SYMPOSIUM
on
RESEARCH AND DEVELOPMENT IN PROCESSED FOOD INDUSTRY
covering

PRODUCT / PROCESS DEVELOPMENT

DEVELOPMENT IN ANALYTICAL TECHNIQUES

MARKET RESEARCH

Saturday, 24th May 1997

VENUE

ADA RANGAMANDIRA

Opposite Ravindra Kalakshetra

109, J.C. Road, Bangalore 560 002

ASSOCIATION OF FOOD SCIENTISTS & TECHNOLOGISTS (INDIA), BANGALORE CHAPTER

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Contents

SYMPOSIUM ON
"RESEARCH AND DEVELOPMENT IN PROCESSED FOODINDUSTRY"
ON 24TH MAY 1997, SATURDAY AT ADA RANGAMANDIRA,
OPP. RAVINDRA KALAKSHETRA, 109, J.C. ROAD, BANGALORE 560 002

PROGRAMME

0900	- 0930 hrs	:	**Registration**
0930	- 0940 hrs	:	**Welcome** ***Dr. R.R. Mohite, President*** AFST (I), Bangalore Chapter
0940	- 0950 hrs	:	**Theme** ***Dr. R. Jayaram*** Executive Vice President & Director M/s. Alpine Biotech Ltd.
0950	- 1000 hrs	:	**Opening Remarks** ***Dr. V. Prakash*** Director, CFTRI
1000	- 1045 hrs	:	***Development of an improved Instant Coffee Chicory Powder*** ***Dr. Prakash Virkar*** Divisional Manager (Beverages Innovation) M/s. Hindustan Lever Research Centre Bangalore and ***Mr. Rajashekar G*** Research Officer, Beverages, Hindustan Lever Limited, Bangalore
1045	- 1100 hrs	:	**Coffee break**
1100	- 1145 hrs	:	**Development of Analytical techniques** ***Mr. V.K. Gupta,*** Asst. Director & Chief (SRB) Shriram Institute of Industrial Research Bangalore
1145	- 1230 hrs	:	**The Paradox of being. Why processed Food Business fail** ***Mr. Ashish Mitra,*** Executive Vice President, Agri-Business Division, ITC Limited Secunderabad
1230	- 1250 hrs	:	**Q & A session**
1250 hrs		:	**Vote of thanks** ***Mr. R. Prakash,Coordinator***
1330 hrs		:	Lunch**

** Lunch will be after the inauguration of the new office of AFST (I) and library. (13.00 to 13.30

About AFST (I)

Objectives

The Association is a professional and educational organization of Food Scientists and Technologists with the following objectives:

* To stimulate research on various aspects of Food Science, Technology and Engineering.
* To provide a forum for the exchange, discussion and dissemination of current developments in the field of Food Science, Technology and Engineering.
* To promote the profession of Food Science, Technology and Engineering.

The ultimate objective is to serve humanity through better food.

Major Activities

* Publication of Journal of Food Science and Technology (bi-monthly) and Indian Food Industry (bi-monthly)
* Arranging lectures and seminars for the benefit of members.
* Holding symposia on different aspects of Food Science, Technology and Engineering.
* Holding Food Expo's

Membership

Membership is open to graduates and diploma holders in Food Science, Technology and Engineering and to those engaged in the profession. As per the option exercised, each member will receive a free copy of the Journal of Food Science and Technology or Indian Food Industry.

Classes of Membership

Full Member: Any person with a degree, diploma from a recognised university, college, institution in any branch of food science and technology or an allied field, is eligible to become a Full Member.

A research investigator or teacher whose work involves a general knowledge of the broad principles of food science and technology is also eligible to become Full Member.

Life Member: Only a Full member with a minimum of one full year standing is eligible for Life Membership.

Affiliate Member: An executive administrator or official active in any aspect of food industry or management who evinces interest in supporting the activities of AFST(I) shall be eligible to become an Affiliate Member.

Student Member: Any person undergoing a full time curriculum study in food science and technology or an allied field without any monetary support is eligible to become a Student Member.

Corporate Member: Any organisation connected with the food and allied industries is eligible to become a Corporate Member on an annual, or five yearly or permanent donor basis. A Corporate Member will nominate one representative who fulfils the qualifications prescribed for a full Member.

Journal

AFST(I) Publishes two prestigious journals viz., Journal of Food Science and Technology (JFST) and Indian Food Industry (IFI)

JFST - A leading bimonthly journal brings out research publications in Food Science and Technology and also covers

* Reviews
* Research Papers
* Book Reviews
* AFST (I) News

IFI - A Leading bimonthly journal carries in depth feature articles on technical and research developments. It also covers

* Industry News
* CFTRI - Highlights
* New Machinery
* Data Bank
* Trade Fairs & Get-together

AFST (I) members are eligible to get free copy of any one of the above journal.

For membership and other particulars, kindly contact :

The Honorary Executive Secretary
Association of Food Scientists and Technologists (India)
Central Food Technological Research Institute Campus
Mysore - 570 013, India.

Cable : FOODSEARCH Telex: 0846-241 FTR IN
Phone: (0821)-515557 Fax: 91-821-518670

OR

Association of Food Scientists & Technologists (India) Bangalore Chapter
Ist Floor, ADA Rangamandira
Off Ravindra Kalakshetra
109, J.C. Road, Bangalore - 560 002

EXECUTIVE COMMITTEE - 1996 - 97

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Mr. Seshamani V.
Mr. Sukumar R.
Mr. Verma H.C.

About the Symposium

Since mid 80's the Indian Food processing industry has undergone a major change in its outlook. Today it is very receptive to modern technology and processes. It is conscious of its deficiencies and ready to equip itself to face stiffer competition in the market place. Productivity, quality and cost competitiveness have become the watch-words of successful enterprises. The processed food industry has grown rapidly it terms of both quantity and quality. According to a recent study the value of agri-products exported from India is expected to reach Rs.50,000 crores by 2000 AD from the present figure of Rs.20,000 crores in 1996. A number of new companies have entered the field including MNCs. Newer products have come into the market place in rapid succession as never before. All this has put tremendous pressure on the rapidly growing but still fledgling Indian food industry. The industry is coping with the situation in a number of ways. It has realised the importance of Research and Development (R & D) in enhancing its competitiveness through improved productivity, efficiency and achieving high quality standards. This has resulted in increased investments in R & d activity by at least the larger food companies. This has come at a time when the Government has reduced its involvement by reducing research support. Compared with 1.7% in developed countries the expenditure in R & D activity is only 0.4% of the GDP in India. This figure has to increase substantially for the future if India has to compete effectively and be a major player in international food trade. At present India contributes to hardly 1% of International trade in food.

