

APPLICATIONS OF SCIENCE AND TECHNOLOGY IN MALAYSIAN COSMETIC INDUSTRY

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Abstract:

The use of cosmetics and toiletries is an integral component of life. Malaysian cosmetics and toiletries market recorded approximately RM 3 billion sales in 2004. Facial care contributed 60% of the market value in the skin care segment. In the facial care segment, moisturiser is identified as the most marketable product. Moisturiser is used to restore the barrier function of the epidermis; provide a soothing protective film; increasing water content of the skin and other properties such as anti-ageing. The function is depending on the ingredient used in the formulation of the product. Although there is a strict regulation on cosmetics product, the development of ingredient technology is continuously evolving to cater the sophisticated consumer demand. Application of science and technology is critical to ensure the cosmetic industry to remain competitive and sustainable. The future of Malaysian skin care industry is hence dependent on the application of science and technology to success. A study on the local entrepreneurs regarding the formulation technology and marketing of facial moisturiser is recommended.

Introduction

The word 'cosmetic' may give a picture of an attractive women with juicy colour lipstick, smooth and radiance skin and perfected with a wonderful smell of perfume, or a picture of ageing women who wonder if there is anything that can be done to slow the process of ageing and wrinkle skin. Although cosmetic are synonyms with women as always been portrayed in an advertisement as in Figure 1, men cannot simply be excluded in the cosmetic market. Recently, it is common for men to use cosmetic and this contributes to the sale of cosmetics products. Figure 2 shows an example of men skin care product.



Figure 1 Advertisement of skin care product by channel



Figure 2 Men's skin care product by Clinique.

Almost everyone used at least one skin care products daily since the appearance and health of the skin has become a great concern. If we visit the skin care counter today, there is a vast array of lotions, potions and pots of magic creams designed to solve any number of problems, from dry skin to wrinkle. But do they work or not will depend on the material and the formulation used. Whatever the function of the cosmetic product, there is a limited list of ingredients that can be used. The selected ingredients in the calculated amount were mixed together as one formulation to make up a product that could deliver the desired effect. Growing awareness among public on the ingredient used force the cosmetics companies to be selective and consider the safety of the material used in their formulation. It is therefore, a compulsory for manufacturer to list the ingredient used at the product label.

Market of cosmetic industry is continuously growing and is also known to be relatively immune to recession. Globally, the cosmetics industry represented a US\$166.2 billion market in the year 2000. Between 1994 and 2000, the global cosmetics industry grew at rate of 11.5 percent. This is reported to be the results of research and innovation [1].

Cosmetic industry is also known as an industry that achieves long-term productivity gains. The productivity gains have been associated with more efficient plants, improved technology, and an expanding line of products that serve the changing market. As measured by output per employee hour, productivity in this particular industry rose at an average annual rate of 4 percent from 1958 to 1980 [2].

This industry comprise of several segments including hair care, skin care, make up and colour, perfumes and fragrances, oral hygiene, bath and shower, deodorants, men's toiletries, children and baby care, and sun care. Skin care segment is the second largest market segment after the hair care segment. Facial care is recognised as an important sector in this segment [3]. In this facial care sector, moisturiser is the most marketable product. Throughout the five years periods from 1993 to 1997, facial moisturisers gain the largest share of sales worldwide with 20 percent growth in sales. Technological development was reported as a key feature in marketing skin care products especially in promoting the benefit of individual brand [4]

The Malaysian cosmetics and toiletries market recorded sales of approximately RM 3 billion or US\$ 811 million in 2004. The growth rate of cosmetics and toiletries market is up to 13 percent annually [3]. Products such as skin care, perfume and toiletries is worth in excess of RM 600 million per year. Pharmaceutical Services Division of Ministry of Health reported that throughout the year 2003, a total of 35,996 registration applications were received since the launched of Cosmetic On-Line registration that started from 1 st of February 2002. From the amount 7578 were local products and 28 418 of imported products. From the data only 27 percent of the registered products were local [5]. Up to July 2005, almost 70 000 types of cosmetic products were registered with Drug Control Authority of the Ministry of Health [3, 6]. The skin care segment was reported to be the largest sector within Malaysian cosmetic and toiletries market whereby 60 percent of the market value was contributed by the facial care product [4].

