PART 2 – AROMA CHEMICALS DERIVED FROM EFFLUENT FROM THE PAPER AND PULP INDUSTRY

1. OVERVIEW of the AROMA CHEMICAL INDUSTRY

1.1 The South African Chemical Industry

South Africa has the largest economy on the African continent, accounting for 25% of Africa's GDP. The South African chemical industry is driven by the relatively large South African home market, accounting in many instances for the bulk of sub-Saharan African consumption. The South African chemical industry is of substantial economic significance to the country, contributing around 6% to GDP and approximately 25% of its manufacturing sales. It employs approximately 100,000 people. In 2001, the industry had an output of R 62 billion, exports accounting for R 29 billion, approximately 50% of domestic production.[1, 2] The chemical and related industry is import-oriented, with export levels approximately half of import levels. In chemicals alone, 57% of the trade deficit pertained to downstream fine chemicals.

The industry, the largest of its kind in Africa, is highly complex and widely diversified, ranging from high volume-low value commodity or bulk chemicals through to high value-low volume, complex and highly specialized products. However, whilst the upstream sector is concentrated and well developed, the downstream sector, although diverse, remains under-developed. Chemical operations in South Africa focus predominantly on basic upstream chemical manufacturing with major production of liquid fuels, olefins, organic solvents and industrial mineral derivatives and downstream formulation and polymer conversion. There are a few major, integrated companies (companies employing more than 150 people) involved mostly in primary and intermediate manufacturing, with small (companies employing less than 50 people) and medium-size (companies employing between 50 and 150 people) enterprises found mainly in downstream formulation and conversion processes.

South Africa has historically had a bias towards upstream commodity chemicals production, as a result of its internal need to guarantee a supply of liquid fuels during period of economic sanctions. The industry focus was on the implementation of technology, rather than the development of technology. The commodity chemical sector is therefore well established, whilst the downstream industry remains comparatively underdeveloped, with relatively low levels of scientific and technological skills available.

Figure 1 outlines the breakdown of the South African Chemical Industry according to the Department of Trade and Industry. The diagram shows that the Fine Chemicals, Speciality and Functional Chemicals currently only comprise 5% of the chemical sector.

[1] Seminar at the Helsinki School of Economics April 10, 2002:The New South Africa: Opportunities for Trade, Investment and Partnership
[2] South African Department of Trade and Industry Web-site: Overview of the South African Chemical Industry

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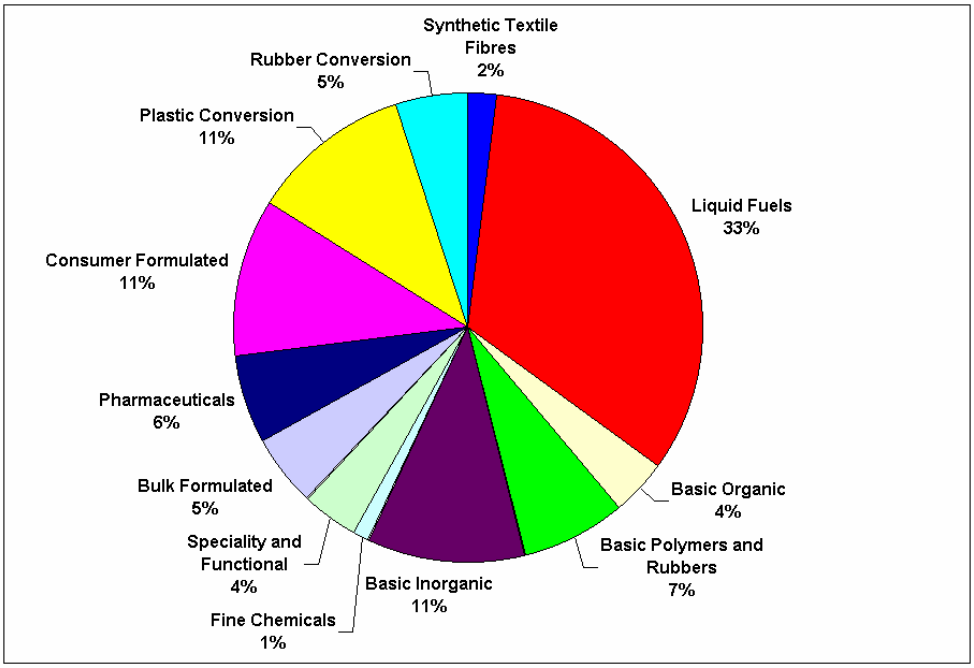
FIGURE 1: The Structure of the South African Chemical Industry. [3]



The South African chemicals industry is in the midst of turmoil, and is undergoing a massive transformation process, these changes affecting mainly the downstream chemical sector. The restructuring process of large South African chemical companies due to global economic forces has resulted in a reduction in innovation from within the private sector. Research and development undertaken by large South African companies, with the exception of SASOL and some innovative small firms has shown a significant, measurable decline in the past four years. In many cases this results in many technologies being developed overseas. This trend is supported by the recent offshore listings of several large technology-intensive South African companies followed by the tendency for these companies to source research outside South Africa.

