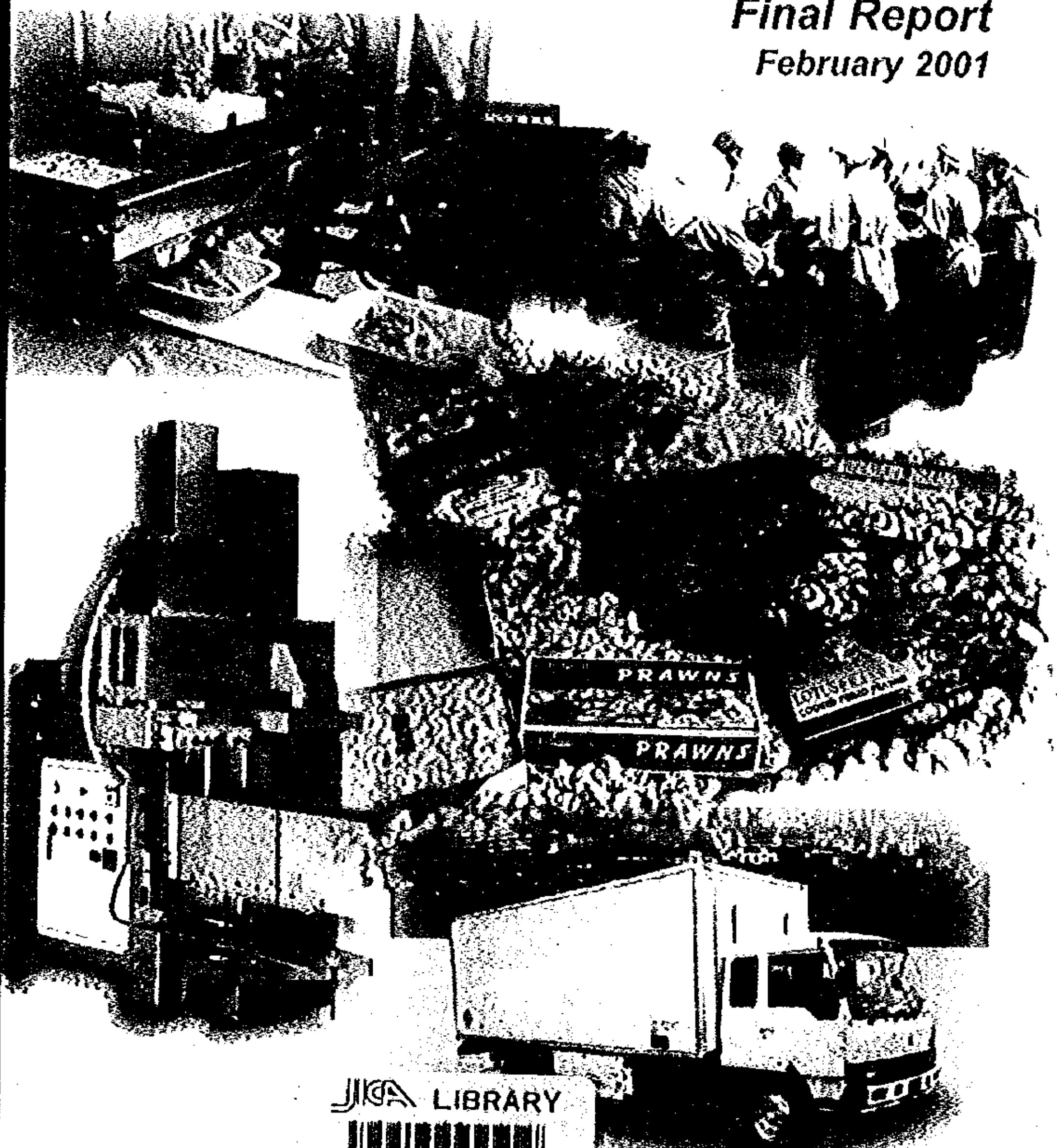
Study on the Marketing of Chilled and Frozen Food in Malaysia

Final Report

February 2001



FAMA

Federal Agricultural Marketing Authortiy

JICA

Japan International Cooperation Agency (JICA) Malaysia Office

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February 2001

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RM1.00 = ¥30.62
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PREFACE

At the request of the Government of Malaysia, the Government of Japan has decided to conduct a Study on the Marketing of Chilled and Frozen Food in Malaysia and has entrusted the study to the Japan International Cooperation Agency (JICA).

JICA Malaysia Office has selected and engaged Deloitte Kassim Chan Management Consultants Sdn. Bhd. (DKC) as principal consultant to carry out the study. The study team is headed by Mr. Azman bin Mohd Zain of DKC and consists of other experts from DKC, the Food Quality Research Unit (UNIPEQ) of Universiti Kebangsaan Malaysia and Universiti Putra Malaysia.

The Steering Committee headed by Dato' Abi Musa Asa'ari bin Mohamed Nor, the Director General of the Federal Agriculture Marketing Authority (FAMA) , was set up to coordinate, examine and guide the study team.

In addition, JICA HQ dispatched to Malaysia Mr. Hidenori Maki and Mr. Akikazu Aoyagi, Japan Development Service Co., Ltd., five times between January 2000 and September 2000, who monitored and assisted in the conduct of the study.

The study team held discussions with the officials concerned of the Government of Malaysia, conducted field surveys, analyzed data collected and prepared this final report.

I hope that this report will contribute to the development of the chilled and frozen food industry in Malaysia and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the stakeholders concerned from both the private and public sectors in Malaysia for their close cooperation extended to the study.

February 2001

Kazutoshi Iwanami
Resident Representative
Japan International Cooperation Agency
Malaysia Office

February 2001

Resident Representative
Japan International Cooperation Agency
Malaysia Office

Dear Mr. Kazutoshi IWANAMI,

Letter of Transmittal

We are pleased to formally submit herewith the final report on *The Study of Marketing of Chilled and Frozen Food in Malaysia.*

The main objectives of this study are to gather information on the current status, market potential and future directions for the industry. Appropriate strategies and action plans have been recommended for the development of the industry. Results of this study should serve as a basis for the Malaysian Government to formulate appropriate policies and programmes for the orderly development of the chilled and frozen food industry.

The successful completion of this project was made possible with the effort and contribution from many people. We would like to express our sincere gratitude and appreciation to all these people for the kind assistance and cooperation extended to the Study Team. In particular, we would like to thank members of the Study Steering Committee and senior officials from FAMA, who have provided invaluable assistance to the study team.

We would also like to acknowledge the kind help and assistance provided by the officials of your agency.

We hope that this report would be able to contribute substantially to the improvement of the chilled and frozen food industry in Malaysia.

Very truly yours,

AZMAN MOHD ZAIN
Study Team Leader,
Executive Director of
Deloitte KassimChan Management Consultants Sdn Bhd

STUDY CONSORTIUM

I) Steering Committee

1. FAMA

• Dato' Abi Musa Asa'ari b. Mohamed Nor	• Director General of FAMA and Chairperson
• En. Samah Hasan	• Senior Director of Corporate Planning, Market Intelligence and IT Division
• Pn. Sharifah Hashim	• Director of Supply Monitoring Department
• En. Lee Kam Chong	• Director of Demand Monitoring Department
• En. Teoh Sian Chew	• Director of Marketing Research and Market Potential Department
• Pn. Norma Mohd Salleh	• Officer and Secretary to the Steering Committee

2. JICA

• Mr. Naofumi Yamamura	• Assistant Representative, JICA Malaysia Office

3. Department of Statistics

• Ms. Kate Van	• Statistician

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5. Malaysian Agricultural Research and Development Institute (MARDI)

• Dr. Noraini Mohd Khalid	• Head, Food Processing and Product Development Program, Food Technology Centre

6. Ministry of Agriculture

• En. Bhaskaran	• Assistant Secretary, Commodity Development Division

II) Technical Advisors

Mr. Hidenori Maki	• Senior Consultant in Marketing, Japan Development Service Co. Ltd. (JDS)
Mr. Akikazu Aoyagi	• Senior Consultant in Food Processing, JDS

III) Study Team

Team members	Designation	Role
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1. **En. Azman Mohd. Zain**	Executive Director	**Team Leader**
2. Mr. Koichi Hayase	Director	Industrial Strategy Consultant
3. Mr. M. Arrasu	Director	Institutional and Marketing Consultant
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5. Mr. Henry Victor	Consultant	Supply Chain Analyst
6. Mr. Hor Seer Foon	Consultant	Business Analyst
7. Ms. Chizuko Takenoyama	Senior Manager	Industrial Policy Analyst
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8. Prof Nik Ismail Nik Daud	Director of UNIPEQ	Food Technologist
9. Mr. Lam Ah Chye	Consultant	Demand Analyst
10. Ms. Tih Sio Hong	Lecturer	Consumer Behaviour Analyst
Universiti Putra Malaysia (UPM)		
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12. Prof. Mohd Zain Mohamed	Deputy Dean	Agribusiness Consultant

EXECUTIVE SUMMARY

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1 INTRODUCTION

1.1 Study Background and Objectives

There is an increasing demand for chilled and frozen food in advanced as well as developing countries and, therefore, an interest to understand the present state of the industry in Malaysia and to plan for its future development. In response to these requirements, the objectives of this Study are to assess the following:

- Market size, market potential, and consumer analysis for chilled and frozen food locally and abroad.
- Quality, technology, research and development, and human resource development programs associated with the chilled and frozen food industry.
- Potential for Malaysia to become the hub for the world's halal chilled and frozen food market.

1.2 Product Coverage and Definition

Fresh food by nature is perishable. The development of chilling and freezing processes has enabled the freshness of these products to be prolonged through temperature control. Generally, chilled food refers to food products that have to be stored at temperatures of minus 1°C to 10°C. Frozen food refers to food that has undergone a quick-freezing process and is required to be stored in temperature of at least minus 18°C.

This Study has covered four categories of chilled and frozen food products namely, **Ready-to-serve meals, Snacks, Food Ingredients and Ready-To-Serve, Ready-To-Cook Meat, Seafood, and Vegetables.**

2 PRESENT SITUATION OF THE INDUSTRY

2.1 Industry Players

It is estimated that there are 64 major manufacturers and 35 importers of chilled and frozen food in Malaysia.