It is important to know the new approaches, concepts, opinions, current thinking and trends in R & D in the areas of food processing. This will give an insight into an important activity that goes into the making of a successful processed food company. It is with this background that the Association of Food Scientists and Technologists (India), Bangalore Chapter has organised a symposium on "Research and Development in Processed Food Industry".

This symposium is expected to be useful to the processed food industry, academicians, financial and developmental institutions, exporters and experts in the field.

Dr. V. Prakash, Director,
Central Food Technological Research Institute
Mysore, India

Born on November 23, 1951 at Mysore, Dr.V.Prakash had his early education at Mysore and completed his Bachelor's, Master's and Doctoral programs in the University of Mysore, Mysore. After he obtained his Ph.D. degree at CFTRI during 1976, he moved to Texas Medical Centre at Baylor College of Medicine, Houston, Texas, USA and worked there on Biophysical aspects of ribosomal proteins and its interactions. He also worked on denaturation of proteins and its mechanism as well as on the protein-ligand interactions later at Brandeis University in Boston, USA.

Dr. Prakash returned to India during 1981 as Pool Officer of CSIR and started his work in the Department of Protein Technology at C.F.T.R.I. where he pursued his interest on seed proteins, functional properties of food proteins, thermal denaturation of enzymes and proteins from shrimp. His important contribution on structure-function properties of seed proteins, structure-function properties of enzymes as applied to food processing is worthy of mentioning. He is currently engaged in research on Structural Biology of Plant Proteins and Structure Function relationship of Proteins and Enzymes of Industrial importance.

He has more than 125 publications in National, International Journals and 130 papers presented in conferences. Amongst the many awards he has received the Sarma Memorial Award of Society of Biological Chemists (India) during 1989 and the prestigious National award i.e. 1996 Shanthi Swaroop Bhatnagar Prize in the field of Biological Sciences.

Rajashekar .G

Research Officer, Hindustan Lever Ltd.

QUALIFICATION

- Bachelor's degree in Dairy Science
- Master's degree in Dairy Microbiology (Recipient of University Gold Medal in the year 1992) from University of Agricultural Sciences, Bangalore.

ASSOCIATION WITH Hindustan Lever Limited

- Since Last five years

AREA OF WORK

- Research and Development - Foods

DESIGNATION AND RESPONSIBILITIES

- Research Officer working in the area of Beverages (Tea and Coffee) Innovation and is in-charge of product / process development on laboratory as well as factory scale.

V.K. Gupta

Dy. Director
SHRIRAM INSTITUTE
FOR INDUSTRIAL RESEARCH
(A Unit of Shriram Scientific and Industrial Research Foundation)

Qualifications	:	Post Graduation in Analytcial Chemistry Diploma in Business Administration
Experience	:	About 22 years in the various fields of Analytical Chemistry including Chemical, Mechanical and Instrumental Analysis
Assessor	:	Approved Lead-Assessor under NABL scheme of Accreditation under the Ministry of Sciences & Technology

ASHISH MITRA

Executive Vice President
ITC Agro Tech Limited.

Education

1. University of Pennsylvania
   The Wharton School
   Completed the programme on **Strategic Studies**

2. Lucknow University
   Master of Arts (MA) : Specialised in **Economic History**

Experience

1. **ITC Ltd**

1992 onwards

Executive Vice President

1996 onwards
Head of the Foods Business
ITC Agro-Tech Ltd.

1992-96
Head of Business Planning

Worked with teams from

- **ConAgra :** Vegetables, value added vegetable products and edible oils.
- **United Biscuits** : Biscuits and snackfoods
- **Social** and **pacific Food Brands :** milk and higher value derivatives
- **Grand Metropolitan** : wheat, wheat products and snackfoods
- **Goodman Fielder** wheat, wheat products and bread
- **Heineken :** beer

Conducted a McKinsey Food workshop for selected local and foreign food majors on *The Future Direction and Prospects of the Foods Business in India*

1992 - 94

Member Tobacco Division Board

Clarion Advertising Ltd.

1990-92
President and Chief Executive

Elected **Advertising Man of the Year** in 1992

Ogilvy & Mather
1988 - 90
Executive Director, Bombay

Hindustan Thompson (J. Walter Thompson)
1976 - 88
Senior Vice President

Smith Kline Beecham
1975 - 76

Pursuits and Hobbies

- Studying : Economics, Sociology History, Military Studies, Psychology
- Reading : Physics, Biological Sciences, Philosophy, Literature, Cricket Literature
- Music : Listening to Western Classical, Jazz, Country & Western, Ghazals.

FOOD PROCESSING - THE FUTURE OF FUTURE TECHNOLOGIES

Dr.V.Prakash, Director, Central Food Technolgical Research Institute, Mysore, India.

Food Technologists and Engineers have played a vital role in improving the quality of processed food. A bright future exists for food processing and value addition provided that appropriate and efficient process control strategies are implemented.

Food in raw form, and from many sources, is inedible, poorly digested, less nutritious, perishable and constrained by antinutritional factors. Humankind, therefore, has developed different processing techniques; the earliest, simple and still-practiced method of which is to subject food to cooking. The array of processing techniques have evolved with the progress of civilisation.

Each of these food processing methodologies was confined to individual homes in earlier years and was subsequently exploited commercially in restaurants. The ultimate quality of such processed food is governed by many factors, the most important of which is the inconsistency that occurs when food is processed by different people. To overcome these constraints, and also to meet greater demand, the food processing industries came into existence. As the organoleptic, nutritional and hygienic qualities of processed foods are given more weight by the consumer, the food processing industries and R & D Institutions have worked hard and have incorporated innovations into the technologies. It is

in these respects that food scientists and technologists and engineers are playing a vital role.

