

Skin Whitening
Extract from Rubber
Latex – Technology
Evaluation Report



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Skin Whitening Market—Key Highlights

Projected Skin Whitening Market by 2015

USD 10 Billion



15% Of total
world
population invests
in Skin Whitening
Products and
Treatments

Driven by the desire to have *smooth white skin*, increasing *awareness of beauty and wellness*, rising *dispensable incomes* and *technological advances* in the field

Increasing SHARPLY

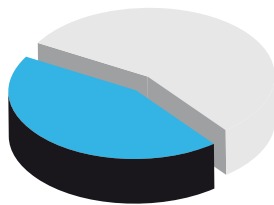
With wide range of holistic products and formulations available.

Rising Demand FOR HOLISTIC PRODUCT Range

encompassing various Applications and Purposes

44%
market share

of Skincare market
is dominated by Asia-
Pacific Region



*Potential
challenges
for TCELS*

*Convincing people in favor
of Natural Rubber Latex
derived product*

**322 PATENTS
FILED**

in US, EU and Japan
in the last 5 years

**80% PATENTS
OWNED BY
COMPANIES**

Maximum patents
held by Japanese
companies

Key Markets

Thailand, India,
China, Japan,
America and some
Eastern European
countries

*Skincare market
contributes to
a massive 31%
share of Global
Beauty Market
(2011)*

Study by L'Oreal

Introduction

Personal Care is a billion dollar market globally. It comprises of two broad categories- Personal Hygiene and Beauty Products. Global Beauty market further comprises mainly of Hair Care, Skin Care, Cosmetics, Perfumes and Toiletries. The skin care category has been the cornerstone of beauty and personal care for the past 15 years.

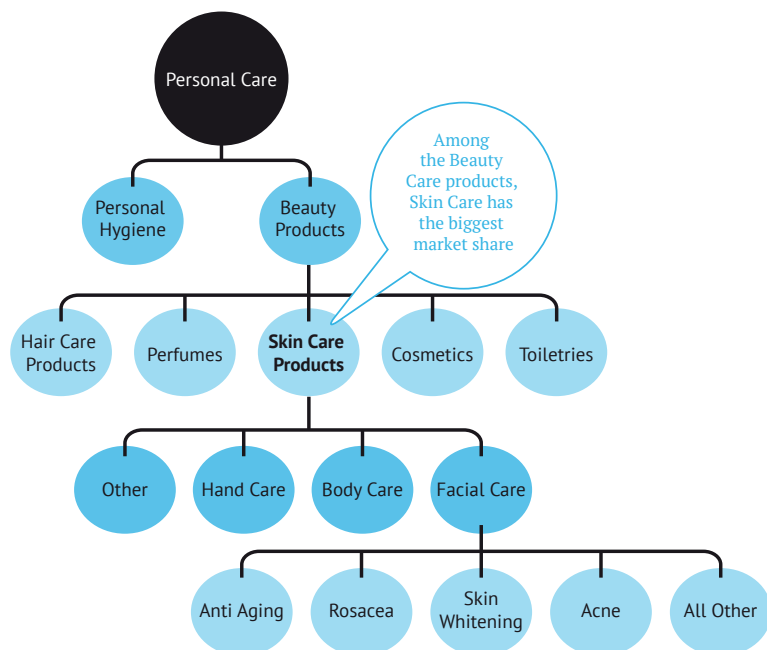


Exhibit 1: Personal Care - Market Segmentation

Skin, mainly categorized as oily, dry and combination may have host of problems like melanin deposits, acne, sun damage or eczema. This has lead to a boom in skin care product market marked with entry of variety of formulations targeting scars, pigmentation, brown spots, stretch marks and aging to name a few. Today premium skincare companies, **Shiseido, Clarins, CavinKare etc.** and mass brands alike offer a comprehensive portfolio of products addressing either one or a combination of such problems.

Of all the skin care applications, skin whitening / lightening or brightening products are the most sought after globally. Interestingly, Asian markets contribute 44% share in this segment. A famous Chinese saying “*One white covers up one hundred ugliness,*” and similar beliefs that have been passed through the generations in Asian communities fuels this market. European and American markets are catching up fast due to steeping Asian population and increasing demand for anti-aging products that have traditionally dominated these markets now offering whitening properties.

Due to consumer demands and

preferences, companies have developed holistic range of products with skin whitening components **(that can be chemical based or natural extracts)**. These are available in various formulations like creams, serums, sprays, oral supplements, soaps and powder form. Besides the topical and oral products, invasive depigmentation technologies like laser treatment, cryosurgery and dermabrasion easily available at private clinics across the globe compete for market space.

Global Skin Care Cumulative market size reported to be USD 96.5 Billion during the period 2007-2011

Euromonitor



Figure 1: Skin Whitening Products available

Facial care alone contributes to 64% of Skincare segment

MarketLine

While traditionally skin whitening products were aimed at facial care, these days products for hands, legs, underarms, and intimate areas are gaining popularity. Another revolutionary trend witnessed in the skin lighteners market is the growing number of products targeting the male consumers with the introduction of products ranging from after shave lotions to skin whitening creams¹.

The surge in skin whitening segment can be attributed to increasing consumer awareness about health, wellness and grooming and expendable incomes in addition to notions that have been passed through generations.

¹ 'Global Skin Lighteners Market to Reach USD10 Billion by 2015', 2009, Global Industry Analysts Inc.(GIA)



Figure 3: Hb Skin Whitening Cream

This report covers existing skin whitening technologies and products, market trends and projected market size in this segment from global perspective, providing TCELS a comprehensive overview of existing competition and key drivers for its skin whitening product.



Figure 2: Latex From Rubber Tree

Technology Overview

Latex tapped from the rubber tree (*Hevea brasiliensis*) is a source of rubber particles. Research conducted by a team from the Prince of Songkla University, Hat Yai, supported by the Thailand Center of Excellence for Life Sciences (TCELS) showed that the non-rubber part of this extract, essentially a waste, has a special serum that has demonstrated skin de-pigmentation and whitening applications.

This serum has phytochemicals rich in multiple natural active compounds and enzymes like protease inhibitors, organic acids and super antioxidants that are known to improve skin health. The extract with all its active components has been named 'Hb extract'. For commercial purposes it has been processed as dried powder and mixed with cream base for application on face and skin.

Applications of the Technology

Skin color generally depends on a combination of genetically determined elements and a set of cells, melanocytes, located at the bottom of the epidermis is primarily responsible for skin protection and pigmentation.

Variation in concentration and distribution of melanin (a combination of pigments synthesized in melanocytes by transformation of pro-pigmentary amino acid tyrosine under catalysis of tyrosinase) in keratinocytes causes skin pigmentation. Melasome containing melanin is transferred to dendrite tips and translocated by membrane fusion and phagocytosis with the help of *Protease Activated Receptor-2 (PAR-2)*.

The extract from rubber latex inhibits activity of Protease Activated Receptor-2 (PAR-2) and tyrosinase to regulate skin pigmentation.

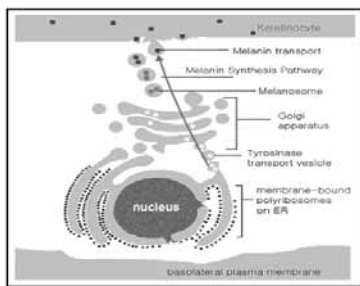


Figure 4: Melanin Synthesis - Process

Skin Whitening essentially entails

1. Elimination of Skin Pigmentation

2. Inhibition of new (or renewed pigmentation) by inhibiting melanin synthesis in order to

- Prevent tanning
- Decrease existing dark skin color
- Improve skin color homogeneity
- Reduce spots/freckles
- Inhibit other mechanisms of pigmentation

Hb extract serum is found to have an inhibitory effect on the activity of serine protease and trypsin which is essential to activate PAR-2 for the uptake and distribution of melanin containing melanosomes in the epidermal keratinocytes.

Based on the reviews of Hb Brightening Cream users, a series of positive effects were reported after application.

- When applied on human facial skin, melasma problems showed improvement with skin brightening gradually and melasma fading.
- Reduction in facial acne and skin inflammation with some reporting lower sebum and oil levels.

92% of people with regular exposure to natural rubber latex show specificity to IgE for Hev b5 protein.

Journal of Biological Chemistry, 271

Anaphylactic reactions in 400 people and 15 deaths due to latex contact were reported in 1989, while today 10-17% of health care workers have become sensitized with 2% showing symptoms of occupational asthma

No adverse effects like irritation and skin sensitization were seen when tested on animal skin under Organization for Economic Co-operation and Development (OECD) test guidelines.

The results demonstrated that the technology has applications in the treatment of:-

- Melasma
- Pigmentation
- Acne
- Skin Patching
- Dullness
- Skin Inflammation

Usage and Acceptance of Natural Rubber Latex Technology

Natural Latex, from the rubber tree *Hevea brasiliensis*, is a milky sap which on blending with chemicals acquires an elastic quality that has been commercially used in making rubber gloves, balloons, rubber bands, toys etc. Natural rubber latex is known to be an allergen for

people with significant cumulative latex exposure. It can cause skin allergies and hypersensitivity, which may range unpredictably from mild to severe life threatening problems.

