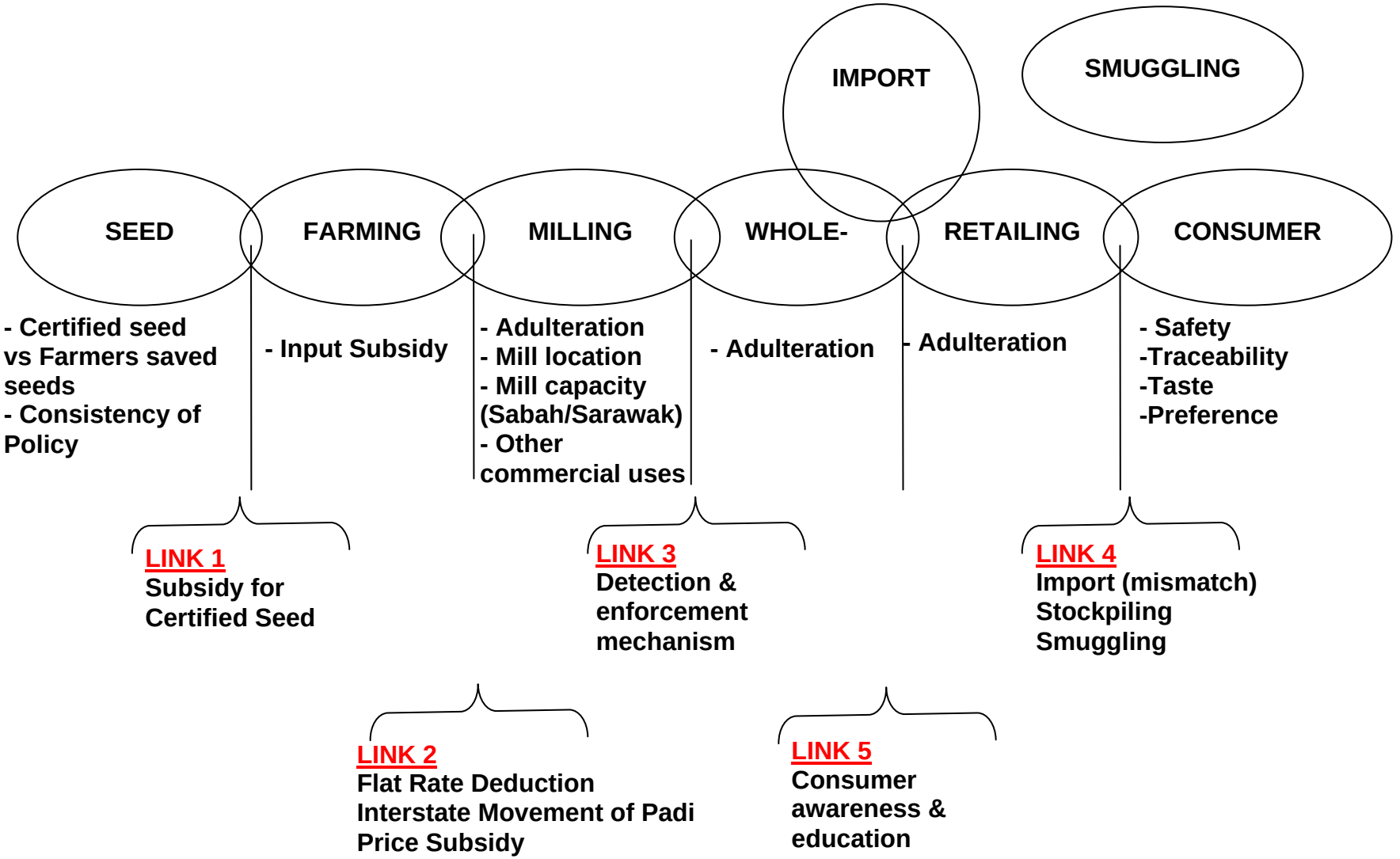
By using the supply chain management approach, strengths, weaknesses, opportunities as well as threats could more easily be pointed out and determined in different segments of the Malaysian Rice Supply Chain. For example (Refer to Figure 5):

