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babylove.

Delivering Health and Beauty, Naturally.

An Eco-E Project submitted in partial satisfaction of the requirements for the degree of Master's in Environmental Science and Management for the Bren School of Environmental Science & Management

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{February 2013}

BabyLove

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The mission of the Bren School of Environmental Science & Management is to produce professionals with unrivaled training in environmental science and management who will devote their unique skills to the diagnosis, assessment, mitigation, prevention, and remedy of the environmental problems of today and the future. A guiding principal of the School is that the analysis of environmental problems requires quantitative training in more than one discipline and an awareness of the physical, biological, social, political, and economic consequences that arise from scientific or technological decisions.

The Eco-E Project fulfills a core requirement for the Master's of Environmental Science and Management (MESM) Program. It is a three-quarter activity in which small teams of students conduct customer research to develop a business model for a new environmental venture, in addition to focused, interdisciplinary research on the scientific, management, and policy dimensions of a specific environmental issue. This Eco-E Project Final Report is authored by MESM students and has been reviewed and approved by:

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DATE

February 2013

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Overview

BabyLove provides pregnant women and new mothers with a monthly cosmetic sampling program, supplemented by an educational online interface offering information and resources. Through this convenient sampling service, BabyLove reduces the high cost associated with maternity health and beauty care (HBC) product discovery.

With pregnancy comes a sense of urgency to find maternity-safe and effective HBC products that address the woman's needs and pose no danger to her developing baby. To ensure safety of cosmetic products, women often suffer through hours of research online and in-store, and spend hundreds of dollars in a trial and error process on dozens of full-size products that end up unused.

A growing awareness of the harmful effects of synthetic chemical ingredients has led to increased demand for safer products, causing a proliferation of health-focused personal care items. Despite increased options for HBC products, pregnant and new mothers remain concerned about the credibility of company claims, and find the product selection process overwhelming and expensive.

BabyLove's website is a one-stop-shop for credible products, information and advice to help pregnant and new mothers navigate the market and discover the products they need. BabyLove ensures credibility to customers with an interactive and transparent product information portal, providing product safety ratings from the Good Guide, harmful ingredient lists and expert analysis, along with user reviews. By sampling verifiably toxin-free, maternity-safe HBC products before committing to an expensive purchase, customers can save both time and money while discovering beauty care products they love.

Executive Summary

BabyLove is a monthly subscription that delivers maternity-safe health and beauty care samples to new mothers looking to try innovative and high-quality products to fit their new lifestyle. New mothers urgently prioritize health above all else in order to nourish their child, and become instantly averse to dangerous chemicals lurking in their everyday beauty products. These women want and need maternity-safe and effective beauty care, but lack expert advice, clear safety information, and easy access to the products they need the most.

BabyLove solves a twofold problem: the incidence of endocrine disrupting chemicals found in humans and ecosystems, and the expensive product discovery process new mother experience in switching to a maternity-safe health and beauty care regimen. Health risks in fetal development associated with harmful skincare product ingredients – infertility, hormone disruption, and cancer – contribute to increasing consumer demand for safer products in the Health and Beauty Care (HBC) industry. The maternity market is increasingly saturated with maternity-specific products, and new mothers often worry about product safety, and are frustrated by the lack a reliable source of information, often spending hours researching a single product online. This time-intensive search for credible brands becomes a barrier to purchasing safer alternatives for overwhelmed shoppers. Additionally, Natural Health and Beauty Care (NHBC) products are typically sold at a high premium compared to their conventional equivalents. Shoppers have stated that they want to try these expensive products before committing to a full-sized investment, and the inability to do so creates another purchasing barrier. The current process of buying several full-sized products in order to discover the one brand that meets an individual's specific need creates an expensive trial-and-error process that forces a choice between money and health.

There is another dimension to this problem. Small natural skincare companies who produce safe and effective products lack both market visibility and customer acquisition resources. Executives at these companies have stated that the greatest challenge in their industry is reaching their target customer, and that converting sales is the highest priority. These companies produce samples, but have no way to target their distribution or track their effectiveness. BabyLove is able to provide these companies with a new marketing channel that puts product samples directly into the hands of the target customer. In a strategic partnership, BabyLove receives these product samples at no cost, and tracks their distribution and sales conversion rates – and then provides this data to the Brand Partners. By partnering with these brands, BabyLove fills a gap in the maternity health and beauty care discovery process by providing new mothers with a monthly bundle of product samples supplemented by an educational online interface.

With the help of their advisory panel of health care professionals and maternity industry experts, BabyLove anticipates customer needs and delivers a personalized package each month on a

subscription basis. Each month's sample bundle is based on a personal profile the customer fills out when they first enroll in the subscription, to ensure the monthly deliveries contain products that match user preferences and hair and skin types. This subscription e-commerce model empowers mothers to make informed decisions in their product discovery process, providing them with a streamlined search method for maternity-safe brands, safety information, and user reviews, on an online platform they already use and are comfortable with. BabyLove ensures product safety credibility through 3rd party verification via the Good Guide, a trusted scientific data based product rating entity. While both the maternity market and the subscription e-commerce industry are crowded and growing spaces, BabyLove stands out to new mothers. Through its simple online educational forum and the product safety credibility achieved through an expert panel combined with ratings from the Good Guide, BabyLove provides new mothers with the targeted maternity-safe product discover process they are unable to find elsewhere.

Through digital media interaction and holistic healthcare networks, the venture keeps customers engaged and enrolled in the subscription service. BabyLove focuses on targeted product sample distribution, adding value through curated personalization and clear safety information. This model keeps operation costs low and allows the venture to provide customers with exactly what they want – an affordable way to try the best, most cutting-edge and innovative maternity care products without committing to a full-size purchase right away. To provide BabyLove customers with easy access to full-size versions of the products sampled, the Venture will partner with external online retailers. The primary affiliate retailer BabyLove will partner with is Amazon, an e-commerce industry leader that sells products offered by BabyLove Brand Partners. Most operational costs will be variable, dependent upon the number of customers each month. The primary revenue stream will come from the subscription to the monthly personalized bundle of samples, and the secondary revenue stream will come from the affiliate partnership with Amazon, which will allow BabyLove to earn fees based on unit volume and sales growth. BabyLove has estimated that the Venture can become cash flow positive at around month 14 of operations with 778 monthly units sold, and the cumulative break-even point comes at month 19 with 5,124 monthly units sold. With over 4 million new pregnancies each year in the United States, about 80,000 unregulated chemicals circulating the consumer market, and a growing $14.5 billion natural health and beauty care industry, there is huge potential for BabyLove's impact. BabyLove's strategic goal is to capture early adopter customers during their pregnancies and retain them throughout the pregnancy and into motherhood.

BabyLove is a graduate student project started by three young women studying environmental science and management. Educated on the social and environmental implications of an unregulated chemicals industry, and witnesses to the health risks associated with harmful cosmetic ingredients, we seek to leverage our passion and education to create a business plan that has a positive, lasting effect on women and unborn children everywhere. Women and children disproportionately bear the burden of unsafe cosmetic products, and we believe we can offer them a better alternative, and reduce the number of babies born with chemicals already polluting their bloodstream.