Commonly observed skin reactions to rubber latex are

- Contact dermatitis
- Itching
- Respiratory problems like severe wheezing
- Anaphylaxis.

For a skin care product from rubber latex, the allergenicity of Natural rubber latex must be addressed to gain market traction. During our research it was found that a total of 13 allergens from *Hevea brasiliensis* latex have been registered with WHO-IUIS so far of which Hev b5, an acidic latex protein, is recognized as a major cause of anaphylaxis.

Owing to the known allergenicity of rubber latex, successful introduction of a formulation based on Natural rubber extract by TCELS would entail ensuring

that none of the reported allergens are present in the composition.

Since the formulation developed by TCELS is based on the extract derived from non-rubber part, immunogenicity would not be a concern. Moreover, 13 allergens have been removed for formulation of the product. TCELS through appropriate studies on over 2,000 users has demonstrated clinically significant results with no irritation or adverse effects. The ease of availability as well as abundance and origin of the Hb extract gives it a definite cost advantage that influences the user acceptability.

Japan dominates the global skin care product market with revenues of almost USD20 Billion.

Euromonitor



According to market researcher Lucintel, Global Personal Care market is estimated to reach USD 630 Billion, by 2017 with a CAGR of 3.4%.

Market Evaluation

The Professional Skin Care Market encompasses products well-suited to meet the needs of specific concerns targeted for different age groups, skin types and color, skin problems, gender and life-style. Most brands segment facial care into four broad categories:

- Anti-aging
- Hyper pigmentation or Skin Whitening,
- Rosacea
- Acne

The constant strive towards being unique from existing marketed products has led to introduction of products with speciality ingredients like diamond, caviar or pearl extracts.

Global skin care market driven by Skin Whitening Products is expected to see a 21.5% growth to USD 95 Billion by 2015 from USD 78 Billion in 2010, with Asia-Pacific region accounting for almost 44%² share.

Skin Lightening is an international billion dollar market catering to billions of people around the world with a dozen of different techniques and over the counter products available. In fact, **Skin whitening has become so commonplace among women, that even big cosmetics firms like L'Oreal have been accused of making its models look paler.** The market has witnessed an expanding demand for products that enhance skin color and prevent aging.

² 'Skincare: Global Industry Guide', 2011, MarketLine

The market for Skin Lightening products in Asia Pacific crossed USD 2 billion mark in 2012.

Global Industry Analysts
(GIA)

"Skin whitening has a long history in Asia, stemming back to ancient China, and the saying, 'One white covers up one hundred ugliness,' was passed through the generations."

- Li Yanbing, Vice-Secretary General, Chamber of Beauty Culture and Cosmetics, All-China Federation of Industry and Commerce, in an interview with China Daily.

Approximately USD 7.5 Billion were spent on skin lighteners in 2009 and the market is projected to reach USD 10 billion by the year 2015³

Present Consumption Pattern of Skin Whitening Products

About 15% of world population invests in skin brightening products, Asia being the largest market.

Whiter skin has been perceived as a symbol of beauty, good health, and high social status since time immemorial in Asia thus making it one of the key markets for these products. Amongst Asian countries skin whitening products are widely consumed by countries such as *China, India, Japan, Thailand* and *Korea*.

Asian Skin Whitening Consumer Percent (2009)

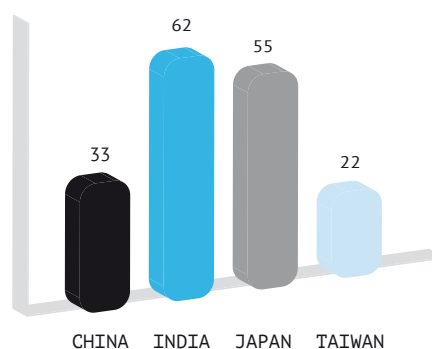


Figure 5: Asian Skin Whitening Market Share (2009,% Population)

³ Study by Global Industry Analysts

It is estimated that USD 432 million was spent on skin lightening creams in 2010 in India alone growing at 18% annually. Similarly in China, where the skin care market is worth more than 35 billion Yuan (USD 5.5 billion), whitening products comprise a whopping 71% of the market.

According to a survey by a research firm Synovate, skin whitening products were used by 58% of Thai women between the ages of 18 and 64. Respondents spent roughly 10% of their income on skincare. It was also reported that four out of ten women in Hong Kong, Malaysia, the Philippines, South Korea, and Taiwan use a skin whitening cream.

The Thai language is peppered with expressions that denigrate dark skin, such as the insult *dam mhuen e-ga* - “black like a crow”. Products promising to lighten the face, body and armpits are already available across the country, with skin whitening pills and diet supplements claiming to pick up where the cosmetics leave off.

Riding on the back of growing proportion of ethnic groups like Asian, Hispanics and African Americans in the United States and the United Kingdom, an emerging potential market for skin whitening products was spotted by SkyQuest’s research team. Additionally these markets have showcased an increasing demand for *anti-aging products with the added advantage of skin whitening and spot removal in these markets.*

Our research also revealed that the demand for skin lighteners in North America and Europe has additionally been driven by

- A desire to reverse sun damage
- For the appearance of younger looking skin.

In North America and Europe, skin lighteners are used to minimize the appearance of sun spots and freckles

The Indian male fairness market also saw a staggering growth from USD 20 Million in 2009 to USD 50 Million in 2011.

Consumption by Categories:

Male Grooming:

Traditionally only female population had shown inclination for whitening skin care products. With the introduction of male skin care product range in the market, our research demonstrates an increasing demand for products including products specifically for skin lightening targeting male consumers.

While European countries have emerged as the largest market of overall male grooming sector, growth has been significant in Asian markets like India, Korea, and Japan etc. Based on our findings this growth can be mainly attributed to

- Ease of availability of products at drug stores and supermarkets
- Growing number of men seeking to retain a youthful and appealing look particularly in markets like Japan and South Korea.

A study conducted by Hindustan Unilever Limited (HUL), India's largest Fast Moving Consumer Goods Company owned by Unilever Group reported that men from southern Indian states are most enthusiastic users of skin whitening creams consuming maximum number of the fairness products.

Product Composition:

Another major product categorization that has been observed in the skin whitening products market is based on the composition of such products mainly

- Natural and organic products
- Chemical based products.

A number of natural and organic products from both premium and mass brands are available in market; such products have not enjoyed a sizeable share in this segment owing to a considerable gap between consumer expectations and the real market offer which have been associated with negative effects and skin sensitivities.

France, which is one of the key markets in European region, experienced an annual average sales growth of 25% for total skin care (during 2005-2011). however the growth from the organic and natural products accounted for only 2% in 2011⁴.

In a competitive environment with both small and big players for organic products and early signs of market downturn, it is necessary for any new product launches in this segment to be validated, build customer trust about the product consistency, invest more in R&D and marketing activities.

Besides these, companies in this segment compete for shelf space not just with rival big companies, but smaller and cheaper brands offering similar unbranded products. Emerging markets hold a huge potential for big players offering better quality of products. Multinational companies have begun establishing a strong foothold in countries such as Russia, India and China.

⁴ 'The French Market For Natural & Organic Cosmetics', 2013, Organic Monitor

Premium vs Mass Regional Breakdown
US\$ million, 2011

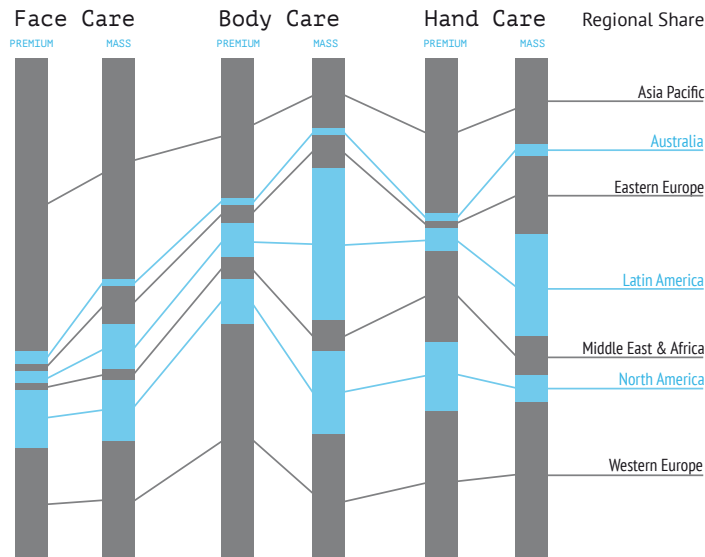


Figure 6: Regional Breakup for Premium and Mass Products (2011)

*Classified as
Poison in 1634,
Lead Powder
used for makeup
caused problems
like Hair Loss,
Mental Deteriora-
tion, Muscle
Paralysis and
Face Distortion.*

Skin Whitening Technologies

Skin whitening has been of interest, especially for women since the Renaissance. The obsession to have skin as pale and white as possible paved the way for herbal remedies and to the use of lead powder as opaque mineral makeup in European nations and Japan predominantly.