- there is hardly any local player of substance in the chilled and frozen ready-to-serve meals category.

- the chilled and frozen **snacks** industry is currently dominated by only six companies, i.e., KG Pastry Sdn Bhd, Kait Food Sdn Bhd, Ben Fortune Sdn Bhd, P.A. Food Sdn Bhd, Anika Food Industries Sdn Bhd, and Sydney Cake House Sdn Bhd.

- there are about seven **food ingredient** manufacturers but only one of them, Sensori Food Industry, produces frozen coconut milk and has a more established market in this category.

- the main players in the chilled and frozen food industry are from the **meat, seafood and vegetable** categories. KFC Holding Bhd, Dinding Poultry Sdn Bhd, Sinmah Holding, and Leong Hup are few of the major players. The survey also indicates that most meat (except for poultry), seafood, and vegetables in Malaysia are imported.

2.2 Production Facilities and Technology

- Most manufacturers use locally fabricated machinery as imported machines are expensive. However, most manufacturers find the locally fabricated machines inferior to imported ones.

- Each market category calls for a different uptake on the level of technology. Companies producing ready-to-serve meals and snacks tend to use locally fabricated machinery of mediocre quality, while the seafood and meat companies use sophisticated imported machinery and employ proper production systems.

3 EXISTING MARKET SIZE AND CHARACTERISTICS

3.1 Existing Market Size

The total market size of chilled and frozen food for Malaysia is estimated at RM2 billion (including exports) in 1999 (refer table below). The industry registered an average of nine percent growth p.a. in 1999.

Estimated Market Size for Chilled and Frozen Food in Malaysia

Market size						
				1999		
In RM (million)	1996	1997	1998	Total market size	Export	Local consumption
Ready meals	6.3	7.2	8.3	9.5	NS	9.5
Snacks	N/A	N/A	N/A	62.9	20.2	42.8
Food Ingredients	N/A	N/A	N/A	5.6	NS	5.6
Vegetables	N/A	414.0	476.5	506.7	NS	506.7
Meat	N/A	N/A	769.7	853.7	NS	853.7
Seafood	439.0	519.3	584.7	610.0	468.1	141.9
Total	N/A	N/A	1,839.2	2,048.4	488.3	1,560.2

Notes: N/A – not available, NS – not significant.
Figures are obtained from Euro monitor, ROC, and the industry players. Some of the data involve projection based on experts' opinions

The meat, meat-based products, seafood, and vegetables category accounted for the biggest market size.

Generally, meat and meat-based segment is well-developed with the market dominated by a few large players, some of whom are also public-listed companies in Malaysia. These products make up the largest segment of the industry. Poultry products are the major component of this segment and are principally produced and consumed locally. Malaysia imports over 85 percent of its meat (except poultry) requirement while an insignificant quantity of poultry meat is exported to Sabah, Sarawak, and Singapore.

Seafood is the second largest product component after meat. Supplies from domestic landings are insufficient to meet the increasing local demand as almost 77 percent of the local production of seafood is exported. Hence, local demand for seafood, especially shrimp, is met by importing from India, Bangladesh and Myanmar.

There is a ready market for chilled pre-cut vegetables but the supply is currently met by imports.

3.2 Consumer Characteristics

A consumer survey was carried out to gather information on product awareness and perception, consumption patterns, purchasing patterns, future trends, and influences of some socio-demographic characteristics. 800 respondents from five areas (Klang Valley, Penang, Ipoh, Seremban, and Johor Bahru) were randomly sampled at shopping complexes using Mall-Intercept survey method.

The following are the findings:

a) Consumer Life-style and Perception

- In general, consumers still prefer fresh food to chilled and frozen food. If given a choice between chilled food and frozen food, however, consumers prefer chilled food. Some of them perceive frozen food as low quality.

- Among consumers, the higher educated and high-income group has a higher acceptance of chilled and frozen food and appreciate the product's value.

- There is a growing trend of eating out at food service outlets. The concept of convenience food with minimal preparation time is gradually being adopted among households.

b) Main Reasons for Consuming Chilled and Frozen Food

- The attraction to chilled and frozen food is not its taste, as most consumers expressed the factors of convenience, easy to get, as well as time saving/faster food preparation as the main reasons for buying chilled and frozen foods.

c) Price

- About 82 percent of the respondents feel that the overall price of chilled and frozen food is reasonable.

d) General Consumers' Preference and Taste

- Chilled and frozen Malay cuisine is the most favoured choice, followed by Western varieties and Chinese. The most preferred taste is hot and spicy food.

e) Types of Chilled and Frozen Food Consumed

- **Meals and Snacks:** *roti canai*, pizza, *karipap*, *pau*, and spring rolls.

- **Ingredients:** chilled fruits, tofu, and noodles.

- **Meat, Seafood, Vegetable:** nuggets, burgers, chicken, sausages, and frozen vegetable.

f) Consumers' Indication

- Consumers indicated they will consume more chilled and frozen food and are willing to try new products.

4 DISTRIBUTION SYSTEM

The cold chain is basically in place with all its necessary components. The functioning of the chain, however, is suspect though there are not many recorded incidents of economic losses due to the breakage of the cold chain

Most of the bigger companies in the industry employ their own cold trucks and cold rooms. Despite this, the cold chain in Malaysia breaks down very often as product handling is still poor. Transporters, cold room operators, retailers, and even consumers lack knowledge in handling chilled and frozen food.

5 INSTITUTIONAL SITUATION

5.1 Regulations

There are three principal legislations that govern food in general, and are, therefore applicable to the chilled and frozen food industry:

- Food Act 1983
- Food Regulations 1985
- Import regulations and restriction on meat and meat-based products

To a certain extent, the existing regulations are not as stringent and comprehensive as those in more developed countries, such as the US and Europe, and are usually not stringently enforced. Only 21 producers out of an estimated total of 5000 Malaysian food companies have the HACCP certification.

Currently, there is no well-defined quality standard for local chilled and frozen food, except for meat and meat-based products. Generally, consumers use fresh products as a benchmark for standards.

5.2 R&D and Human Resources

There is very little systematic R&D on chilled and frozen foods in Malaysia. R&D where carried out, is limited mainly to public research institutions. Work implemented outside the public research institutions are more of the product development type, and are done during formulation trials in conjunction with the machinery and ingredient suppliers. Private companies are also generally unaware of related R&D carried out by public research institutions.

The industry has not adequately used trained manpower, such as qualified food technologists available in the country, mainly because small-scale producers/ entrepreneurs are cautious of sharing their experience and knowledge. There is also a shortage of semi-skilled and unskilled workers in this sector due to the special nature of the chilled and frozen food operation, e.g., the harsh cold room working environment.

6 INTERNATIONAL MARKET

The global market for the chilled and frozen food in currently concentrated in developed countries such as, US, European countries, and Japan. The largest frozen food market is US, accounting for over 60 percent of the total sales.

The worldwide halal food market appears to be very big and growing, driven predominantly by the size and growth of the Muslim population worldwide. The current Muslim population worldwide is estimated at 1.5 billion and growing at about three percent a year. There is also a large Muslim population in Middle East, South and South East Asia, the East European states of the former Soviet Union, China, and United States.

Demand for halal food is currently estimated at USD80 billion a year. The halal frozen food segment alone is estimated at USD27 billion. Currently, halal chilled and frozen food accounts for about 85 percent of the total chilled and frozen food market in Malaysia and is estimated at RM1.7 billion.

7 MARKET POTENTIAL

7.1 Industry Drivers

Drivers for consumption of chilled and frozen food around the world are common. The following are factors that drive this industry:

- Changing socio-demography and lifestyle are the main demand drivers such as, increasing number of working woman, higher diffusion rate of electrical appliances, higher income, and education.
- Growing food service industry is also creating additional demand as the industry opts for more frozen food for convenience and to reduce labour costs.
- Increasing product varieties and merchandising space allocation for chilled and frozen food encourage more purchases.
- Marketing efforts are creating awareness and improving product perception.
- Growing improvements in the supply chain enable production of better quality products, output improvement, and cost reduction.

7.2 Market Size Projection

The market size for local chilled and frozen food is projected to be RM3.1 billion in 2005 and RM6.0 billion in 2010. Malaysia's chilled and frozen food consumption is projected to increase to 11.7 kg per capita by 2010. The halal frozen food market is projected to grow at 4.3 percent a year and by 2010, the market is expected to reach USD43 billion

In view of this, there is a growing demand for chilled and frozen food which would significantly impact the industry's market size.

8 KEY CHALLENGES AND ISSUES

8.1 Malaysian Market

Based on the study, the following are several key issues identified that can be generally divided into common and industry specific segments:

(a) Common Issues

Production	• Generally, industry players lack technical knowledge. • Lack of affordability in purchasing chilling and freezing machinery. • Lack of availability of local raw materials.
Technology and R&D	• SMIs with relatively smaller production scale benefit little from using good imported machines as these machines normally have high production capacity. • Most previous R&D projects often stop at the research stage with no commercial benefits derived from them.
Consumer Acceptance, Perception, and Awareness	• Frozen food is perceived to be inferior in quality. • Consumers generally do not appreciate the quality parameters of chilled and frozen food.
Cold Chain	• The cold chain is often broken mainly due to lack of knowledge in handling chilled and frozen food, poor equipment maintenance, improperly designed facilities for loading/unloading of the food, and poor quality of locally fabricated machines.
Human Resource	• The industry is not adequately using locally trained manpower. • Shortage of general workers in this industry.
Legislative and Institutional	• Local producers are having difficulties in meeting international food standards and requirements. • No organisation to spearhead the development of this industry and to coordinate efforts of the industry players.
Impact of Globalisation	• Local food producers will have to face greater competition from global liberalisation.

(b) Sector Specific Issues

Complete Meals and Snacks	• Most food producers have poorly designed manufacturing premises. • Food producers have difficulty meeting industry food standards such as GMP and HACCP. • Most snack products are developed on a trial and error basis. • Industry's main challenge for producers to produce food with similar qualities as the fresh alternatives. • Lack of experience in proper operations of central kitchen.
Food Ingredients and Vegetables	• There are very few players in the food ingredients sector. • About 60 percent of chilled and frozen vegetables are imported and consumed by local food service establishments. • Lack of minimally processed local ingredients and vegetables.