a) Concerns on 'effectiveness and reliability' of certified seeds versus the farm-saved seeds as well as consistency (or inconsistency) of policy
b) Concerns on various farming or production inputs, techniques, technology and requirement.
c) The flow of *padi* from farms to mills lacks quality control which is largely conditioned by a flat deduction (grading) system.
d) Wastage at mills and warehouses, can be rather high, though it varies from facility to facility
e) The grading of rice at the mill, wholesale and retail levels has also been compromised and we witness many types of adulteration which have proven difficult to control.
f) Smuggling is another major problem though this has waned recently because of high international prices.
g) Determination of level of reasonable stockpiling as buffer and/or emergency reserve
h) Customers (and traders), in some cases (like in Sabah and Sarawak), do not get rice matching their preference. There is also raising doubts in terms of traceability and safety of their rice.

All these problems can incur additional costs in the supply chain taken as a whole. These costs would ultimately be passed on to consumers or borne by the government indirectly through higher subsidies and administrative costs.

It is thus important to highlight the strengths as well as weaknesses at each level of the current rice supply chain and the chain taken as a whole. The strengths and weaknesses will determine the opportunities found in the present supply chain system. This, in turn, will indicate how the government can utilize and manage the supply chain system to meet national rice policy objectives. From the strengths and weaknesses, one would also be able to formulate the tasks which need to be undertaken by the relevant institutions/government agencies in using the supply chain system to meet national objectives.

Figure 5 : Malaysian Supply Chain Of Padi & Rice: Strengths & Weaknesses



Consideration for Technology & Innovation Supply Chain in Padi & Rice

In this connection, one should be cognizant of Thailand's recent initiative to organize and target R&D efforts coupled with effective global marketing strategies to power the development and commercialization of innovative rice products. These are summarized in Table 1 below.

While rice will be made available in future in different forms (pre-cooked or instant rice, easy-to-cook and ready meals, germ rice, novel blends of rice with other seeds or ingredients such as millet, sesame and green tea) and packaging to cater to the more discerning consumers and their changing lifestyle and preferences as much as supported by technological developments, the opportunities for rice by-products end-use (such as bio-fertilisers, substrate for high value mushroom culture, power generation, bicycle tyres, building panels and roadside posts, biodegradable food boxes, carbonized rice husk as pest controls agents including for golden apple snails) is equally if not more exciting to the extent that they are increasingly referred to as co-products rather than by-products. Figure 6 shows other value-addition which can be potentially developed from padi and rice.

It is important to note that a number of our local research institutions such as UPM-BERNAS Laboratory, Universiti Pertanian Malaysia (UPM), Universiti Teknologi Malaysia (UTM) are involved in various research and product development. Some researches have even managed to come out with final products. Unfortunately, these efforts are often restricted to pilot project stage, mainly due to failure to identify takers at commercialization level. It is, therefore, high time for a concerted effort to be initiated to:

a) streamline all technology and innovation efforts;

b) identify, explore and collaborate local and international research;

c) identify areas of potential research; and

d) link the different elements of the supply chain.

MARDI, through its subsidiary, MARDITECH can and should play a major role in linking up and enhancing the technology & Innovation Supply Chain System and Network.

In order to meet the challenges of impending WTO and AFTA compliance, Malaysia needs to develop clarity of focus to build a set of distinctive organizational capabilities to support the future development of Rice Supply Chain in Peninsular Malaysia, Sabah and Sarawak so that they can become more competitive, efficient and above all, in a financially, socially and environmentally

sustainable manner. Consequently, technology and innovation should be focused on high value rice products, with due considerations on the unit cost of producing the finished products and the ability to get them to the targeted markets in the appropriate quantity, quality, time and price.

In other words, it is crucial to develop a strong Technology & Innovation Supply Chain to complement and reinforce the existing Product Supply Chain to better develop the whole padi and rice industry and MARDI should leverage on its inherent advantage as well as current institutional and expertise strengths to play a major role.