This industry therefore can be regarded as a promising area for the entrepreneur and can contribute to performance of a country's economy. The industry is no doubt is an industry that apply scientific application starting from the selection of material or ingredient followed by the mixing process, then packaging and finally marketing of product. Therefore, this paper shall discuss the application of science in cosmetic industry and the important of this application to enhance Malaysian facial care industry.

Skin physiology

It is very important to understand the physiology of the skin, the biochemical reaction and mechanism involves in the skin structure before formulating skin care product. Human skin is a uniquely engineered organ that regulates heat and water loss from the body while preventing the entrance of harmful chemicals or microorganisms. Skin is the largest organ of human body; the skin of average women is about 3 kg and an average man is about 5 kg. It can be divided into three layers; the epidermis, dermis and subcutaneous layer. The thickness of skin varies depending on its site on the body [7].

Epidermis consist of 5 layers. The outer layer is the corneum layer or known as stratum corneum in a form of a flattened disc, tightly packed together at the surface of the skin. This is the part at which the cosmetic products are being applied. The next layer is the lucidum layer or known as keratinocyte, then followed by the granulosum layer, mucosum layer and germinative layer or the basal layer. The proper balance of all the epidermal elements is essential for the keratinocytes and the corneum layer to function appropriately. The epidermis gives the skin its glow, suppleness, youthfulness, texture and good looking. Understanding the epidermal layer allows us to comprehend the problems of dehydration, sensitivity, ageing and pigmentation, which in turn help associate product and ingredient effectiveness relevant with the skin requirement [7].

The dermis is the second layer of the skin, much thicker than the epidermis. This layer serves two principle functions. One is to provide nutrition to the epidermis by means of its vast network of capillaries and blood vessels. The second is the formation of a supporting framework composed of collagen and elastin protein fibres. The proper functioning dermis as well as water content is responsible for the skin's elasticity and a key for a youthful appearance. The subcutaneous layer is the last layer of the skin connecting the skin with the muscle tissues. This layer is highly elastic and has fat cells acting as shock absorber to delicate structure such as blood vessels and nerve ending [7].

Overall, skin is a complex tiny component with multilayered structure. The understanding of how it works is essential for cosmetic chemist to explore the possible product that can be introduced to improve the skin condition.

Basic skin care product

Everyday basic skin care requirement include cleansing, exfoliating, toning and moisturising. Cleansing would normally remove make up, dirt, dust, waste products excreted by the skin and dead skin cells without leaving the skin dehydrated. Exfoliating on the other hand could remove dead skin cells to prevent pore clogging and dull the surface of the skin. Regular and consistent exfoliation is the best way to improve the overall appearance of the skin. The next basic product required in skin care is freshener or toner that is use to re-establish the pH of the skin as well as to prepare the skin for the next step. Finally, moisturising; to protect the skin from moisture loss and guard the skin against the effects of environmental condition as well as to hold moisture next to the skin to counteract dryness and help prevent the signs of aging.

Moisturising was recognised as a prime function of skin care. Moisturisers are widely used products that are important in many dermatological and cosmetic skin therapies. During 1950s, Irwin H.Blank demonstrated the importance of water content of the skin's horny layer and for many years epidermal water content known to be crucial for skin plasticity and prevention of dry skin. In general, moisturiser is a topically applied product that relieves the signs and symptom of dry skin [8].

Dermatologists see moisturizers as bland oleaginous substances that are applied to the skin by rubbing [9]. Moisturiser is a key component of basic care especially when there is alteration of the epidermal barrier and reduces water content in the epidermis. They are used to restore barrier function of the

epidermis, to cover tiny fissures in the skin, provide a soothing protective film, and increasing the water-content on epidermis. They may, thus, slow evaporation of the skin's moisture, therefore maintaining hydration and improving the appearance and properties of dry and aging skin.