(b) Sector Specific Issues (cont'd)

Chilled and Frozen Seafood	• Inadequate supply of raw materials. • Industry's main challenge is to produce quality local products that could withstand the freezing process and distribution. • Industry may lose competitive price advantage if preferential treatment in Europe is retreated.
Chilled and Frozen Poultry	• High cost of raw materials for the production of animal feed. • Export market of poultry products is limited
Chilled and Frozen Meat Products (Beef, Lamb)	• Limited export markets for local production of these meat-based products. • Industry's main challenge is to penetrate more overseas markets with locally produced VAP.
Chilled and Frozen Pork Products	• Only a few major players. Disease outbreaks, such as the Nipah outbreak that occurred in 1999 have negatively impacted local and overseas demand.

(c) International Halal Food Market

Based on the study, the following identifies several key challenges and issues facing Malaysia should Malaysia position itself as the world hub for halal food:

Halal Food Hub	• The efforts of various Government agencies involved in crystallising the "Malaysia Halal Food Hub" concept are not concerted, and lack a common vision. Hence, it is important for the authorities to revisit the following strategic issues:
	  • **What should this Halal Food Hub be?**
	  • **What to hub?**

Production and Distribution	• Need to establish a comprehensive guideline and monitoring system for halal food production.
Technology and R&D	• Scientific advances such as, genetic engineering, pose a great challenge to halal certification. • Need to address the many technical and practical aspects of halal food production.
Legislation and Institutional	• Lack of coordination among Government agencies in promoting and implementing strategies. • No legal requirement for mandatory compliance of halal production and certification, and no standardisation of halal logo in Malaysia. • Fee structure for JAKIM halal certification is relatively high for SMIs. • Insufficient infrastructure to support halal food supply chain.
Consumer Education	• Lack of certification agencies' commitment to educate the public.
International Trade	• Sanitary & Phytosanity Measures are not included in halal principles. • No standardisation of international guidelines on halal certification. • Possibility of losing the prestigious "Malaysian Halal" logo once Halal Logo in ASEAN is standardised. • Limited internationally promotional activities on Malaysian halal food.

8.2 The Need for Intervention / Government Action

In view of this, the Malaysian Government has an important role to play in order to achieve the following:

- Achieve projected market potential
- Gain economic benefits from developing selected categories
- Ensure food safety
- Improve nation's overall food security

Therefore, appropriate recommendations for strategies and action plans are necessary to achieve the above.

9 DEVELOPMENT STRATEGIES AND ACTION PLAN

9.1 Vision

In order to capitalize the economic potential of the chilled and frozen food industry and to meet the challenges and issues, the study team proposes a strategic vision for Malaysia's chilled and frozen food industry.

The following is the vision recommended for the Malaysian chilled and frozen food industry:

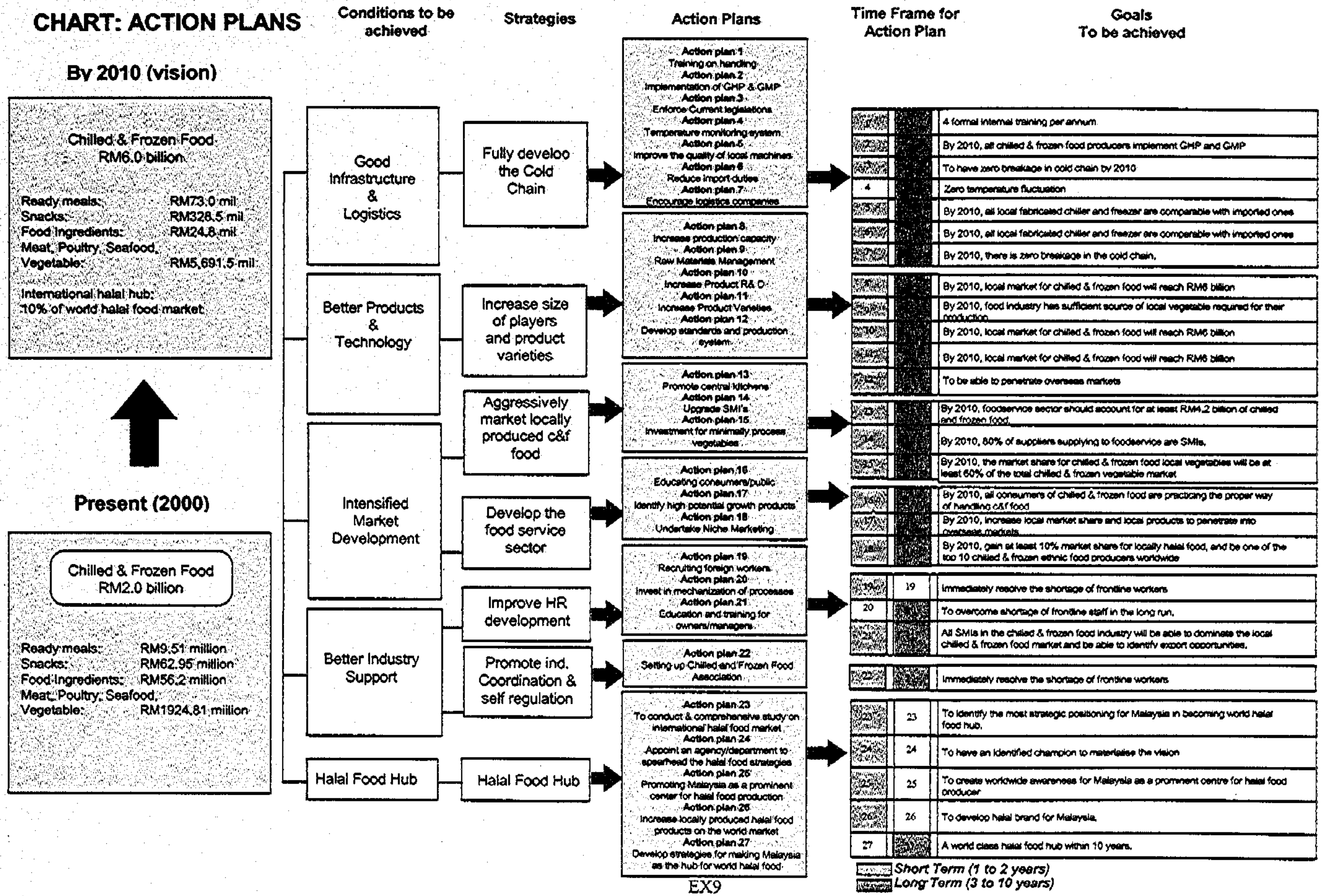
> By **2010**, the consumption of chilled and frozen food will be **RM6.0 billion**, with the **infrastructure** fully developed to support the industry and there will be **sufficient range of products** to satisfy the needs of customers.
>
> The industry will be using **up-to-date technology**, some of which are home-grown, to produce **high quality products**.
>
> All chilled and frozen food producers will implement **GHP and GMP** while the **major ones** will have **HACCP** certification to gain acceptance overseas.
>
> For Malaysia to be the **International Halal Hub in 2010**, the country will produce **at least 10 percent** of world's halal food market.

9.2 Strategies and Action Plans

In order to achieve the vision and address and resolve the challenges, opportunities, and threats, seven key strategies and 27 action plans for the Malaysian chilled and frozen food industry are recommended.

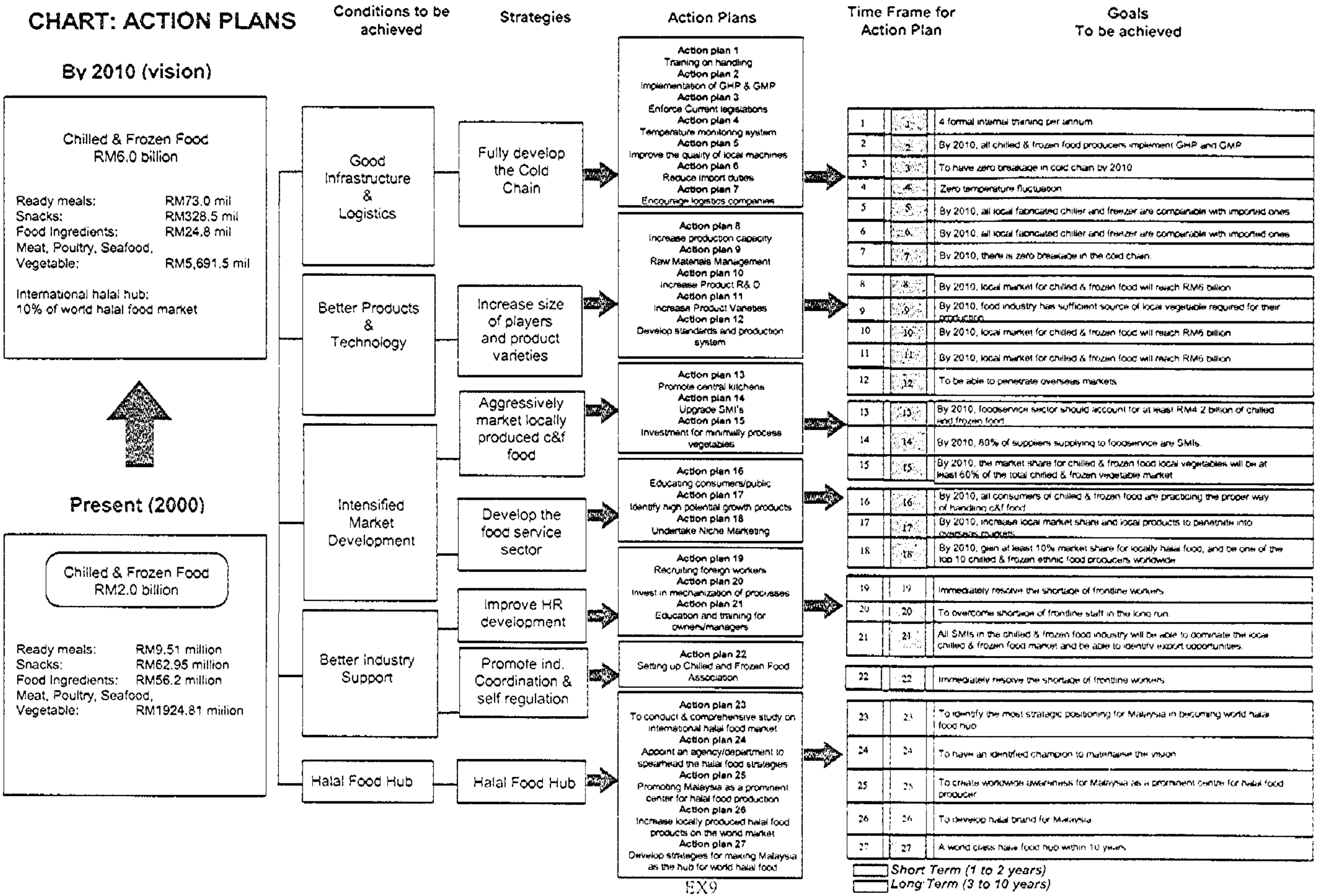
The following graph describes the time frame and where applicable, the corresponding goals for each of the strategies and action plan:

CHART: ACTION PLANS



EX9

CHART: ACTION PLANS



EX9

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

TABLE OF CONTENTS (cont'd)

LIST OF TABLES

LIST OF TABLES (Cont'd)

LIST OF TABLES (Cont'd)

LIST OF TABLES (Cont'd)

LIST OF APPENDICES

APPENDIX

LIST OF CHARTS

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ABBREVIATIONS

3F	Fund for Food
ABAC	APEC Business Advisory Council
AFAPK	Association of Forwarding Agents at Port Klang
AFFI	American Frozen Food Institute
AFTA	ASEAN Free Trade Area
AMAF	ASEAN Ministers of Agriculture and Forestry
APEC	Asia Pacific Economic Co-operation
ASEAN	Association of Southeast Asian Nations
BNM	Bank Negara Malaysia (Central Bank of Malaysia)
BPM	Bank Pertanian Malaysia
C&F	Chilled and Frozen
CEO	Chief Executive Officer
CEPT	Common Effective Preferential Tariffs
CFFI	Chinese Frozen Food Institute
CIF	Cost, Insurance and Freight
CIS	Commonwealth of Independent States
CO_2	Carbon Dioxide
CPI	Consumer Price Index
DOE	Department of Environment
DVS	Department of Veterinary Services
ECR	Export Credit Refinancing Scheme
EIU	Economic Intelligence Unit
EPS	Expanded Polystyrene
EU	European Union
FAMA	Federal Agricultural Marketing Authority
FAS	Foreign Agriculture Service
FDI	Foreign Direct Investment
FMM	Federation of Malaysian Manufacturers
GAHP	Good Animal Husbandry Practices
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GM	General Manager
GMP	Good Manufacturing Practices
GPR	Glass Reinforced Polyester
GSP	Generalised System of Preferences
HACCP	Hazard Analysis of Critical Control Points
HMR	Home Meal Replacement
IAP	Individual Action Plan
IDSB	Ihlam Daya Sdn Bhd
IFANCA	Islamic Food and Nutrition Council of America
IMP2	2nd Industrial Master Plan
IPC	International Policy Council
IQF	Individual Quick Freezing Foods
IRPA	Intensified Research in Priority Areas
IRPA	Research Projects in Priority Areas
ITA	Investment Tax Allowance
ITAF	Industrial Technical Assistance Fund
JAKIM	Jabatan Kemajuan Islam Malaysia (Department of Islamic Development Malaysia)
JICA	Japan International Cooperation Agency

ABBREVIATIONS (cont'd)

KLAS	Kuala Lumpur Airport Services
LHRA	Leatherhead Food Research Association
LPKP	Lembaga Perlesenan Kenderaan Perniagaan (Commercial Vehicle Licensing Board)
MAFMAG	Malaysian Food Manufacturers Group
MAP	Mechanisation and Automation for Agriculture Program
MARDI	Malaysia Agricultural Research and Development Institute
MATRADE	Malaysian External Trade Development Corporation
MD	Managing Director
MFCA	Malaysian Food Canners' Association
MFFPA	Malaysian Frozen Foods Processors Association
MIDA	Malaysian Industrial Development Authority
MNC	Multinational Companies
MOA	Ministry of Agriculture
MOH	Ministry of Health
MOU	Memorandum of Understanding
MT	Metric Tonne
NAP3	3rd National Agricultural Policy
NEP	New Economic Policy
NERP	National Economic Recovery Plan
PAKSI	Pakej Kewangan Untuk IKS (Financial Package for SMI's)
PTA	Preferential Tariff Arrangement
QA	Quality Assurance
QAP	Quality Assurance Program
QC	Quality Control
QFF	Quick Frozen Food
R&D	Research and Development
ROC	Registrar of Companies
SANSHA	South Africa National Halal Authority
SC	Steering Committee
SIRIM	Standard and Industrial Research Institute of Malaysia
SMIDEC	Small and Medium Industry Development Corporation
SMP	7th Year Malaysia Plan
SPS	Sanitary and Phytosanitary Measures
SWOT	Strengths Weaknesses Opportunities Threats
TBT	Technical Barriers to Trade
TUF	Thai Union Frozen
UAE	United Arab Emirates
UKM	Universiti Kebangsaan Malaysia (National University of Malaysia)
UM	Universiti Malaya
UPM	Universiti Putra Malaysia
US	United States
USDA	United States Department of America
USM	Universiti Sains Malaysia (University Science of Malaysia)
VAP	Value Added Products
VHM	Veterinary Health Mark
WTO	World Trade Organisation

Chapter 1

INTRODUCTION

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INTRODUCTION

1.1 Study Background and Objectives

Fresh food by nature is perishable. The development of chilling and freezing processes has enabled the freshness of these products to be prolonged through temperature control. The following are reasons why chilled and frozen food is important to the food industry:

- Provides convenience in food preparation
- Improves food distribution
- Lengthens food shelf life with minimal effect on quality
- Improves food supply and availability
- Reduces food wastage and spoilage
- Reduces post harvest losses
- Lowers cost and stabilises the supply of food products

There is an increasing demand for chilled and frozen food in advanced as well as developing countries and, therefore, an interest to understand the present state of the industry in Malaysia and to plan for its future development. As stated in the Terms of Reference, this study is undertaken in response to these requirements. The objectives of the study is to assess the following:

- Market size, market potential, and consumer analysis for chilled and frozen food locally and abroad.
- Quality, technology, research and development, and human resource development programs associated with the chilled and frozen food industry.
- Potential for Malaysia to become the hub for the world's halal chilled and frozen food market.

1.2 Product Coverage and Definition

The Terms of Reference identified four product categories of chilled and frozen food to be studied. The following describes the product categories:

Table 1.1 Product Coverage and Definition

Categories	Product Description:
1. **Ready-to-serve meals** are complete meals that require minimum re-heating time prior to serving.	• Meals refer to main course that comprise primary and complementary dishes. Primary dishes would include rice, noodles, meat or fish. Complementary dishes, normally in a smaller portion, could be meat, seafood, vegetables and/or sauce. Complete meals include *nasi lemak*, *nasi briyani*, pizza, *murtabak*, or other types of food either local, oriental or Western cuisine.

Table 1.1 Product Coverage and Definition (continued)

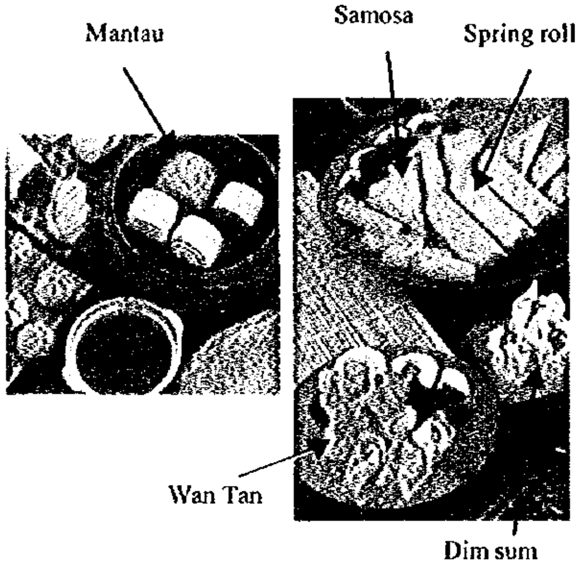
Categories	Product Description:
2. **Snacks** are cakes either sweet or savoury that require more elaborate re-heating process.	• Light meal products consumed during tealime or between meals. In Malaysia, snacks include *popia*, *samosa*, egg rolls with various types of filling, *donut*, *pau* (steamed bun), *karipap* (curry puffs), and others.
3. **Food Ingredients** are prepared local spices and ingredients (either single or combination of spices in the form of paste) to be used during meal preparations.	• Products used to prepare meals such as onions, lemon grass, galangal, and ginger.
4. **Chilled and frozen ready-to-serve, ready-to-cook meat, seafood, and vegetables.** The ready-to-serve category refers to cooked meat, seafood and vegetables that require re-heating prior to serving, while the ready-to-cook segment refers to pre-cut or marinated meat, seafood, and vegetables that need a more elaborate cooking process.	• Products that are in the original texture such as chilled and frozen poultry, beef, pork, mutton and seafood. • Products that are further processed such as chilled and frozen nuggets, burgers, sausages, fish balls, *sotong* balls, and crabmeat. • Chilled and frozen vegetables and pre-cut chilled and frozen vegetables.