Existing Technologies

Skin lightening is a well-established procedure and many of the active ingredients found in commercial skin-lightening creams have been successfully used by dermatologists to treat hyper pigmentation. Yet there's a significant population that cannot afford professional skin lightening treatments offered by dermatologists and for them over-the-counter channel is an affordable alternative.

Consumers today try various methods ranging from herbal products like sandalwood packs and rose water, pills and nutritional supplements to more advanced treatments like laser skin brightening and of late, skin peeling chemicals to get flawless skin. Table 1 highlights some commonly used technologies with their basic principle and type of products available.

Table 1 Conventional Skin Whitening Methods⁵

Technology	Principle	Major Products
Skin Bleaching	Whitens complexion and helps diminish hyper pigmentation while inhibiting melanin production with the help of hydroquinone as an important ingredient.	Jolen, Fem, Celabright, Revitol, Celazome, Epibright
Topical Skin Whiteners	In the form of a gel, cream or concentrated serum made from natural ingredients like Kojic Acid, Citric acid, Arbutin, Mulberry, Teritinoin extract or chemicals like Hydroquinone, Mercury, Mequinol. These work by inhibiting the activity of skin pigment cells and their enzymes, tyrosinase. Some products also have steroids in them.	Shishido White Lucent, Avon Anew Luminosity Ultra Advanced Skin Brightener, Nivea Whitening Deodorant, Dove Whitening Spray, Clean & Clear Face Scrub, Lotus White Glow Intensive Skin Whitening Face Wash, elureTM Advanced Dermal Whitening
Skin Whitening Pills and Nutritional Supplements	These help achieve body whitening with glutathione as their active ingredient along with some antioxidant by reducing cell damage.	Lakme Perfect Radiance Whitening Capsules, Glow2thione
Skin Whitening Laser Treatments	It includes ablative and non-ablative procedures effective for hyper-pigmentation. They function by emitting a monochromic, high-intensity, coherent energy source that destroys melanin.	IPL (Intense Pulsed Light) and lasers, Quality-switched Laser or Q-Switched Laser, AFT Laser
Cryosurgery	Utilizes liquid nitrogen which alters melanin and causes it to rise on skin's surface which then can be peeled off in some days. Should be avoided if possible.	Galvanic Beauty Microcurrent Cryotherapy Machine, Cryo-Electroporation Machine
Microdermabrasion	Gentle abrasion of the outer skin is done with the help of steam of fine micro-particles blasted across the required area. It loosens and partially removes outermost epidermis.	Physicians Formula Derm@home Mineral Microdermabrasion System, Estee Lauder Idealist Micro-D, Neutrogena Advanced

⁵ Collated from various sources.

While the aforesaid technologies are most commonly employed by consumers for skin whitening purposes, a slew of new age technologies have been entering this segment. Few such products identified during SkyQuest's analysis have been summarized below.

Hybrid Technology – Acutip 500™:

This is a novel technology combining the principle of Laser and light energy to replace cryotherapy developed by Cutera. It replaces liquid nitrogen to treat individual sun spots without the risk of scarring or hypo pigmentation that occurs with traditional cryotherapy. The unique design combines the targeted delivery of a laser with the economics of flash lamp technology where the

cooled tip is customized for treating age spots on nose, cheek, chin, and other areas of the face. It can just as easily be used to remove sun or age spots often found on the most sun exposed areas such as the face, chest or décolleté, arms, hands and even isolated spots on the lower legs.

Other Technologies based on Natural Ingredients

Algae Based Whitening Agent:

Silab, one of the leading French manufacturers of Natural Active ingredients, has launched a Red Algae based whitening agent Whitonyl. This extract from *Palmaria palmata* limits Melanogenesis and the transport of melanosomes thereby lightening brown spots and creating even complexion.

Lignin Peroxidase Enzyme:

An Israeli start-up Rakuto Bio Technologies Ltd. has developed a product based on **LiP enzyme**, a *Lignin peroxidase* from a fungal strain which provides a unique



Figure 8: Elure's Skin Whitening Range

and innovative approach for skin whitening by eliminating melanin from upper layers of the epidermis. The product is distributed by **Syneron Medical Ltd.** (a leader in non-invasive aesthetic device market) under the brand name of **Elure**

Chemical Based Therapeutic Product:

Galderma Laboratories, a joint venture between **Nestlé** and **L'Oreal** towards development of Therapeutic dermatology products, has developed a topical cream **Tri-Luma®** for the treatment of Melasma. The product has completed Phase 4 efficacy and safety studies and employs a triple component combination



Figure 7: Cutera's Acutip 500TM

of Fluocinolone Acetonide 0.01%, Hydroquinone (HQ) 4% and Tretinoin 0.05% with series of Glycolic Acid Peels or Cryotherapy for sequential therapy of moderate to severe case of solar lentigines and melasma, the brown patching of skin because of hormonal imbalances.

Nano-particle Delivery based products:

Product delivery using *Nano-particles*, approved by FDA in 1999, has been commonly employed in skin care products like sunscreens and is gaining momentum for its efficiency and efficacy in topical skin whiteners without leaving a white cast on applied skin area.

Technologies in Pipeline

Research Groups

Patents

With the growing scope and market of skin lightening products significant research efforts are being invested in this sector to find technologies and extracts that yield better results and no side effects. The increase in patents filed and granted in this sector in the last five years is a witness to this trend. These patents cover wide scope in terms of purpose of the composition and formulation varying from additional benefits of anti-aging to obesity or hair treatment available as topical skin product, oral supplement, drinks or food additive.

A list of patents from 2010 till date granted to research institutes in USA, Japan and Europe have been collated and summarized in Table 2.

Table 2: Patents from Research Institutes for Skin Whitening (2010-2013)

Serial No.	Patent Origin	Patent Number	Patent Title	Assignee	Publishing Date
1	USA	8398958	Carotenoid compositions useful for whitening skin	I.B.R. Israeli Biotechnology Research Ltd.	3/19/2013
2	Japan	JP2012176913	Material which suppresses skin photo oxidation and imparts skin whitening effect	Research Institute For Production Development	9/13/2012
3	Europe	EP2092837	Compositions for skin whitening comprising (2z, 8z) - matricaria acid methyl ester	Inha-Industry, Partnership Institute Inha University Yonghyeon-Dong	9/21/2011
4	USA	7947314	Skin whitening cosmetic composition, pack containing the same, and preparation method thereof	Nam, Jong Hyun	5/24/2011
5	USA	7932232	Cosmetic composition comprising beta-fructosyl-L-ascorbic acid for skin whitening	Korea Research Institute Of Bioscience & Biotechnology	4/26/2011
6	USA	7777073	Topical delivery system for anti aging and skin whitening agents	Bioderm Research	8/17/2010
7	Japan	JP2010173964	Serotonin compound, tyrosinase inhibitor and skin whitening cosmetic	Kinki Univ, Look	8/12/2010

Clinical Trials

Our assessment of the product pipeline revealed that besides the aforesaid patents, many research institutes with commercialization interests are undertaking clinical studies for their products and technological developments. Most of these trials focus on combination treatments of topical cream/oral supplement with cryotherapy or laser treatment for post inflammatory pigmentation and melasma.

One of the most striking ongoing trial is testing the efficacy and safety of Biocellulose Mask - *Farhorm*® (from Coconut Juice) for people undertaking laser treatment for pigmentation. This product has proven to be better than Vaseline application, the research undertaken jointly by *Chulalongkorn University* (Thailand) and *Agricultural Research Development Agency* (Thailand).

Cairo University's research to devise a Fractional CO2 laser treatment, *SmartXide*, is under safety and efficacy testing for treatment of facial melasma and freckles.

Table 3 summarizes the technologies from Universities / research institutes that are being clinically tested.