India has the heritage of traditional foods and also the heritage of the set up and infrastructure of Indian food processing industries which are more labour intensive and skill based. In the current liberalised policy there are more avenues for potential investments in this industry. The individual technologies under development have a large role to play in terms of the R & D efforts that is today synergising into a very smooth transition of industry - R & D interaction. Recent technologies such as food preservation by hurdle technology, advanced process control techniques, new methods of encapsulation of flavors and natural colours, image techniques in food structure and analysis have all shown that the latest technologies in other fields can be telescoped into the food industry to give that value addition to the food product.

Thus, a bright future exists for food processing and value addition under appropriate and efficient process control strategies. The aspects that need to be highlighted in food technology, food manufacture and food science are food safety and food hygiene. The consumer, the manufacturer, the retailer and the agriculturist have to join together to deliver clean, safe and hygienic processed food to the customer at an effective cost. This should be our goal.

DR. PRAKASH VIRKAR, Division Manager, Hindustan Lever Research Centre, Bangalore.
& RAJASHEKAR G., Research Officer - Beverages, Hindustan Lever Ltd., Bangalore.

PRODUCT / PROCESS DEVELOPMENT

Product / process development is a key feature for the success of any manufacturing company , more so in the category of foods business. The growth and success of a foods manufacturing company lies in its ability to anticipate the aspirations of consumers and respond creatively and competitively with products and services.

In the fast changing and highly competitive market scenario ("Thirst for new products"), product / process innovation appears to be an essential route for the companies engaged in manufacturing to sustain in the competition. A formidable R& D base backed with consumer research activities are required to support such business needs.

The key factors of consideration in the product / process development are a) understanding consumer needs b) clear project definition c) Precise project planning d) Effective execution of plan e) Commitment to the task undertaken etc. All these factors play an important role in the successful development and launching of a new product.

BRU - NRT (New Rich Taste) -- a premium brand of instant coffee and chicory blend in the Indian market is the result of one such successful product development process carried out at Hindustan Lever Limited.

PRODUCT/PROCESS DEVELOPMENT

- Food product / process development
  - Deliver quality products to satisfy consumer needs
  - Gain a competetive edge over other products in the market
  - Sustain profitable growth in the market

- REQUIREMENTS
  - Knowledge of consumer needs and wants
  - Flexible team working

BRU - IC

▪ BRU -IC : Market scenario 1994

- Declining market share

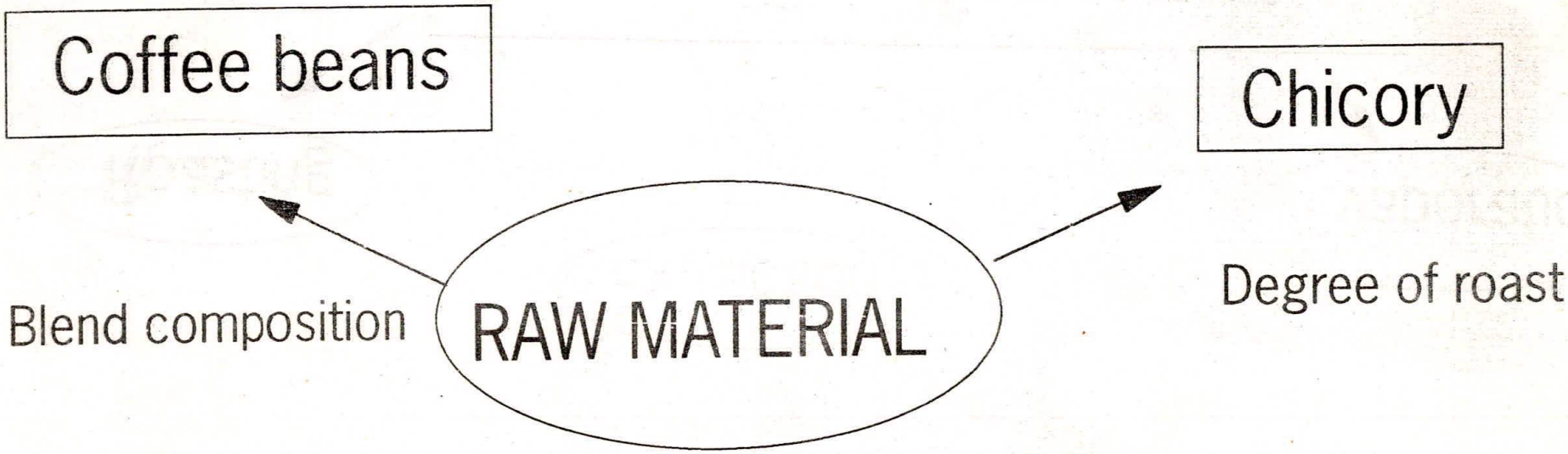
▪ Consumer feed back

- Competitor's product preferred to BRU on some key attributes
- Consumer preference mapping and sensory (QDA) profiling carried out to identify key attributes driving consumer preference.