Examples of ready-to-serve meals

Japanese Noodle

Nasi Lemak

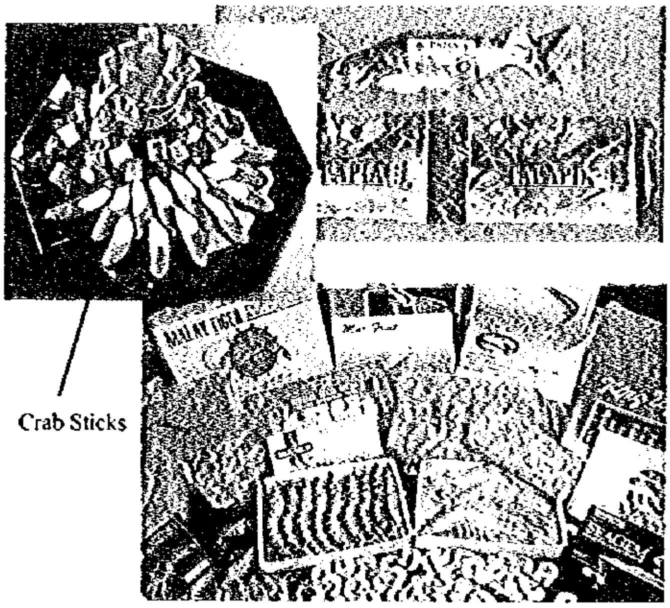
Examples of snacks



Examples of food Ingredients

Coconut milk *(santan)*

Examples of Seafood



Chilled food is defined as food products that have to be stored at temperatures of minus 1° C to 10° C. Chilled food comprises food stored in a chilled cabinet. Some examples are value-added products such as ready-to-serve meals and snacks, prepared salads, pizza and pasta; chilled food ingredients such as chilled fruits and vegetables; chilled meat and seafood products such as meat cuts, chicken and seafood.

Frozen foods have to be stored at temperatures minus 18°C and below, and comprise foods that have undergone quick-freezing process. Some examples are frozen meals and snacks, frozen food ingredients, and frozen meat and seafood products.

Fresh foods by nature are perishable. Chilling and freezing maintains the shelf life and reduces spoilage of these products through temperature control.

The **chilled chain** is generally applied to foods where the texture and consistency of the food would not withstand the harsh conditions of being frozen, and where quality needs to be maintained as close as possible to the fresh form. Examples of these products are chilled meat, and vegetables. Depending on the type of product, these products normally have a shelf life of about two weeks.

The **frozen chain** is applied to foods that need to be kept at a lower temperature to prolong the shelf life as compared to chilled foods, with minimal effect on their quality and freshness. Examples are frozen meat, snack food, and vegetables. The shelf life of these products is about one year.

1.3 Study Framework and Major Activities

The study team was guided and advised by a Steering Committee comprising representatives from Ministry of Agriculture (MOA), Federal Agricultural Marketing Authority (FAMA), Department of Statistics (DOS), Malaysian Agricultural Research and Development Institute (MARDI), the Economic Planning Unit (EPU), and the Japan International Cooperation Agency (JICA).

1.3.1 Surveys

Primary research was implemented to extract information from both the consumers and industries' perspectives on chilled and frozen food in Malaysia. Two surveys, namely consumer survey and industry survey, were carried out to gather information on the consumers and industry players.

a) Consumer Survey

The main objectives of the consumer survey of the chilled and frozen food are to explore consumers' evaluation and perception toward chilled and frozen food. This study serves the following objectives:

- Determine product awareness and perception
- Determine consumption pattern
- Determine purchasing pattern including their taste and preference
- Forecast future trend of the local market based on current ceiling level of the industry
- Determine the influence of some socio-demographic characteristics

The survey was carried out from 4 April 2000 to 15 April 2000. 800 respondents from five areas (Klang Valley, Penang, Ipoh, Seremban and Johor Bahru) were randomly sampled at shopping complexes using Mall-Intercept survey method and the full list of shopping malls included in the study is shown in Appendix 1. The following table (Table 1.1) lists the survey samples:

Table 1.2 Summary of Survey Samples

City	Number of Respondents
Klang Valley	554
Penang	59
Ipoh	61
Seremban	60
Johor Bahru	66
Total	**800**

As chilled and frozen food is predominantly an urban phenomenon and is expected to remain so, the survey carried out concentrated in urban areas. The survey focused in Klang Valley and assumes that the consumers' behaviour in all major towns is similar. In order to test the assumption on urban consumers' behaviour, the same survey was carried out in four other major urban areas in Malaysia, i.e., Johor Bahru, Penang, Ipoh, and Seremban, but with a smaller sample size. The finding on consumers from Klang Valley and selected towns has shown that they have similar perception on the differences between chilled and frozen food, purchase frequency and purchase quantity.

All respondents were either current or previous chilled or frozen food consumers. Demographic data of the consumers who participated in this survey are provided in Appendix 2. The questionnaire used is attached in Appendix 3.

Though there are four categories of chilled and frozen food covered in the Study, for purpose of the survey, chilled and frozen ready-to-eat meals were combined with snacks, as there are only a limited number of products in the former category. Hence, the following three main product categories of chilled and frozen food surveyed are:

- Chilled and frozen meals and snacks
- Chilled and frozen food ingredients
- Chilled and frozen meat and seafood products

Selected items were used to represent each of the above categories. In so doing, interviewees had a better perception of the products and this assisted them in responding to the questions. The following are the selected items:

Table 1.3 Selected Items for Various Categories

Product Category	Selected Items
Chilled & frozen meals and snacks	• frozen curry puff, *murtabak*, *pau*, *mantau*, *dim sum*, spring rolls, *roti pratha*, *roti canai*, *samosa*, pizzas, pies, chilled *nasi lemak* and frozen *naan/capati*
Chilled & frozen food ingredients	• chilled & frozen coconut milk/grated, spice pastes, vegetables, fruits, *cendol/cincau*, tofu, noodles, and Japanese ingredients
Chilled & frozen meat and seafood	• chilled & frozen burgers, sausages, nuggets, seafood, meat cuts, chicken, *satay/kebab*, TV dinner/lunch meal pack, Japanese type meat, marinated meat and cold cuts/dairy type of foods

Since there is a trend towards snacking, some consumers have been consuming a pizza meal as a snack.

Vegetables and fruits were grouped under food ingredients because of local consumers' cooking practice. Local consumers normally perceive that any food which are served as part of the complete meal or used to prepare a meal, are food ingredients. Hence, vegetables and fruits are grouped as ingredients merely for the purpose of consumer perception rather than scientific classification.

Examples of Japanese ingredients include *goma konbu*, *donton zuke* (pickled radish), pickled ginger, and Japanese green pepper. Frozen vegetables include pre-cut vegetables such as potatoes, carrots, and green beans, which are normally imported and in a standard package size. Chilled vegetables include those minimally-processed vegetables sold in the chilled cabinet, both local vegetables and imported vegetables.

TV dinner meal pack is grouped under chilled and frozen meat and seafood category because in the Malaysian context the TV dinner meal pack is usually meat-based food products, such as steak.

Detailed findings on the awareness, general perceptions, consumption pattern, purchasing pattern, consumers' preferences, future prospects, and the influences of some socio-demographic characteristics are in Chapter 3.4.

b) **Industry Survey**

The main objectives of the industry survey were to understand the following aspects of the industry:

- Market size
- Market structure and competition, market segmentation, present market demand and supply for each product category and/or the local chilled and frozen food industry
- Current technology, industry practice, and distribution of chilled and frozen food

In-depth interviews were conducted with local manufacturers, importers, retailers, food service providers and support service providers as well as industry experts. A structured questionnaire (see Appendix 4) was also sent to those who could not be interviewed. The following are the companies participated in our survey:

Table 1.4 List of Companies Interviewed

	Company / Organisation	**Interviewee / Designation**
Meals & Snack Manufacturer	• Tricious Food Sdn Bhd • Starlet Food Industries (M) Sdn Bhd • Ben Fortune Sdn Bhd • Prima Agri Product Sdn Bhd • Momotaro Foods Sdn Bhd	• Ms Lau Pik Choo (Director) • Mr Yoshimi (MD) • Mr Tan (Senior Manager) • Ms Julia Lim (Sales Manager) • Mr Hennie Coenraad (Exc. Dir) • Mr Koyama Akira (MD)
Snacks Manufacturer	• K.G. Pastry Manufacturing Sdn. Bhd. • P.A. Food Sdn. Bhd (Syarikat Pau Ahamd)	• Mr T.C. Gan (MD) • Mr H.S.Ding (MD)
Coconut Milk Manufacturer	• Sensori Food Ind Shd Bhd	• Mr. Low Yeam Hong (Director)
Meat Manufacturer	• Ayam Manjung • Burger Tanjung • Dinding's Poultry • Selangor Food Industry • Sri Rasah • Omar's Deli • Saudi Cold Storage (Manufacturer & Importer) • Lucky Frozen (Manufacturer & Importer) • Prima Agri-Products Sdn Bhd • Rex Canning • Taipei Food • Solid Side Food Ind S/B • U.B. Food SB	• Mr Yeoh Teng Choon • Mr Khor Guai See • Mr Quah Qing Hoe • En Hisham • En Malik Ghulan • Abang Omar • Mr Lee Y.T • Mr See Kian Thien • Mr Hennie Conraad • Mr Lee Chak Hiang • Mr Sim Kai Hong • Mr Foog Kee Weng • Mr Chai Meng Liew

Table 1.4 List of Companies Interviewed (continued)

	Company / Organisation	Interviewee / Designation
Seafood Manufacturer	• QL Foods • HSH Sdn. Bhd (Manufacturer & Importer) • Kami Food Sdn Bhd • Seapack • Tradisi Emas • Sea Master Trading Co Sdn Bhd	• Mr Eric Cheah • Mr Philip Goey • David & Daniel Yong • Mr Chin Hai Hong • Mr Lee Teck Wee • Lim Seow Pei
Importer of Japanese Ingredients	• Focal Marketing Sdn Bhd • Daisho (M) Sdn Bhd	• Mr Lim Thiam Hock (Director) • Mr Lee Yit Siew
Importer of Frozen foods	• Pillsbury (M) Sdn Bhd • Principal Agents (Frozen Foods) • Selamat Suppliers Sdn Bhd (Chilled & Frozen meat)	• En Johannis Arif Ibrahim • Mr Kuek Heng Song (Manager) • Mr Eric T.G. Tan
Retailer	• TOP' S Subang Parade • Hock Choon Supermarket S/B, Ampang. • Extra, The Mines Shopping Fair	• En Shadat • Ms Diana • Mr Lee Fook Seng
Food service providers	• MAS Catering Sdn Bhd • KL Airport Services Sdn Bhd (KLAS) • Eurest • Sajibumi • McDonalds	• Raja Kamariah Raja Hussein (VP Marketing) • Mr Wayne Alan Diffey (GM) • En Ikmal Hisham (QA/QC Executive) • En Azham Shah Attan (Purchasing Executive) • Mr. Kuhn (CEO) • En Suhaimi (CEO) • Tengku Athiyah
Support Service Providers	• NKP Perkasa Continental	• En Adnam Adam (COO)
Equipment suppliers	• Risha Sdn Bhd • MS Cooling Sdn Bhd • Rigidform Industries (M) Sdn Bhd • Wong Brothers Electrical & Refrigeration Industry • TM Cooling Technology Sdn Bhd	• En Mohd Rizal (Partner) • • Mr L.Y. Chan (MD) • Mr Ivan K.B. Wong • Mr W.P. Lim (MD)