Table 3: Clinical Trials from Research Institute for Skin Whitening Formulations/Technologies

Serial No.	Trial Identifier	Title	Status	Sponsor	Publishing Date
1	NCT01545869	Efficacy and Safety of Fractional Carbon Dioxide Laser for Treatment of Facial Freckles.	Not Yet Started	Cairo University	3/19/2013
2	NCT01695356	Ultraviolet and UV-Visible Light Photoprotection for the Treatment of Melasma	Ongoing	Universidad Autonoma de San Luis Potosí, Hospital Central "Dr. Ignacio Morones Prieto"	9/25/2012
3	NCT01162850	Oral Polypodium Leucotomos for Melasma	Completed	University of Miami	7/14/2010
4	NCT01088737	Imiquimod to Detect Residual Lesions and Prevent Recurrence of Lentigo Maligna	Ongoing	Medical University of Graz	3/16/2010
5	NCT00467233	Study of Acid Peel and Laser for the Treatment of Melasma	Completed	Northwestern University	4/26/2007
6	NCT00707174	Combination Therapy With Imiquimod Cream 5% and Tazarotene Cream 0.1% for the Treatment of Lentigo Maligna	Ongoing	University of Utah	6/25/2008
7	NCT01161888	Effect of Topical Imiquimod on Lentigo Maligna (LIMIT-1)	Completed	University Hospital Birmingham NHS Foundation Trust	6/24/2010
8	NCT01016080	Role of Oral Glutathione in Skin Whitening	Completed	Chulalongkorn University	11/17/2009
9	NCT01806831	Efficacy and Safety of Biocellulose Sheet Containing Anti-hyperpigmentation Agent ("Biocellulose Mask", "Far-horm®") in Patients Receiving Laser Treatment	Ongoing	Chulalongkorn University, Agricultural Research Development Agency	3/5/2013
10	NCT01778179	A Fixed Triple Combination Cream for Solar Lentigines Associated to Cryotherapy	Completed	Brazilian Center for Studies in Dermatology	4/1/2011

Companies and Brands

Apart from Research Groups many large and small companies are engaged in the development of skin whitening products.

Oriflame, the Swedish Cosmetic Group has researchers working on decreasing epidermal pigmentation by a pathway other than tyrosinase control. It involves regulation of *beta2-adrenoreceptor* by targeting several pathways in one product⁶.

Sirona Biochem, a Canadian biotechnology company with expertise in carbohydrate based chemistry is developing cosmetic agents that can be used to maintain viability of skin fibroblasts and protect skin from oxidative stress and UV radiation. In preliminary studies, *TFC-723* and *TFC-849*, the product has been found to be seven times more effective than popular commercial lighteners. Sirona's skin lightener development program is directly supported by the French government

Cognis, now acquired by *BASF* developed *Radianskin*, a new skin

whitening agent that is being pitched as a potential alternative to the traditional ingredients like hydroquinone and kojic acid. It helps reduce the amount of melanin released by melanocytes. It is also claimed to have a photoprotective effect.



Figure 9: Popular Skin Whitening Products Collated

Global Competitor Mapping

Today, the quest for prolonged skin health and radiance has become a more standard mindset among men and women alike, confirmed by a variety of technological enhancements from basic ingredients to the use of specialized extracts or cryogenic methods and gigantic number of products available in the market.

Direct competition for Natural Rubber Latex extract – essentially a cream based preparation in skin lightening would be from other existing topical skin care

⁶ 'The Melanogenesis and Mechanisms of Skin Lightening Agents – Existing and New Approaches', 2010, International Journal of Cosmetic Science.

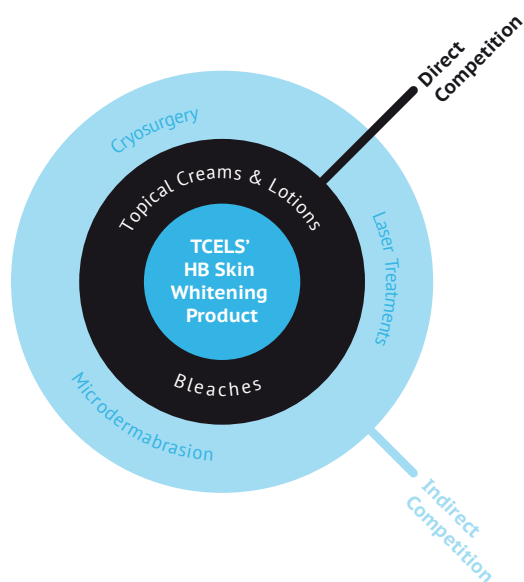


Exhibit 2: Competition in Skin Whitening Segment

products and bleaches. The major 10 players identified by Global Industry Analysts (GIA), a leading Market Research Company, in this segment from global perspective along with their market brands are detailed in Table 4.

Kojic Acid at a maximum concentration of 1.0% in skin care formulations poses a risk to the health of consumer as reviewed by European Scientific Committee on Consumer Products

All the Laser Treatment Centers, Microdermabrasion Clinics and Cryotherapy Treatment providing centers constitute indirect threat to proprietary skin whitening product. These invasive skin treatments can be accessed at various skin clinics and hospitals under the supervision of a dermatologist. It involves the use of specialized devices that inhibit melanin production pathway using parameters like light of different wavelengths, extremely cold temperatures, and chemicals as skin peelers. Such treatments are gaining wide popularity owing to larger dispensable income and benefits lasting for longer duration compared to topical products which need a strict daily regime to be followed. Few of such treatments and combinations have been detailed in existing and pipeline technology section.



Issues/ Challenges with Existing Skin Whitening Technologies/ Products

Even though skin whitening products are in high demand, skin being a sensitive organ when exposed to such products in excess leads to various acute and chronic problems. Currently available technologies and products have raised concerns based on various side effects seen upon their use or due to presence of specific ingredients.

Table 4: Major Competitors and Brands

Serial No.	Company	Global Brands	Thailand Products	Product Type
1	Emami Ltd.	Emami Fair and Handsome for Men, Boroplus	Not Available	Topical Skin Cream
2	Hindustan Unilever Ltd.	Dove, Ponds, Pears, Fair and Lovely, Lux, Lakme, Rexona and Aviance	Dove, Ponds, Vaseline, Aviance, Citra, Lux and Rexona	Creams, Lotions, Soaps, Talc, Whitening Deodorants, Face Wash, Body Wash, Scrubs and Oral Supplements
3	Shiseido Company Ltd.	Elixir, Aqua, Senka, Qiora, Revital Granas, Haku, The Ginza, DQ, Pure & Mild, Bare Minerals, Pure White W, The Collagen	White Lucent, Anessa, Revital Whitening Lotion	Topical Creams, Oral Supplements, Serums
4	CavinKare Pvt. Ltd.	Fairever, Spinz and Nyle skin Care	Not Available	Creams, Talc and Deodorants
5	Procter & Gamble	Camay, Olay, SKII, DDF, Anna Sui	Camay, Olay, SKII, DDF, Anna Sui	Creams, Lotions, Soaps, Face Wash, Body Wash and Scrubs
6	Clarins SA	Clarins	Not Available	Creams, Lotions, Soaps, Face Wash, Body Wash and Scrubs
7	Kao Corporation	Jergens, Biore	Biore, Men's Biore	Creams, Lotions, Scrubs, Masks and Face Wash
8	Beiersdorf AG	Nivea, Nivea for Men, Eucerin, La Prairie, Florena	Nivea, Nivea Visage, Eucerin, Nivea for Men	Creams, Lotions, Soaps, Face Wash, Body Wash and Scrubs
9	E. T. Browne Druf Company Inc.	Palmer's Eventone	Eventone	Lotions, Creams, Masks
10	Jolen Inc.	Jolen	Not Available	Bleach, Creams, Lotions, Scrubs, Face Wash

• **Bleaches & Chemical Based Products:** Regular bleaching and use of chemical based topical skin brightening products have shown many adverse short term effects along with long term hazards on the consumers health like skin burn (See Fig 10) and skin deformation.

• **Arbutin:** Even though Arbutin is a natural extract, various safety concerns for its stability surround the products with Arbutin base. In unstable state it has been shown to release hydroquinone which has its side effects covered below.

The European Cosmetics Association placed a ban on the use of beta arbutin in 2008.

• **Kojic Acid:** It is a mild inhibitor of pigmentation along with antibacterial and antifungal properties. Although, if present in quantities higher than permissible levels or used frequently, it is found to act as depressant.

- **Retinoic acid:** A vitamin A derivative that stimulates the sloughing off of the upper epidermal layers that essentially comprises of the dark-pigmented skin cells. Unfortunately, it can also cause skin sensitivity in sunlight, leading to raw and red skin. Alpha hydroxy acids function in a similar way, prompting exfoliation of the skin.



Figure 10: Skin Burns After Bleaching

- **Hydroquinone and Mercury based products:** These ingredients are found to be carcinogenic and may even lead to permanent skin disfiguration. Besides these products may show allergies like irritation, redness of applied area and burning sensation or hypo pigmentation in later stage leading to uneven skin. Despite the dangers, restrictions and bans, hydroquinone is still widely used around the world.

Ochronosis occurs even with small dosages of hydroquinone (as low as 2%). Users suffering from ochronosis use even more lightening cream, only to worsen the effects of the disease.

In the United States, restrictions have been placed on concentration levels of hydroquinone. While over-the-counter (OTC) creams are restricted to no more than 2% hydroquinone, prescription products can have maximum of 4% hydroquinone.

Our research revealed that skin whitening products are so immensely popular across Asia that poor consumers are willing to try questionable or even downright illegal products, with disastrous results.

Case Example- Application of Topical Skin Brightening Product

Based on the experience of a Thailand based consumer in her quest to become fairer applied an OTC product, the following was reported.