This process is resulting in a serious depletion of strategic skills in South Africa. Research and Development expenditure has been declining in the last 5 years, with South Africa undertaking only approximately 0.5% of global research. The percentage of the South African gross national product spent on research and development has declined from 1,1% in 1990 to its current level of around 0,7%. This is compared to the average OECD country, where expenditure is 2,15% of GDP; with at least 30% of Research and Development spending in large integrated developed economies made by the government. Currently,

[3] South African Department of Trade and Industry Web-site

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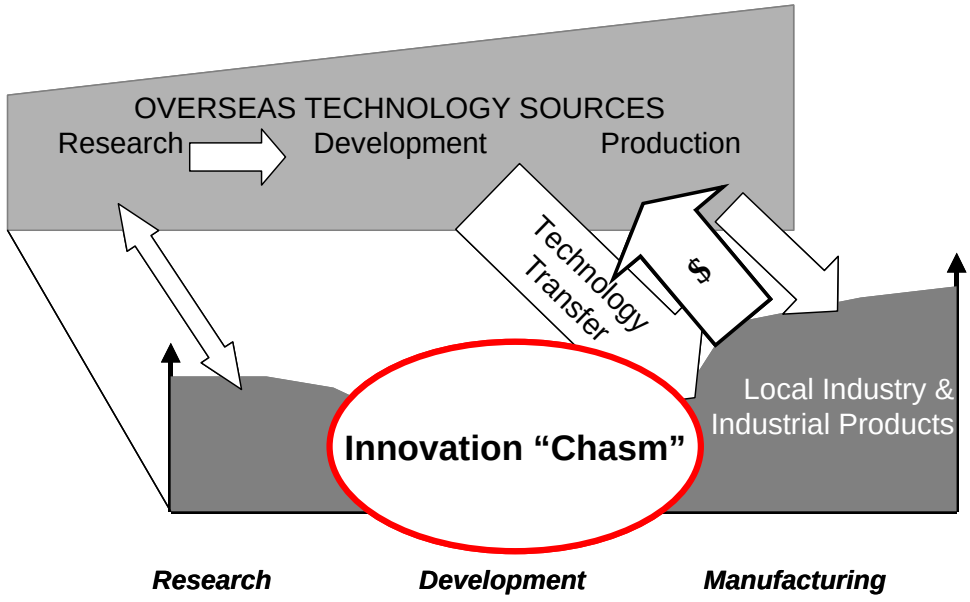
there is less than one researcher for every thousand members of the workforce, as compared with five in Australia and ten in Japan.[4]

Globally, the sector is knowledge-intensive and technology-intensive. However, South Africa does not conform to these trends, as evidenced by the indicators for value added per employee and wages, being substantially below international best practice. South Africa is a net importer of technology, and is generally recognized as being successful as a technology adapter and extender. The implementation rather than the development of technology has been a focus of South African industries and economic growth based on local innovation is low. A key feature of the South African terrain is therefore that, whereas South Africa both exports and imports technology, it rarely takes its own technologies through the complete development cycle. There is evidence of good technologies that are lost or not commercialized due to a lack of innovation resources. This phenomenon has lead to the so-called "Innovation Chasm". This is an innovation gap that exists between the knowledge generators and the market and has never been addressed strategically. This feature is depicted in a diagram below.[5]

FIGURE 2: South Africa – "The Innovation Chasm"



[4] UNDP Report: 2001 Technology and Development
[5] A National Perspective: Contribution of Research and Innovation to the SA Economy. Adi Paterson (Department of Science and Technology)

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High population growth constantly exceeds the growth in employment demands. This is compounded by the consistent loss of jobs in the formal sector, as the country's economy moves away from labour-intensive to capital-intensive operations. The labour market is characterized by an oversupply of unskilled workers and a shortage of skilled ones. Furthermore, in South Africa, the distortion of under development and/or disinvestment in the majority of South Africans has resulted in the skewed skills profiles from a racial perspective and in terms of the 'soft' and 'hard' qualifications. An overwhelmingly white, male and aging scientific population is not being replaced by younger groupings more representative of the country's demographics.

A study for the Chemical Industries Sector Education and Training Authority, Chieta, has found that while black people are predominantly located in the lower-skill occupational categories, 83% of African employees reported receiving no training relevant to work in the previous year, compared with 46% of white employees.[6] A HSRC[7] study for the Chieta on the skills needs in the chemical sector in South Africa has indicated that more than two thirds of all the workers in the Chemical Industries Sector are black, but that many top-level decision makers (financial, managing, and related senior management positions) and technically qualified posts (chemical, production, and process engineers etc.) are predominately filled by white males. The average age of workers at all occupational levels, except for that of operators, seems to be increasing, which makes the training of replacements an urgent matter.