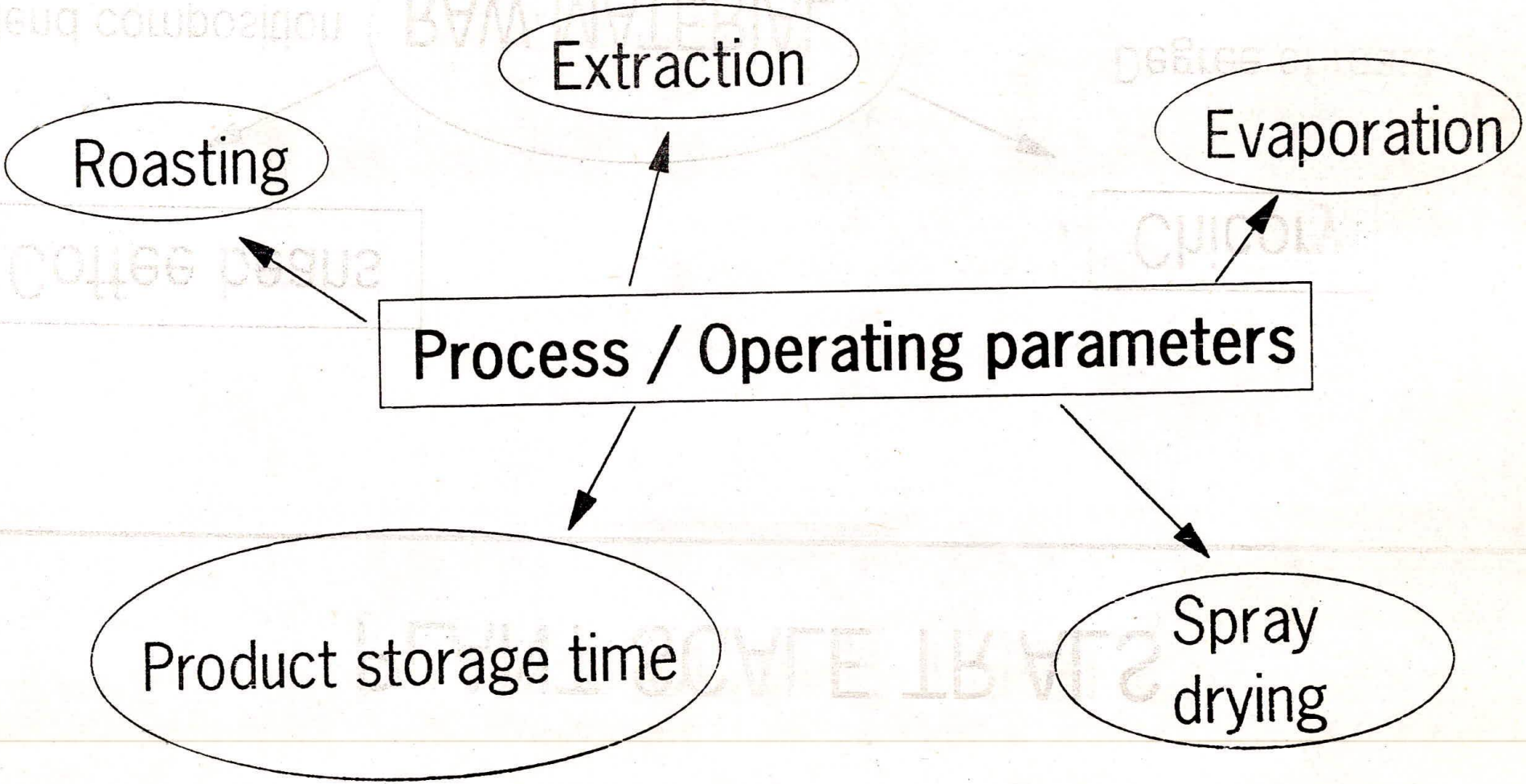
BRU - IC

- Project initiated - Feb'95
  - "Develop improved BRU - IC which will be rated by consumers to be significantly better to current BRU and atleast on par with competitor product"
- Multi - Disciplinary task force
- Challenging time frame
- Detailed Action plan with Milestones

PLANT SCALE TRIALS



PLANT SCALE TRIALS



BRU - IC

- Short listing the best development samples
  Based on results of In-house tasting panel

- A quick market research study
  To assess "noticeability of improvement" in "New Bru"

- Further Factory optimisation trials based on QMR

BRU - IC

- Extended In-Home product test with improved samples
- "New Bru" rated better on key attributes v/s "Current Bru"
- Parity with competitor product

" BRU - NRT"

- Pre launch tasks
  - Product innovation unit
  - Technical
  - Marketing
  - Sales
  - Commercial - Purchase and Logistics

- Bru - NRT launched June'96

THE PAY - OFF

- REGAINED AND IMPROVED MARKET SHARE AS A RESULT OF IMPROVED PRODUCT QUALITY

SPEED OF INNOVATION

- KEY FACTORS:
- Clear project definition
- Concurrent project activities
  - Multi disciplinary team, Collection and analysis of required data
- Precise project plan
- Effective execution of the plan
  - Cohesive working of different disciplines involved
- Top Management commitment
  - Frequent reviews and performance monitoring

V.K. GUPTA, Deputy Director (SRB), Shriram Institute for Industrial Research

Development of Analytical Techniques

Only a few years ago,food quality was a simpler concept.This was because,the competition between brands was not as severe as it is today,the sales of food products were through a multitude of small shops and probably most important of all,consumer expectations were not as high as they are currently.The combination of competion and consumer expectations is a powerful incentive to make better foods.

Quality of Food

The quality of a food product is a sum of many attributes-safety,colour,flavour,texture being the obvious ones,but there are others which can be described as 'presentation' i.e.the nature of the packaging,convenience,value for money,ease of use,availability to the consumer.All these descriptions have been used to describe a "Quality Product".

Quality

ISO-8402-1986 defines Quality as the Totalability of the features and characterstics of a product or service that bears on its ability to satisfy stated or implied needs

Safe Food

Colour,texture and sensory qualities of food are not the only criteria for acceptance by the consumer and the Health&Safety Authorities.We are living in a chemical culture surrounded by a variety of chemicals,metals,pesticides and toxins.Therefore the role of the laboratory to ensure that the Food Products for human and animal consumption are safe with respect to:

-Chemical Composition

-Freedom from Adulterants

-Residual Pesticides

-Microbiologically safe

-Aflatoxins

-Naturally Occuring Toxic Substances

-Artifical Colouring Matter etc.

The labs. that perform analyses for food companies should examine their abilities to perform analysis related to food safety,as this will be the area that should receive the most attention in the coming years.

Major Events that Occured in 1996 that Effected the Food Industry

-US Congress enacted the Food Quality&Safety Act of 1996 which revived the regulatory programme for handling pesticide residues,especially in processed foods

-The US Dept.of Agriculture Food Safety& Inspection Service(FSIS),issued its Pathogen reduction/Hazard Analysis Critical Control Points(HACCP) regulations;and

-FDA scheduled its mandatory seafood HACCP requirements published in late 1995,to become effective in Dec.'97

Role of a Accredited Lab.in ensuring the Safety of Food

Nothing can improve the performance of a laboratory more than an accredited lab.accredited system.A disciplined quality system is an effective laboratory management tool for identifying,meeting and improving performance goals,including;internal and external customer service levels,data reliability,employee skills development,external accreditations and laboratory reduction errors.