“The cream applied to her face and neck was supposed to transform her into a white-skinned beauty, the kind she saw on page after page in women’s magazines and on television. But rather than lighten her complexion, the illegally produced lotion she bought in a local grocery store near this village in southeastern Thailand disfigured her skin into an unsightly patchwork of albino pink and dark brown, a condition that doctors say might be irreversible.”

Laser Skin treatment and **Cryo-surgery** users have reported scarring on the application area. Immediate effects noted include mild swelling, redness and post inflammatory hyper pigmentation. In some cases bleeding, blister formation and skin infection was also noted. Photosensitivity, skin tightness, bruising and redness were common observations of people using Microdermabrasion technology for skin brightening.

There is a strong body of evidence supporting the advantages of Nano ingredients in such products, but new studies have found that their frequent use may pose considerable risks to consumer's immune system and may lead to cancer development.

Titanium dioxide and zinc oxide based Nano-particles were found to induce free radical formation in presence of light, causing cells to mutate, as reported by Therapeutic Goods Administration of Australia in 2006.

Besides these specific side effects these all methods require regular use and if discontinued can lead to hyper or hypo pigmentation in the skin.

Demand / Key Drivers for Natural Rubber Latex Extract for Skin Whitening

Skin lightening products have a considerable market share across the globe especially among Asians, Arab women and Africans. The factors driving this segment can be mainly attributed to the following categories:

- Physiological Factors
- Social Aspects
- Others

In addition to various factors listed above, most of the existing products and technologies need to be applied multiple times periodically to get desired results. This may vary from once a day to several sittings (as in laser treatments). Besides this, focused treatment has following additional drawbacks:

- 1) Reduced overall effect,
- 2) Resurgence of problems over time, or
- 3) Show short term/long term side effects.

It was also observed during the research that with increasing awareness of harmful effects of

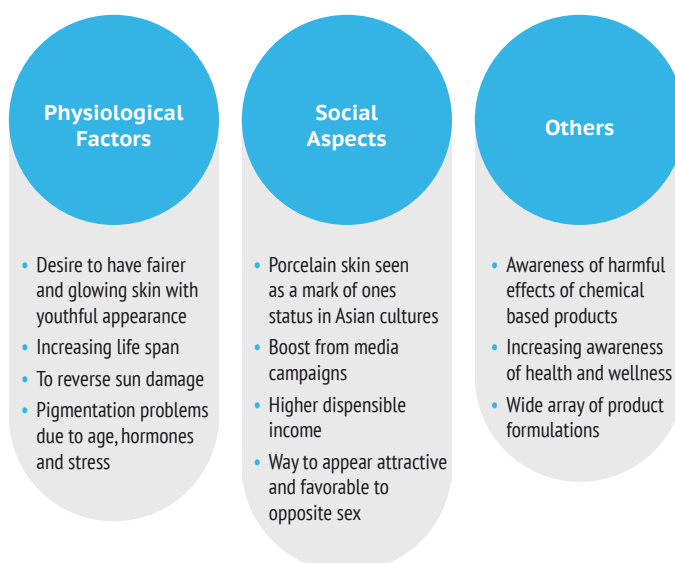


Exhibit 3: Market Drivers for TCELS Natural Rubber Latex Technology

chemical based products as well as ban on major skin whitening ingredients like Hydroquinone and Arbutin, consumers are getting choosy about what product they use.

Thus to effectively tap this market, companies and researchers alike are putting in their resources to search for ingredients or methods which can provide economically viable and side effect free skin whitening treatment. Considering these aspects promising results in skin brightening with minimal or no side effects as seen with Natural Rubber Latex extract, a hopeful future can be envisioned in this market where more and more people have the desire for a healthy glowing skin.

Intimate Toiletry products with Whitening benefits are readily available in countries like Thailand (Lactacyd White Intimate – Bleach Product) and India (Clean and Dry Intimate Wash – Bath Wash)

Market Trends and Technology Needs Assessment

As evident from historic practices, pale skin has long been considered as a sign of affluence. It was seen as a sign of modesty and virtue in women across the globe. This has been critical in inculcating the importance of skin color in the mind sets of consumers, especially in black and Asian communities, where women have shown no refrain from trying various methods from powders to peeling of outer skin to lighten their appearance in order to gain respect and maintain elite status.

Even today, flawless, porcelain looking skin is in demand more than ever with even men entering the fad to get lighter complexions. Our research indicated that this perception has further been instilled in the minds of people by various other factors referred in the above section.

Our findings indicate to some key trends that have been witnessed and are expected to grow in the coming years.

1. Dominance of Asia – Pacific Market

Since 1970s, Skin Lightening segment has been amongst the fastest growing skin care segment in Asia with increasing growth potential and disposable income of middle-class. The importance of the region is reflected by brand giants like Chanel and Christian Dior launching skin whitening products especially catering to the needs of Asian population.

2. Growth in Western Markets

The demand for brighter/more radiant skin has now arrived in Western Europe and North American market marked by the popularity of brightening/whitening products and BB (blemish balm) creams. These products are now widely available in Western Europe and North America. Besides the growing Asian population has had a significant impact on the growing market in these regions. Consumers in the West often use lighteners along with their anti-aging benefits further contributing to the market.

3. Increase in Male Grooming Products:

A major cultural shift has been seen among men from all age groups, especially 16 to 40, going beyond just cleaning and shaving, opening an unexplored market of skin care products specific for men. The skin whitening product for men may include after shave lotions or sprays or skin whitening creams specific for male skin type.

4. Holistic Skincare Products:

Fueled by the need to offer value for money, beauty brands have been launching more holistic products. SPF, hydrating, anti-wrinkle and evening out skin tone are just a few of the features now present in many skin whitening products.

The launch of Lab Series' first BB cream for men and Sleek Make-Up Be Beautiful BB Cream for dark skin in the U.K. are an indication of the increasing diversification of the category, and it is only a matter of time before its known if such products cannibalize sales of tinted moisturizers or even eliminate them altogether.

There are many small and big players in the field, who offer a basket of products for skin lightening which may include creams, bleaches, face washes, face masks, scrubs, body washes, deodorants, pills, nutritional supplements and drinks.

Our research also demonstrated that the skin whitening market has expanded from products solely for face to whitening products for whole body including private and nether areas.

With new entries in the segment and consumers' need to get that perfect skin the predicted market size is going to be huge in the near future. Some of the existing products consist of harmful and banned ingredients like hydroquinone, mercury while other may have extracts containing vitamins, minerals and anti-oxidants to get the desired effect on skin.

A new product said to make women's intimate areas 'fairer within four weeks' revived the beauty debate in colour-conscious

Thailand, where fair skin is associated with opportunity, success and status, and caused critics to question when, if ever, the skin whitening craze will end.

Products promising to lighten the face, body and armpits are already available across the country, with skin whitening pills and diet supplements claiming to pick up where the cosmetics leave off. But this is the first time that a vaginal whitening wash hit the Thai market.

Patent Landscaping⁷

Our analysis of patents filed and published for Skin Whitening, Lightening and Brightening in the last five years (since 2008) revealed that a total of 322 patents were filed in US, EP, Japan, and WIPO. On further analysis it was found that an average of 63 patents had been published every year since 2008.

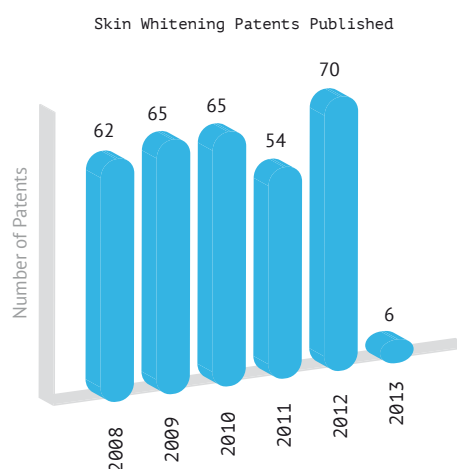


Figure 11: Skin Whitening Patents Published (by Year)

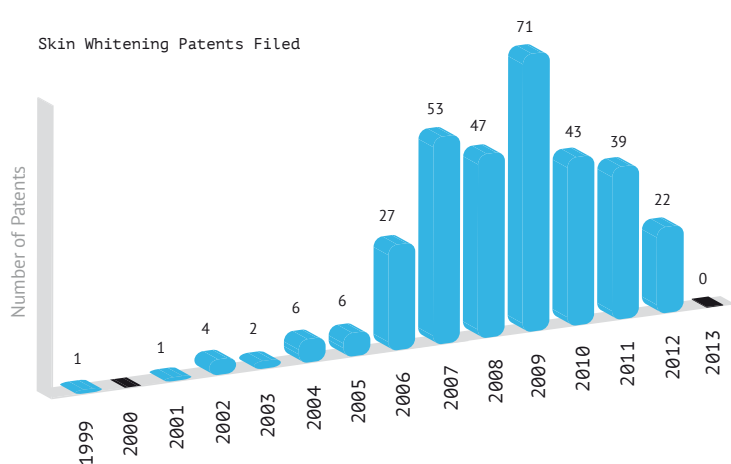


Figure 12: Whitening Patent Filed (by Year)

A steady average of 40 patents filed for whitening products and treatments can be observed since 2007, with it peaking to over 70 patents in 2009. SkyQuest's Intelligence suggests that this marked increase in the number of patents filed is indicative of trend and increasing market size of skin care products specific to skin whitening.