The fact that employers in the Chemical Industries Sector experience difficulty in recruiting new staff at the managerial, professional and technician level, especially affirmative action candidates, can be ascribed to the low output of graduates in the natural sciences. This is indicated by the fact that South Africa produces about 10 times fewer scientists and engineers compared to typical first-world countries. Figures from the Department of Science and Technology state that only 3.9% of approximately 490,000 learners who wrote Matric exams in 2000 passed mathematics on the higher grade, and 4.7% passed science on the higher grade. The continual plea for access to expatriate skills and capacity by the industry is backed up by statistics that show there are insufficient locally based professionals to meet the demands of the sector in the short term.

South African ageing and shrinking human resources in science and technology are not being adequately developed and renewed and the number of A-rated scientists is declining annually. In 1998, 45% of all scientific publications were by authors over the age of 50. This is further compounded by the emigration of senior and junior scientists to further their careers

[6] Chieta Report: "A Demographic Profile of the Workforce in the Chemical Industries Sector and Sub-sectors" May 2002
[7] HSRC Chieta Report "Skills Needs by the Chemical Industries Sector in South Africa" December 2003

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in countries with a more competitive research environment. Innovations, patents and technology transfer are not sufficiently rewarded as core tasks of academics and researchers at academic institutions.[8] This focus is reflected in the relatively low number of patents per South African scientist. Start-ups are derived at a low level of 2 per 100 patents in South Africa, *vs* the international norm of 10 to 15 start-ups for every 100 patents.[9]

Over the last 5 years, the chemical sector has nevertheless increased employment by 2.1% per annum and achieved an annual average value-added growth rate of some 5.1%.[10] South Africa's performance in mathematics and science seems to be reaching a turning point and inequalities are gradually being eliminated. Although there has been some progress in developing black managers in the science and technology system there are still far too few black researchers. The percentage of university graduates (of all population groups) in the natural sciences has returned to the 1985 level.

The future prospects of the chemical industry will depend on an appropriate skills development and retention strategy. The South African government has adopted a proactive approach to many of the fundamental issues affecting the country. One of these is the investment in, and management of, human capital development in order to strengthen the transformation of its science and technology capacity. The chemical sector can therefore be seen as a critical industry from which to advance South Africa's social economic development objectives.

Stimulating the growth of a globally competitive and sustainable aroma and fine chemicals value chain can be seen as a means of developing the Fine Chemical, Speciality and Functional Chemicals sub-sectors and addressing the strategic imperatives discussed above that confront the growth of chemical industry as a whole. The findings enumerated in this report would suggest that by South Africa supporting an investment in an Aroma and Fine Chemicals cluster based on the portfolio of products indicated, the downstream sector would benefit positively and would help to bridge the innovation gap identified in the national research and development strategy for South Africa.

[8] Draft Emerging Biotechnology Roadmap: Department of Science and Technology: November 2003
[9] National Biotechnology Audit: September 2003
[10] Chemicals SA 2003: South Africa's Petrochemical Industry – Globalisation, Restructuring, and Government Policies

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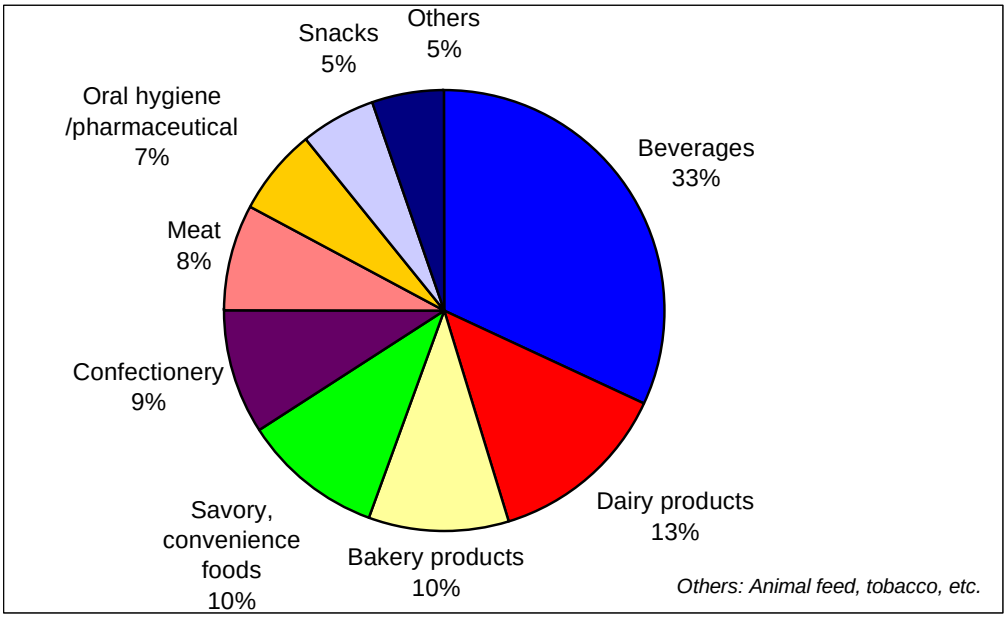
1.2 Overview of the International Flavour and Fragrance Industry

This section of the report provides an outline of the Flavour and Fragrance industry in a global context. It also serves to describe the position held by aroma chemicals and essential oils in this market.