SECTION ONE: ENVIRONMENTAL, HEALTH, & REGULATORY CONCERNS

Personal Care Products and Eco-Toxicity

There is a growing concern for the fate and potential impacts of synthetic organic chemicals found in personal care products (PCPs).[1 & 2] 80,000 thousand chemicals are registered for commercial use in the United States, with very little pre and post market safety testing.[3] Soaps, sunscreens, hair styling and dental care products are a few examples of the many cosmetics formulated with synthetic chemicals that are consumed in vast quantities globally.[4] In the early 1990s, Germany alone produced more than 550,000 metric tons of these personal care items annually.[4] The synthetic compounds contained in PCPs enter the environment indirectly via wastewater treatment plant outflow, after the products are washed off the body in the shower or sink and directed to treatment plants.[5] There is also a chance these compounds will enter the environment directly from recreational activities such as swimming in an aquatic ecosystem, or if domestic wastewater flows into the environment untreated.[7]

Of the synthetic compounds used to formulate PCPs, several categories have been defined to better focus analyses of potential biological effects and prevalence. Given the thousands of such compounds used in the PCP industry, specific categories are useful for understanding the general potential impacts of compounds that have slight variations in composition. This review will focus on musk fragrances (or musks, or fragrances), antimicrobials, ultraviolet filters and parabens, due to their frequent inclusion in PCP formulas and studied biological effects.[3 & 4]

Musk Fragrance

Synthetic musk fragrances are used to scent many products, such as deodorant, shampoos or detergent.[3] Production of these compounds exceeds 1 million pounds annually in the United States, and more than 7600 metric tons globally in 1996.[3] Synthetic musk fragrances were first detected in the environment in 1980, when concentrations of the compounds were discovered in freshwater fish found in Tama River, Tokyo, Japan.[3] Similarly, musk fragrance compounds were measured in surface water and wastewater treatment plant effluent, as well as in marine shellfish around Tokyo.[6]

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1 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

2 Ternes, T. A., Joss, A. & Siegrist, H. (2004). Scrutinizing pharmaceuticals and personal care products in wastewater treatment. Environmental Science & Technology. 38 (20): 392A-399A.

3 Nel, A., Xia, T., Madler, L. & Li, N. (2006). "Toxic Potential of Materials at the Nanolevel." Science. 311: 622-627.

4 Daughton, C.G. & Ternes, T.A. (1999). Pharmaceuticals and Personal Care Products in the Environment: Agents of Subtle Change? Environmental Health Perspectives. 107 (Supp 6): 907-938. Retreived from http://www.jstor.org/stable/3434573

5 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

6 Yamagishi, T., Miyazaki, T., Horii, S. & Akiyama, K. (1983). "Synthetic musk residues in biota and water from Tama River and Tokyo Bay (Japan)." Environmental Contamination and Toxicology. 12(1): 83-89.

The potential toxicity and environmental risks of musk fragrance chemicals have been regarded as low.[7] Though synthetic musks are detected widely in marine and freshwater environments and have been observed to bioaccumulate to a high degree in fish and invertebrates, the chronic toxicity thresholds for these compounds in fish and invertebrates are higher than levels measured in the environment.[9] Nevertheless, Luckenbach & Epel were able to demonstrate certain harmful biological effects of specific musk compounds.[9] Nitromusk and polycylic musk were analyzed for their potential to inhibit the activity of multidrug/multixenobiotic resistance (MDR/MDX) efflux transporters in the marine mussel *Mythilus californianus*. They determined both compounds inhibited the activity of the efflux transporters, obstructing the defense mechanism that prevents accumulation of xenobiotic in cells.[9] The result is increased sensitivity of cells to xenobiotics by permitting normally excluded toxicants to enter the cell.[8&9] In addition, Luckenbach & Epel were able to positively confirm that the constructed laboratory scenario could mimic real-world situations.[9]

Antimicrobials

Triclosan and triclocarban are commonly reviewed antimicrobial compounds found in toothpaste, soaps, lip balms, lotions and many other PCPs.[10] Triclosan has been found to react under certain conditions to form chlorinated products, which are further readily converted into polychlorinated dibenzo-p-dioxins (PCDDs) by heating.[11] This is significant because these resulting products have been determined toxic under certain concentrations.[13&12] In addition, triclosan has been described as persistent, and often survives several degradation steps in wastewater treatment plant processes.[14] The treated water outflow from such plants will therefore enter the environment still containing these persistent compounds, potentially altering the water quality of receiving river systems and subsequently effecting ecosystem health. [14]

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[7] Luckenbach, T., & Epel, D. (2005). "Nitromusk and Polycyclic Musk Compounds as Long-Term Inhibitors of Cellular Xenobiotic Defense Systems Mediated by Multidrug Transporters." Environmental Health Perspectives. 113(1): 17-24. National Institue of Environmental Health Sciences. Retrieved from http://www.ehponline.org/ambra-doi-resolver/10.1289/ehp.7301

[8] Epel D. (1998). Use of multidrug transporters as first lines of defense against toxins in aquatic organisms.Comparative Biochemistry and Physiology-Part A. 120:23–28.

[9] Kurelec B. (1992). The multixenobiotic resistance mechanism in aquatic organisms. Critical Reviews in Toxicology. 22:23–43.

[10] Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

[11] Kanetoshi, A., Ogawa, H., Katsura, E., & Kaneshima, H. (1987). "Chlorination of Irgasan DP300 and formation of dioxins from its chlorinated derivatives." Journal Of Chromatography. 389(1): 139-153. Retrieved from http://www.sciencedirect.com/science/article/pii/S0021967301944188

[12] Ricart, Marta, Helena Guasch, Mireia Alberch, Damià Barceló, Chloé Bonnineau, Anita Geiszinger, Marinel•la Farré, Josep Ferrer, Francesco Ricciardi, Anna M. Romaní, Soizic Morin, Lorenzo Proia, Lluís Sala, David Sureda, Sergi Sabater, Triclosan. (2010). Persistence through wastewater treatment plants and its potential toxic effects on river biofilms. Aquatic Toxicology, 100 (4): 346-353.

Triclosan has been discovered in several environmental systems, such as marine and freshwater ecosystems as well as in sediments.[13&14] The synthetic antimicrobial agent has been determined toxic to bacterial and agal communities at environmentally realistic concentrations.[15] Ricart et al. found that triclosan destroys enzymes involved in the synthesis of fatty acids in bacteria cell walls which ultimately increases mortality rates, leading to changes in bacterial community composition and ecosystem health.[17] Toxicity to bacteria was measured to be greater than for algae in the study, yet Ricart et al. suggests triclosan damages the photosynthesis apparatus in algal organisms, as supported by a measurable decrease in photosynthetic efficiency.[17] This could be considered a precursor of a toxic effect that may take place at the structural level of the organism. [17]

Ultraviolet (UV) Filters

Ultraviolet (UV) filters, or sunscreen agents, have been added to an increasing number of cosmetic products to protect the user from UV radiation (Peck, 2006).[16] The concentration of UV filters in containing products can range from 0.1%-10% and are either organic or inorganic micropigments.[18&17] In the United States, sixteen different compounds are permitted for use as sunscreen agents, and several of these have portrayed estrogenic activity and potential for bioaccumulation.[18,18,19&20] Typically, three to eight unique UV filters are found in sunscreen and PCP formulas.[19]

In a local study in Switzerland, Poiger, et al. estimated that up to 1263 mg of UV filters are applied per person each day, which results in as much as 966 kg of UV filters directly released into a small lake each year.[21] Balmer, et al. examined the presence of four UV filters in wastewater outflow,

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13 Ishibashi, H., Matsumura, N., Hirano, M., Matsuoka, M., Shiratsuchi, H., Ishibashi, Y., Takao, Y., et al. (2004). "Effects of triclosan on the early life stages and reproduction of medaka Oryzias latipes and induction of hepatic vitellogenin." Aquatic toxicology Amsterdam Netherlands. 67(2): 167-179. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15003701

14 Kanetoshi, A., Ogawa, H., Katsura, E., & Kaneshima, H. (1987). "Chlorination of Irgasan DP300 and formation of dioxins from its chlorinated derivatives." Journal Of Chromatography. 389(1): 139-153. Retrieved from http://www.sciencedirect.com/science/article/pii/S0021967301944188

15 Ricart, Marta, Helena Guasch, Mireia Alberch, Damià Barceló, Chloé Bonnineau, Anita Geiszinger, Marinel•la Farré, Josep Ferrer, Francesco Ricciardi, Anna M. Romaní, Soizic Morin, Lorenzo Proia, Lluís Sala, David Sureda, Sergi Sabater, Triclosan. (2010). Persistence through wastewater treatment plants and its potential toxic effects on river biofilms. Aquatic Toxicology, 100 (4): 346-353.