A study of the patent assignees revealed that of the total 322 patents analyzed by our research team, about 258 were owned by

⁷ Information collated from "Acclaim IP" for Patent Landscaping

companies showing dominance and product oriented research patenting trend.

Of these, Japan's Shiseido Co. Ltd. currently holds a maximum of 40 skin whitening patents, followed closely by Amorepacific Corp. a Korean Cosmetics Company, owning a total of 28 patents. Other known companies include, L'Oreal (France), Unichem (USA), Fancl Corp. (Japan), Kao Corp. (Japan), Noevir Co. (USA), and Coreana Cosmetics (Korea). Research groups have a share of about 10% of the 322 patents published during 2008-2013.

Our analysts also evaluated these patents based on IPC classification (referred in Table 5), and found them to vary from topical products and food stuffs to apparels that are based on microbial, herbal as well as chemical composition.

It was noted that as many as 309 patents fall in the section of human necessity developed by medical sciences and 8 patents provide method for measuring, testing and computing the efficacy of the composition prepared.

Key Asian Skin Care Companies Shiseido Co. Ltd. and Amorpacific Corp. hold approximately 70 Skin Whitening patents.

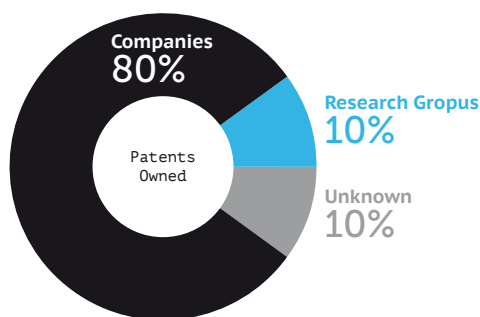


Figure 13: %age Share in Patent Ownership

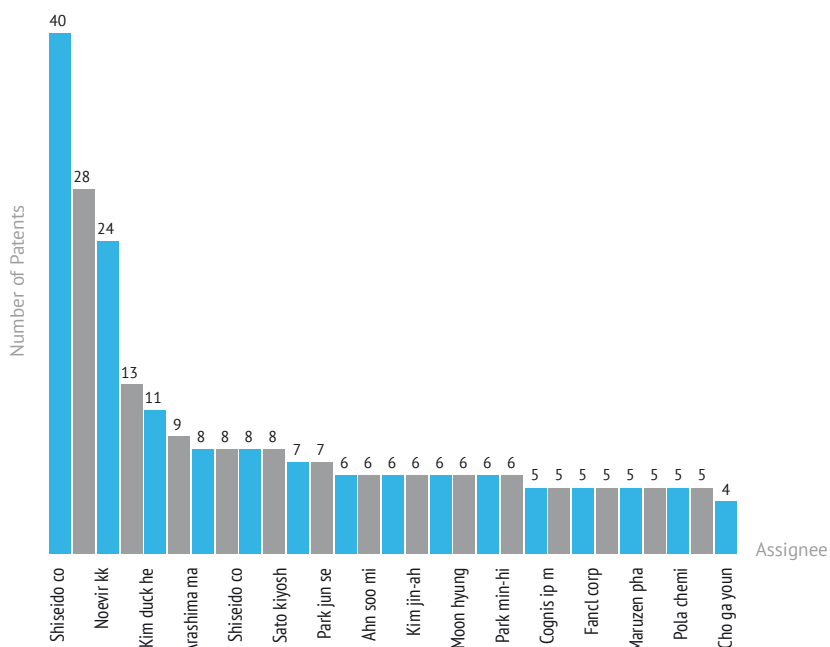


Figure 14: Number of Skin Whitening Patents (by Assignees)

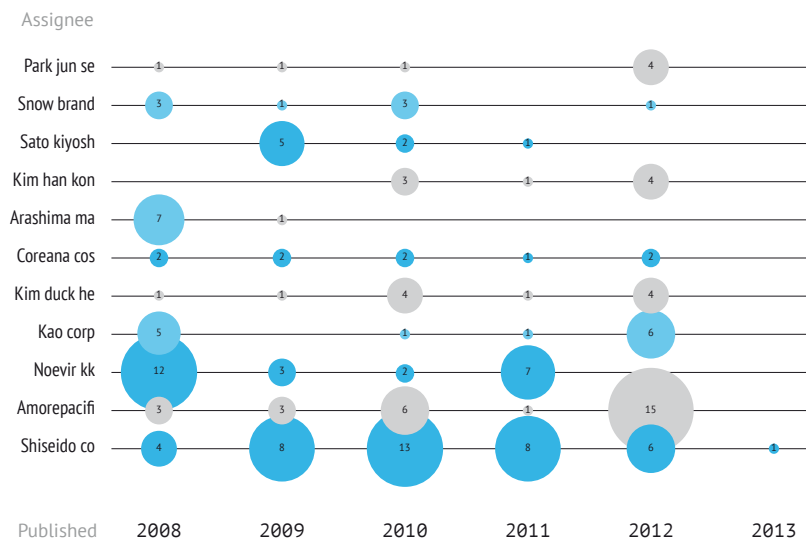


Figure 15: Analysis of
Skin Whitening Patent
(by Assignees and Year
Published)

Figure 16: Whitening
Patent by IPC Class

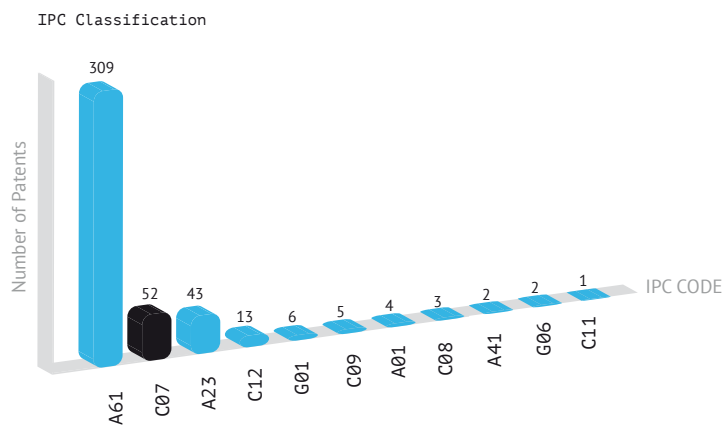


Table 5: IPC Classification

IPC	Section	Class	Patents
A01	Human Necessities	Agriculture, Forestry, Animal Husbandry	4
A23	Human Necessities	Food or Foodstuffs for Treatment	43
A41	Human Necessities	Wearing Apparel	2
A61	Human Necessities	Medical or Veterinary Science, Hygiene	309
C07	Chemistry & Metallurgy	Organic Chemistry	52
C08	Chemistry & Metallurgy	Organic Macromolecular Compounds, Their Preparation or Chemical Working and Compositions	3
C09	Chemistry & Metallurgy	Dyes, Paints, Polishes, Natural Resins, Adhesives, Compositions Not Otherwise Provided For	5
C11	Chemistry & Metallurgy	Animal or Vegetable Oils, Fats, Fatty Substances or Waxes, Fatty Acids	1
C12	Chemistry & Metallurgy	Biochemistry, Beer, Spirits, Wine, Vinegar, Microbiology, Enzymology, Mutation and Genetic Engineering	13
G01	Physics	Measuring, Testing	6
G06	Physics	Computing, Calculating and Counting	2

Complementing Technologies / Products

Considering the current trend and consumer's preference for holistic products, it is advisable for TCELS to have a portfolio of products comprising of multiple formulations and benefits.

SkyQuest's Competitive Intelligence reveals that a wide range of properties like anti-aging, patch removal etc. when added with Skin Whitening product can increase its market prospect. Another criterion that may be considered for complementing technologies is based on the type of product developed, such as creams, lotions, scrubs, masks, face wash, body wash, oral supplements etc which may be used on its own or in combination with other whitening treatments for effective results.

In 2006, European Commission estimated use of Nano-particles in 5% of the Skin Care Products.

Specifications of Complementing Technologies / Products

A wholesome Skin Whitening product can integrate various other extracts aiding in combating skin problems like aging, freckles, scars, skin patching, dryness etc. Some of the criteria that must be taken into consideration are highlighted below.

Target multiple indications:

Many manufacturers currently have grouped various benefits and developed products catering to a specific set of people, like, a fairness cream with anti-aging properties would be of interest for women over 35 to get youthful appearance along with even skin tone and a fairness lotion with after shave lotion properties can be targeted for men from 25 and above.

Some companies have discovered extracts which along with skin

whitening can be used for hair growth, enhancing immunity and as anti-obesity agent also.

Formulation type:

This category may range from creams and lotions, to scrubs and even sprays. A significant set of consumers may prefer a face mask over a scrub, or a group of consumers with sensitive skin who do not use topical skin products may make use of oral products to get desired effect.

