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Abstract	Now, whether Malaysia benefits from these interplay depends on the net benefits to producers and consumers through better prices, time costs, and food safety as well as on access to markets and on employment generated, skills and wage effects in the whole agrifood supply chain. It will also depend on how well Malaysia develop and manage the supply chains and integrate them into the overall economy as well as international networks. Hence, it is critical to understand the dynamics of the interplay of key factors, its implications and adjustments required and to take a holistic perspective. Consequently, closer monitoring, more empirical study, and more rigorous policy analysis are required.

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Food Security and Growth: Malaysia's Strategic Approach and Future Adjustments¹

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INTRODUCTION

The purpose of this paper is two-fold. Firstly, I elect to provide a better understanding of Malaysia's Strategic Approach to Food Security which has served us well all these years. Secondly, I wish to highlight the increasing relevance and impact of agri-food Supply Chain Management (SCM) and its interplay with the advancements and applications of agri-biotechnology. This is expected to lead to a 'big bang' or major structural shift or transformation which has major implications on Food Security and Growth as well as Malaysia's elected Strategic Approach.

Consequently, this paper presents some reflections from an economist's perspective³. Unfortunately, it is not sufficiently grounded empirically nor is it the result of rigorous analytics, as yet. This paper is also motivated by the urge to share some of my thoughts, aspirations and concerns at this Forum.

The underlying theme of this paper is that it is imperative for policy makers, researchers, stakeholders at all levels of the agri-food supply chain to understand, grasp, and appreciate the underlying rationale for Malaysia's Strategic Approach to Food Security as well as the need for future adjustments in the wake of globalization, increasing relevance of agri-food supply chain management and agri-biotechnology revolution so as to 'get the balance right'. This will involve the balancing between gearing up for globalization and putting our own house in order (including Food Security), balancing the role of public and private sectors, balancing sectoral considerations as well as balancing the interests of the stake holders along the entire agri-food supply chain and that of the nation.

This paper is organized such that after this introduction, the next Section provides an overview and understanding of Malaysia's Strategic Approach to Food Security in order to act as a backdrop. Section 3 examines the increasing relevance of agri-food Supply Chain Management and considers some of the promises of agri-biotechnology. Section 4 considers the need for the Government, researchers, and stake-holders 'to get the balance right' in moving forward, before the conclusion in the final Section.

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³ These are gained from jottings, anecdotal evidence, secondary sources including personal communication with stakeholders over more than a decade of establishing and managing supply chains and international production and trading networks in Malaysia and the region, coupled with a more recent fascination with the promises of agri-biotechnology.

UNDERSTANDING MALAYSIA'S STRATEGIC APPROACH TO FOOD SECURITY

Overview

From the outset it should be pointed out that 'Food Security', very much like 'love', means different things to different people and under different circumstances. Maxwell (1996), in his review encountered 32 different definitions! These ranged from the simple, FAO's (1983) "Access for all people at all times to adequate food for a healthy and active life" and its three major components of:

- ADEQUACY in food production;
- STABILITY in food supplies; and
- Physical and economic ACCESS by vulnerable groups.

To the more idealistic, USDA's (1996) "Food Security exists when all people at all times have physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life" and its three dimensions of:

- AVAILABILITY of sufficient quantities of food of appropriate quality, supplied through domestic production or imports;
- ACCESS by households and individuals to adequate resources to acquire appropriate food for a nutritious diet; and
- UTILIZATION of food through adequate diet, water, sanitation, and health.

As far as Malaysia is concerned, we have adopted a pragmatic Strategic Approach linking Food Security (mainly focused on rice which is our basic staple and 'political' crop) and Economic Growth (growth with redistribution) at both the 'macro' and 'micro' levels.

At the Macro-level, the Approach involves leveraging policy control over the Sectoral composition of income growth as well as stabilization of food prices. At the micro level, it involves rural development, focusing on:

- Rural education/HRD – accessible to poor and females
- Rural clinics – healthcare, family planning
- Home economics, nutrition education

Schematically, the Strategic Approach comprises three components (See Figure 1):

- Rapid growth in macro economy;
- Poverty eradication through rural economic growth ('pro-poor' growth); and
- Stability of food system.

The important thing is that the net-result of adopting this pragmatic approach is 'WE CONSISTENTLY GOT THE JOB DONE!' despite the Approach being sometimes frowned upon by economists because of 'distortionary' and 'efficiency' arguments. With this, we turn to consider the twin issues often linked to Food Security in Malaysia, viz. that of 'Food Self-Sufficiency' and 'Rising Food Import Bill'.