In order to give beneficial effect to the skin, the moisturiser contain varying combinations of emollients, occlusive, and humectants, and there are an overwhelming number of formulations available. Humectants can enhance the water holding capacity of the skin; certain emollient can influenced the aesthetic properties of moisturiser and the stability of active ingredient. Traditional moisturisation was believed to inhibit transepidermal water loss (TEWL) by occlusion. There is a vast array of moisturizers available on the market today as consumer demand for these products is growing. These products range from value brand that provide basic moisturisation to luxury therapeutics with claims of anti-ageing benefits. Newer products claim to have other than basic properties such as anti-aging, skin firming, whitening and surface protecting effects [10,11].

The application of science and technology in facial care product

Consumers are looking for products that will not affect their facial skin negatively or damaging to the skin. The product must also be in an optimal quality that contains at least one or more active ingredient in an effective concentration. All the ingredients combined in the formulation should not interfere or suppressed the activity of the active ingredient; have an effective delivery system to be delivered to the skin and safe with an appropriate preservative. It is not an important task to put all these condition together to produce a stable, easy to use and cost effective formulation. Therefore, it is very important for the manufacturer to access to dermatological research and development expertise to formulate such convenient and value for money skin care product. Technological development is also able to expand the upper mass market. They are use to strengthen the position of prestige brand through reaffirmation of brand image to ensure consumer brand loyalty.

The innovation of skin care ingredients is continuously evolving to cater consumer sophistication. There are an introduction of new actives, emollients, emulsifiers and other materials to be offered to the formulator. The formulation with these innovative ingredients shall satisfy the more sophisticated consumer and meet the increasing expectation. For today's consumers, skin care is not only about maintaining youthful appearance but also on the well being of the skin.

There are numbers of new ingredient innovated by supplier worldwide, Degusa for example, introduce ceramides, an active ingredient that revitalize the skin by reinforcing the natural skin barrier. Ceramides is said to minimise the effects of the skin's thinning and making skin less susceptible to the effect of detergents and other external insults [12].

Another example is introduction of the Zymbizome Fermentum product line based on a plant globin molecule (leghemoglobin) that scavenges the free radical nitric oxide (NO) by cosmetics ingredient supplier, Arch Personal Care Products. NO induces a range of biochemical reactions associated with UV-induced skin aging. The zymbiozome technology addresses the market trend of preventing the skin from damaging effect rather than just to cure. The development of new ingredient in the marketplace is due to the greater willingness of consumers to pay premium prices for the skin care products. Consumers nowadays are willing to pay more as long as they can get out of the product what's on the label and what is promised [12].

Other than ingredients, marketers have developed novel ways to stabilise vitamins, acids and other active materials and deliver them to specific sites on top of and into the skin. High-tech delivery systems are used to transform rather ordinary skin care ingredients into extraordinary skin care products. Skin care delivery system can sustain the release of active materials on the skin for lasting effects or release active materials precisely when or where they are needed.

Procter and Gamble for example has successfully combine niacinamide (vitamin B3), panthenol (pro-vitamin B5) and vitamin E. According to the senior scientist, skin care P&G, Timothy Fowler; by combining the benefits of each ingredient, Olay was able to develop a single material called Vitaniacin. The Vitaniacin has been shown in clinical studies to exfoliate and moisturise the skin while providing skin moisture barrier repair benefit. This unique combination is said to be synergistic, inherently stable and has excellent skin compatibility. Vitaniacin is an essential prerequisites for addressing multiple benefits from one product or technology [13].

Emulsion determined forms of product delivery. The process of emulsification combines the phases containing the ingredients. The majority of moisturizers are in the form of lotion (oil-in-water emulsions) or cream (water-in-oil emulsions). There are other more complicated emulsion being used to deliver and stabilize some active ingredients, for example oil-in-water in oil mixture, serums, gels, sprays and milk. The aesthetic of the product vary in accordance to consumer preferences and the desired attributes. Water or solubiliser, preservative, thickener, stabilizer, fragrance, colour and vitamin are among other ingredients that could be incorporated into the moisturiser's formulation [14].

Malaysian facial care industry

There is an upsurge of local brand for cosmetics product in domestic market nowadays. As reported in *Cosmetics and Toiletries-Malaysia*, up to July 2005, almost 70 000 types of cosmetics products were registered with Drug Control Authority of the Ministry of Health [4]. This beauty industry is highly competitive and local companies are confronted with challenges to grab the opportunity in influencing the consumer and to success in the market.