Critical analysis of patents done by our research team revealed advancement of technology in terms of availability of drinks and food products with skin whitening benefits. This further is indicative of natural extracts that have no harmful effects on consumption as major skin whitening components in future.

Alternate Delivery Systems:

Other delivery forms gaining

popularity comprises use of Nano-particles. Titanium dioxide and zinc dioxide have been successfully used in sun screen lotions in the past, as they have been found to have benefits in terms of efficiency of product and are FDA approved. A steady movement towards use of Nano-dermatology for skin whitening products can be observed as it allows for deep penetration thereby drastically improve products efficacy.

Thus, to exploit all such markets it is advisable for TCELS to develop a wider product range.

Ownership of Complementing Technologies

A notable finding of the Patent Landscaping (**limiting the review to patents from 2010-2013, published in US, EP and Japan**) is that most of these patents were held by Japan based companies.

- **Shiseido Co. Ltd.** has 4 patents for anti-aging and antioxidant properties along with skin whitening two of which have been filed in Europe and two in Japan.
- **Noevir Co. Ltd.** has seven patents catering to anti-aging, anti-inflammatory, humectants in combination with whitening ingredients. Some of these products also show benefits of hair growth, immunity activator and obesity treatment.
- **Maruzen Pharmaceut Co. Ltd.** and **Toyo Shinyaku Co. Ltd.** have patents that have food and drink composition delivering whitening agents in the body for inhibition of tyrosinase or melanin production in general.
- Preparation of **Nano-shells** from shrimp shells chitosan by ionic gelation process is being researched by Mihaela Leonida and team at Fairleigh Dickinson University, New Jersey.

Details of some of these patents are listed below in Table 6.

Table 6: List of Patents by Companies

Serial No.	Patent Origin	Patent Number	Patent Title	Assignee	Publishing Date
1	Japan	JP2012232976	Whitening composition, skincare preparation for external use and food and drink which each contain the same, and method for producing the whitening composition	Toyo Shinyaku Co. Ltd.	11/29/2012
2	Japan	JP2012162487	Whitening agent, anti-aging agent and skin cosmetic	Maruzen Pharmaceut Co. Ltd.	8/30/2012
3	Europe	EP2465488	Preparation for external application to skin, skin whitening agent, antioxidant agent, and anti-aging agent	Shiseido Co. Ltd.	6/20/2012
4	Japan	JP2012036148	Sustainable skin whitening agent	Toyo Shinyaku Co. Ltd.	2/23/2012
5	Europe	EP2394635	Skin whitening agent, anti-aging agent, and anti-oxidant agent	Shiseido Co. Ltd.	12/14/2011
6	Japan	JP2011246376	Anti-aging agent, antioxidant, anti-inflammatory agent, whitening agent, humectant, skin care preparation and functional oral composition	Noevir Co. Ltd.	12/8/2011
7	Japan	JP2011195537	Antioxidant, whitening agent, anti-aging agent, hair tonic, humectant, skin care preparation and functional oral composition	Noevir Co. Ltd.	10/6/2011
8	Japan	JP2011168560	Anti-aging agent, antioxidant, whitening agent, immunoactivator, skin care preparation and functional oral composition	Noevir Co. Ltd.	9/1/2011
9	Japan	JP2011157299	Humectant, anti-aging agent, antioxidant, skin whitening agent, anti-inflammatory agent, skin external preparation and functional oral composition	Noevir Co. Ltd.	8/18/2011
10	USA	20040166069	Boosting Tyrosinase Inhibiting Activity of Skin Whitening and Sunscreen Compositions	Gupta, Shyam K.	8/26/2004

Present Demand in Various Categories/ Sub-Sectors

The Global Personal Care market is witnessing a boom with revenues projected to be USD 630 Billion by 2017. While the overall market share is being led by North America and Western Europe, beauty and skin care segment, which has maximum share, is led by Asian markets. The global skincare market had total revenues of USD 86 Billion in 2011 as reported by MarketLine. While, India's beauty care market generated revenues of approximately USD 9.5 Billion in 2010, according to RNCOS.

In 2011, Asia-Pacific accounted for a 43 per cent share in the total skin care value sales, reported by Euromonitor International.

Skin Whitening has been common in women since olden days and the demand has been growing with growing incomes, ease of availability of these products and technologies, increasing life span, and desire to look youthful and stay healthy.

SkyQuest's analysis revealed that

- Both Europe as well as North America are active markets for skin whitening products due to increasing Asian population migrating there. Moreover anti-aging products are also accelerating the demand for skin whitening products in these regions.
- Asia has been key market for skin whitening products led by Japan, India, and China with a whitening fad increasing among Korean, Malaysian and Indonesian Women, together contributing to growth in size of Asia Pacific market.
- Another market which has been less explored but gaining momentum for such products includes Arab countries, where women follow strict routines to get the porcelain doll appearance.

Other key categories which are in demand are referred below

China's Overall Skin Care Market saw 71% increase in Skin Whitening products in 2010-2011

-Economic Times.

Male Population driving the growth

Besides this growing awareness among male population across the globe concerning their appearance and increasing specificity of benefits of such products is driving the growth of male skin whitening products worldwide. Global sales of male grooming products have rebounded back to their growth path with most significant growth occurring in Asian regions, with India in particular posting a 32% increase in 2012, says Kline & Company.⁸

Product Formulations:

Skin Whitening products in different forms of lotions, toners, masks, and soaps are available providing holistic benefits of anti-aging, whitening, even skin etc. Because of huge market for anti-aging products in US and Western Europe, whitening products with anti-aging benefits were reported to have a 7% growth in the year 2011 globally.

Figure 17: Skin Care Market (by Product Type, 2011)

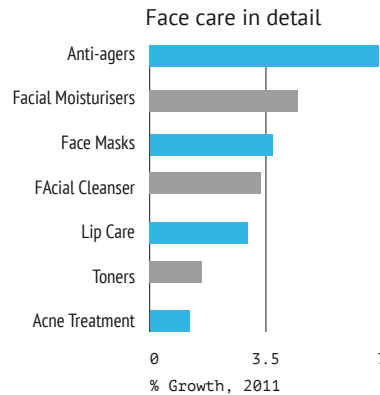
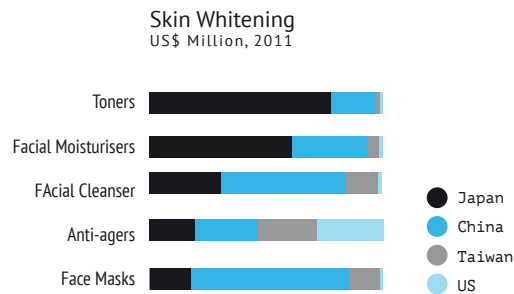


Figure 18: Skin Whitening Products (by Country, 2011)



⁸ 'Male Grooming Products: Global Market Brief', 2012, Kline & Company

Estimated Future Demand/ Projections for the Next 5-10 Years

Global Personal Care Market is set to reach USD 333 Billion by 2015 as reported by GIA.

In the past, despite the economic crisis, one segment that showed steady growth is global beauty and skin care market. This trend is expected to continue in the years to come, where beauty care segment is projected to record gains in all segments. Skin care market will remain the key sector, growing on the back of wholesome products.

During our research it was seen that the lines between general skincare products and application specific skincare products are diminishing, thus products for comprehensive skincare will continue contributing towards overall skincare market growth.

Skin care market is projected to grow steadily reaching a size of USD 110 Billion by 2019, as estimated by Trefis, a stock analysis

service that breaks down Company's revenues and stock prices by individual product. As much as 70% of this skin care growth over the next five years will be derived from the Asia-Pacific region.⁹

In Skin Care, Face Care is going to lead the market with expected growth of 86% by 2016.

Euromonitor

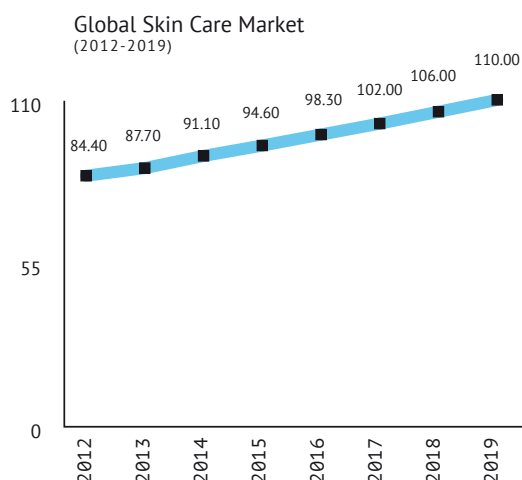


Figure 19: Projected Global Skin Care Market Size (in Billion USD)¹⁰

⁹ 'Skin Care Market Radiant for Forseeable Future', 2012, Euromonitor International

¹⁰ Skin Care Market Size', 2013, Trefis

While facial care will remain the star segment with many whitening products entering the market, products with targeting other body parts are expected to capture considerable market share. Our research also indicated a boom in products that cater to various age groups, skin types and needs. While on one hand consumers over 50 lead the demand for skin whitening products with anti-aging and wrinkle lift benefits, on the other hand younger population will contribute to lighteners providing even skin tone, moisturizing and age preventive measures.