Figure 7 is an attempt to demonstrate how a Technology & Innovation Supply Chain can be developed, comprising:

a) the enablers which are the consumers and the market place, national level or regional/international, and

b) the process, from ideas to marketable products

Table 1 : Opportunities for Commercialization of Innovative Rice Products

Product	Value Addition Potential*	Closeness to Commercialization	Market Potential**	Potential for returns
Gamma	Medium	Ready	Medium	Medium
Embryo rice	Medium	Ready	Medium	Medium
Organic five-grain rice blend	Medium	Ready	Low / medium	Medium
O-Rice	Medium	Ready	Low / medium	Medium
Modified starch	Medium / High	Ready	Medium / High	High
Baby foods	High	Ready	Medium / High	High
Stabilized rice bran	Low / medium	Ready	Medium / High	Low / medium
Tyres	Low / medium	Ready	Low / medium	Low / medium
Bio-organic fertilizer	Low	Ready	Low / medium	Low / medium
Carbonized rice husks (CRH)	Low	Ready	Low to medium	Low / medium
Biodegradable fast food meal box	Low	Ready	Medium	Medium
Rice bran oil	Medium	Ready	Low / medium	Medium / High
Paper production	Low	Ready	Low / medium	Low
Rice bran	Medium	Ready	Medium	Low / medium
Oryzanol	High	Ready	Medium / High	High
Probiotics	High	Ready	Medium / High	High
Phytosterols	High	Ready	Medium / High	High
Rice ingredients for Cosmetics	High	Ready	High	High
Rice ingredients for cosmeceuticals	High	Ready	High	High

* Relative to base ingredient ** Integration of factors e.g. competing products/size of products/time scale to gain value

Source: Asia BioBusiness (2006)