Flavour and fragrance formulations are widely used globally for enhancing, among others, foods, beverages, detergents and pharmaceutical products. Compounded flavour and fragrances are thus complex blends designed to impart either an attractive taste and aroma to processed foods and beverages, or a pleasing scent to consumer products such as perfumes, toiletries, household cleaners etc. The formulations may contain aroma chemicals as well as essential oils and natural extracts. The formulation will also contain solvents, diluents and carriers.

Figures 3 and 4 outline the breakdown of the use of flavour and fragrance compositions in the end-markets. [11]

FIGURE 3: Flavours End-Use Market



It is interesting to note that the major use in the flavour market is in beverages. In the fragrance end-use market, over 50% is used in two applications i.e. soaps/detergents and cosmetics/toiletries. These end-use markets are characteristically first-world markets. This

[11] Chemical and Engineering News: July 14, 2003

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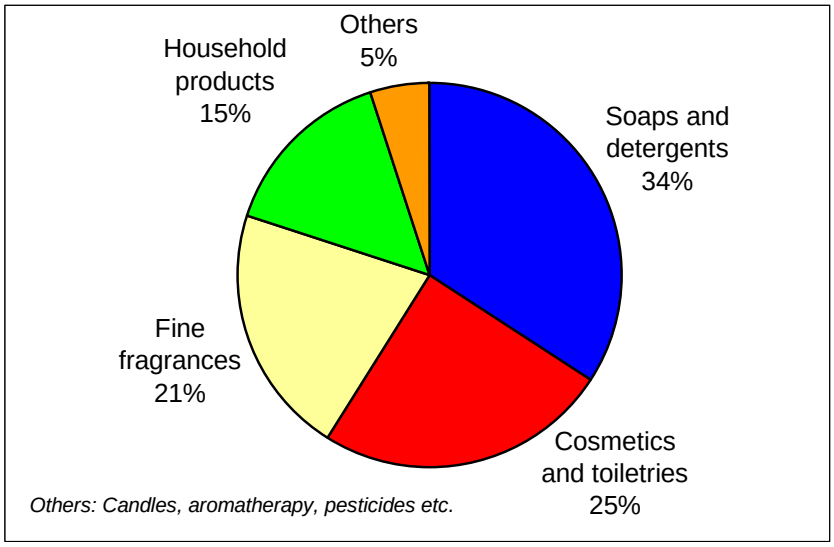
is supported by the global consumption usages for flavour and fragrances, which show that the USA accounts for 31% of the market, with Western Europe representing about 29% of the world market and Japan 12%.[12] The rest of the market lies in developing countries with high growth rates and potential, as use of the consumer products in these particular major end-use markets increase. The South African market in 1999 was worth a total of $ 107.3 million. Flavours were the largest application of $ 56.7 million.[13]

FIGURE 4: Fragrances End-Use Market



In 2002, the worldwide flavour and fragrance business, including sales of compounded flavour and fragrance products, aroma chemicals as well as essential oils and natural extracts, was valued at an estimated $ 15.1 billion. [14] The industry is segmented broadly into three areas:

1. Isolation of synthetic and natural aroma chemicals or essential oils/natural products.
   (Aroma Chemicals are single, chemically defined substances which act on the senses of smell and taste; and essential oils are naturally occurring, volatile products obtained from various parts of plants.)
2. Compounding of these products into formulations tailored to meet specific customer requirements
3. The sale and use of these formulations in the production of personal care and pharmaceutical active ingredients, food and beverage markets etc.

[12] Chemical and Engineering News: July 14, 2003
[13] IAL Consultants: 2000 Data; C&EN July 2003; IAL Data 2001
[14] Leffingwell and Associates

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This flavour and fragrance value chain is represented in Figure 5. This report uses the term "Flavour and Fragrance industry" to encompass this full value chain.