Issues often linked to Food Security- Food Self-sufficiency and Food import Bill

Food Self-sufficiency: With regards to food self-sufficiency, my contention is that given Malaysia's enviable economic position as well as the rapid globalization and technological change, it would be more relevant to focus on 'Food Self-reliance'.

Malaysia is a small open economy but a 'large' trading nation being ranked in the top 20 (WTO, 2005) and with total trade in 2006 exceeding RM1 trillion. Malaysia was ranked 23rd in 2006 on the World Competitiveness Scoreboard while in the same year, we were ranked 19th in A.T Kearny/*FOREIGN POLICY* Globalisation Index. That same year we enjoyed a healthy Trade Surplus (Balance of Trade) of RM108.46 billion.

So given the absolute quantum and the types of food demanded, our extensive trade links, excellent International relations, and healthy trade surplus, we do not envisage serious problems in sourcing and importing the balance of our food requirements in future. In other words, Malaysia is and will continue to be quite comfortably 'food self-reliant'. Consequently, it is not surprising that we have elected to remain a net importer for rice and other food items as spelled out in the 9th Malaysia Plan (See Table1).

Food Import Bill:

There has also been much anxiety over Malaysia's rising import bill. Let us try to see things as they really are.

Rising Food import Bill' (RM Billion)

	2002	2003	2004
<i>Food Imports</i>	12.43	12.77	16.64
<i>Food Exports</i>	7.49	8.44	10.03
<i>Net Imports</i>	4.94	4.33	6.61

Source: MIDA

Over the recent years food imports have outstripped food exports resulting in net food imports rising from RM4.9 billion to RM6.6 billion over the 2002 to 2004 period. More recently, the Malaysian Minister of Agriculture and Agro-based Industry was quoted by Bernama Sept 6, 2006 during his visit to China that there was a 'current deficit of RM5 billion in Malaysia's Food Import Bill' .

Now, my contention is that given our Balance of Trade of RM108.46 in 2006, this deficit works out to less than 5% of overall trade surplus. More importantly, there is a serious definitional 'quirk' in computing Malaysia's Food Import Bill as palm oil and palm oil products are not included as food. Now as palm oil and palm oil products (the bulk of which are edible oil and its derivatives) exports in 2006 was a whopping RM32.2 billion (5.5% of total exports), a very different picture would have emerged if palm oil had been included. Hence, as the devil is always in the detail, there is a need to keep things in proper perspective and see things as they are.

Agriculture is back on the Agenda

After about two decades (since mid 1980s) of neglect or disinterest by academics, researchers, donor communities and some developing countries, interest in agriculture is resurging, largely fuelled by a new understanding that growth in the agricultural sector plays a major role in overall growth and poverty reduction through linkages to manufacturing and services in a supply chain and international trading network framework as well as in connecting the poor along the agri-supply chain to growth.

There are three basic drivers of this renewed interest in agriculture:

- a. *Agri-Biotechnology Revolution* – Agri-Biotechnology (or ‘green’ biotechnology) Development in genetics (both GMOs and non-GMOs), microbiology and diagnostics, coupled with ICT and nanotechnology have revolutionized and pushed out agric production/productivity and profit frontiers. The 21st Century is touted as the ‘Biology Century’ and there are great expectations that agro-biotechnology can contribute greatly to innovations, cost reductions, productivity improvements, new processes, and new products.
- b. *The Rise of Supermarkets* – The supermarket revolution in Asia has transformed agri-food supply chains, especially food retail markets. There are new important opportunities for farmers to diversify into high-value crops with greater demand potential, and thus capture some of the value-added being generated by the supermarkets and increasingly sophisticated and stochastic supply chains and international networks. They also increasingly connect farmers and other stakeholders more directly to changing consumer preference and demand. Whether this is a boon or bane for farmers and stakeholders at different levels of the supply chain depends as much on public policies as the ability of the farmers and stakeholders to be proactive, adaptable and work together.
- c. *Reducing Poverty and Preserving the Environment* – The recognition that as urbanization occurs at unprecedented rates, economic growth generated by agriculture (and the value adding along the supply chain) is the main vehicle for reducing poverty and preserving the environment in the rural areas

Taken together, all the above are compelling many researchers and governments to relook the role of agriculture in economic development, reassess and build on their relative strengths and endowments as well as better understand and track the drivers.