16 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

17 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

18 Reisch MC. (2005). "New-wave sunscreens active ingredient makers are frustrated by the long list of sunscreen and UV-A treating protocols that are still waiting FDA decisions." Chemical and Engineering News. 83(15):18-22.

19 Suzuki T, Kitamura S, Khota R, Sugihara K, Fujimoto N, Ohta S (2005) Toxicology and Applied Pharmacology 203:9–17.

20 Maerkel K, Lichtensteiger W, Durrer S, Conscience M, Schlumpf M (2005) Environmental Toxicology & Pharmacology. 19:761–765.

21 Poiger, T., Buser, H.-R., Balmer, M.E., Bergqvist, P.-A., Muller, M.D. (2004) Occurrence of UV filter compounds from sunscreens in surface waters: regional mass balance in two Swiss lakes. Chemosphere 55: 951–963.

surface water and fish tissue in Switzerland. 77% to 95% of water samples tested positive for various UV filter compounds.[22] In another report, Nagtegaal, et al. found UV filters in fish lipid tissue at concentrations up to 2 ppm.[23] Additionally, UV filters were determined to have bioaccumulation factors of greater than 5000 in fish.[24] While these compounds do not appear to be acutely toxic to aquatic organisms, there have been observed reductions in reproduction and increases in mortality in certain benthic and invertebrate species monitored for long-term exposure effects.[25] Various UV filters have also been seen to demonstrate estrogenicity or antiestrogenicity, adversely affecting fecundity and decreasing fertilized egg hatchability, among other reproductive disorders for fish species.[27]

Parabens

Parabens are the most common preservatives used in PCPs, in addition to several other consumer products such as food and pharmaceuticals.[26] There are seven different paraben compounds in this group, including methyl, propyl, ethyl, isobutyl, isopropyl, benzyl and butyl, which are often used together in cosmetic formulations for their synergistic preservative effects.[27] They exhibit a strong resistance to antimicrobial degradation, which allows these compounds to enter the environment after the consumer has used and disposed of the containing product.[28] In 1987, over 7000 kg of parabens were used in PCPs.[27] This figure has only increased over the last 25 years.[27]

Parabens have been measured in varying concentrations in wastewater treatment plant effluent and surface water.[27] The different paraben compounds have individual levels of acute toxicity, with benzylparaben of highest toxicity to organisms, when tested on invertebrates and fish.[27] It has also been reported that increasing chain length of paraben's substituents can increase paraben toxicity to bacteria, while chlorination also substantially increases toxicity of parabens to *D. magna* as well as bacteria.[28&29] There is limited research on the chronic effects of parabens on aquatic organisms however based on evidence gathered thus far, these compounds are likely to cause adverse effects if

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22 Balmer, M.E., Buser, H.-R., Muller, M.D., Poiger, T. (2004). Occurrence of some organic UV filters in wastewater, in surface waters, and in fish from Swiss lakes. Environmental Science and Technology 39: 953–962.

23 Nagtegaal, M., Ternes, T.A., Baumann, W., Nagel, R. (1997). Detection of UV-sunscreen agents in water and fish of the Meerfelder Maar the Eifel, Germany. Umweltwissenschaften und Schadstoff-Forschung. 9: 79–86.

24 Kunz, P.Y., Gries, T., Fent, K. (2006). The ultraviolet filter 3-benzylidene camphor adversely affects reproduction in fathead minnows (Promelas pimephales). Toxicological Sciences. 93: 311.

25 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

26 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

27 Madsen, T. (2009). Environmental and Health Assessment of Substances and Household Detergents and Cosmetic Detergent Products. Danish Environmental Protection Agency. Project No. 2001-615.

28 Dymicky, M., Huhtanen, C.N. (1979). Inhibition of Clostridium botulinum by phydroxybenzoic acid n-alkyl esters. Antimicrobial Agents and Chemotherapy. 15: 798–801.

29 Terasaki, M., Makino, M., Tatarazako, N. (2009). Acute toxicity of parabens and their chlorinated by-products with Daphnia magna and Vibrio fischeri bioassays. J. Applied Toxicology. 29: 242–247.

in contact with such organisms.[30] Aside from acute toxicity, parabens can elicit estrogenic responses or vitellogenin (VTG) synthesis in fish when exposed to low concentration levels.[31&32] These levels studied are environmentally relevant, meaning such effects are likely to occur under current conditions of anthropogenic use and disposal of paraben containing cosmetic formulas.[32]

Addressing the Issue

Scientific research regarding eco-toxicity of synthetic chemicals in PCPs is lacking relative to the overwhelming daily presence of these compounds.[32,33&34] Of the 80,000 chemicals that are currently registered for commercial use in the United States, just 530 have been subjected to long-term testing, while only 70 have undergone short-term testing by the National Toxicology Program (NTP).[35] In addition, the resource-intensive nature of chemical testing results in prolonged and costly assessments which often take more than 3 years and $2 to $4 million per chemical to complete.[37] This substantially low rate of testing within NTP and associated high costs indicates a serious discrepancy in institutional ability to verify safety of synthetic chemical ingredients in PCPs. In addition, there are no monitoring requirements in the United States and most other countries for PCPs in water or biosolids.[36&37] A system that circumvents the costly and time intensive process of chemical testing is therefore a very attractive option for confronting synthetic chemical over-use.

Physiological Concerns for Mother During Pregnancy

When a woman transitions into motherhood, her life can change dramatically, shifting her priorities, preferences, and social circles. Pregnancy can bring great changes in both lifestyle and physical well-being. Specifically, skin changes occur - and while considered normal, they can cause a significant amount of stress for the pregnant mother, as many changes do not naturally regress completely postpartum, and require some sort of external treatment. For example, common physiological ailments include changes in skin pigmentation, hair and nails, glandular activity, vascular and hematological changes, and mucous membranes. Some key pregnancy skin changes to consider:

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30 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

31 Dobbins, L.L., Usenko, S., Brain, R.A. & Brooks, B.W. (2009). Probabilistic ecological hazard assessment of parabens using Daphnia magna and Pimephales promelas. Environmental Toxicology and Chemistry. 29: 242-247.

32 Oishi, S. (2002). Effects of propyl paraben on the male reproductive system. Food and Chemical Toxicology. 40(12): 1807-1813.

33 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

34 Nohynek, G.J., Antignac, E., Re, T. & Toutain, H. (2010). Safety assessment of personal care products/cosmetics and their ingredients. Toxicology and Applied Pharmacology. 243: 239-259.

35 Nel, A., Xia, T., Madler, L. & Li, N. (2006). "Toxic Potential of Materials at the Nanolevel." Science. 311: 622-627.

36 Daughton, C.G. & Ternes, T.A. (1999). Pharmaceuticals and Personal Care Products in the Environment: Agents of Subtle Change? Environmental Health Perspectives. 107 (Supp 6): 907-938. Retreived from http://www.jstor.org/stable/3434573

37 McClellan, K. & Halden, R.U. (2010). Pharmaceuticals and Personal Care Products in Archived U.S. Biosolids from the 2001 EPA National Sewage Sludge Survey. Water Research. 44(2): 658-668.

Hyperpigmentation
In up to 90% of women, pigmented areas such as areolae, genitalia, neck, axillae, inner thighs, and periumbilical skin may become darker; this applies to recent scars, freckles, and nevi, which may also enlarge in size. Although under discussion still, increased levels of progesterone, estrogen, and melanocyte-stimulating hormones are thought to cause these changes in pigmentation. Hyperpigmentation can fade after childbirth, but is unlikely to completely disappear.

Melasma
Occurring in 45%-75% of pregnant women, a centrofacial pattern (cheeks, forehead, upper lip, nose, and chin), malar pattern (cheeks and nose), or mandibular pattern (chin) of symmetric, blotchy brown hyperpigmentation occurs. This facial change is believed to occur from genetics, increased estrogen, progesterone, and melanocyte-stimulating hormones, and exposure to the sun and cosmetics. Treatment for melasma can be difficult if it does not fade naturally postpartum, and includes use of hydroquinone, retinoic acid, and corticosteroid creams. Prevention measures include use of sunscreen and avoidance of UV radiation and irritating cosmetics.

