Oleochemicals in Skincare Products

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INTRODUCTION

Oleochemicals are chemicals derived from natural sources of vegetable oils and animal fats. However the emphasis is more towards vegetable oils such as coconut oil, soyabean oil, palm oil and palm kernel oil. Various processes may be employed to split these natural triglycerides into glycerine and fatty acid components such as fatty alcohol, fatty esters, and fatty amides which form the basic building block of the oleochemical industry. In general, palm oil yields fatty acids varying from C14 to C18 chain lengths while palm kernel oil from C8 to C18. The fatty acid composition of palm oil, palm kernel oil and other selected oils and fats is given in *Table 1*.

The cosmetic and toiletry industries are dependent on a regular supply of fatty acids and their derivatives for various purposes such as emollients, emulsifiers, thickeners and foaming agents. In 1984, the cosmetic industry used approximately 23 000 tonnes of fatty acids and their derivatives in virtually all types of cosmetic products such as hair care, make-up, oral hygiene, personal hygiene, shaving products, and most importantly in the skincare industry (Schlossman, 1985).

SKINCARE INDUSTRY

Among the major cosmetic items sold, the skincare industry is the fastest growing with a 46% growth between 1987-1991 while colour cosmetics comes second with a 30% growth (Smith, 1994). In the

TABLE 1. FATTY ACID COMPOSITION OF SELECTED OILS/FATS

Fatty acids	Weight Percentage							
	Palm Oil	Palm Stearin	Tallow	Palm Kernel Oil	Palm Kernel Olein	Coconut Oil	Palm Olein	Soya Bean Oil
C6	–	–	–	0.3	0.4	0.2	–	–
C8	–	–	–	4.4	5.4	8.0	–	–
C10	–	–	–	3.7	3.9	7.0	–	–
C12	0.2	0.3	–	48.3	41.5	48.2	0.2	–
C14	1.1	1.3	2.5	15.6	11.8	18.0	1.0	–
C16	44.0	55.0	26.6	7.8	8.4	8.5	39.8	6.5
C18	4.5	5.1	21.8	2.0	2.4	2.3	4.4	4.2
C18:1	39.2	29.5	42.8	15.1	22.8	5.7	42.5	28.0
C18:2	10.1	7.4	2.3	2.7	3.3	2.1	11.2	52.6
Others	0.8	0.7	4.0	0.1	0.1	–	0.9	8.0
I.V	53.3	35.5	35–48	17.8	25.5	9.5	58.4	133
SAP.V	196	199	195	245	–	256	198	192