INCREASING RELEVANCE OF AGRI-FOOD SUPPLY CHAIN MANAGEMENT & PROMISE OF AGRI-BIOTECHNOLOGY⁴

Increasing Relevance of Agri-food 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 revolves around the production, processing, moving, buying and selling of ‘stuff’ and that SCM is about mechanisms and processes by which these activities are organized.

⁴ This section draws from and builds upon Wong (2007).

A central tenet of 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 partnership 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 rubber, or rice, or pork); 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, thus enabling 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 agri-biotechnology and its impending convergence with ICT as well as innovations. Similarly, there will be exponential growth, if and when interconnectivity of supply chains is exploited, as is already happening with telcos and multimedia superhighways.

From a policy and institutional standpoint, most government interventions and programmes in Malaysia are invariably 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 2, 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 my mind, forms the cornerstone of the current Administration'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 2.

Promise of Agri-biotechnology

The advances in agri-biotechnology is nothing short of staggering and promises much with the mapping of rice and other genomes and the spread of biotech crops. The 21st Century has been touted as the 'Biology Century' and agri-biotechnology is expected to lead to 'New Agriculture' where plants and animals are endowed with new value creation mechanism. Consequently, we now have focused research and development in Bio-Farming (biotech crops, bio-fertilisers, bio-pesticides); Bio-Pharming (bio-factories for insulin and vaccines); BioFuels; BioPlastics; and BioRemediation.

Teng (2007) contends that the reported crop biotech R&D to date is 'just the tip of the iceberg'. In the area of agronomic traits we note the progress in biotic stress (insect and disease resistance as well as weedicide tolerance; abiotic stress (drought, cold, heat and poor soils tolerance); desired or hedonic quality traits (taste, shelf-life, nutrients, seedless); novelty products (oils, nutraceuticals); and renewable resources (biomass conversing, biofuels or 'energy farming'). A more detailed listing of the possibilities is provided in Figure 3.

Consequently, there is great expectations that agri-biotechnology will contribute greatly to innovations, cost reductions, productivity increases, new processes and new products that will benefit mankind in general. However, to the extent that as in all forms of technology they would tend to be embodied and hence would benefit different stakeholders in the respective supply chains unequally.

MOVING FORWARD

In many important ways, the Malaysian Government still sees Food Security as a public mandate, especially in the case of rice. Be that as it may, my contention is that in the wake of globalisation, biotechnology revolution and the increasing importance of SCM, on-course corrections or adjustments are both necessary and crucial in order to build on past gains.

Consequently, Malaysia while continuing with it's proven Strategic Approach to Food Security, should strive to make the following adjustments:

- Make rice more of an 'economic' commodity;
- Leverage on agri-biotechnology to value-add and create more high-value products at different levels of supply chain so that prices can be transmitted back along entire supply chain and in so doing, sustain the 'virtuous circles' in relation to Food Security;
- Greater investments in rural capital, improve labour productivity and mobility; more efficient rural financial and land markets to facilitate farm consolidation and even rural exit; and more coordinated efforts to open rice market to freer trade so as to deepen and stabilise price formation; and
- Minimise marginalisation of small farmers and other stakeholders as agri-food sector transform.

Above all, more focused/holistic studies should be conducted as a basis for strategic government intervention to facilitate development and management of selected agro-food supply chains as well as innovative application of agri-biotechnology advances. Ultimately, all these efforts should be targeted at 'getting the balance right', between gearing up for

globalization and putting our own house in order in relation to being 'food self-reliant', balancing the role of public and private sectors, balancing sectoral considerations as well as balancing the interests of the stake holders along the entire agri-food supply chain and that of the nation.

CONCLUSION

Stemming from the above we can see that there are well founded reasons for Malaysia's Strategic Approach to Food Security as well as the increasing need to emphasise 'Food Self-reliance' and strategic adjustments. The dynamic interplay between agri-food supply chains and agri-biotechnology development in Malaysia can and should be harnessed to generate wealth, income and stability and hence ensure Food Security.

Now, whether Malaysia benefits from these interplay depends on the net benefits to producers and consumers through better prices, time costs, and food safety as well as on access to markets and on employment generated, skills and wage effects in the whole agri-food supply chain. It will also depend on how well Malaysia develop and manage the supply chains and integrate them into the overall economy as well as international networks. Hence, it is critical to understand the dynamics of the interplay of key factors, its implications and adjustments required and to take a holistic perspective. Consequently, closer monitoring, more empirical study, and more rigorous policy analysis are required.