Anti-aging products are mainly viewed as an investment for future skin health. In view of this new entrants, like TCELS, should focus on necessity products in their skin care ranges, like moisturizers and anti-aging products. Another key driving

trend in future will be growth of products that have moved from being limited to only facial care, to encompass overall skin care.

Amongst the global skin whitening products, those that prevent pigmentation, brown spots and freckles, will see massive growth, with maximum opportunities emerging from the rapidly expanding Asian markets. As projected by GIA, projected global market value for skin whiteners by 2015 will cross USD 10 Billion.

China emerging as the leading Asian market in skin brightening segment will become a key market by 2016, adding approximately 43 per cent value, as reported by Euromonitor.

As consumers become increasingly wary of potential toxicity of constituents of cosmetics and toiletries, market segments offering products made from natural ingredients and essential oils are likely to record strong growth.

Besides these, even with the affordability of Premium brands and extensive promotional activities to build brand loyalty, Mass brands will have a wider appeal and see a steady growth.

The USA's Natural and Organic Skin Care market along with Hair Care is expected to reach USD 11 Billion by 2016.

MarketLine

More product manufacturers are likely to enter the market in next five years, moving the overall sales of this sector.

Mass skin care products will see a growth of 68% by 2016 leading in holistic skin whitening products, as reported by Euromonitor International

As the definition of beauty is changing to overall skin products, skin whitening craze is set to continue driving the future growth. As Skin Whitening market becomes saturated, the focus is shifting towards finding new ingredients and technologies that offer specialized assistance based on the individual needs. In order to make most of the current opportunity it is necessary to market, promote and distribute the products based on recognized population preferences while maintaining a global reach.

Key future market driving trends-

- ***Essential Skin Products***
- ***Product range comprising of overall skincare***

Key Observations and Findings of the Evaluation

Key Trends Observed by SkyQuest's Research Team:

- Skincare market is driven by Skin Whitening products
- Products in Skin Whitening segment vary based on:
 - Composition – Organic compounds, natural extracts or chemical based
 - Application – Specific for whitening to holistic products with multiple treatments
 - Formulation – Lotion, Cream, Serums, Soaps, Foaming Face Wash etc.
- Key identified markets are China, Japan, India, Thailand, Malaysia along with some American and European countries
- Important factors to consider before entering a market:
 - Extensive Patents for IP security
 - Certifications ensuring viability of the product
 - Unique and targeted marketing and product placement strategies
- A lot of researches are:
 - Jointly owned by Research Centers and Skincare Companies
 - In-licensed by Skincare Companies
 - Smaller companies in the segment have been acquired by bigger brands

Our research has shown that Skin Whitening, a key market in the skin care segment, is growing steadily with the entry of unique elemental compositions like chemicals (glutathione, hydroquinone), diamond, pearl extracts, or use of enzymes, natural extracts that inhibits melanin production pathway along with laser, cryo-surgery etc. based devices.

Paradigm Shift in Product Range

A paradigm shift in product range from specialized products for specific needs to better and wholesome products assisting in the treatment of a group of problems can be seen. A significant number of companies including both premium and mass players have come up with their portfolio of products in variety of formulations (like lotions, toners, creams, oral supplements) and with multiple additives for anti-aging, glow, depigmentation etc. These are further categorized as day creams, intense night treatments or moisturizing purpose only, in a whole wide range of formulations like creams, serums, sprays, pills, powder, soap, face wash, etc.

Marketing Strategy – The key to Success

During the research, key factor in success or failure of the products was attributed towards the marketing strategy employed. Companies with extensive and market specific product branding did well, while products which did not use well planned promotional activities or strategic product placement were replaced by new entrants and products after a market life varying from 1 to 3 years.

Key Target Markets:

Key markets identified by Sky-Quest, based on research and first/second filing of patents, are Japan, India, China, Thailand, Korea & Malaysia, also followed by European and American countries, riding on the back of growing Asian population and added benefits it provides. Further, trend analysis for patents filed between 2008 and 2013 in major patenting bodies, WIPO, EP, Japan and USA, showed an average of 65 patents published each year. 80% patents of 322 patents published in last five years (since 2008) are currently owned by

Demand for Blemish Balm creams is particularly strong in Hong Kong where it's used to conceal blemishes and hide pores while offering sun care protection and skin whitening properties

global cosmetic/skincare companies like Shiseido, L'Oreal, Noevir to name a few, which have a commercial line catering to skin whitening needs specifically.

Patent Strategy:

While patenting with wide scope of applications across the globe gives an edge over non-patented competing products in that segment, certifications and clinical trial results are increasingly becoming integral to such products due to rising health concerns over the potential side-effects. The awareness about availability of such certifications and dispens-

Thai Market is one of the most up & coming with 48% of all anti-agers sold in the country in 2011 offering additional whitening properties

Euromonitor

able income has led to consumers' opting for quality products without cost being a constraint.

Collaborative Research

A growing trend towards collaborative researches, licensing and acquisitions between research groups and companies for novel extracts that have been developed for treatment of hyper pigmentation was observed during SkyQuest's assessment of the skin whitening space.

- Bioland Ltd, a Korean cosmetics company, jointly holds the research patent for its beta-fructosyl-L-ascorbic acid based skin whitening composition with Korean Research Institute of Bioscience & Biotechnology
- Elder Healthcare, a subsidiary of pharma company Elder Pharmaceutical, has signed an in-licensing agreement for distribution rights of skin whitening cream and gel with Japan's Pola Chemical Industry along with other products in their skin care range.

- Some skin whitening products like, Tri-Luma® are marketed as a topical treatment for post inflammatory pigmentation that is observed after cryosurgery or laser treatments.

As the market is already flooded with thousands of products and technologies claiming skin whitening benefits, a stiff competition for TCELS whitening product can be expected. Besides this, it is a known fact that latex is allergenic, thus acceptance of a latex extract based skin product by consumers will require effective marketing strategies to change the mindset.

Prospective Clients for Natural Rubber Latex Technology Commercialization

Skin Whitening is a key product in skin care segment with almost all the products providing one of the benefits of whitening, brightening and lightening. Therefore, major potential prospects for TCELS whitening technology would be various personal goods companies and cosmetic brands

with skin care product lines. Besides these certain pharmacological groups which are into medicated depigmentation treatment can also have prospects for future collaborations. A few of such prospects are listed below in Table 7.

Table 7: Prospects for Natural Rubber Latex Skin Whitening Technology

Serial No.	Company Name	Service Sector	Location	Selection based on
1.	Emami Limited	Personal and Health Care Products	India	No patents or recent product launches in this segment
2.	Clarins	Skin Care Products	USA	No patents and very few plant extract based products
3.	Elder Healthcare Ltd.	Consumer Products	India	No patents and no new product launches in this segment
4.	Noevir U.S.S.A. Inc.	Beauty Care Products	USA	Major product line based on natural extracts
5.	Galderma	Dermatological Products	USA	Open for licensing new products
6.	Nepentis Pharma	Dermacosmetics	Poland	No products for Skin whitening currently
7.	Johnson and Johnson	Healthcare Products	USA	Wide range of skin care products, scope of new products
8.	Fischer Pharmaceutical Laboratories (Dr. Fischer)	Dermatological, Ophthalmological and Nutraceutical Products	Belgium	Wide range of anti aging products, no skin whitening products
9.	Stiefel, A GSK Company	Dermatological Products	USA	Wide range of skin care products, no skin whitening products
10.	Healthpoint Limited	Personal Care Products	UK	No Skin whitening specific products

SkyQuest Technology Consulting Pvt. Ltd. Recommendations

The study undertaken by our research and analytics team indicated a ready market and wide range of competitive technological products catering to the Skin Whitening sector. Thus it is necessary for TCELS Hb extract based skin whitening product to have strong IP securing the technological knowhow, product customization and formulations, cutting edge marketing strategies and supportive clinical data for mass reach. Some of the key decisive points have been referred below.

- TCELS research team should work on product development utilizing various complementing extracts and technologies to broaden its market specific for skin type (race and ethnicity), age and formulation.
- To overcome the hitch seen in consumers due to allergic properties associated with natural rubber latex, safety and efficacy trials of the product covering a large demographic distribution should be undertaken by TCELS. This will provide Hb extract a distinct selling point and an edge over existing products lacking supportive clinical data.
- With right product placement and extensive marketing strategies based on target consumer behavior, TCELS can enjoy key position in this segment in the existing markets and new markets.
- While another option, based on observed trends that can prove to be profitable for TCELS is licensing its product/technology to skin care companies with high value brand image or else collaborate with existing invasive skin treatment provider for Hb Whitening as topical cream for post inflammatory pigmentation reactions.