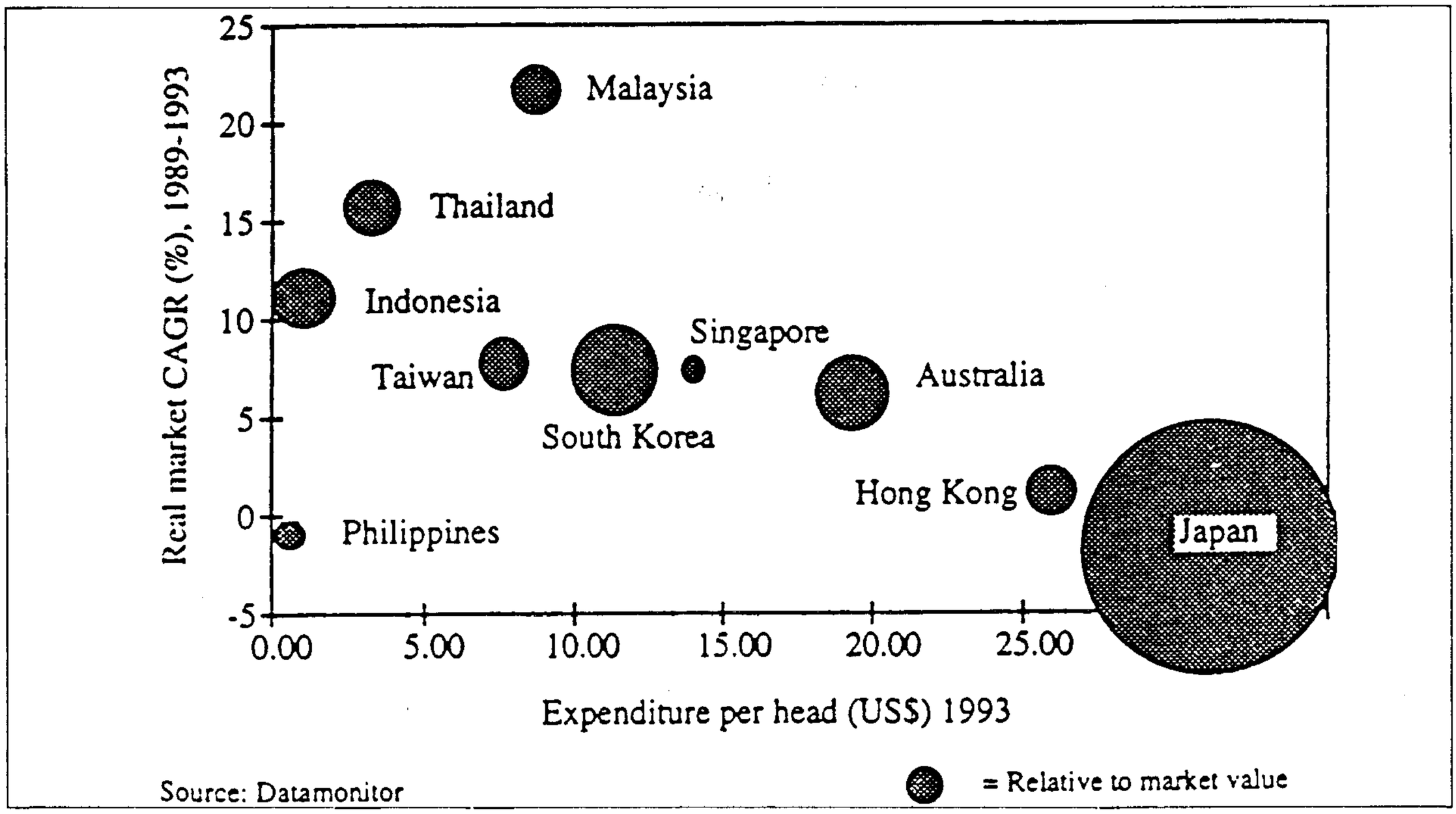

Figure 1. Development of Skincare Markets in The Asia Pacific Region, 1989-1993.

Asia Pacific region, Japan has the highest usage rate of skincare products followed by Hong Kong and Australia. Countries such as Malaysia, Thailand, and Indonesia have low expenditure per head on skincare products but are currently showing increase potential for real term market growth (*Figure 1*). Malaysia in particular, has a growth rate of over 20% in the skincare market alone (Smith, 1994).

The skincare industry basically consists of lotions, creams and their variations such as cleansing lotion, day cream, vanishing cream, cold cream, hand and body lotion, and face cream. Lotions and creams are basically cosmetic emulsions of oil and water, emulsified with surfactants resulting in homogenized, and stable products. Cosmetic creams and lotions could be of water in oil (W/O) or oil in water (O/W) types. W/O emulsions are those where the oil droplets are dispersed in water. This has the advantage of being water soluble and less oily on the skin. O/W type emulsions on the other hand are where the water droplets are dispersed in oil. The advantage of this type of emulsion is a higher fat retention on the skin which is desirable for dry skin.

In general, the type of emulsion formed is determined by the way of adding the two phases. If the oil phase is added to the water phase, the result will be O/W type emulsion. The reverse addition will give W/O emulsion. In addition, the type of surfactant used also exerts an influence on the type of emulsion formed. A strongly hydrophilic surfactant will result in O/W emulsion while a strongly lipophilic surfactant will give W/O emulsion.