Table 1.4 List of Companies Interviewed (continued)

	Company / Organisation	Interviewee / Designation
Transportation	• Konsortium Logistik Bhd. • Diperdana Corporation Bhd • Pok Brothers • United Logistics Sdn Bhd • Selamat Supplies Sdn Bhd • Binakon (M) Sdn Bhd • Cima Forwarding Sdn Bhd • Sin Kang Sdn Bhd • Sanjungan Sekata Sdn Bhd • G-Force Sdn Bhd	• Mr Loo Hooi Keat • En Fisal Bin Awab (Asst. GM) • Mr Pok York Keaw (MD) • Mr Lim Keh Kuan (Director) • Mr Eric Tan (MD) • Mr C.K. Wong (MD) • Ms Lee (Fin Controller) • Mr Ong Ling Jin (MD) • Mr Apalasamy • Mr Ben Ong
Cold storage providers	• G-Force Sdn Bhd • Sitt Tatt Logistics Sdn Bhd • Tamadam Bonded Warehouse Sdn Bhd • Igloo (M) Sdn Bhd • Ng Kee Cold Store • Folin Food Processing Sdn Bhd • Subang Coldrooms Sdn Bhd • Long Lit Jee Sdn Bhd • Selayang Cold Store Sdn Bhd	• Mr Ben Ong • Lew Joo Ken • Chia Ku Kuan • Mr Tony Ang (GM) • Mr K.C. Lim • Mr F.L. Wong (MD) • Mr Low (MD) • Mr Alan Chee Sin (Sales Manager) • Ms Lee (Finance Exec)
Private Association	• Frozen Food Importers Association	• Mr Eric Tan, Mr. Kuek Heng Song

1.3.2 Secondary Research

A comprehensive secondary research was carried out where relevant materials and statistical data were gathered from the following various sources:

a) Malaysian Government agencies such as:

- Ministry of Agriculture
- Ministry of Health
- Ministry of International Trade and Industry
- Department of Statistics
- Federal Agricultural Marketing Authority
- Department of Fisheries
- Central Bank of Malaysia
- The Malaysian Industrial Development Authority
- Malaysian External Trade Development Corporation
- The Small and Medium Industries Development Corporation
- Malaysia Agriculture Research and Development Institute

- Bank Pertanian Malaysia
- Ministry of Transport
- Lembaga Perlesenan Kenderaan Perdagangan (Commercial Vehicles Licensing Board)
- Royal Customs and Excise Department
- Federal Land Development Authority
- Economic Planning Unit

b) Deloitte Touche Tohmatsu International offices

c) Local and overseas publications including:

- Vision 2020 Document
- 2nd Perspective Plan
- Industrial Master Plan 2
- Third Malaysian National Agricultural Plan
- Bank Negara Malaysia Economic Report
- Statistics Year Book
- Federation of Malaysian Manufacturers Directory 2000
- Economic Intelligence Unit (EIU) Retail Business
- Quick Frozen Foods International
- Food Processing
- Asia Pacific Food Industry
- Food and Pack
- The World of Ingredients
- USDA Reports
- Canadian Asian Agricultural Trade Commissioners
- Other periodicals, newspapers, magazines, journals, and food-related Internet websites

d) Trade associations such as:

- Federation of Malaysian Manufacturers
- Frozen Food Importers Association
- Malaysian Institute of Food Technology

e) Private research companies and universities research works

1.3.3 Interviews and Workshops with Relevant Government Agencies and Industry Players

The purpose of the interview with relevant Government agencies was to obtain information on general policy directions, trade policies and development for chilled and frozen food or other industries which may have impact. The following are the list of major Government agencies interviewed:

- Ministry of Agriculture (MOA)
- Ministry of Health (MOH)
- Ministry of Domestic Trade & Consumer Affairs
- Department of Veterinary Services (DVS)
- Department of Fisheries
- Department of Agriculture
- Malaysia Industrial Development Authority (MIDA)
- Malaysia Agricultural Research and Development Institute (MARDI)
- Standard and Industrial Research Institute of Malaysia (SIRIM)
- Department of Islamic Development Malaysia (JAKIM)

In addition to the interviews, the study team had also conducted the following two workshops with:

a) Relevant Government agencies

The purpose was to gather their views on current status and future directions of the chilled and frozen food industry. The Government agencies participated were:

- Economic Planning Unit (EPU)
- Malaysia Industrial Development Authority (MIDA)
- Malaysia Agricultural Research and Development Institute (MARDI)
- Ministry of Agriculture (MOA)
- Department of Veterinary Services (DVS)
- Malaysian External Trade Development Corporation (MATRADE)
- Ministry of International Trade and Industry (MITI)
- Federal Agricultural Marketing Authority (FAMA)

b) **FAMA and Key Industry Players**

The purpose was to obtain feedbacks on our findings and proposed strategies and action plans from key industry players. The participants were:

Table 1.5 List of Key Industry Players

Industry	Company
Catering / Central Kitchen	• MAS Catering Sdn Bhd
Cold room and refrigerated equipment	• Hai San Resource Sdn Bhd
Cold room providers	• Waichak (M) Sdn Bhd
Equipment suppliers	• Wong Brothers Electrical & Refrigeration
Fast food chain operator	• Ayamas Food Corporation Berhad
	• McDonalds
Food Manufacturer	• Li-Ter Vegetarian Supplier
Food Technology	• Mitsubishi Corporation Sdn Bhd
Logistics Provider	• Igloo (M) Sdn Bhd
Meat processor	• Prima Agri Product Sdn Bhd
Palm oil producer	• Southern Nisshin Bio-Tech Sdn Bhd
Retailer	• HAVI Food (Malaysia) Sdn Bhd
	• Xtra Supercentre
Seafood manufacturers	• Seapack Food Sdn Bhd
Snack manufacturer	• K.G. Pastry Manufacturing Sdn Bhd
Snack manufacturer	• P.A. Food Sdn Bhd
Transportation provider	• G-Force Sdn Bhd
	• Tamadam Bonded Warehouse Bhd

1.3.4 Market Potential Projection Methodology

The qualitative nature of the market drivers (see Chapter 7) and the lack of historical statistics for the Malaysian chilled and frozen industry has made it difficult to implement the quantitative method in projecting the future market potential.

As an alternative, a "comparative model" approach was used on the basis that the chilled and frozen market in various countries is driven by similar market factors and would experience similar growth pattern.

In order to determine the likely growth scenario for the industry from now till 2010, there is a need to understand how this industry has grown and evolved in other more developed countries. This is because, as outlined later in this report, the drivers of the industry's growth are similar globally, resulting in similar growth patterns.

In this study, we selected Japan's chilled and frozen food industry as a model to project the future market potential of chilled and frozen food in Malaysia, after taking into consideration the following factors:

- Being an Asian country, there are more similarities in the demand side of the industry such as consumption pattern, and taste compared to western countries.
- The Japanese has a record of more than 30 years of time series statistics for its chilled and frozen food industry.
- The need to benchmark the Malaysian chilled and frozen food market by selecting the best model of the best chilled and frozen food industry in Asia, which is Japan.

The method used for projecting the market potential is described in the following sections.

a) **Steps followed for overall market size projection:**

- Step 1 - determined the market drivers of chilled and frozen food industry in Malaysia and overseas.

- Step 2 - determined Malaysia's per capita consumption of chilled and frozen food.

- Step 3 - estimated the per capita consumption of chilled and frozen food in Japan, using statistics available from Japan Frozen Food Association. The Japanese statistics are adjusted for the consumption of frozen confectionery, which are not in the scope of this study.

- Step 4 - compared the estimated per capita consumption in Malaysia versus Japan and determined the stages of industry development in Malaysia relative to Japan. e.g. Malaysia's per capita consumption is equivalent to Year "x" of Japan.

- Step 5 - the future market size (in ton) of chilled and frozen food in Malaysia is derived based on Japan's per capital consumption growth pattern, beginning from *x+1* year, for the next 10 years, and then multiplied with the projected Malaysian population for the corresponding period.

- Step 6 - the total market size (in ton) is then converted into value by multiplying an estimated average price of chilled and frozen food and a 4.5% p.a. inflation factor. The average price of chilled and frozen food is estimated from a basket of commonly consumed chilled and frozen food in Malaysia (see Table 1.6).

Table 1.6 Average Prices per kg of Frozen Food

		g	RM	RM/KG
1	Spring rolls	250	3.2	12.80
2	Mantau	375	2.5	6.67
3	Roti canai	400	3.3	8.25
4	Pizzas	250	6	24.00
5	Chicken burgers	600	5	8.33
6	Chicken nuggets	900	9.5	10.56
7	Beef burgers	700	4.8	6.86
8	Fish chips	500	4.9	9.80
9	Fish nuggets	500	5.8	11.60
10	Fish burgers	500	5.5	11.00
11	Sotong balls	500	4.5	9.00
12	Chicken balls	1000	8.4	8.40
13	Chicken BBQ sausages	600	6.6	11.00
14	Kaya pau	360	4.4	12.22
15	Tofu Jepun	140	1.9	13.57
16	Broccoli	283	6.55	23.14
17	Sweet corn	500	4.1	8.20
18	Peas	500	3.1	6.20
19	Mix veg	250	1.9	7.60
20	Spinach	450	6.75	15.00
	Total			**224.20**
	Average price (rounded to nearest 2 decimals)			**11.20**

Source: Supermarket audit conducted in April 2000

b) **Steps followed for projection of market size of each food segment:**

- Step 1 - Estimated the growth rate of Ready-to-Serve Meals, Snacks, Ingredients and Meat, vegetables and seafood categories (see Market Potential Computation Framework in the following pages)

  As the first three food categories, i.e., Ready-to-serve meals, Snacks and Ingredients are in its infancy stage, the future growth estimated for these categories rely heavily on key industry players' forecast, and cross referencing with the historical growth rate of more developed chilled and frozen food industries.