FIGURE 5: Flavour and Fragrance Industry Value Chain

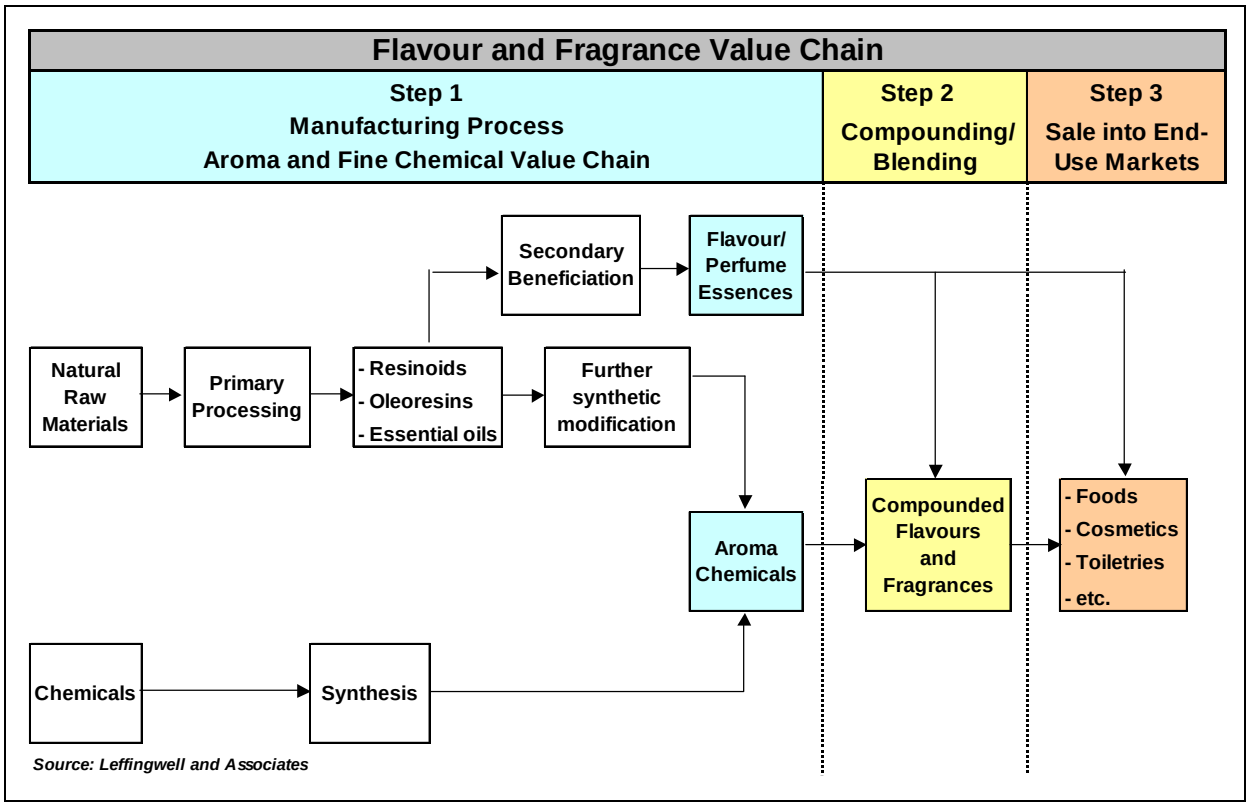

Table 1 illustrates the contribution of the various components of this value chain.[15] It is worth noting that over 75 % of the industry's value lies in the composition of the flavours and fragrances.

[15] Chemical and Engineering News Estimates May 2002/Leffingwell and Associates

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Table 1: Value of the Flavour and Fragrance Industry 2002[16]

	% of the Value Chain	$ Billion
Aroma Chemicals	12%	1.8
Essential Oils and Natural Extracts	12%	1.8
Flavour Compositions	41%	6.2
Fragrance Compositions	35%	5.3
TOTAL	**100%**	**15.1**

Production of aroma chemicals is estimated to be worth $ 1.812 billion. In 2000, the SRI Chemical Economic Handbook report estimated the market for aroma chemicals to be $ 1.766 billion.[17] This estimate was based on supply and demand estimates by the major geographic regions.

A recent survey by the market research company, Freedonia Group[18], forecasts growth in global demand for flavours and fragrances of 5.4% per annum, with the industry reaching $ 18.4 billion in 2004. Market growth will primarily be due to strong growth in the developing regions of Latin America and Asia (excluding Japan). Countries such as China, Brazil, India, Mexico, Vietnam and Chile particularly are experiencing dramatic growth in their food-processing and consumer-product industries. It is predicted that the growth in developed markets will in contrast be slow. The developed countries market growth is characterised by trends, which favour less flavour and fragrance-intensive consumer goods, consolidation in end-user industries, strong pressure on price reductions, and market maturity. It is also anticipated that the growth in the essential oil and natural extract market will exceed that in the synthetic aroma chemical market.