One of the determining factors of Quality for an Analytical Laboratory is its ability to confidently and consistently make analytical measurements with required accuracy.Latest instrumental and associated techniques provide the basis for attaining the desired levels of accuracy in analysis.Further,traceability to national meaurement standards is necessary as a part of the management of Quality.

Modern Analytical Tecniques in the Food Industry

-Gas-Chromotography(GC)

-Gas-Chromotography coupled with Mass Spectrometry(GC-MS)

-High Performance Liquid Chromotography(HPLC)

-Potentiometry

-IR Spectroscopy

-UV-VIS Spectrometry

-AtomicAbsorptionSpectrometry(AAS)

Gas chromatography

Gas chromatography is used to seperate mixtures into their component parts. Having performed the separation the components are detected and analysed qualitatively and quantitatively. A gas chromatograph essentially consists of a high pressure cylinder used to supply carrier gas such as helium, argon, hydrogen, nitrogen. The actual separation of sample components occurs in the columns, where the nature of the solid support, liquid phase, length and temperature are important factors in obtaining the desired resolution. Columns used are essentially of two types- packed columns and open tubular columns.

. Each component in the sample is retained by the column to a different degree.,depending on the chemical nature of the component and the stationary phase.The GC also consists of a detector , situated at the exit of the separation column. The function of the detector is to analyse the small amounts of separated components present in the carrier stream leaving the column . The choice of the detector depends upon the concentration level to be measured and the nature of the separated components. The detectors most widely used are the thermal conductivity detector, (TCD), flame ionisation detector (FID), electron capture detector, (ECD) The time delay from sample injection to detection at the end of the column identifies each component while size and duration of detected peaks supply quantitative information.

Applications

GC is used for the quantitative measurement of separate components down to 1 ppm in a suitable mixture of compounds. Mainly suitable for organic materials of all kinds.

In food used for the analysis and detection of:

-alcohols in flavors, wines, lemon, orange and lime extracts .

-animal fats in vegetable oils and fats.

-N- nitrosadimethylamines in beer ,milk .

- methyl mercury in fish and processed foods.

-benzoic and sorbic acids in foods.

- ammonium glycyrrhizinate in flavor extracts.

-saffrole in processed foods.

Gas chromatography-Mass spectrometry

GC - MS is a confirmation technique for all analytical methods which may be carried out on simple GC, GC is used to separate the mixtures into their component parts, which are later analysed by mass spectrometry(MS). In MS each molecule is fragmented/ionized in a unique pattern depending on its structure.Both positive and negative ions are formed, either by electron impact or by (low pressure) chemical ionization .The ions are separated on the basis of their mass to charge ratio with the help of a uniform magnetic field. The mass to charge ratio of each ion is proportional to their angular frequency in the magnetic field. A frequency analysis of the corresponding reciever signal yields the mass of the ions. The compounds are identified by matching their mass spectra with the ref. spectra in the library.

Applications

GC -MS is widely used in analysis because of its unique ability to act as a universal and selective detector, and because of the greater tenability of the data acquired.
GC-MS in food used for the analysis and detection of
-sulfamethazine in beef.
-flavors in processed foods .
-fragrances in foods .

Spectrophotometry

The principle of spectro photometry is that radiation is selectively absorbed when passed through a sample. A plot of the way in which absorption varies with changing wavelength/ frequency is characterstic of the sample and is called a spectrum.

UV/VIS Spectrophotometry

Ultraviolet/Visible (UV/VIS) spectrophotometry measures the degree of absorption of radiation by the substance in the UV/VIS region.i.e. 190nm - 900nm range.In the UV/VIS region the degree of absorption, at aspecific wavelength , is directly proportional to concentration. Thus quantitative and qualitative determinations may be made by the examination of the spectrum and comparison of the absorption with that of known concentration standards.

Applications

UV/VIS spectroscopy is used for the quantitative and qualitative determination of organic or inorganic substances which can absorb UV/VIS radiation. UV/VIS spectroscopy is used in almost every sector of chemical and food analysis. In food it is used in the analysis and detection of

-vanillin in vanilla extract.
-caffeine in instant tea.
-benzaldehyde in dry fruit extracts.
-dyes in processed foods.
-sorbates, benzoates, sulfites etc preservatives in foods.
-benzoic acid in foods.

Infra -Red Spectrophotometry (IR)

Infra red spectra originate from the different modes of vibration and rotation of a molecule that occur on absorbtion of energy from incident radiation. Radiation covering the range $4000cm^{-1}$ - $200cm^{-1}$ is focused on the sample, a spectrum is produced which is entirely characterstic of that compound. IR- spectroscopy is mainly a qualitative technique , but with the advent of ratio recording electronics quantitative determinations can be carried out both quickly and precisely . Samples may be examined in the gas liquid or solid phase,.

Applications

Infrared spectroscopy is the premier technique for identification of organic and some inorganic compounds in a wide variety of materials .In foods it is used in the analysis and detection of

-gums in icecreams and frozen desserts.
-trans - isomers in vanaspati oils .
-trans - isomers in margarines and shortenings .
-mineral oils in baked products.
-cyclohexylamines in cyclamates and artificially sweetened foods.
-antioxidants in foodstuffs.

Atomic Absorption Spectrophotometry

Atomic absorption spectrophotometry (AAS) has now become the preferred technique for elemental analysis of complex mixtures. The technique is so specific that chemical separations are rarely neccessary. Radiation of a wavelength characterstic of the element under examination, generated by a hollow cathode lamp is passed through a flame. When a solution of a sample is sprayed into the flame in the form of an aerosol , a portion of the radiation proportional to the concentration of the element preset is absorbed. The respective absorbance is measured , compared with the standard and the concentration. is determined.