Figure 6: Value Added Products from Rice, Rice Bran & Rice Bran Oil

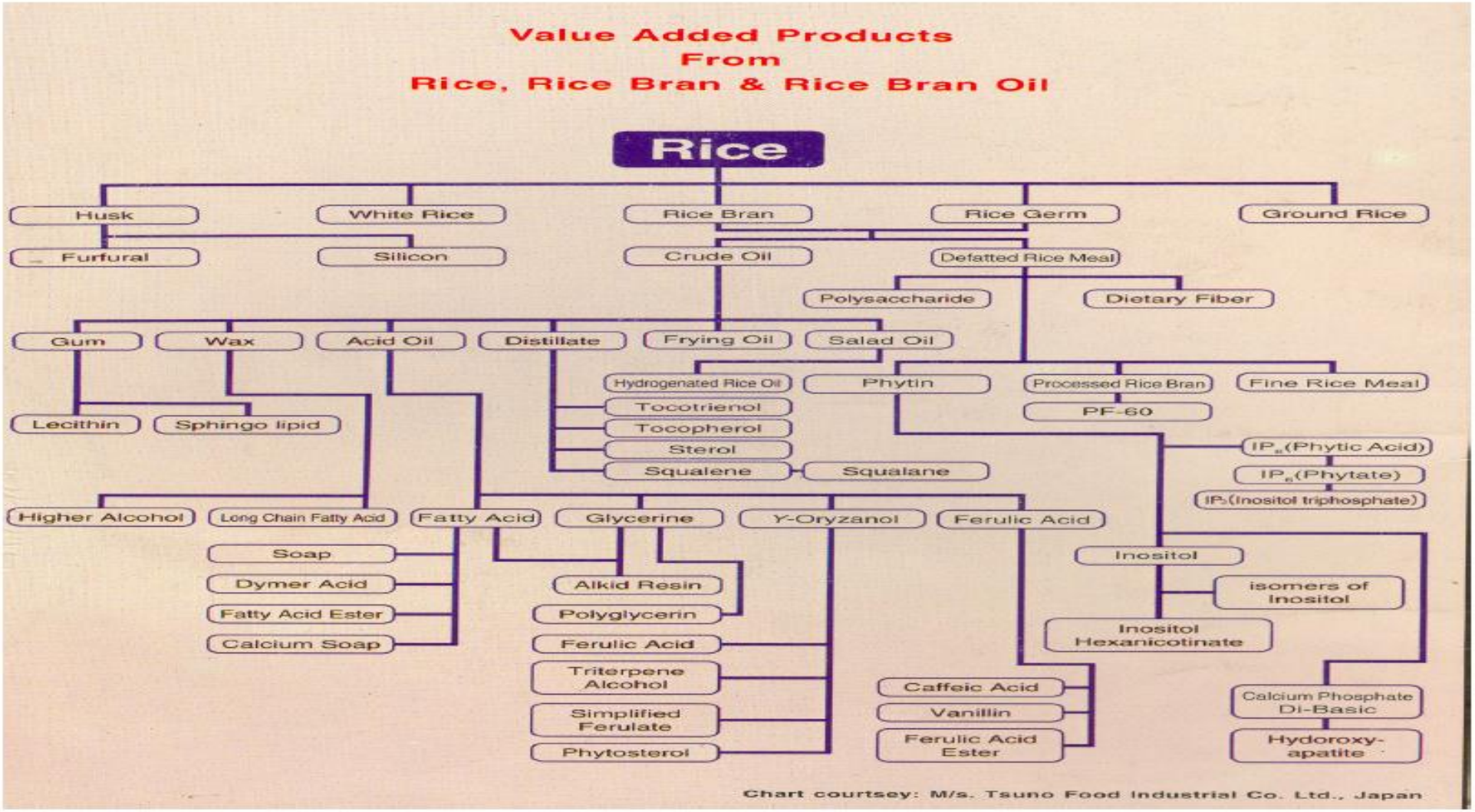
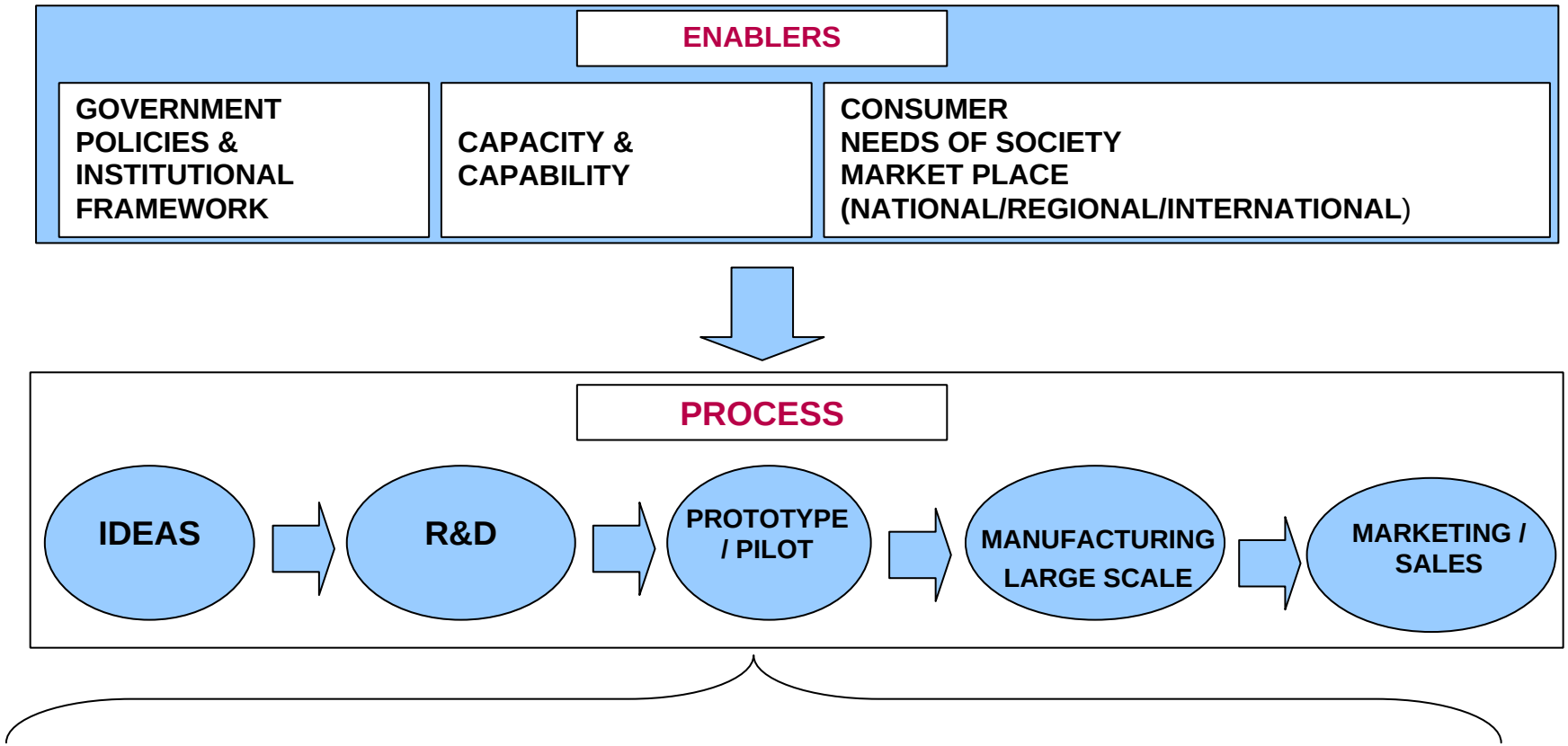