Striae Distensae
Otherwise known as "stretch marks", this skin condition can occur on the abdomen, breasts, axillae, lower back, buttocks, arms, and thighs in up to 90% of pregnant women later in the second trimester of pregnancy. These can result from genetics, hormones, and weight gain. There is no proven method of treatment.

Cutaneous tumors
Molluscum fibrosum gravidarum, small benign skin tags on the face, neck, chest, axillae, and inframammary areas appear in the second half of pregnancy and either disappear naturally after childbirth or can be surgically removed. Granuloma gravidarum, are smooth, soft, pedunculated or sessile lobules that can form in the mouth or head and neck regions. These can cause pain, ulcerate, and bleed, but disappear naturally.[38]

Additionally, although researchers have difficulty in studying the effects of chemical exposure on miscarriages, it is widely believed that exposure to chemicals that cause reduced fertility also cause miscarriages. A primary cause of miscarriage - linked to at least 50% of first trimester miscarriages, 15% of second trimester miscarriages, and 5% of third trimester fetal losses - is chromosomal abnormalities, which are linked with exposure to certain chemicals like Bisphenol-A.[39]

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[38] Barankin, B., Silver, S.G., Carruthers, A. (2002). The skin in pregnancy. Journal of Cutaneous Medicine and Surgery. 6(3): 236-240
[39] Schwartz, J.M. and Woodruff, T.J. (2008). Shaping our legacy: reproductive health and the environment. UCSF Program on Reproductive Health and the Environment

Physiological Concerns for Developing Baby During Pregnancy

By applying conventional health and beauty care products, a pregnant mother may expose developing baby to chemicals during neonatal and fetal development. Even low levels of chemical exposure can disrupt reproductive development. This results in abnormal function in adulthood due to changes in the DNA methylation pattern.[40] A developing baby is highly susceptible to potential health risks - exposure during particular windows of development can cause irreversible brain and organ damage. Not only does the placenta fail to adequately filter toxins and shield the fetus, but fetal blood contains lower levels of proteins that neutralize harmful chemicals by binding to them, and the blood-brain barrier's ability to block harmful chemicals from entering the brain does not fully develop until post-birth.[41] This heightened vulnerability puts developing babies at extreme risk if mothers are not aware of the dangers of cosmetic ingredients, or do not have access to better alternatives.

Synthetic and natural environmental compounds such as pesticides (DDT, MXC, atrazine), detergents and surfactants (octyphenol, nonylphenol, and bisphenol-A), plastics (phthalates), industrial compounds (PCB, TCDD), and natural plant estrogens (genistein, coumesteral) can mimic or disrupt endogenous hormones by binding to steroid hormone receptors.[42] These disruptors target oocyte maturation and maternal sex chromosomes, which affect developmental processes controlling gonadogenesis. Alarmingly, such abnormalities are passed on to the next generation, materializing in both genders.[42]

In females, a specific example is development of *fibroids*, or non-cancerous uterine tumors, which affect between one half to three quarters of all women of reproductive age. These are painful and cause hysterectomies, infertilities, miscarriages, abnormal fetal positioning in the womb, premature labor, and placentia complications. Female fetuses exposed to estrogenic chemicals while in the womb are two and a half times more at risk for fibroid development in adulthood. Other female-specific problems with reproductive development include menstrual cycle irregularities, early or delayed puberty, reproductive organ deformities, cervical and vaginal cancers, infertility, and premature menopause.

In male fetuses, healthy reproductive system development depends on androgen hormones such as testosterone, dihydrotestosterone, Mullerian inhibiting hormone, and insulin-like 3. Chemical exposure can interfere with hormone production or signaling, damage and destroy cells, and change gene expression, which can cause deformities, diseases, and abnormalities in sperm production. In

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[40] Uzumcu, M. & Zachow, R., (2007). Developmental exposure to environmental endocrine disruptors: consequences within the ovary and on female reproductive function. Reproductive Toxicology. 23(3): 337-352

[41] EWG (2009). Pollution in people: cord blood contaminants in minority newborns. Environmental Working Group. Retrieved February 2013 from http://static.ewg.org/reports/2009/minority_cord_blood/2009-Minority-Cord-Blood-Report.pdf

fact, malformations of male reproductive organs rank second and third among the most common birth defects. For example, interference with testosterone production can cause testicular dysgenesis syndrome, characterized by four symptoms: birth defect of the penis (hypospadias), birth defect of the testes (undescended testes), low sperm counts, and testicular cancer.[42]

Regulations Overview

The US Food and Drug Administration (FDA) is the federal agency in charge of cosmetic regulation. However, this agency lacks the legal authority to test cosmetics prior to their entry to market or recall faulty products after released.[43] Due to its budgetary deficiencies, the FDA has relied on the cosmetic industry to self-regulate for product safety for almost a century.[44] The insufficiencies of this system have been well documented. In 1977, AETT, a once commonly used synthetic fragrance material, was discovered to be a neurologically debilitating compound, yet the industry lead organization International Fragrance Association (IFRA) listed it as "safe" for nearly 20 years (Elermann, 1980).[45] In 1996, severe phototoxicity problems were discovered to be associated with exposure to musk ambrette (another synthetic fragrance material), but it took over five years for industry to discontinue its use.[46] Last year, the Campaign for Safe Cosmetics published a report that found 400 lipsticks on the market to contain levels of lead considered by the FDA to be unsafe; the worst offender contained 275 times more than lead than the safest alternative.[47] Despite these violations, the FDA is constrained by the existing legal framework to ensure cosmetic product safety.

The FDA's authority to actively regulate cosmetic and personal care industry is governed by two laws. The first is the Federal Food, Drug, and Cosmetic Act of 1938 (FDC). In addition to defining a cosmetic, this law primarily gave the FDA the legal capacity to fine a firm, pursue judicial action against a firm, or seize merchandise for marketing an adulterated or mislabeled cosmetic product.[48] The second is the Fair Packaging and Labeling Act (FPLA), which intends to protect consumers from misleading labels and requires manufacturers to include certain information: a product identity

[42] Schwartz, J.M. and Woodruff, T.J. (2008). Shaping our legacy: reproductive health and the environment. UCSF Program on Reproductive Health and the Environment

[43] FDA. (2012). Cosmetic Labeling and Label Claims. US FDA Food and Drug Administration website. Retrieved from http://www.fda.gov/Cosmetics/CosmeticLabelingLabelClaims/default.htm

[44] Donegan Jr, T. J. (1995). Fifty Years of Comestic Safety: A Government and Industry Partnership. Food & Drug LJ, 50, 151.

[45] Elermann, H. (1980). Regulatory issues concerning AETT and 6-MC.. Contact Dermatitis Journal, 6(2), 120-122. Retrieved February 9, 2013, from pubmed.gov

[46] Reiner, J., C. Wong, , K. Arcaro, & K. Kannan. (2007). Synthetic Musk Fragrances in Human Milk from the United States. Environmental Science & Technology 41 (11), 3815-3820, Retreived December 11, 2013 from pubs.acs.org

[47] Campaign for Safe Cosmetics (2012). Hundreds of lipsticks contaminated with lead, reports new FDA study [Press Release]. Retrieved from http://safecosmetics.org/article.php?id=952

[48] FDA. (2005). FDA Authority Over Cosmetics. US FDA Food and Drug Administration website. Retrieved from http://www.fda.gov/Cosmetics/GuidanceComplianceRegulatoryInformation/ucm074162.htm

statement, a net weight of contents, name and address of the business, material facts (i.e. directions), appropriate warning statements, and ingredients (FDA, 2012).[49]

In 1971, the federal government added an important addition to the FPLA, which is known as the Administrative Procedures Act.[51] This established the Voluntary Cosmetic Registration Program (VCRP). This supplement had two intentions: one, to reduce the need for earmarking government resources to this agency, and, two, to encourage transparency within this industry.[50] However, the VCRP included a clause that did not require cosmetic manufacturers to disclose ingredients that produced flavors, fragrances or deemed by the firm to be trade secrets.[51] Resultantly, many harmful ingredients were not registered in the public database. The Environmental Working Group found that the average product tested contained fourteen hidden ingredients not listed on the label, including known hormone disruptors, neurotoxins, and carcinogens.[52] Despite their inadequacies, the FDC and FPLA are the most current legislations that govern the FDA's authority.

