

SIFST and the UK ISFT have recently agreed to foster closer links. This article, in a précis version, was recently published in Food Science and Technology UK Vol18 (2) 18-19 2004 to inform UK members about developments in Singapore.

Food Science and Technology in Singapore: Innovative, Competitive and Trusted.

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Singapore is a small nation with practically no natural resources and had moved into industrialization back in the 1960s. At that time many people questioned if this was the correct direction to follow and lots of negative responses were heard. However, history has shown that it was the correct way forward for most industries including the food industry.

In Singapore, during the initial industrialization, MNC's were the first to start investing in this young and growing market. Food manufacturers, both local and from these MNC's, were in the same boat and products produced in their traditional ways of processing and packaging soon started to roll out from the factories. As industrialization progressed, the manufacturers in Singapore gradually found that the same food products that they manufactured using their existing equipment and packed traditionally could no longer stay ahead of their foreign competitors. In order for Singapore to be competitive and to keep up with the advanced development in Food Science & Technology (FST) there was, and continues to be, every need for innovation and constant keeping abreast of advancement in technology to be ahead of other countries. Leading food manufacturers began to learn that they must leverage on new strategies such as the production of higher quality and more value added products and more innovative products in order to operate at lower costs and stay ahead of their foreign competitors.

In 1999 the National University of Singapore (NUS), with encouragement from the Singapore Government Economic Development Board and various sectors of the Food Industry in Singapore, decided to develop a FST Programme. Prior to this date only the Polytechnics who produced a range of good technicians for the food industry were providing the FST learning opportunities in Singapore. However, most, if not all, of the senior people in the food sector in Singapore were foreigners or possibly locals who had been trained to graduate level overseas. As the food industry became, and continues to become, more sophisticated (e.g. the plan by the Agri-Veterinary Authority, the

Government body responsible for food safety in Singapore, to introduce a compulsory HACCP system for food production establishments), it was recognised that there was a need to produce locally trained FST personnel who would become the managers in the food sector in Singapore and possibly the region. The food sector, certainly in Singapore, tends to focus on the R & D function and thus there is a need to develop appropriate graduates with this focus. Thus, the new programme at the National University of Singapore was developed.

A Mission Statement for the programme was agreed and defined with the mission to be:

“The Regional Centre of Excellence for Research and Teaching in Food Science and Technology and to be recognised as an innovative and valuable resource by the local, regional and international food industry.”

Currently there are about 350 food companies in Singapore with a staff base of 10 or more and the sector is worth circa S\$4 billion per year, which represents about 4% of total manufacturing output. Around 18 000 people are employed in the food sector of which about 10% are graduates. This has to be put in the context of the worldwide value of the food industry, which is estimated to be around US\$ 492 billion. Thus, the sector and demand for FST graduates in Singapore, even considering the wider regional demand, is not great. The Programme was always designed to be a small specialist programme but one that produced a high quality product that was in demand and that the industry wanted and found useful.

The Programme began with the aim of addressing this niche market. It was decided to develop a programme that complemented what was already available, both in the University and at the Polytechnics and as FST is a multi-disciplinary subject, the programme was developed to be inter-departmental and cross Faculty within the University and with the FST staff providing the integrative and specialist aspects. For administrative purposes and in part to reflect its dependence on Chemistry, the Programme sits within the Chemistry Department but operates autonomously. The programme is designed to be academically sound but also one that reflects the needs of the modern sophisticated food industry.

The programme is designed as a four-year programme and includes basic sciences, legal aspects, management aspects, research ability and a period of Industrial Attachment. In order to focus the studies there are three themes, which run through the various modules and activities and these are:

Food safety – microbiological and chemical aspects
New Food product Development –scientific and legal aspects
The Globalisation of the food industry – logistics and public health

One of the things that was initiated right from the start of the programme was to establish an Industrial Liaison Panel to advise us on the needs and changes in the industry. This consists of representatives of MNC food industries, regional and local companies along

with the enforcement authorities, the groups where we expect the majority of the graduates to find their future careers.