Malaysian cosmetics products are under the Control of Drug and Cosmetic Regulations 1984. All cosmetic in Malaysia must be registered with the Drug Control Authority. Under the regulation, cosmetic is subject to mandatory ingredients listing on products label under the Control of Drugs and Cosmetic Regulations, 1984. The Drug Control Authority (DCA) has the mandate to protect the health of Malaysians by minimising the risk associated with the use of cosmetics marketed in Malaysia. Manufacturers are required to list all the ingredients on the product labels. This will allow consumers to avoid products containing ingredients to which they are sensitive. The Ingredients should be listed according to their International Nomenclature Cosmetic Ingredient (INCI) names to assist in the free movement of cosmetic products globally [15]

Labelling is the information written or printed or graphic matter on the immediate or outer packaging and any form of leaflets. The following particulars shall appear on the outer packaging: The name of the cosmetic products and its function, unless it is clear from the presentation of product; Instructions on the use of the cosmetic products, unless it is clear from the product name or presentation; A list of ingredients. Using the nomenclatures from the latest edition of standard references may specify the ingredients. Its genus may be abbreviated; Country of manufacture; The name and address of the company or person responsible for placing the product on the local market; The contents given by weight or volume, in either metric or both in metric and imperial system; The manufacturer's batch number; The manufacturing date or expiry date of the product in clear terms (eg. Month/year); Special precautions to be observed in use; Specific warning for example declaration of ingredients from animal parts must be declared and Registration number. The label display must be clearly legible and comprehensive and appear in English and or Bahasa Malaysia [16].

Recently, there are more than 60 local brands of facial care product in Malaysian market. Figure 3 shows the illustration of product under the local brand and the ingredient listed at the label, and Figure 4 shows an illustration of a product with an international brand and the ingredient listed at the product label. Generally, the ingredients used to formulate local product is still in a simple form to compare with the sophisticated international brand.

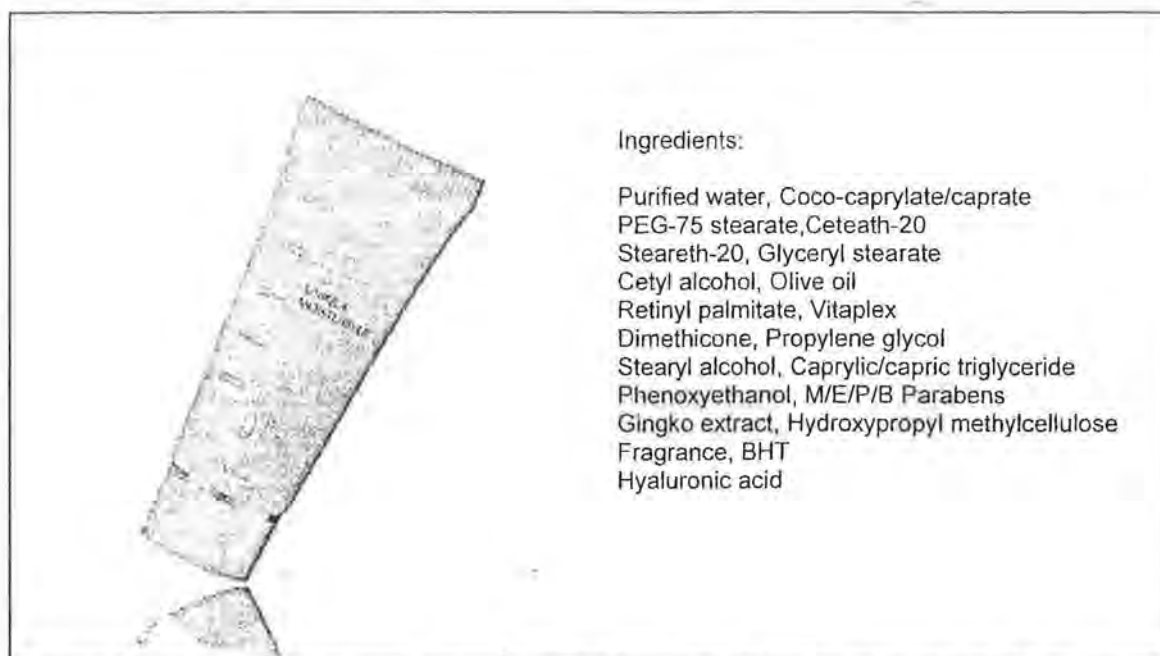


Figure 3 Illustration of local brand, Olynn Unique Moisturiser and the ingredients listed at the label



Figure 4 Illustration of an international brand, Estee Lauder DayWear Plus and the ingredients listed at the label.