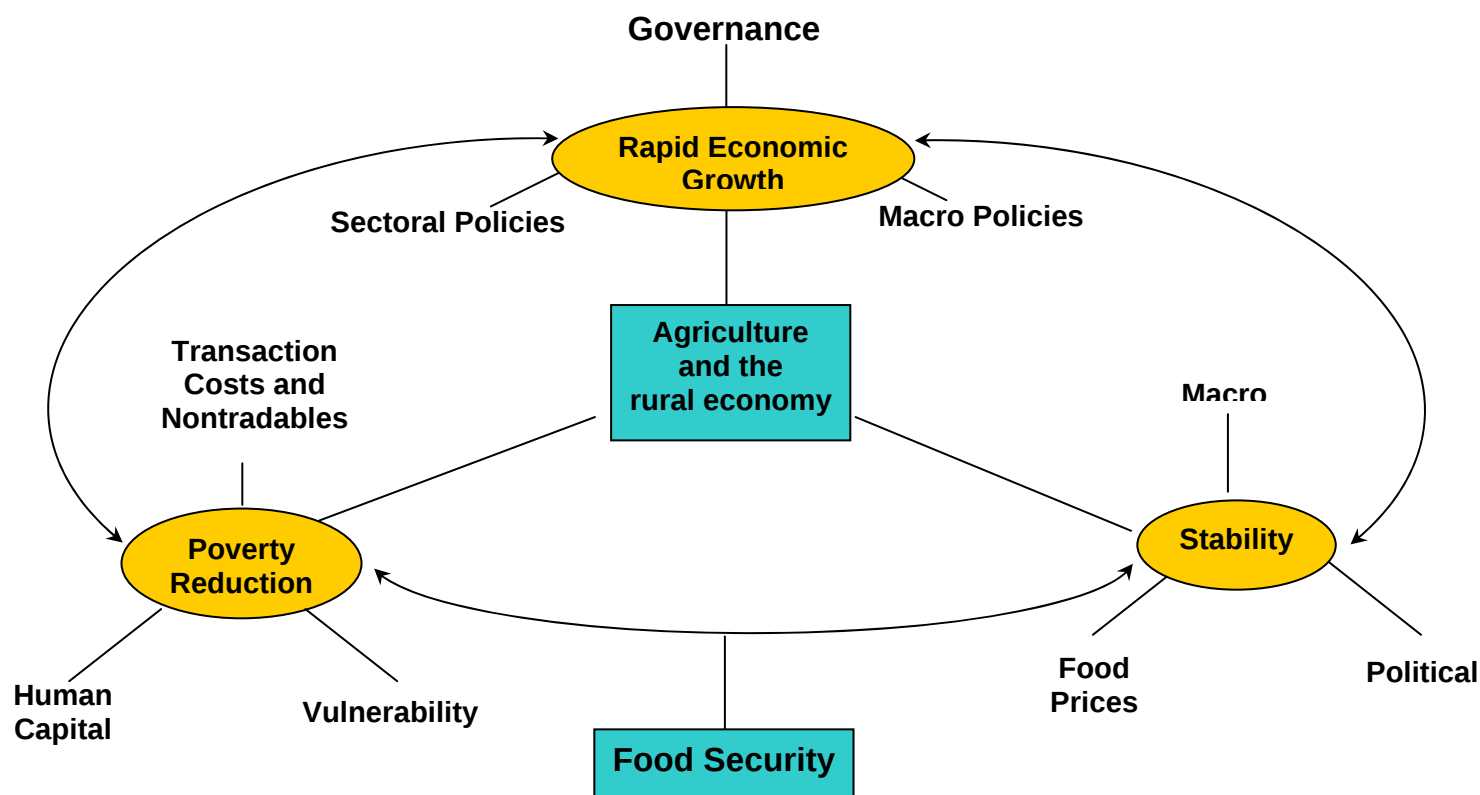
Rather than being forced out altogether, stakeholders may find farming and related agribusiness or economic activities along the agri-food supply chain more profitable and sustainable than ever. A key challenge is to minimise their marginalisation and help them get plugged into and become players in supply chains and international trading networks. Another is to mount focused empirical studies to guide policy so that the adjustment process can be a smooth (if not painless) one as well as enabling the inherent benefits to be harnessed in a balanced and harmonious manner.