Thus, the programme has been developed to meet the two demands of meeting academic quality and producing graduates who are respected by, and in demand by the industry. Graduates have found employment across a range of industries and functions, most of them in the food area but in its widest sense, e.g. as nutritionists, as QA laboratory staff, as technical sales personnel, as management trainees and in R & D roles. In addition, some students have stayed on in the University to pursue higher degrees.

The new programme development was planned to recruit only 35 to 40 students only per year (although the application rate is 3 to 4 times this). This factor allowed the programme to be highly selective in accepting only well qualified students and to undertake things that well-established and large programmes could not do. From the beginning there has been a focus on student centred learning which encourages a high degree of independence in the students. The defined attributes that it is aimed for the students to possess at the end of the programme are:

Dynamic, Problem Solver, Confident, Team player, Responsible and Multi-disciplinary in addition they should be *trained as technical managers, skilled in laboratory operations, developed life long learning skills, be food risk and commercially aware and recognise the importance of the Global food industry.*

The programme also set out to establish and maintain a good rapport between the students and staff, which we believe encourages the students to work hard and give of their best. It also offers the longer-term advantage of encouraging Alumni support.

The programme has now been running for approximately five years and has secured a number of industry sponsored Scholarships and prizes for the students. These include a 3-year ongoing sponsorship for a student each year by Asia Pacific Breweries and a similar arrangement by Nestle R & D Centre Singapore. The prizes range from a monetary prize in years 1 to 3 and a substantial monetary (S\$3 000) and Gold Medal in the Honours year, the latter kindly donated by Firmenich Asia Pte Ltd. None of the prizes or Scholarships has any student-bonding requirement.

Perhaps one of the greatest constraints is the availability of space. Once the programme had begun, a new suite of specialist laboratories were developed but now with circa 120 undergraduates and 15 postgraduates the space is at a premium. An approach of not allocating laboratories to individual staff has been adopted but rather to allocate according to function which has allowed a much close working relationship between all the students and staff.

One approach used to try and expand facilities is to form links with other departments of the University and also with outside bodies. The FST Programme has close links with the Departments of Pharmacy, Chemical Engineering and Microbiology. Also an MOU has been signed with Food Science Australia, the major food research organisation in

Australia. This allows for joint research, possible student exchange, joint project work for industry and the running of joint workshops and conferences.

As part of the UG programme (and currently there is discussion for similar opportunities for PG students) all students spend approximately six months on industrial attachment. As a reflection of the globalisation theme, some students have undertaken their placement overseas. To-date students have been placed in the U.K., Switzerland, Australia and New Zealand. It is considered that bringing the students and industry together in this way helps greatly with future job prospects. In addition, to the industrial attachment, the FST team organises an Industry Day for prospective employers to meet the about to qualify graduands. All Honours students are required, as part of their final year assessment to produce a research poster and these are displayed for the industry representatives to discuss with the students. Last year about 75 industrialists attended and received a copy of the graduating students CV. A number of preliminary job interviews were arranged during the event.

Whilst the staff base for FST is small (a planned Faculty of 6) the original plan of having the programme cross- faculty continues so that students receive lectures and learning facilitation from a much larger group of staff. Input from Departments such as Life Sciences, Mathematics, Chemistry and the Business School all contribute to the development of the graduates to become life long learners and to enable them to acquire the necessary skills to contribute to the economy, practice their research skills or assist in the enforcement of food safety legislation. Much of the programme is student centred and aims to encourage students to be self-reliant, to think for themselves and to use a multi-disciplinary approach to problem solving.