The deficiencies in the federal legislation lead some states such as California, New York, and Maine to pass statewide regulation for cosmetics.[54] Each of these states' laws differs slightly, causing complications for cosmetic manufacturers to distribute their products into these regions.[53] Consequently, cosmetic industry representatives have recently asked Congress to draft federal laws for cosmetics in hopes to ensure uniformity throughout the US.[55] At the Energy and Commerce subcommittee on health annual meeting, Curran Dandurand, the CEO of a men's personal care products company stated that "the myriad diverse state regulations would substantially increase the cost of producing and distributing personal care products. The consequences for small business owners would be disastrous."[55] In spite of this recent attention, none of the proposed cosmetic regulations were passed in 2012.[55]

[49] FDA. (2012). Cosmetic Labeling and Label Claims. US FDA Food and Drug Administration website. Retrieved from http://www.fda.gov/Cosmetics/CosmeticLabelingLabelClaims/default.htm
[50] Donegan Jr, T. J. (1995). Fifty Years of Comestic Safety: A Government and Industry Partnership. Food & Drug LJ, 50, 151.
[51] Fischer R. (1974) Cosmetic Labeling: The FDA's Response to Consumer Needs, Santa Clara Lawyer (14) 542.
[52] EWG (2009). Pollution in people: cord blood contaminants in minority newborns. Environmental Working Group. Retrieved February 2013 from http://static.ewg.org/reports/2009/minority_cord_blood/2009-Minority-Cord-Blood-Report.pdf
[53] Westervelt, A. (2012). "As FDA rejects BPA ban, Congress looks to set to punt chemical reform". Forbes Online. Retreived from http://www.forbes.com/

Section Two: Secondary Research

Market Overview

While the government bundles all personal care items under the umbrella term cosmetic, many segments comprise the entire cosmetic industry. BabyLove intends to focus on the pregnancy segment of the growing Natural Health and Beauty Care Market (NHBC), a subset of the Health and Beauty Care Industry.

The Overall Health and Beauty Care Industry (HBC)

The US Health and Beauty Care Industry (HBC) consists of about 750 companies with a combined total annual revenue of about $40 billion.[54] Several product categories exist within this industry, including makeup (33% of annual revenue), hair care (25%), and lotions/creams (21%).[55] The remaining 21% comes from perfumes, mouthwash, and other products related to skincare.[57] Following the stagnant years of an economic recession, in 2010, Americans still spent $33.3 billion on HBC products, indicating an industry growth of 6% that is anticipated to stay consistent to 2016.[56]

HBC Trends

Packaged Facts (2011) highlighted four trends emerging throughout the HBC industry.

1. Long-Lasting Features: in response to demand from today's time-poor consumers looking to reduce the amount of time and money spent on beauty routines.
2. Increased Internet Beauty Shopping: online total beauty retail achieved stronger absolute value growth (over $11 billion in 2010) than department stores.[57]
3. Increased Internet Beauty Consultations: Department store makeup counter consultations increasingly move online.[58]
4. Consumer Demand for Healthy: the use of "organic", "natural", or "free-from __" claims are increasingly being used manufacturers due to increased consumer demand. The trend also includes manufacturing commitments to recycling and eco-friendly materials. [59&60]

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[54] Dowd, T. (2011). Natural and Organic Personal Care Products in the U.S., 5th Edition. Packaged Facts. Rockville, MD. December 2011

[55] Finn, K. (2011). "Beauty and Personal Care Products Industry Overview". Business.com. Retrieved November 22, 2012 from http://www.business.com/guides/beauty-and-personal-care-products-industry-overview-21128/

[56] Andriotis, A. (2011). "10 Things the Beauty Industry Won't Tell You." Smart Money Magazine. Retreived Apirl 22, 2012. http://www.smartmoney.com/spend/family-money/10-things-the-beauty-industry-wont-tell-you-1303249279432/#articleTabs

[57] Lennard, C. (2011). "Global Beauty Industry Trends 2011". Skin Inc. Magazine. http://www.skininc.com/spabusiness/trends/126516783.html?page=2

[58] Mintel Corporate (2011). "Mintel Beauty Innovation Reveals 'Down-to-Earth' as Key Trend to Impact Beauty Industry in 2011". Corporate News: Mintel Press Release. January 2011. http://www.mintel.com/press-centre/press-releases/645/mintel-beauty-innovation-reveals-down-to-earth-as-key-trend-to-impact-beauty-industry-in-2011

This market segment's growth is supported by the fervent customer loyalty that is characteristic of the Natural HBC consumer.[61] It has been well-documented that certain consumers have a higher willingness to pay for some natural products and the organic industry.[62] However, the magnitude of this price difference varies considerably between consumer groups.[62] In particular, women who are pregnant or have at least one child at home are the most likely pay this price premium, especially for personal care items.[62] According to the joint market research study from Babycenter and comScore, Inc., nearly 50% of American mothers preferred to purchase organic or natural alternatives when they shop and look for "natural" and "wholesome" ingredients.[64] The fear of exposing their children to toxic and harmful substances--either by baby or adult products--lead many parents to buy natural items.[63] The lack of available information regarding the purchasing trends of pregnant women lead the team to conduct in-person interviews and distribute surveys to learn more about this demographic, which is discussed in Section Three.

Consumer and industry reports revealed that overall, consumers strive to live healthy lives, and to remain consistent with this goal, they increasingly seek out natural brands. Additionally, they tend to remain loyal to the natural cosmetic industry once they have made the switch from non-natural alternatives. Various experiences can trigger a new awareness regarding environmental, social, economic, or personal benefit for consumers. These can be personal or experiential triggers that include having children, or informational triggers that include product labels or mass media. According to a recent study, the top three sources for informational triggers in regards to sustainability are product labels, internet search engines, and in-store information.

Additionally, The Hartman Group ranked consumer sustainability lifestyles on three levels, Core, Mid-Level, and Periphery, according to five factors, Price, Convenience, Knowledge, Expert Opinion, and Experience.[64] Key indicators for BabyLove's customer discovery were the that Mid-Level and Core segments would be most likely to find value in BabyLove's proposed solutions, due to a low priority ranking for Price, and high priority rankings for Expert Opinion and Knowledge (Appendix 3.2). Consumers shopping for natural HBC products do so in order to meet personal health and wellness needs – considerations of environmental stewardship come secondary and aare

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[59] Todd, A. M. (2004). The aesthetic turn in green marketing: Environmental consumer ethics of natural personal care products. Ethics & the environment,9(2), 86-102.
[60] Batte, M. T., Hooker, N. H., Haab, T. C., & Beaverson, J. (2007). Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products. Food Policy, 32(2), 145-159. BirchBox (2013). "About Us." What Is Birchbox? BirchBox, Web. 22 Feb. 2013.
[61] Todd, A. M. (2004). The aesthetic turn in green marketing: Environmental consumer ethics of natural personal care products. Ethics & the environment,9(2), 86-102.
[62] Baby Center Solutions (2012). "2012 American Media Mom Report". Retrieved on from http://www.babycentersolutions.com/assets/download/BabyCenter_21st_Century_Mom_Insights_Series_2012.pdf
[63] Lennard, C. (2011). "Baby Care Market Report: Euromonitor International". GCI Beauty Business, Brand Impact Magazine. 20 January 2011.
[64] Sprinkle, D. and The Hartman Group, Inc. (2009). Consumers and Sustainability: personal care. Packaged Facts. Rockville, MD. September 2009

of much lower importance to the consumer.[66] In fact, the health effects from product use emerged as a major factor in purchasing decisions, as shown by the 86% of American women who used a makeup product co-positioned on its benefit to skin health.[65]

Price Point as a Barrier and Willingness-to-Pay

In a 2008 Datamonitor Consumer Survey, over a third of US respondents believed natural or organic claims in cosmetics were "not credible" or "not at all credible." [67] However, this skepticism did not seem to preclude failure to purchase cosmetic products promoting such claims, as consumers continued to purchase natural or organic HBC products. In fact, in determining the reasons for natural/organic purchasing preferences, the study reported that 45% of 1,800 surveyed female consumers cited their fear of chemicals as the major driver in purchasing natural/organic beauty products. For skin application, 80% believed that naturally based products were better, 64% did not want chemicals, and 27% felt traditional products contained harmful ingredients. [67] This suggested that even though consumers were wary of company claims, their desire to use natural, organic, chemical-free, and safe HBC products was strong enough to warrant purchases of these items.