Applications

AAS is used for the determination of the concentrations of nearly 70 metals and non-metals,from ultra trace levels to high levels is determined, requiring high precision and accuracy.In food it is used in the analysis and detection of

-aluminium in baking powders..

- mercury in foods

-cadmium in foods.

-copper and nickel in tea, distilled liquors.

-lead in foods, dried milk.

-potassium in beer.

-tin , zinc in foods.

Potentiometry

The measurement of ions in solutions is of interest in a wide range of applications.
Two techniques extensively used are conductivity metering and specific ion measurement by potentiometry. Specific ions can be measured using potentiometric sensors. The titration vessel consists of two electrodes, that is an indicator electrode and reference electrode, and the potential of the cell is measured during the course of the titration potential changes slowly initially , whereas near the end point there is a drastic change in potential, with the help of this the concentration of individual ions can be calculated. Two types of potentiometric titrators are available .The first is one that carries out titrant addition automatically and records the electrode potential differences during the course of the reaction., in the second type titrant addition is made automatically until a preset potential, or pH , representing the endpoint, is reached, at which point the titrant addition ceases. Both use the glass pH electrode which, in conjunction with a reference electrode, produces a mV output proportional to the hydrogen ion concentration of the solution in which it is immersed. Other ions such as chloride, fluoride, calcium and ammonium can be measured using similar sensors with sensitive membranes of various materials, and also glasses other than the pH-sensitive kind,. New applications increasingly demand indirect and incremental measurements of ions, these are measured by use of microprocessor controlled meters.

Applications

This technique is mainly used for detection of impurities in purified drinking or process water and salt solutions . In food , it is used in the analysis and detection of
-hydrocyanic acid in crops and foods.
-nitrates in lettuce and spinach.
-chlorides in milk-based infant formula.,cheese.
-monosodium glutamate in processed foods.

High pressure liquid chromatography

High pressure liquid chromatography (HPLC), sometimes called high-preformance liquid chromatography, is a seperation technique based on a solid stationery phase and a liquid mobile phase. HPLC is essentially preformed in two ways. Isocratic chromatography, in which a solvent

of fixed composition is used to separate the sample components. Gradient elution chromatography, in which two or more solvents are gradually (linearly or exponentially) mixed to obtain the verstality needed for separating more complex mixtures. Seperations are achieved by partition, adsorption, ion-exchange process and size exclusion, depending upon the type of stationary phase used. Compounds to be analysed are dissolved in an organic liquid and most seperations take place at room temperature. Organic compounds which have low volatility and are thermally unstable can be analysed by HPLC.

Applications

Liquid chromatography methods are used for the analysis and detection of food in

-aflatoxins in food, fluid milk.

-benzoate, caffeine and saccharin in soda beverages.

-glucose, fructose, sucrose and maltose in pre sweetened cereals.

-purity of lactose.

-quinic, malic and citric acids in cranberry juice and apple juice.

-saccharides in corn syrups and sugars.

-benzoic acids in fruit jams.

-separation of sugar in honey.

-vitamin A and D in mixed feeds.

Development of a new Analytical Technique

The procedure for adopting a new Analytical Technique is as follows:

-Literature Survey for the existing methodologies available by referring

-On-Line Search

-Analytical Absracts

-Chemical Abstracts

-AOAC latest developments

-Selection of the Methodology to be adopted depending upon the availability of

-Infrastructure like Instrumentation

- Reference Materials

-Expertise

-Validation of the methodology adopted by

-Ensuring Calibration of the Instruments used to National Stds.

-Traceability of Reference Materials

-Addition of Internal Standards and estimation of % Recovery

-Comparison with other available techniques

-Repeatability and Reproducability

-Proficency testing of the method

Need for the development of a New Technique

Analytical chemists face what might be called a "Star Trek" image of their work.In the popular TV serial,analytical sampling is routinely done with a technological magic wand called a "tricorder"that is pointed in the general direction of the sample to reveal the concentration of every conceivable analyte.Many people view present day Analytical Chemistry similarly:You put the sample in a black box that tells you what is there,down to the limits of detection.No fuss,no muss,no uncertainity.

Then there are some people who think that where is the need for development of a new technique when we have got published methods of -AOAC,ISI,APHA,EPA etc.

There are certain constraints faced by the Laboratory Manager.Some of them are:

1.Non availability of specific reagents

The estimation of Beta Carotene calls for a reagent,that is no longer commercially available.Not only does this mean that the Official Method cannot be used for routine tests,it also means researchers trying to develop new methods cannot compare their results to the old one's.

2.Non availability of a particular Analytical Technique

PFA states that the food products should be free from Naturally Occuring Toxic Substances(NOTS) like Saffrole,Hypercine,Agaric Acid and Hydrocyanic acid.But the methods

for Hypercine,Agaric Acid and Hydrocyanic acid are not available even in AOAC.Even the method for Saffrole is only for Non-alcoholic beverages.

The other example is that of estimation of Benzoic Acid in Food Products by UV-Absorption Spectrophotometry.The method asks to have a benzoic acid free sample,which is dificult to get for a lab.

3.Matrix dependent problem

Many existing methods are matrix depedent. For example high fat foods can produce very different types types of interferences than low fat foods.Sugar levels can also cause problems.

Another matrix dependent problem is that Vitamins can be chemically bound to components of the food matrix,requiring enzyme digestion,to release them so that the bioavailable levels can be measured.Not only are the necessary digestion methods matrix dependent but one has to be careful that the extraction process doesn't degrade the very chemical one is tryng to measure.

4.Detection Limits

Non chemists do not understand what it means for a test to say an analyte is undetectable.They assume it means the machine showed zero--like waving a Geiger counter over the sample and not hearing any clicks.They do not understand it's statistical measure and you may in fact be getting numerical results.

For the nonspecialist,it is a revelation to discover that these zeros or "Below detection Limits" or "Not-Detected"on the laboratory simply means one cannot say with statistical confidence that the analyte is present.

5.Non availability of a particular Instrument

Even in many cases there may be the availability of methods but the laboratory may not be in the position to procure that technique due financial constraints.For example residual pesticides and food flavours can be best analysed by GC-MS but the tecnique is within the reach of only a few labs.