The philosophy underpinning the programme may be summarised as:

- ♣ *providing a coherent and academically challenging provision*
- ♣ *enabling the students to develop and demonstrate their intellectual, transferable and personal skills*
- ♣ *developing initiative and confidence in students as regards problem solving*
- ♣ *being flexible and ready to adapt to meet the ever- changing academic and industrial challenges*
- ♣ *enabling students to apply their academic knowledge to professional practice*

The FST Programme at NUS is a small niche programme but meets a recognised and specific need in the food industry in Singapore and in the surrounding region. The graduates to date, have found good employment opportunities in a range of functions from QA managers, through management trainees to Government food safety enforcement officers. Currently the programme recruits mainly from the region but it is hoped to widen this base to Europe and the USA so as to add to the globalised nature of the programme and provide a platform where the knowledge and skills of students from

East and West can come together to develop and produce food products to meet the demands of the international market for foods.

Singapore has striven to become a global food gateway from which foods are accepted on a worldwide basis, as being safe and of the highest quality. Innovative, competitive and trusted are the promoted attributes by the Singapore Government for foods from Singapore. For this to be achieved requires a partnership between the various stakeholders - the industry, the government enforcement authorities, the local professional body (SIFST) and the educational establishments who are producing the future food scientists and technologists. All must work together to ensure that Singapore retains its worldwide reputation of safety and quality for food.

One body that contributes to the continued development of FST in Singapore is the Singapore Institute of Food Science and Technology (SIFST). SIFST a professional society for members who are Food Scientists and Technologists from academia, government and private sectors was incepted in 1976 and registered by the Registrar of Societies as a Professional Society in May 1977. The institute became a member of the Singapore Professional Center in 1979 and was awarded membership of the International Union of Food Science & Technology (IUFOST) in 1980. The Institute became an affiliate organization of the Institute of Food Technologist of USA in 1989 and is also a member of the Federation of Institutes of Food Science & Technology in ASEAN (FIFSTA).

The mission of the Institute is committed to the furtherance of Food Science and Technology through life-long learning and interaction and collaboration amongst professionals, locally and worldwide and has the following objectives:

- 1. Promote the application of science and technology to all aspects of food*
- 2. To advance the standing of the food profession and to maintain high ethical standards within the profession*
- 3. To develop and maintain collaboration with other National and International bodies concerned with food science and technology*
- 4. To promote the dissemination of knowledge and to provide a forum for the exchange of ideas amongst members*
- 5. To further the education and training of food scientists and technologists*

The logo of SIFST (shown in Figure1) was designed to have a special meaning. Taken as a whole, the designed symbol may be visualized as the active and collective effort taken towards the acquisition and accumulation of knowledge in the realm of food science and technology.

The dark blue and sky blue contours may be understood thus:

1. They form the letters, S & T – Science & Technology
2. They form an ARROW pointing UPWARDS and symbolize the first three objectives of the Institute

3. They may also be visualized as a PAIR OF HANDS reaching out TOGETHER (in harmony – dark blue for science & sky blue for technology) for improvement, scientifically as well as technologically and thus achieves objectives 3 and 5 of our constitution.

The red dot may be understood thus –

1. Enclosed between a pair of hands it represents FOOD
2. It may be taken as the symbolic representation of KNOWLEDGE in Food Science and Technology as it is arbitrarily the shape of a standing professional.

The enclosure between the blue shades forms the outline of a volumetric flask, with the red dot as contents and therefore illustrates the analysis and quality of food.

Since 1977, SIFST has been actively involved in organizing symposia, conferences, short courses & other professional activities. SIFST was the 1st FIFSTA member to organize the 1st ASEAN Food Conference in Singapore in 1982 & again the 6th ASEAN Conference in 1997. The recent 8th ASEAN Conference in Hanoi saw active participation of some 20 Singaporeans inclusive of SIFST and student members from NUS.

Food in Singapore is an important matter! Both eating and manufacturing are national pastimes and people come to expect quality and safety as the norm. The AVA enforcement body has gained a global reputation for its standards. To maintain the standards of safety and quality, to be competitive, innovative and trusted requires the industry, the appropriate Government bodies, the educational establishments and the professional body for food scientist and technologists to continue to work together to meet the challenges and opportunities for the food industry in the twenty first century.



Figure 1 The logo of the Singapore Institute of Food Science and Technology (SIFST)