  The growth rate of meat and seafood consumption is estimated taking into consideration the market's historical trend and current stage of development.

  Our industry survey revealed that currently there is no significant player in the minimally processed vegetables segment but this segment appears to have great potential and we have, therefore, estimated the future market size of vegetables separately. Using the residual growth approach, i.e., the growth rate of the vegetables segment is derived after the market sizes of other segments have been determined (see Step 2 of the Market Potential Computation Framework).

- Step 2 - the projected market size of vegetables has been equated to the difference between the projected overall market size of chilled and frozen food and total projected market size of ready-to-serve meals, snacks, ingredients and meat and seafood. We have then consulted with industry sources and benchmarked the projected market size with the demand for value added vegetables forecasted in NAP3 to verify that the projected market size for chilled and frozen vegetables is within reasonable range.

Table 1.7 Benchmark – Value-added Vegetables Forecast by NAP3

	2005	2010
1978 price	826.0	1,132.0
Estimated Current price*	2,710.9	4,629.9

Note: Assuming average inflation is 4.5% p.a

c) Sensitivity Analysis

We conducted a sensitivity analysis to gauge the possible impact of socio-economic differences on the projected market size in the process of adapting Japan's chilled and frozen industry growth model to the Malaysian scenario. This is to ensure that the projection for Malaysia's chilled and frozen food market is directionally correct.

Chart 1.1 Market Potential Computation Framework –

(a) Estimated Overall Market Size (Step 1)

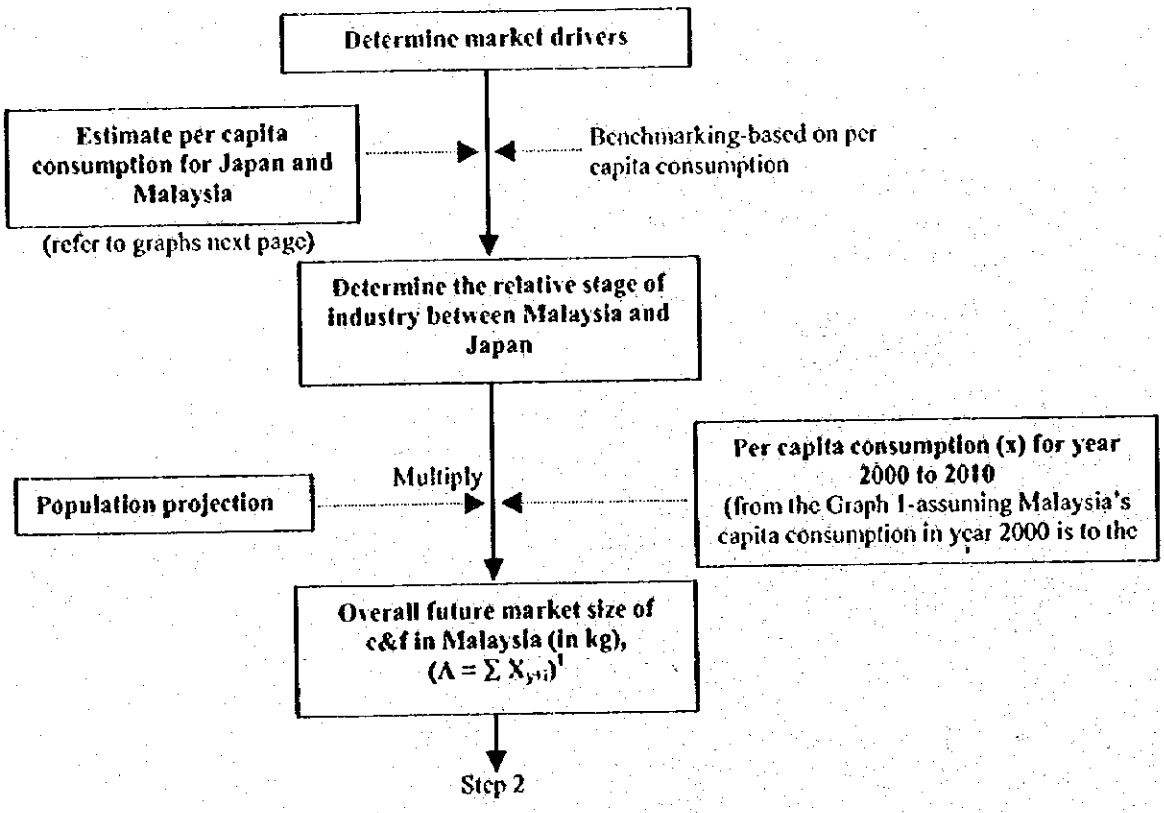
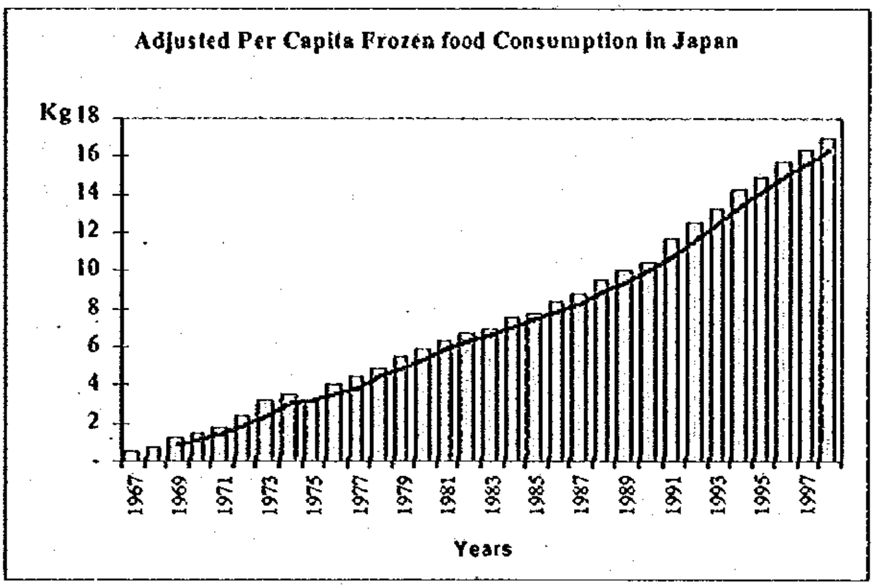
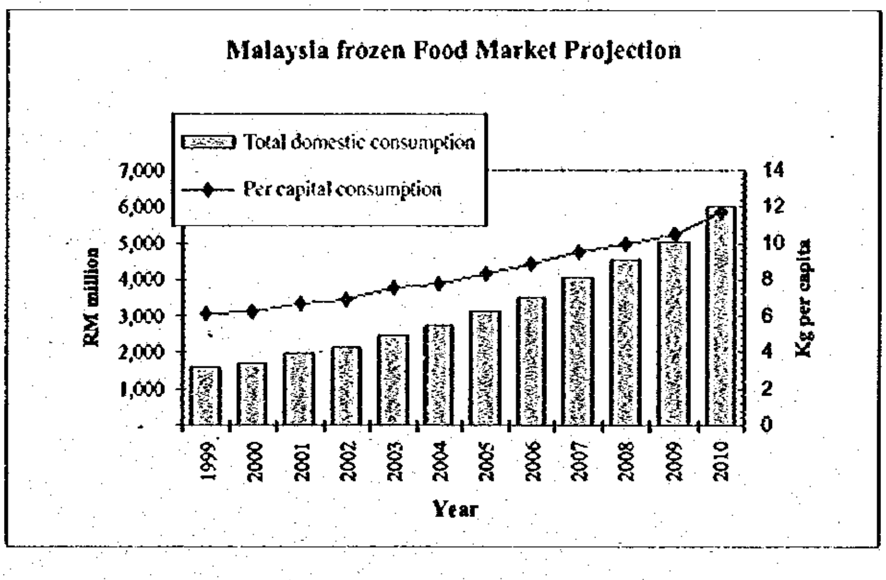


Chart 1.1 Market Potential Computation Framework –

(a) Estimated Overall Market Size (Step 1) (cont'd)



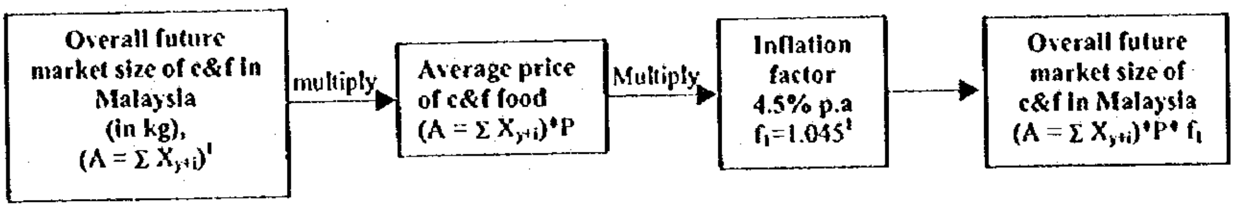
Note: The per capita frozen food consumption is sourced from the Japan Frozen Food Association.



Note: 1 "x_{y+i}" – per capita consumption (x) of year (y+1).
"y" – the year of which the Malaysian's and Japanese's per capita consumption is equivalent (y=1979).
"i" – from 1 to 11.