Large international Flavour and Fragrance houses specialise in the compounding of flavour and fragrance products. A number of these houses also produce selected aroma chemicals for captive use. In addition, some also manufacture personal care active ingredients from captive and purchased aroma chemicals. Generally, success in the formulation and compounding business is dependant on the ability to offer a basket of products, and an ability to respond quickly to ever-changing trends in consumer preference. Most major participants in the Flavour and Fragrance industry operate internationally and maintain a presence in virtually all markets of the globe. The major motivation for this is that the leading Flavour and Fragrance houses are following key end users such as food processors and

[16] SRI Chemical Economic Handbook Report: Aroma Chemicals and the Flavour and Fragrance Industry August 2001
[17] SRI Chemical Economic Handbook Report: Aroma Chemicals and the Flavour and Fragrance Industry August 2001
[18] Freedonia Group News Release 2003

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detergent producers to these regions. China, Brazil, and Mexico have as a result seen a strong growth in production.

Over recent years there has been a large amount of rationalisation and consolidation within the industry and this process is likely to continue. It has been estimated that there are over 1,000 companies active in this industry worldwide, but 12 international flavour and fragrance companies hold over 65% market share. One major reason for this is that of the cost of owning an adequate infrastructure, which includes the cost of toxicological testing, research and development, quality control, and efficient manufacturing and marketing, is so high that only the largest of companies can afford it. The costs associated with these activities also explain the reason for the high value associated with this segment of the market.

Table 2 outlines the top 12 companies in 2002. [19] It is noticeable that the top 6 participants have sales over $ 800 million. The next tier has sales in the region of $ 200 to 400 million. Below this level, the industry is highly fragmented with a host of much smaller players. A recent report from SRI International[3] comments that there is a "virtual absence of medium-sized participants" with sales in the region of $ 75 to $ 100 million.

Table 2: Estimated Sales Volume Flavour and Fragrance Companies 2002

Company	Country	$ million	Market Share
Givaudan	Switzerland	1,933	12.8%
IFF	USA	1,809	12.0%
Firminech	Switzerland	1,373	9.1%
Symrise	Germany	1,300	8.6%
Quest International	UK	1,153	7.6%
Takasago	Japan	850	5.6%
Sensient Technologies	USA	423	2.8%
T.Hasagawa	Japan	381	2.5%
Mane SA	France	270	1.8%
Danisco	Denmark	263	1.75
Degussa Flavours	Germany	234	1.5%
Robertet	France	218	1.4%
TOTAL TOP 12 COMPANIES		**10,206**	**68%**
Others		4,894	32%
TOTAL		**15,100**	**100%**

[19] Leffingwell and Associates

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There are a number of reasons for this consolidation. A major reason has been the pressure on prices. As outlined above, the major market is USA followed by Europe and Japan. In the USA the advent and power of the supermarket chains has placed pressure on consumer product manufacturers to drop costs in order to be given "shelf space". This has lead to consolidation amongst consumer product manufacturers. These manufacturers in turn have pressurized the Flavour and Fragrance houses (which once commanded huge margins) to reduce prices. The Flavour and Fragrance industry is thus reacting to the concentration of its customer base. In addition, end-users have found it too costly to deal with too many Flavour and Fragrance houses, and accordingly only deal with the largest few. If the Flavour and Fragrance house is not strong in all markets it cannot keep the custom of a larger customer such as a Unilever or Proctor and Gamble. Thus growth in turnover by the Flavour and Fragrance houses has come primarily from acquisitions with the company profiting from economies of scale.

A further reason for the consolidation has arisen from major chemical companies wanting to stick to core business of high volume manufacturing. As a result, many of them have sold their Flavour and Fragrance divisions to previous competitors. Recent examples are Bayer, which used to own Haarmann and Reimer, which was merged with Dragoco forming Symrise in 2002. In 2000, Roche spun off Givaudan. The only chemical company still with a Flavour and Fragrance house is ICI with Quest International.

The smaller and medium sized companies active in the Flavour and Fragrance industry have survived by concentrating on their specialist knowledge within a niche market and offering services and products that the industry giants don't offer. An example of this is Treatt plc, based in the United Kingdom. This company acts as a one-stop shop for the Flavour and Fragrance industry in Europe, but not in the US. Fine chemical companies are increasingly forging partnerships with Flavour and Fragrance customers through joint projects and special services, and are becoming indispensable partners of the Flavour and Fragrance industry. Rhodia is an example of this trend, producing natural vanillin under license from Givaudan who could not justify operating the process on its requirements alone. Fine chemical companies can develop new compounds at a smaller scale or offer process improvements to customers losing patent protection. The proposed portfolio of the petrochemical suite of products was designed to position AECI in this segment of the market.

1.2.1 Aroma Chemicals

Aroma Chemicals can be manufactured *via* a number of different routes:

1. **True synthetic chemicals**: This includes chemicals produced by synthesis from both natural aromatic compounds and from synthetic feedstocks e.g. petrochemicals.

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2. **True Isolates**: Single aroma chemicals, which are extracted from natural materials and subjected only to further processes of purification. These include the following: anethole, camphor, citral, eugenol, and menthol.