Important Methods Developed/Standardised by SRI

-Estimation of Mono Sodium Glutamate(MSG)

-Trans-isomers in Vanaspati by IR

-Benzoic Acid in Fruit Jam by HPLC

-Methyl-Mercury in Processed Foods by GC

-Saffrole in Processed Foods by GC

-Hydrocyanic Acid in Processed Foods by Ion-Selective Electrodes

-Hazards solvents present in the working area of the lab.by GC/HPLC

-Aflatoxins by HPLC

Methods under Development

-Tetracycline Residues in Milk

-Agaric Acid in Processed foods

-Adulteration of Scotch Whiskey by GC

-Quantitative estimation of Dyes in processed foods

Role of SRI in helping the Food Industry

SRI provides prompt,precise,accurate and dependable Analytical Services to a wide spectrum of Clints in the following areas:

-Dairy Products

-Spices and Condiments

-Processed Foods & Vegetables

-Cereals &Pulses

-Sugar and Confectionery

-Food Additives

-Vegetable Oils & Fats

-Alcohlic and Non-Alcohlic Beverages

-Food Packaging

-Meat & Meat Products

-Calibration of Instruments

-Developments of New Methods of Analysis

-Standardisation/Validation of Analytical techniques

-Residual Pesticide Analysis

-Microbiological Analysis

-Metallic Contaminants

-Nutritional Parameters

Accreditation of SRI

SRI labs are accredited by the National Accreditation Board for Testing & Calibrating Labs.(NABL),under the Dept.of Science&Technology in the following fields:

-Chemical

-Mechanical

-Biological

APEDA-SRI MOU

Apeda has recognised SRI for the purpose of providing the following services to Exporters,manufacturers and regulatory agencies in the following broad areas:

-Analytical Services

-Training facilities to Expoters

-Research & Development

-Providing standard reference materials

ASHISH MITRA, Executive Vice President, ITC Agro Tech Limited, Secunderabad.

The Paradox of Being .
Why Processed Food Businesses Fail in India .

Ironically , nobody 'eats' processed foods . Luckily neither does anybody eat an industry . Thus the entirety of the endeavour is founded , bounded and circumscribed by irrelevance . A premise with the fatal flaw . A postulate without an idea . A theorem devoid of a hypothesis .

You eat rotis , rice , dal , sambhar , dahi , chatni , pickles , aalu mattar , karela bhaji , mutton curry and payasam .Or you may consume a tomato ketchup or enjoy a hamburger .
These in turn are prepared from a number of different and distinct raw materials which are in turn cooked/processed by the housewife or by someone else somewhere.
And this last named is prima facie redundant as an entity of preparation except in so far as this someone provides either a service that is sought for by the woman or a benefit that cannot be otherwise obtained .

The problem of the 'Processed Food Industry' in India therefore is inherent in the very definition of its endeavour .It appears as an end in itself . An axiom . An industry without the need of a justification . A business without a customer . A means searching for an end . And unless it permits the horse firmly before the cart it will continue in the prevailing circus of immobilised , frozen deadlock .

This I suppose is sufficient provocation for the day . But provoking is my job . To force people to think outside the boundaries of conventional logic . To encourage them over the tyrannies of the status quo .

What then is the issue ?

At stake is the identification of the purpose of food . Not the obvious one . But the more complex socio-psycho-anthropological basis of needs , statements , tastes and relational structures . People do'nt eat wheat . They do not eat atta . Nor I submit , do they eat rotis . What they do instead is make relational statements . Establish power equilibrium . Create mutual dependencies .

Individuality envelopes families and the family underwrites social contexts .

Food is not a product .And eating is not an act of consumption alone . Unlike other consumption goods and their usage , food and eating are heavily laden with social and anthropological significance .The behavioural dimensions of food shopping , preparation , cooking , serving and eating is a cultural prism . Underlying this is the mosaic of family definition , gender roles and power structure , societal attitudes towards children , developments in educational opportunities and nearly all the other issues that define a society and determine its civilisation .

None of this is new or unknown . The problem lies in not taking a conscious view on this.
Instead , it is assumed that a product offer will somehow fit into this mosaic by virtue of its proven success in some other market .The market and the plan is sought to be coaxed towards the product .
Instead of the product designed with the market in mind .
One of the reasons for this inertia is the complexities that the alternative method poses .

Firstly , the variables that determine food behaviour are numerous and interrelated . Attempts at simplification are fraught with danger . Far too often demand is seen as a function of supply And the obvious comforts of cost definitions supercede the criticality of measuring the behavioural determinants of demand . The sanctity of the brand and product form is often the self-imposed shackle that drives all analysis

What is ignored is that there are products that drive behaviour but food is very low in this regard . It is behaviour driven .

The other hobby-horse of all food companies is 'income-segmentation' .

The market is conveniently divided by the Socio-economic Classifications . The assumption being that those in the upper echlons of this table are distinctly different from the ones below . Available research is read but its underlying meanings are ignored , not comprehended or altogether misunderstood . .
A distinction needs to be drawn here between in-home food eating and eating-out habits .
The latter are more amenable to change and in the very long run could also influence in-home practices .
Eating-out characteristics are more suseptible to income variables with a lower component of 'behaviour stock' than in-home habits which have a complex 'value' dimension .
There is a caveat here though . Vast numbers of Indians eat out . And not always for recreation and entertainment . Compulsions of employment , housing and infrastructure are the key determinants of this behaviour . Unfortunately the 'Managerial' classes with their empirical learnings are incapable of bridging this 'imagination gap' . They are too myopically anchored in the conventional wisdom of derived metaphors .

It is my hypothesis that a house-wife's 'value' derivation is located in the interstices of three concentric circles of _

- ***Variety*** -what she offers the family to receive their appreciation ,
- ***Cost*** -both price and non-price cost she incurs including the entire 'system of provisioning' -how she shops , how she buys , from where she buys , how she stores , how she prepares for cooking , the method of cooking and the method of serving and eating
- ***Labour***- positive labour which signals her love for the family net of alternative means of signalling her commitment . Minus

negative labour which constitute the chore elements of the activities plus other chores that constitute her life outside of the food and eating related efforts.