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Figure 1: A Macro Perspective on the Determinants of Food Security:

Three “virtuous circles” of activity, held together by agriculture and the rural economy



Source : Timmer (2004)

Table 1a: Self-Sufficiency Levels in Food Commodities, 2000-2010 (%)

<i>Commodity</i>	<i>2000</i>	<i>2005</i>	<i>2010</i>
Rice	70	72	90
Fruits	94	117	138
Vegetables	95	74	108
Fisheries	86	91	104
Beef	15	23	28
Mutton	6	8	10
Poultry	113	121	122
Eggs	116	113	115
Pork	100	107	132
Milk	3	5	5

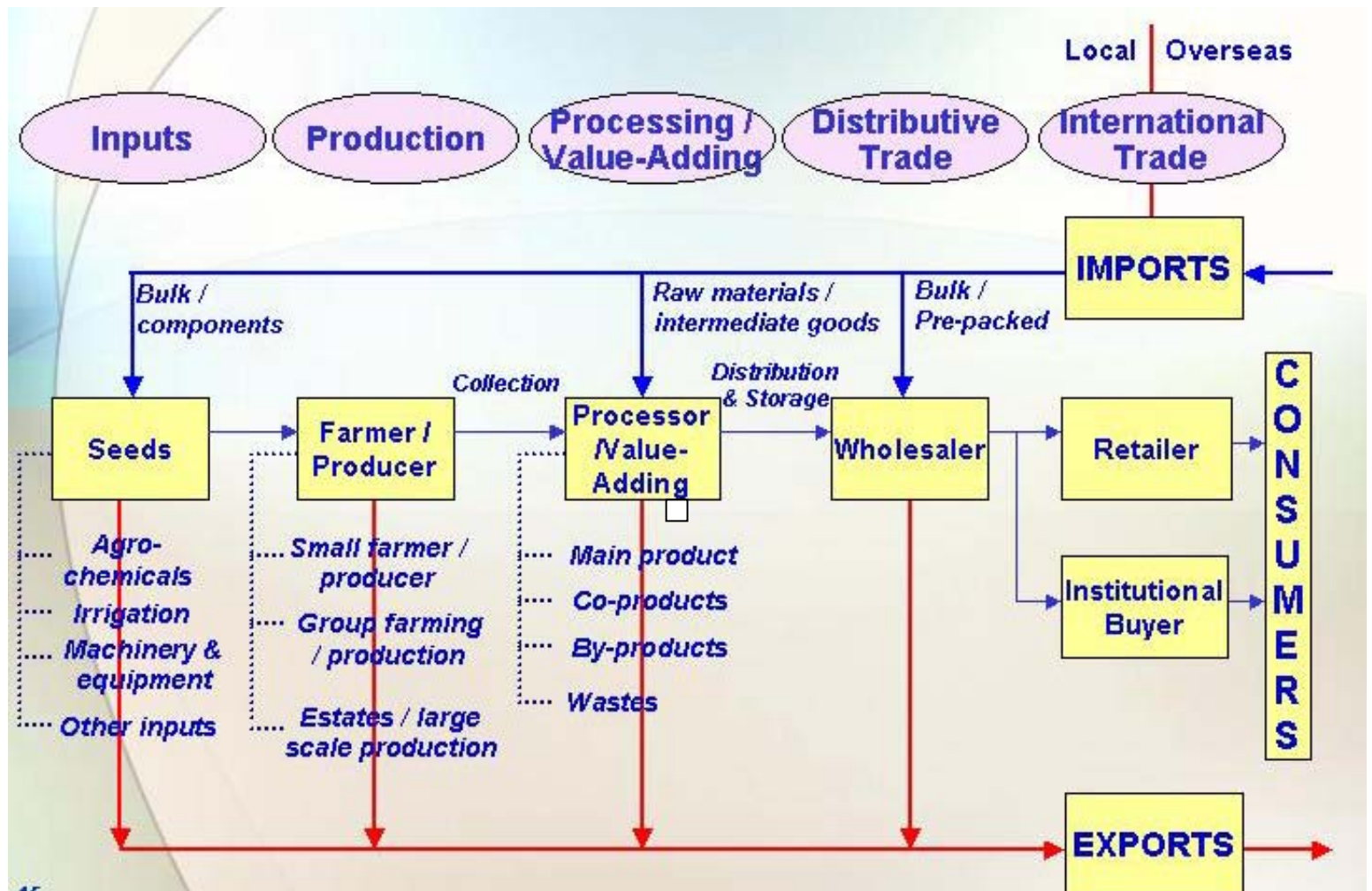
Source: Ninth Malaysia Plan

Table 1b: Food Exports and Imports, 2000-2010

Commodity	RM million			% of Total			Average Annual Growth Rate (%)	
	2000	2005	2010	2000	2005	2010	8MP Achived	9MP Target
Exports	5,268.6	7,986.8	15,501.0	100.0	100.0	100.0	8.7	14.2
Live Animals	357.4	425.1	467.0	6.8	5.3	3.0	3.5	1.9
Meat & Meat Preparations	64.6	85.9	2,895.0	1.2	1.1	18.7	5.9	102.1
Dairy Products	410.2	413.2	520.0	7.8	5.2	3.4	0.1	4.7
Vegetables	278.4	491.6	614.0	5.3	6.2	4.0	12.0	4.5
Fruits	512.4	471.9	2,153.2	9.7	5.9	13.9	-1.6	35.5
Sugar, Sugar Preparations & Honey	353.7	479.2	474.6	6.7	6.0	3.1	6.3	-0.2
Cereal & Cereal Preparations	610.8	916.6	576.5	11.6	11.5	3.7	8.5	-8.9
Fish, Crustaceans, Molluscs & Preparation thereof	1,263.3	2,265.9	4,624.7	24.0	28.4	29.8	12.4	15.3
Feeding Stuff for Animals	375.3	547.1	531.0	7.1	6.9	3.4	7.8	-0.6
Others	1,042.5	1,890.3	2,645.0	19.8	23.7	17.1	12.6	6.9
Imports	10,543.5	15,435.0	14,276.9	100.0	100.0	100.0	7.9	-1.5
Live Animals	154.6	177.4	127.0	1.5	1.1	0.9	2.8	-6.5
Meat & Meat Preparations	771.4	1,054.6	1,262.0	7.3	6.8	993.7	6.5	3.7