3. **Chemically modified derivates:** Made by converting isolated products into a different chemical by subjecting them to various chemical processes. This includes the crude sulphonated turpentine derived aroma chemicals such as citral, geraniol and linalool. Crude sulphonated turpentine is a by-product of the Kraft paper pulping process. It also includes vanillin produced from lignin, also a by-product of the paper pulping process.

Aroma chemicals can be classified according to their chemical structure. The main groups and their share of the aroma chemical market are detailed in Table 3. [20] There are about 2,800 aroma chemicals approved for use in flavour and fragrance formulations worldwide. However, only a few hundred are produced in volumes over 50 tons for the merchant market. It is considered that synthetic aroma chemicals constitute 70 – 75% (by value and volume) of the raw materials used in the flavour and fragrance formulations. The aroma chemicals under consideration in this study fall into the categories of either benzenoids or terpenoids.

Table 3: World Consumption of Aroma Chemicals

	Percentage by Value	**Percentage by Quantity**
Benzenoids	34	48
Terpenes/Terpenoids	37	34
Musk chemicals	13	7
Other aroma chemicals.	16	11
	100	100

The majority of aroma chemical manufacturing is by batch processing, often in multi-purpose plants. This is due to the fact that few aroma chemicals are consumed in large enough volumes to justify dedicated equipment. Manufacturers need to shift production from one product to another as the market demand changes. Some aroma chemicals do have a demand in other purposes, however, the application as a flavour and fragrance ingredient usually is the most profitable for these products.

[20] SRI Chemical Economic Handbook Report: Aroma Chemicals and the Flavour and Fragrance Industry August 2001

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Aroma chemicals are generally produced by three different types of companies:

- Flavour and Fragrance Houses:

  These companies produce the chemicals for their own use in compounds and blends and often also sell them on the merchant market.

- Large Diversified Chemical Companies:

  These companies manufacture aroma chemicals as a minor component of their overall chemical business by upgrading small amounts of their large-scale chemical production is to flavour and fragrance specifications. Product is sold to formulators or flavour and fragrance houses; the chemical companies do not themselves sell the products into the end consumer markets.

- Medium and small chemical producers:

  These are companies involved in the synthesis of aroma and other fine chemicals using specialised technical knowledge. (AECI as a producer of a portfolio of fine chemical aroma products would have belonged in this category)

The aroma chemical industry has consistently earned returns in excess of the chemical industry standard. As it is so closely tied to the health, personal care, and food and beverage markets, it is robust, insensitive to commodity cycles, and relatively recession resistant. Success in the production of aroma chemicals is generally characterised by:

- Consistent product quality
- An approved organoleptic quality
- Long-term customer relationships
- Technology driven cost leadership
- An ability to research, develop and commercialise aroma chemicals
- A robust raw material/feedstock position

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1.2.2 Essential Oils

Essential oils are naturally occurring volatile products obtained from various parts of plants. Essential oils are usually extracted from the plant material by steam distillation, expression, or solvent extraction. Essential oils are distinguished from the fatty vegetable oils, such as canola and sunflower by the fact that they evaporate or volatise in contact with the air and they usually possess a strong aroma (the name comes from "essence"). The amount of oil extractable ranges from an infinitesimal quantity to as much as 1-2% of the dry weight of the plant material distilled.

The methods of extraction differ considerably. The sources may be fresh or dried fruit, leaf, bark, root or seed. A typical essential oil is a complex mixture of chemical compounds, each of which possesses its own, individual set of properties. The odour of the oil can be due mainly to one single chemical constituent, or to a mixture of several odoriferous chemical bodies. The chemical constitution of the bodies may not always be known.

The major producers of essential oils are Brazil, China, U.S., Egypt, India, Mexico, Guatemala and Indonesia. All of them, with the exception of U.S., are developing countries with very low labour costs. The major consumers are the U.S. (40%), Western Europe (30%) and Japan (7%).

Although the essential oils industry is primarily an agricultural industry, the oils make up an important component of the flavour and fragrance supply chain, alongside synthetic aroma chemicals. Sales of essential oil and other natural extracts were equal in value to those of aroma chemicals in 2002 (estimated US$1.8 billion each). Essential oils are sold into several different markets (foods and beverages, aroma and fragrances in foods, nutraceutical applications, medicinal applications, cosmetics and personal hygiene products). Most naturally derived aroma chemicals have their synthetic counterpart; however there has always been a niche for the natural products. Furthermore, over the last 50 years, the demand for essential oil products from plants has gradually increased because of a number of factors. Demand for flavouring, perfumery, and aromatherapy materials has risen because of the steep rise in the world population and a desire for greater variety in their food by the people of the industrialized countries. The increased concern for the environment and for the safety of food and the general difficulty in manufacturing synthetic alternatives has also contributed to the continued growth in demand for plant based essential oil products. According to the United Nations Trade Statistics, trade in essential oils and related products are growing at roughly 10% per annum whereas the overall flavour and fragrance market is growing at between 4% and 5% per annum.