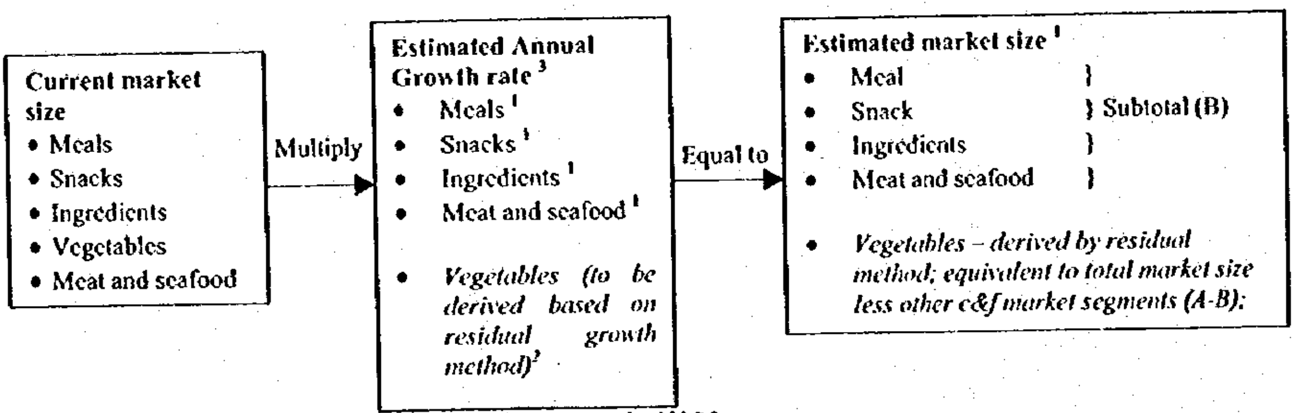
Chart 1.1 **Market Potential Computation Framework –**

(a) Estimated Overall Market Size (Step 2)



Notes: X_{y+1} – per capita consumption (x) of year (y+1)
"y" – the year of which Malaysia's and Japan's per capita consumption is equivalent
"A" – Overall market, from Step 1
"i" – from 1 to 11
"P" – Average price of chilled and frozen food

(b) Estimated Market size for Various Food Segments



Benchmark – value-added vegetables forecast by NAP3

Notes: 1. An average growth rate for the recent years is obtained through industry survey.
2. Derived at after the market size of vegetables is estimated using the residual method, then, benchmarked with the projection by NAP 3.

Year	2005	2010
1978 price	826.0	1,132.0
Estimated Current price*	2,710.9	4,629.9

* Assuming expected inflation of 4.5% per annum.

3. Incorporated expected inflation of 4.5% per annum.

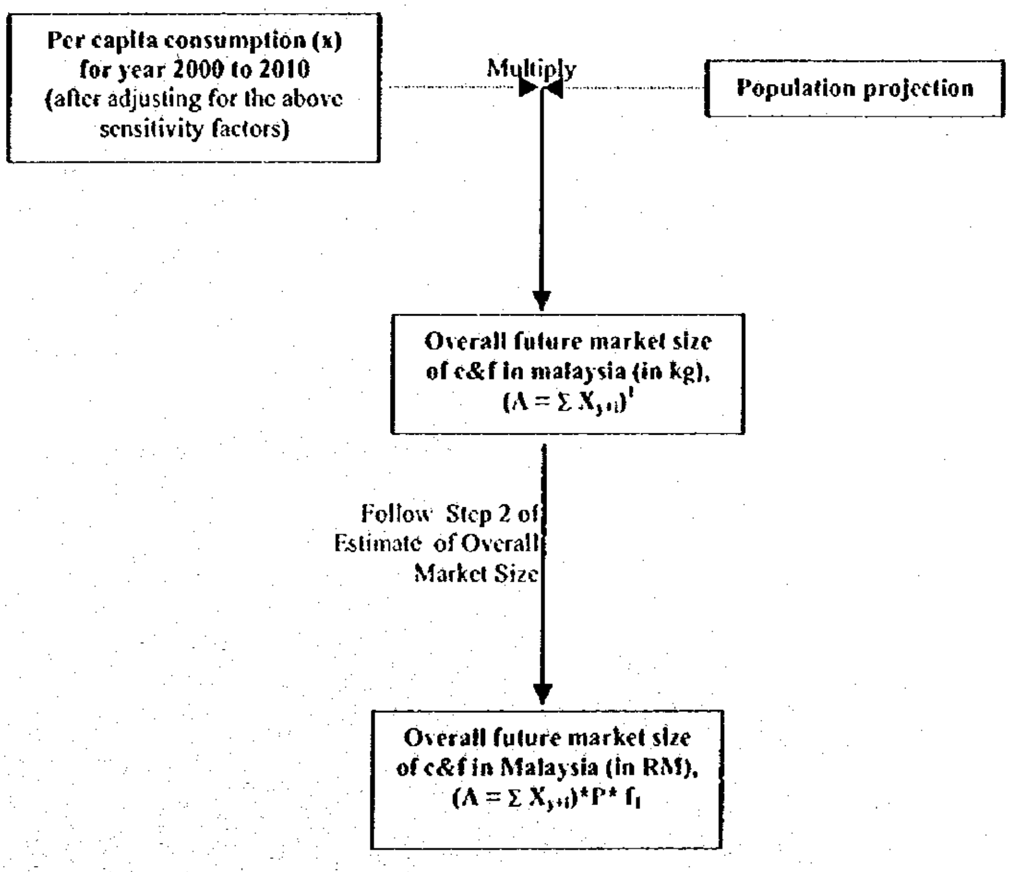
Chart 1.1 Market Potential Computation Framework –

(c) Sensitivity Analysis

	Scenario 1	Scenario 2	Scenario 3
Higher per capita consumption (x) by	25%	-	25%
Faster consumption growth (r) by		25%	25%

Computation for higher per capita consumption $= x_{1999+i} * (1.25)$

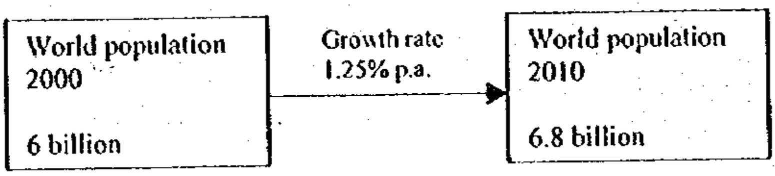
Computation for per capita consumption At a faster consumption rate $= x_{1999+i}$ *(effective growth rate per annum for the period 2000 to 2010)



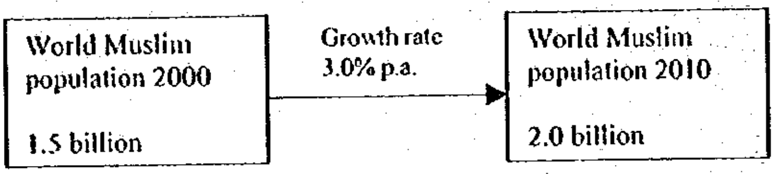
Note;
x = Per capita consumption
n = Number of period from 1999 to 2010 (n = 11)
i = Number of period from 1999 to 2010 (i = 1 to 11)
r = consumption growth rate

Effective consumption growth rate = $(n*(1-r))\sqrt{X_{2010} / X_{1999}}$

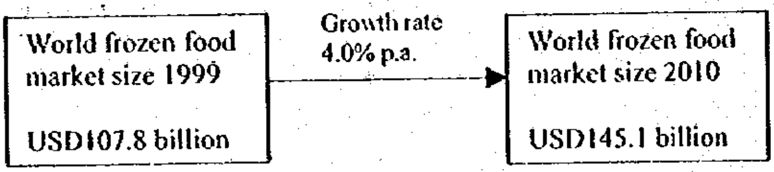
Chart 1.2 Computation Framework For Future Frozen Halal Food Market



Note 1: Source: United Nation population projection, revision 1998



Note 2: www.imangroup.org



Note 3: DKMC estimate

a) Demand for halal food 2000

$$\left[\frac{\text{World Muslim population}}{\text{World population}}\right] \text{*worldwide frozen food market size}$$

= (1.5/6.0) * USD107.8 billion
= USD27.0 billion

b) Demand for halal frozen food 2010

= (2.0/6.8) * USD145.1 billion
= USD43.1 billion

* The estimated market size for halal frozen food is at the higher end range as the purchasing power of Muslim countries on average is lower than the developed countries who accounted for most of the worldwide frozen food consumption

1.3.5 Research Limitations

The research has been carried out successful given the means and the timeframe. Despite this, the following are the research limitations that need to be highlighted to users of this report pertaining to the reliability and accuracy of the findings:

- The statistics for estimating chilled and frozen food sub-sector industry is not readily available and limited data is found in the Registrar of Company (ROC). Further, data from ROC is not all relevant and up-to-date, hence, most of the latest information in relation to the import, export, and sales of chilled and frozen food are based on experts and major industry players' opinions. Issues in relation to the industry, market overview, gaps, potential and growth of the chilled and frozen food industry are heavily dependent on data gathered from interviews and discussions with major players in the industry. Hence, certain issues or statements in the report are subjective and judgmental.

- Though purposively drawn to meet specific requirements, participants of the consumer survey represent a convenience sample, and all caveats about non-probability sampling are operative. The analyses of findings of the consumer survey results are derived from chilled and frozen food consumers only, and majority of them are from Klang Valley.

- Only statistics of frozen food consumption in Japan is available. The study team, however, noticed that the chilled food in Malaysia, except for chilled vegetables, is relatively small (see Chapter 7.2.2). The comparative model assumed that the Japanese frozen food industry growth trend is still a good proxy for the Malaysian chilled and frozen food industry, given that market drivers are similar. As such, the projection model employed herein would provide only an indicative future market size. It also implies that Malaysia has to take some interventions to stimulate and develop the industry as in Japan to achieve the projected level of market size.

- Since the growth rate for each of the food category is obtained directly from survey of industry players, the survey has to be carried out periodically in order to update growth parameters.

In spite of these limitations, the research carried out does provide useful information for us to achieve the study's objectives. The following findings have enabled us to:

- Obtain an estimate of the current market size.
- Estimate the potential growth of the chilled and frozen food industry.
- Provide a general view of local consumers' perception toward chilled and frozen foods.
- Use the findings of the study to determine the industry's future directions.

Aside from the above, the research also initiates empirical study of chilled and frozen foods market in Malaysia.