It is my contention that this equation has a multiplier relationship between the functions such that a zero perception of any one of the components reduces the entire relationship to zero and thereby product and category rejection .

The 'service' embedment in the product must be of perceptible meaning and consequence in the woman's life . It must in the final analysis enhance her self-worth which in the vast majority of cases is derived from the family perception of her as a wife and mother .The discomfort of people from developed societies with this model is palpable and understandable .
What is perhaps more unforgiveable is the Indian managers alienation from the local realities . Their own prevalent value structures at home seem to transfer little learnings to their corporate entities . The two beings seem completely divided with no cross-flow of experential data and evidence .

Even a cursory glance through the pages of the English press matrimonial advertisements in metropolitan India will give an insight into the Indian psyche of both men and women .
The reason for this trivialisation of an otherwise profound issue is that there surely is'nt an Indian manager anywhere in corporate governance who does not read the English press regularly . And is also alive to the reality or at least should be , to the fact that people who advertise in the english press would constitute the infinite minority of the Indian population .
If therefore , the value structure and expectation of this minority too is out of sync with managerial knowledge and its application , then something is quite desparately wrong somewhere . And the market failures of food companies explainable .

It is this ignorance and insensivity to the life around and the unconsciousness to the lives they lead at home that makes the Indian managerial capability the Achilles Heel of any food venture in India . Added to this is the 'arrogance' of food companies with their obsessive emphasis on their brands and product forms .

This compound of ignorance , insensivity and inflexibility of the Indian and the Global managers together result in repeated failures in the Indian food business .

It is often assumed for simplicity that the advent of TV and the consequent globalisation of communication has already shifted values . There are two fallacies in this assumption :

- we are still in the present and therefore many of the results are yet to transpire and
- value structures in society change very , very slowly particularly in societies that are old even if economically under developed .

Products and categories that have a higher income sensitivity of adoption take-off much more easily due to these global influences . Food , family and nurture are much less income sensitive .

Within this context eating-out is more income led . Although here I might add that recipe and cuisine preferences change equally slowly . However , trial rates and occasionality of usage if given a sufficiently large universe , can mask this phenomenon .
Which leads me naturally to the second point that the ***lessons from other countries are often very superficially read*** without an endeavour to reach under the results and dissect the forces that may have determined them .

To illustrate with just one example and a fairly simple one at that .
Is eating-out a part of the 'food' activity of a family or a subset of the 'entertainment' allocation?
In different countries of the Asian region what are the distributive share and range of these respective allocations by house-holds ? Add

to this analysis the income distribution of the house-holds themselves and the nature of the data is likely to be

- less globally applicable across regions , and/or
- more dependent on the income sensitivity of demand . It is also important to identify the ethnic composition of 'out of home ' consumption . Is there a large tourist traffic that drives volumes ? The list is long but must be seen through if any assurance of future success is sought . But the most important question of all is the
- locus of the 'out-of-home' food business . If it is a sub-set of 'entertainment' as I suspect it is , atleast in poorer countries , the dynamics of the business and the pricing structure need to be looked at afresh in India .

With a percapita income of $330 is likely to prove very different from Thailand with its percapita income of $2500 .
An 'entertainment' experience of very low frequencies by a large share of the population will produce quite different results to an equally low frequencies by a smaller numbers . Furthur incomes will determine occasion outlay of budgets . And the ease of availability and prices of substitute offers will influence trial and repeats . Not to mention tastes and preferences .

Similarities between countries are simplified and an aggregate view taken . In the process it is forgotten that the issues may be in the realm of societal dynamics and these are complex forces that are not easily apparent .

It is interesting to note that the largest growth of percapita allocation of private consumption expenditure in India in recent years has been in education , housing and transportation costs . The consequent allocation to food expenditures have remained constant . Implying a tightening of the family food budgets and an even lower drive to experiment .

Fourthly , the dependency on numbers is overwhelming and drive the demand forecast . This is perfectly legitimate in categories where the interplay of the forces that create demand are more definitive . But this is a guaranteed recipe for failure in the foods business .
Generally , branded consumer product companies make two errors of judgement in planning an entry into an emergent economy .

It is perhaps relevant to attempt and draw an implicit distinction between the 'marketing' and the 'economic' definitions of the brand . I believe it assumes significance when looking at developing markets because of the tautology inherent in the 'marketing' definition of the brand and the concept of price premium .
This approach takes in effect a 'post-product' perspective .
Pre-supposing a product superiority , a consumer need that can overcome the price hurdle placed before them , an absence of substitute products and a degree of price in-elasticity This is inherent in the mind sets of most companies that operate in developing countries .The new product and its superiority becomes an act of faith with these companies .
The 'economic' perspective on the brand is less 'self-conscious' of the offer and more modest of its posssibilities . It seeks to encompass the nature of the consumer's bundle of product preferences of which the specific brand is only a constituent .
These definitional issues become very basic points in under developed and low income markets. It is a moot point whether the the more rigid and myopic perspective on the brand has survived even in the developed markets . Price premium has long seized to be either a reality or an expectation . Yet this expectation resurfaces the moment an underdeveloped market is being assessed .

I submit that developed and under developed markets are on a rotating circular polarity with 'brands' and 'commodities' changing positions given changes in technologies , availability , consumer familiarity and alterations in incomes , wealth and education . The distinctions between the two are in any event subjective issues of risk and confidence .

The economic definition of a brand as something that attempts to signal a product discriminant tangible or otherwise is I believe a good starting point . The ability to call on price premiums is not a part of this mind set . What is germane is whether or not a degree of price inelasticity has or can be introduced into a product category given knowledge of substitutes and complements and their cross elasticities of prices and incomes .
This would explain the price cuts in the western markets for all consumer products as well as the prospects of products and brands in developing economies with low incomes and high elasticities of price .

Unfortunately , the short run novelty values of some high end life style products is projected across all product categories without ever probing the intrinsic roles of the products themselves . This often leads to attractive projections before entry into the markets and deep despair when on the ground .

In the final analysis there is no substitute to detailed consumer focus and sensitised consumer knowledge . And it is here that all beginnings begin .

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