In a 2011 Natural HBC industry report, price proved to be a deterrent for over 44% of HBC consumers. Despite this barrier, the natural HBC market increased by 61% from 2005-2010, reaching $7.7 billion. [67] When it comes to cosmetics, consumers tend to value efficacy over sustainability, and are skeptical of the performance abilities of natural HBC products. In a report studying consumer behavior as it relates to sustainable personal care products, consumer perception of natural HBC cosmetics quality is most affected by efficacy and entertainment value. [66] However, quality is also directly affected by both brand reputation and price point or retail location, with drug store brands deemed lowest quality, and boutique brands and farmers market or artisanal products perceived as highest quality. Boutique brands, along with spa-only cosmetic brands, achieve their high-quality reputation through exclusive distribution and claims to natural ingredients. Cosmetic products sold at farmers markets are valued for their handcrafted and natural ingredient appeal, since they are not sold in typical retail outlets. These findings show that given consumer value for natural HBC on efficacy, brand reputation, and retail outlet, the most credible products have the highest price points and are the hardest to obtain.

The study also included a consumer survey on 1) sustainable cosmetic purchases recently made in a 30-day period, 2) immediate growth opportunity based on non-sustainable purchasers' willingness to pay for sustainable products, and 3) survey-wide willingness to pay a 20% premium for sustainable products.

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[65] Dowd, T. (2011). Natural and Organic Personal Care Products in the U.S., 5th Edition. Packaged Facts. Rockville, MD. December 2011

[66] Sprinkle, D. and The Hartman Group, Inc. (2009). Consumers and Sustainability: personal care. Packaged Facts. Rockville, MD. September 2009

1. Results showed that 17% of respondents had bought a natural or chemical-free skin or beauty product in the previous 30 days. However, compared with the 63% of all respondents who had bought a conventional version of such products during that same period, this meant that only about 27% of consumers purchasing HBC items were purchasing natural or chemical-free products remaining (Appendix 3.1.1).
2. However, to project the potential immediate growth for the sustainable cosmetics category, the 73% of respondents who did not purchase a sustainable HBC version were asked if they would be willing to pay a 20% premium for a sustainable version, and 25% of respondents said they would (Appendix 3.1.2).
3. This willingness to pay was measured more generally as an overall percentage of cosmetics purchasers, regardless of whether they had recently purchased a sustainable version or not. In this quantification, 27% of respondents said they would be willing to pay a 20% premium on skin and beauty products.[67]

Interestingly, a category for "Personal Care Products for babies or small children" was also included in this study – this category received the largest percentage of positive respondents in all three categories of consumers who recently purchased sustainable products, potential growth opportunity, and willingness to pay a premium.[67]

Analogous Business Model: Birchbox

Company Overview

A cosmetics online retailer, Birchbox launched in 2010 and reports current revenues of $7 million. [68] This company's core value proposition is to help women identify and experience the "newest" and "best" in beauty care. Birchbox offers a monthly subscription service of expert-selected beauty care samples that are mailed directly to the customer's doorstep. The company is comprised of three main components: the subscription service, the editorial online content, and the online retail shop where customers purchase full-size versions of products. To differentiate the business and create customer value, the company generates original content that is disseminated almost exclusively through various social media outlets. Birchbox gains and maintains customer trust by delivering useful, relevant content that cannot be obtained through other means. Additionally, Birchbox offers loyalty programs to those who contribute to the Birchbox online community and frequently make purchases from the site.

[67] Sprinkle, D. and The Hartman Group, Inc. (2009). Consumers and Sustainability: personal care. Packaged Facts. Rockville, MD. September 2009

[68] Rubin, C. (2011). "Hayley Barna and Katia Beauchamp, Founders of Birchbox". Inc. Magazine Online. Retrieved from http://www.inc.com/30under30/2011/profile-hayley-barna-and-katia-beauchamp-founders-of-birchbox.html

Financial Structure

Customers have the option to purchase a monthly subscription for $10 per month or a yearly subscription for $110.[69] The company also generates affiliate revenue from every full-size purchased through the online store.[70] In exchange for customer research information, Birchbox receives deluxe samples at no cost, which allows them to keep their per unit costs relatively low.[71]

Business Development Phases

Before developing an entire business plan, the Birchbox founders tested the model with their minimum viable product to validate its core business hypotheses, answering three main questions:

1. Would (established) beauty brands work with Birchbox?
2. Would customers pay for samples?
3. Would samples drive full-size purchases?[72]

During this two-month beta phase, the company reached 200 potential customers and partnered with eight brands.[73] The positive response from participants garnered the attention of several investing firms and the founders raised nearly $12 million dollars in seed funding in less than a year.[75] Birchbox officially launched in October 2011, a mere eight months after its conception.[74]

Current State of the Business

As of late 2012, Birchbox had over 100,000 paying subscribers and over 164,000 likes on Facebook.[75] Birchbox's success over the last two years has lead the company to expand into other product categories (such as male beauty and home décor subscription models) and geographic regions outside of the US.[75] Its growing popularity has also attracted more brands seeking to better target their customers.[74] However, numerous competitors have emerged in the last two years, including Glossy Box, RedMeow, and Loose Button.[72] To remain a leader in the online subscription sampling market, Birchbox recently acquired its closest European competitor, JolieBox.[75]

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[69] BirchBox (2013). "About Us." What Is Birchbox? BirchBox, Web. 22 Feb. 2013.
[70] Coles, P., B. Edelman (2011). Attack of the Clones: Birchbox Defends Against Copycat Competitors. HBS 9-912-010. Boston, MA: Harvard Business School Publishing.
[71] Pietka, A. (2012). "Birchbox the perfect subscription business". Subscrea Subscription Sales Platform. Retrieved from http://www.slideshare.net/AnnaPietka/birchbox-the-perfect-subscription-business-13899217
[72] Baldwin, T (2012). ""Entrepreneur's Corner: Birchbox"". Wharton Journal [blog posting]. Retreived from http://whartonjournal.com/?p=1063.
[73] Pietka, A. (2012). "Birchbox the perfect subscription business". Subscrea Subscription Sales Platform. Retrieved from http://www.slideshare.net/AnnaPietka/birchbox-the-perfect-subscription-business-13899217
[74] Rubin, C. (2011). "Hayley Barna and Katia Beauchamp, Founders of Birchbox". Inc. Magazine Online. Retrieved from http://www.inc.com/30under30/2011/profile-hayley-barna-and-katia-beauchamp-founders-of-birchbox.html
[75] DOW Jones & Company (2012). "Birchbox Hits Europe, Acquires Joliebox". Dow Jones Online. Retrieved from http://pevc.dowjones.com/

Key Insights

Learning from example, the company BabyLove structured its core business model to closely mirror the successful elements of Birchbox. The company Babylove adapted the subscription service, affiliate revenue streams, active online community, and loyalty program because of its demonstrated success. Similarly, BabyLove developed strong brand partnerships and receives free samples in exchange for marketing opportunities to decrease costs. The fierce competition Birchbox continues to face underscores the need to create strong barriers for entry into this flooded market. To better position BabyLove within the market, the team relies on a stringent rating system, a trusted and transparent source, to select products. The Team also is exploring potential opportunities to partner with healthcare providers to distance BabyLove from the crowded marketplace. Overall, Birchbox's rapid growth and high customer satisfaction reports showcase the strength of this business model.