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The world trade in essential oils may be divided into two components, often referred to as the major and minor oils. With regards to the major oils, these are those oils that are traded in large quantities (but often lower prices). There are approximately 160 essential oils traded globally. The top 10 oils make up some 80% of the world trade in essential oils. The remaining 150 minor essential oils are of higher value but are traded in quantities ranging from a few kilograms per annum to a few hundred tons per annum.

Although it is possible to isolate aroma chemicals from essential oils this is only done in respect of the major oils, where the economies of scale allow for the natural isolate to compete with the synthetic counterpart. The competition in the major essential oils is stiff with the low cost producers of Asia and South America dominating (particularly Brazil and China). On the other hand, the minor essential oils are traded and used more or less “as is”. Their attraction is in their complex chemical structure and consequent organoleptic properties they possess. The minor oils are more difficult to produce as they are not produced in “plantations” and neither can they be highly mechanised.

South Africa has a long involvement in the essential oil industry with regards to the production of major essential oils like eucalyptus and citrus oils, supplying some 5% and 2% of the world market. These industries are under pressure form the low cost producers and the strengthening of the Rand. With regards to the higher value minor essential oils (e.g. geranium, chamomile and lavender), South Africa has a fledgling essential oils industry that was pioneered by the CSIR. It is this latter industry that holds potential for growth. Internationally, essential oils form a major component of the flavour and fragrance industry and therefore the development of this industry in South Africa would be complementary to South African Aroma Fine Chemical industry.

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1.3 The South African Flavour and Fragrance Industry

The market for flavours and fragrances in South Africa and Sub-Saharan Africa in 1999 and projected for 2004 is shown in Table 5 below.

Table 5: Market for Flavours and Fragrance in South and Sub-Saharan Africa: 1999 – 2004[21]

End-use ($ millions)	South Africa		Sub-Saharan Africa	
	1999	**2004**	**1999**	**2004**
FLAVOURS				
Beverages	18.1	21.0	22.4	30.8
Dairy	9.3	10.9	8.0	10.6
Snacks/Savoury/Convenience	7.0	9.2	6.8	9.7
Bakery	6.4	6.7	5.6	6.2
Confectionary	5.2	5.6	6.2	6.9
Meat	5.1	6.4	3.5	4.7
Oral Hygiene/Pharmaceutical	3.0	4.6	3.0	3.9
Others*	2.6	3.1	4.0	4.9
TOTAL	**56.7**	**67.5**	**59.5**	**77.8**
Growth Rate		**3.6%**		**5.5%**
FRAGRANCE				
Soaps / Detergents	24.6	27.7	28.6	36.5
Cosmetics/ Toiletries	12.0	14.7	13.0	17.2
Household cleaners	8.3	9.2	5.9	7.4
Fine Fragrances	2.5	2.7	1.1	1.3
Others#	3.2	3.4	3.7	4.1
TOTAL	**50.6**	**57.8**	**52.3**	**66.5**
Growth Rate		**2.7%**		**4.9%**
GRAND TOTAL	**107.3**	**125.3**	**111.8**	**144.3**

**** Including Pet Food and Tobacco***
#* Includes: Candles, aromatherapy, insecticides etc.

In South Africa, the current emergence of the black middle class is having a positive impact on the consumption levels of flavour and fragrance containing compounds.

[21] An Overview of the Global Flavours and Fragrances Market: IAL Consultants 2000

PART 2 – AROMA CHEMICALS DERIVED FROM EFFLUENT FROM THE PAPER AND PULP INDUSTRY

The largest flavours sector in Africa is beverages followed by the dairy section. Higher flavour loads tend to be used in the beverage sectors in the African markets compared to more developed markets. For example, in Western Europe, fruit-flavoured soft drinks typically contain 12% fruit juice, reducing the need for added flavour. In the majority of countries in Africa, no fruit juice is used at all. Although South Africa in general has a food culture similar to the rest of Africa its food processing sector is however more sophisticated than in the rest of Sub-Saharan Africa.

Within the fragrance sector, the largest use is in soaps and detergents. Within this sector, washing soap is predominant in the less affluent regions, where the use of washing machines is at nominal levels. Many cosmetics and toiletries multinationals have located production facilities in South Africa as a production base for the Sub-Saharan region.

The South African total market in 2004 was therefore predicted to be $ 125.3 million. At an exchange rate of R 7/US$ this is equivalent to R 877 million. This figure for the value of the South African Flavour and Fragrance market in 2004 has been confirmed by industry sources. The regional South and Sub-Saharan African market in 2004 was expected to be in the order of $ 279 million or R1,887 million. Growth in the region is anticipated to continue to be strong, the flavours market growing at 4%.

Any increase in aroma chemical and essential oil production in South Africa would increase the potential of participating more in the regional Flavour and Fragrance market.

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