Malaysian cosmetic firms adopt almost the same strategy in promoting and marketing their facial care product as seen in most magazine advertisement. Most of them do not give details on their formulation

and how it works on the skin. It is important for the local cosmetics companies to educate and influence customer's preferences by leveraging in their product special nature.

Generally, the brands for skin facial care product in Malaysia consist of three groups. The first group is a product with local brand, own by local company and manufactured locally. The second group is a local brand, own by local company and manufactured overseas. The third group is an international brand, own by international company and manufactured overseas. Table 1 shows example of product brand in Malaysia for each category.

Table 1 General category of product brand in Malaysia

	Category	Example
1	Local brand, manufactured locally	Sendayu Tinggi, Nouvelle Visage and Olynn
2	Local brand, manufactured abroad	Golden Horse, Derm White and BML
3	International brand, manufactured abroad	SK-II, Loreal and Estee Lauder

The cosmetics industry consist of companies and entrepreneur that functioning in many ways. Some of the company manufacture and market their own products and others manufactured the product but they do not themselves sold the product. A rough grouping of cosmetic companies can be made as shown in Table 2. However the classifications are not rigid and are often overlapping [17].

Table 2 General Classification of cosmetic companies

Group	Description
1	Firms manufacturing their own products or most of their own products. Most of their product line are produce or manufactured in house. However, to some extend they look for outside aid to manufacture certain product even though they have their own facilities; for example, they may produce their own creams, lotions and shampoos and yet have lipstick and eye-makeup made by other manufacturer
2	Firms that turn entirely or primarily to others to manufacture their product. Companies in these categories look entirely for outside manufacturer to get the products. Most of them are small firms or larger firms that considered themselves specialists in advertising, promotion, marketing and sale
3	Firms that manufactures entirely, or primarily, for others, and does little or no marketing or distributing for themselves. They are known as contract manufacturer or private label manufacturer
4	Firm that formulates the product themselves but get outside manufacturer to produce all of their product range. This firm does not have their own manufacturing facilities

Most Malaysian facial care entrepreneurs can be classified in-group 3 and 4. They are firms that turn primarily to others to manufacture their products using their own recipe or formulation and also firms that depend entirely to the manufacturer for the formulation and production of products. Although they do not manufacture the products, understanding of the scientific application of the product is important. There is a drawback for the firm's advancement if the entrepreneur does not understanding and master the related scientific application.

Technological development and innovation including product formulation and product presentation are reported to be key features in promoting the skin care product of certain brand. Malaysian cosmetic industry had to be innovative to be competitive in the market. The ability to survive and success will largely depend on the competencies to regularly formulate and test new attributes in order to lead the marketplace [18].

Advertising and promotion are regarded as crucial areas for marketing skin care product. They are able to create awareness of new products and build brand loyalty among consumers [19]. It is recommended that the local marketer to be knowledgeable in the formulation of their products. This shall ensure the marketing and promotion of the moisturiser reach consumer effectively and able to convince and influence them to purchase local brand.

Summary

The cosmetic industry is highly competitive industry with rapid changes. Understanding, mastering and applying production and formulation technology is an important attribute for cosmetics companies to remain competitive and successfully market the local facial care product to the consumer. Therefore it is recommended to conduct a study to identify the state of technology application by Malaysian entrepreneur in facial care moisturiser and what are the strategies adopted to promote the benefit of their facial moisturiser to the market.

Upon the identification of the state of the local cosmetic entrepreneur in applying the scientific application for production and marketing of the moisturiser, further recommendation could be identified to enable the local facial care entrepreneur sustain, success and gain a competitive edge in the cosmetic market.

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