Competitive Landscape

The subscription commerce industry is new and growing.[76] Pioneered by the company Birchbox, the concept of a subscription sampling service has caught on - new companies pop up regularly, targeting different customer niches. In addition to other sampling services, BabyLove faces competition from traditional shopping outlets like online retailers or brick and mortar establishments.

This graphic shows the recent growth trends in the subscription commerce industry for three subscription commerce brands.[76]

The direct or indirect competition BabyLove faces include beauty product sampling services (e.g., Birch Box and The Green Grab Bag), online retail websites that offer beauty care and/or maternity products (e.g., Amazon and Eco Mom), and maternity-specific companies (e.g., The Honesty Company, Mommies First, Citrus Lane, and Ecocentric Mom) (See Appendix 4.7). BabyLove's closest competitor, Ecocentric Mom, offers a monthly subscription for maternity-specific and eco-

[76] Percival, S. (2011). Subscription Commerce #SUBCOM Matrix. Blog post retrieved February 2013, from http://www.seanpercival.com/blog/2011/08/27/subscription-commerce-subcom-matrix/.

friendly lifestyle products including makeup, skin care, baby care, household cleaning supplies, snacks, and other consumer items.[77] However, BabyLove's Pregnancy Box is very focused on beauty care for the mother, and the Mommy & Me Box retains that focus while introducing the customer to skin care products safe for babies. BabyLove understands that the pregnancy demographic is heavily marketed to for many products in many categories, and proposes to help its customers efficiently find the maternity-safe HBC products they urgently need. This single focus helps to avoid dilution of the BabyLove service.

Stringent Rating System Options

To address this lack of federal regulation, many third party certification bodies have emerged to simplify the decision-making process for consumers. Certification bodies such as Fair Trade, Cruelty Free, and USDA Organic each have different guidelines used to evaluate products and address particular health, social, or environmental issues. Consequently, this market space is cluttered and often confusing to consumers. For examples, Abrams et al. found that participants misunderstood the meaning of the USDA Organic certification seal and regularly felt bombarded with labels regarding how their products are produced, processed, and regulated.[78] For consumers to make better purchasing decisions, a streamlined tool is needed. Listed below are three of the most prominent organizations tackling this problem. Currently, BabyLove intends to use the Good Guide's rating system to screen products, offering only items with health scores between 8 and 10 to its customers.

The Good Guide

The Good Guide is a for-profit company that has compiled an extensive database, consisting of 145,000 products ranging from skincare to children's toys to car production.[79] The ingredients for each of these products are externally tested for health and safety. Additionally, this organization ranks the social and environmental impacts not only of the specific product, but also for the company as a whole. The Good Guide gives each of the three categories (health, social, and environmental) an individual score and then averages it for an overall score, which makes it easy for the consumer to understand (See Appendix 3.1). Items with no probable health concerns are ranked between eight and ten, with ten being the absolute safest. More recently, this organization has introduced a mobile application that allows consumers to take a picture of a product's barcode to find more information about the item while they are shopping.[79]

[77] Ecocentric Mom (2013). Ecocentric Mom. Retrieved February 2013, from https://www.ecocentricmom.com/

[78] Abrams, K. M., Meyers, C. A., & Irani, T. A. (2010). Naturally confused: consumers' perceptions of all-natural and organic pork products. Agriculture and Human Values, 27(3), 365-374.

[79] Good Guide, Inc. (2011). The Good Guide: About Us.. Retrieved February 2013, from http://goodguide.com

Environmental Working Group's Skin Deep Database (EWG)

EWG's Skin Deep Database is a non-profit science and policy advocacy organization that tests skincare product for health and safety internally. Like the Good Guide, the EWG ranks products on a scale of 1-10 so consumers can easily evaluate the health risks associated with the product. It also provides easy access to peer-reviewed journal articles related to specific ingredients effect on human and ecosystem health. However, it does not provide rankings of social and environmental impacts.[80]

Whole Foods' Whole Body

Whole Body is an arm of the for-profit company Whole Foods. With a blacklist of over 400 ingredients, the Whole Body certification seal is a stringent system Whole Foods Market uses to decide which products will be stocked on their shelves. This ranking system includes 2,800 products and takes into account the environmental impact, but does not evaluate an item or brands' social impact.

The rising popularity of these rating entities suggests that consumers trust these sources because of their transparency, rigorous methodology, and easily understood ranking system[81]. While BabyLove's early evangelists are most concerned with the health risks affiliated with beauty care products, other potential early adopters voiced their environmental and social concerns in interviews and surveys. Additionally, the company intends to expand vertically into other sectors, including baby toys and cleaning products. Thus, the team deemed the Good Guide's database to best fit for the company's needs. BabyLove is the first subscription sampling service to use a scientifically tested, third party ranking system to filter its products before offering them to its target customers.

[80] EWG (2009). Pollution in people: cord blood contaminants in minority newborns. Environmental Working Group. Retrieved February 2013 from http://static.ewg.org/reports/2009/minority_cord_blood/2009-Minority-Cord-Blood-Report.pdf

[81] IBM Software. (2011) Good Guide supercharges user acquisition, growth, and retention. IBM Case Study ZZC0314-USEN-01. Somers, NY: IBM Corporation Publishing.

Section Three: Primary Research

Customer Research

It is important to note that in the initial stages of BabyLove's customer discovery, the hypothesized target customer was a young educated female, who is eco-conscious and social media-savvy. The initial hypotheses and proposed solutions described below were methodically tested first through secondary research of industry reports and relevant literature. Following analysis of those findings, the Team conducted interviews with industry experts, to learn about the challenges and potential opportunities in the natural HBC market. With additional insights to the industry, the Team designed and distributed qualitative, short answer customer surveys to 50 target customers to gain some general insight to what populations may form BabyLove's target customer. In-depth customer interviews were then conducted with the hypothesized target customer segment. This section will describe the customer discovery research performed and highlight the major pivots and findings that led to BabyLove's current target customer, new and pregnant mothers.

There were two initial customer problem hypotheses for BabyLove's customer research:

1. High price points for natural/organic HBC products form a barrier to consumers.
2. Consumers face difficulty in finding credible and effective natural/organic products suited to their individual preferences.

BabyLove tested three main aspects of the hypothesized solution to the customer problem:

1. Potential natural/organic HBC consumers wish to try products before taking the plunge to purchase the full-sized version
2. Consumers are willing to pay for a customized service that sends HBC product samples targeted to their preferences, and value an online forum to express opinions and read reviews.
3. Companies would be willing to form partnerships with us, and provide samples to us, in return for our methods to target their intended customers.

Industry Interviews

To better understand the state of the natural HBC, numerous naturally-focused, certified organic, or otherwise environmentally-inclined skincare and makeup companies were contacted for in-depth interviews. The questions that needed to be answered were

- What major challenges faced natural HBC companies?
- How did companies reach their target customer, and were there challenges?
- Did the produce samples of their products?

METHODOLOGY: Company representatives were asked to give the Team some insight to the challenges in this particular industry (See Appendix 3.3 for Interview Questions). The natural HBC companies that provided interviews were

- Episencial
- Susan Brown's Baby
- MotherLove
- Fundamental Earth
- 100% Pure
- Miessence
- Mothers Helper Inc.
- Trillium Herbal Company
- Pretty Mommies

KEY FINDINGS:

Regardless of social and environmental missions, business metrics were not social or environment focused.