LOTION/CREAM

Raw Materials

Lotions and creams have a basically similar composition. They are distinguished by the active ingredients used and their behaviour on the skin such as providing a water retention barrier, sunscreen effect, cleansing, and whitening. In general, all skincare

formulations consist of emulsifiers, emollients, active ingredients , rheological additives and other ingredients which enhance the effectiveness of the end products such as perfume, colour and preservatives.

Emulsifiers

These compounds possess both hydrophilic and lipophilic properties in their chemical structure which enable them to orient at the oil/water interface. In this orientation, the hydrophilic portion is absorbed at the water phase and the non-polar lipophilic portion will seek the oil phase. This results in the reduction of the surface tension, enabling the two phases to mix and form an emulsion. Emulsifiers produced from oleochemicals are widely used in the skincare industry. *Table 2* gives an example of various types of emulsifiers commonly used in the cosmetic industry.

TABLE 2. VARIOUS TYPES OF EMULSIFIERS

Emulsifiers	Examples
Anionic	Sodium lauryl sulphates
	Sodium lauryl ether sulphates
	Magnesium lauryl sulphates
Cationic	Quaternary ammonium compounds
	Imidazoline based quaternary compounds
Nonionic	Fatty alcohol ethoxylates
	Alkyl phenyl ethoxylates
	Fatty acid alkanolamides
	Sorbitol-sorbitan
Amphotherics	Betaines
	Imidazoline derivatives

Source: Brand (1994)

Emollients

Emollients are substances which help to maintain the desired smooth, soft and pliable texture of the normal human skin. They also prevent dryness and irritation (Kalustian, 1985). Various fatty acids and fatty esters could be used as emollients. *Table 3* shows the various classes of emollients:

TABLE 3. DIFFERENT CLASSES OF EMOLLIENTS

Fatting emollients	Glycerol esters of isostearic acid
	Propylene glycol esters of isostearic acids
	Octyl isostearate
Dry emollients	Isopropyl isostearate
	Isostearyl alcohol
	Isopropyl palmitate
Astringent emollient	Isopropyl myristate
	Octyl octanoate

Source: Brand (1994)

Active Ingredients

Active ingredients are any substances in a cosmetic preparation which give substantive effects upon application with time. The promised effect must be proven, not only in terms of activity of the active ingredients but also the preparation as a whole. Palm vitamin E is an example of an active ingredient which is widely used in skincare products such as antioxidant, and UV protectant.

Rheological Additives

These are substances that are used to adjust viscosity which in turn will improve stability of the emulsion. Examples of rheological additives are carbopol, veegum ultra, cetyl alcohol, *etc.*

Typical Formulation for Lotion/Cream

Since lotion/cream are emulsions of O/W or W/O types, they are frequently formulated by mixing the oil and water phases, with emulsifier/s present in either one of the phases, using high speed homogenizer. Each phase contains several ingredients that are needed to form the emulsion and give the desired feel and stability. Each ingredient however, will contribute to the overall characteristics, feel, penetration and stability of the products. Under the Cosmetics and Detergents Section of PORIM, formulations which use as much as 98% palm based oleochemicals (excluding water) have been successfully tested. An example of a cream with high residual emolliency, which spreads easily on the skin, giving a lustrous, velvet-like skin feel, is described below:

A. Oil phase
   Octyl isostearate
   Isostearyl isostearate
   Tri-isostearin
   Glycol stearate SE
   Oil soluble preservative

B. Water phase
   Glycerin
   Propylene glycol
   Water soluble preservative
   Water

C. Perfume

CONCLUSION

With more educated consumers and an increase in buying power, demand for more sophisticated cosmetic products is expected to increase. Since consumers are currently more aware of the environmental issues, natural cosmetic products have started to gain importance. What started as a niche area has now become mainstream products. Natural products are generally defined as products produced from raw materials of vegetable origin containing no animal fat and are mild and beneficial to the environment (Kintish, 1995). This definition gives the oleochemical industry an edge since they are generally derived from natural sources and are environmental friendly. With skincare market worth US$ 8.5 billion in Europe (Promar International, 1994) alone to tap, the oleochemical industry is set to be a major raw materials producer for the skincare industry. ■

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