Dairy Products	1,176.5	1,745.1	1,533.0	11.2	11.3	121.5	8.2	-2.6
Vegetables	1,023.6	1,620.2	670.0	9.7	10.5	43.7	9.6	-16.2
Fruits	561.6	694.9	812.1	5.3	4.5	121.2	4.4	3.2
Sugar, Sugar Preparations & Honey	1,085.8	1,406.0	1,216.0	10.3	9.1	149.7	5.3	-2.9
Cereal & Cereal Preparations	1,839.1	2,267.1	1,464.8	17.4	14.7	10.3	4.3	-8.4
Fish, Crustaceans, Molluscs & Preparation thereof	1,085.8	1,851.9	841.0	10.3	12.0	5.9	11.3	-14.6
Feeding Stuff for Animals	1,928.4	2,838.2	4,303.0	18.3	18.4	30.1	8.0	8.7
Others	917.3	1,779.6	2,048.0	8.7	11.5	14.3	14.2	2.8

Source: Ninth Malaysia Plan

**Figure 2 : Agri-Food Supply Chain – From ‘Seed to Shelf’ :
Potential Economic Activities**



Source: Wong (2007)

Figure 3 : Crop biotech R & D to date – “Just the tip of the iceberg”

🌾 Agronomic Traits

🌱 Biotic Stress

- Insect Resistance
- Disease Resistance Viral, Bacterial, Fungal, Nematode
- Weed- herbicide tolerance

🌱 Abiotic Stress

- Drought, Cold, Heat, Poor soils

🌱 Yield

- Nitrogen Assimilation, Starch Biosynthesis, O₂ Assimilation

🌾 Quality Traits

🌱 Processing

🌱 Shelf-life

🌱 Reproduction: e.g seedlessness

🌱 Nutrients (Nutraceuticals)

- Macro: Protein, Carbohydrates, Fats
- Micro: vitamins, antioxidants, minerals, isoflavonoids, glucosinolates, phytoestrogens, lignins, condensed tannins
- Anti-nutrients: Phytase, Allergen and Toxin reduction

🌱 Taste

🌱 Architecture

🌱 Fiber

🌱 Ornaments: color, shelf-life, morphology, fragrance

🌾 Novel Crop Products

🌱 Oils

🌱 Proteins: nutraceuticals, therapeutics, vaccines

🌱 Polymers

🌾 Renewable resources: Biomass conversion, feedstocks, biofuels

Source: Teng (2007)