Figure 5: Technology & Innovation Supply Chain For Padi & Rice



MARDI. especially Marditech (and Economy & Technology Management), can play the 'bridging' role in bringing various research and strategic bodies / stakeholders together, hence linking the technology & innovation supply chain together.

Moving forward

Arising from the above discussion, the crucial elements can and should be distilled and incorporated into MARDI's immediate and longer-term plans. Research agencies should consciously strive to get the basics and balance right as they respond to challenges in future rice production system and supply chains as well as seek out the opportunities accompanying these challenges. They should also garner the resolve and master the discipline to transform and develop new supply systems of technology and innovation as well as rice supply chains incorporating various aspects of the ideas outlined above.

More focused and holistic policy studies should also be conducted as a basis for strategic government interventions as well as public-private partnership initiatives. Such studies will facilitate sustainable development and management of new supply systems and networks including innovative applications of the promises of bio-technology advances and incorporation of innovative strategies, policies, and programmes. Ultimately, all these efforts should be targeted at the appropriate balanced response to the issues surrounding food security and sustainable development and the need to put the house in order in relation to food self-reliance, optimum public-private partnerships, productive and equitable sectoral linkages and the interests of stakeholders along the entire padi and rice supply chains.

Conclusion

There are well founded reasons to be guardedly optimistic of Malaysia's prospects and ability to harness and exploit the various opportunities accompanying a better understanding and focussed development of the technology and innovations as well as the padi and rice supply chain. However, the increasing need to "get the basics and balance right" should be underscored. The dynamic interplay between the various drivers of the renewed interest in agriculture, strategy for future food systems and evolving innovative developments/ideas can and should be harnessed to generate wealth, income and stability and hence ensure food security at the local, national, regional and global levels.

From a national perspective, key challenge is to continuously address the fundamentals of population growth, the nutrition transition, energy, land, water, labour, and climate change as well as emerging trends, new ideas and innovations. Another challenge is to mount multidisciplinary empirical studies to better understand the interplay and impacts and guide policy so that future development and progress can be more balanced and sustainable.

In so far as MARDI is concerned, a critical success factor will be how well MARDI and its strategic partners (other research institutions, including the universities and the Departments of Agriculture in Sabah and Sarawak) can integrate supply chain of Technology and Innovation with that of the Rice Supply Chain in Peninsular Malaysia, Sabah and Sarawak. There-in lies the real challenge.

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