- The most common response to the question, "How does your company measure success?" was sales volume.
- Although these natural HBC companies were founded on health and wellness principles, they are still businesses that depend on sales volume for survival. Many of them value their customer relationships, but experience great difficulty in reaching potential customers due to limited budgets.
- When asked the question, "What are your most challenging problems?" most companies explained that it was difficult to overcome expense barriers. These companies stated that they must cover higher production costs due to the cost of input materials, since their products have health and safety guarantees.

The smaller-sized and lesser-known companies faced challenges such as customer outreach, recruitment, and conversion.

- Marketing was expensive, and that there is an added challenge of customer education – many consumers are uneducated, which is a major barrier for customer recruitment.
- It costs money to create educational materials and launch outreach campaigns.
- Some companies produce and distribute samples, and have seen a positive correlation between sample distribution and sales volume increases.
- A few companies had been approached by existing subscription sampling services, but had so far not participated.

The major lesson learned from this primary industry research was that the opportunity to partner with natural HBC brands existed, as these companies were experiencing difficulty in reaching

customers. BabyLove's service could provide the targeted marketing these companies were struggling to establish.

Primary Research: Customer Surveys

Due to a broad hypothesized customer definition and widespread secondary research, the customer profile needed validation and/or re-positioning. The discovery of a segment within the hypothesized broad target range would indicate that while nearly all surveyed customers felt the hypothesized pain of high costs, some felt it more than others and current remediation methods varied.

METHODOLOGY: To do this, BabyLove distributed qualitative surveys across the market demographic, reaching 50 user-respondents, in the categories: "younger"-young females without children, "new mother"- recent or first-time mothers currently raising an infant, and "older"- women in the 45+ age group who have grown children and may be new grandmothers.

KEY FINDINGS:

Younger female survey respondents indicated they did not feel the customer pain.

- The insights gathered from the "younger" consumer responses shifted target customer focus away from this category. Many of these "younger" respondents considered health or environmental effects and "loved" natural products, but did not actively seek out a solution; they allocated minimal time to product discovery, and did not have or cannot acquire a budget for prestige items. Overall it appeared this category either lacked awareness about a problem or felt indifferent.

  "I'm definitely in favor of using organic products but I don't necessarily seek them out." – 24-year-old female survey respondent

Older female survey respondents indicated that they did feel the customer pain.

- About thirty middle to upper middle-class "new and pregnant mothers" and baby boomer ("older" female category) females, or roughly 2/3 of total respondents, reported feeling the pain of excess time and money spent on finding new personal care products to address newly developed needs. This provided a key insight to the original customer hypothesis, suggesting a new focus for further customer research.

- The baby boomer respondents spent ample time and money in their quest for the perfect skin care regimen as their skin care needs change, however, these women tended to value product efficacy over the potential health and wellness effects and natural or organic ingredients.

  "Yes it is time-consuming (finding new products)...As I've gotten older, I feel some products irritate my skin more...usually I find natural or organic products more expensive, so I don't purchase those." - 55-year-old survey respondent

Specifically, new mothers indicated feeling the customer pain at the highest level.

- The new and pregnant mothers segment reported prioritizing health and wellness effects first and expressed a strong, unyielding fear of exposing themselves and their developing or newborn baby to harmful chemicals. Generally, new and pregnant mothers felt compelled to scrutinize product health effects in purchasing decisions, and often spent significant time on research.
- While these women gain awareness of chemical health effects, develop adverse reactions due to skin changes, and often discover that items get discontinued or altered, they currently struggle with switching to natural alternatives.
- In these scenarios, the customer searches for new cosmetics usually based on a specific need. For these reasons, the BabyLove Team decided to pursue the pregnant or new mother segment as the target customer.

  "What worries me the most is if I were to use something on [my child] and then I were to find out years after the fact that what I was using on him was harming him." – 30-year-old new mother of 1-year-old infant

The ability to test a product prior to committing to a full-sized purchase is desired.

- Survey responses provided another key insight for customer product discovery methods. While many appreciated the value of testing an item before purchasing, few trusted in-store testers enough to physically sample them.
- Those who utilize testers did so to determine product scent, and only tried fragrances or lotions, while avoiding other product testers.

  "I DO NOT use any testers in the store since I'm a germaphobe. I don't like knowing someone else who isn't as clean could have used it before me." – 28-year-old pregnant female

Customer Interviews

To further understand the pregnant and new mother demographic, the BabyLove Team conducted in-depth interviews with 19 women.

METHODOLOGY: The questions were open-ended and qualitative, and the interviews lasted between 30 minutes to one hour, conducted either in person or over the phone (See Appendix 3.4 for Interview Questions).

KEY FINDINGS:

Current product discovery process varied based on individual, and typically described as frustrating, overwhelming, and time-intensive.

- The women interviewed all expressed concern for product ingredients, and some interviewees said they spent many hours researching products online and in-store. They felt a range of emotions regarding their current method of product discovery, from busy and hurried to stressed out and frustrated to bored and unhappy. No interviewees were happy with their current method.
- When asked about how they obtained product information, every interviewee mentioned "friends and family recommendations" as a top method. Some trusted the recommendations from their obstetricians, some sought out natural or holistic experts such as midwives, natural health centers, or other holistic health care practitioners. Most women reported spending time researching products online, reading user reviews on sites like Amazon or Sephora, and looking up the potential effects of individual ingredients.
- If the interviewee was no longer pregnant, a series of questions were asked about baby care products (See Appendix 3.4 for Interview Questions).

Gauging customer interest in a monthly subscription to a personalized bundle of product samples revealed most of the target customers wanted a service like BabyLove.

- Most interviewees stated that they would be interested in a sampling service. Some respondents explained that they were less concerned about the price of products, and more concerned with the ingredients.
- When asked about the price point for such a service, most respondents felt that $15-$30 would be fair. This information was a major insight regarding BabyLove's target customers. Not only were they interested in a service like BabyLove's, but they were willing to pay a high price point for high quality products

  "I would be willing to spend some money on a service that provides samples. I really like being able to sample. With skin care stuff, you are going to buy it, and you'll either like it or not. It's not something you will give to someone else, and it's hard to return. I like the idea of having an option to try before I buy because the products are not cheap." – 35-year-old mother of a 2-year-old infant.

PLUSH Trade Show

In June 2012, the Team worked at the consumer trade show PLUSH (Posh Little Urbanites SHow), which describes itself as, "a baby and toddler trade show dedicated to all posh and eco-conscious

retailers and parents who are always setting the next big trend." [82] At this show, the team interacted with women in BabyLove's hypothesized target demographic, and was able to gain insights to their preferences and shopping habits.

KEY FINDINGS:

The insights gained from this trade show helped the BabyLove Team develop their customer archetype for the Plush Mom (See Appendix 3.7)

- Show attendees wanted to be trendsetters, and sought out the top luxurious, innovative, and eco-friendly products in the industry. They were looking to find trendy, top-of-the-line brands that sold highly coveted items and had celebrity partnerships (e.g., The Honest Company's celebrity founder, actress Jessica Alba).
- These women wanted to look good while pregnant or with their newborn, wearing the most popular maternity clothing and skincare brands, while carrying the most popular diaper bag or pushing the most popular stroller.
- The "eco-conscious" aspect came naturally with the maternity products at the show, as this maternity trade show demonstrated how "safe", "eco-conscious", "natural", and "organic" were synonymous with luxury, trendy, and innovative.
- The PLUSH show attendees were women who wanted to spend money on the newest and best maternity products.

Target Market

BabyLove's customer research revealed the original customer hypothesis was incorrect. Instead of the college-age, educated, social media-savvy demographic, the segment that seemed tp be most receptive to BabyLove's value proposition turned out to be new and pregnant mothers. To understand the potential size of this target market, additional research into pregnancy statistics was performed.

- Total Available Market: There are 80.5 million mothers in the United States.
- Served Available Market: Each year in the United States 2.8 million women become pregnant for the first or second time (there are 4.1 million total annual pregnancies).[83] Based on customer interviews with women regarding their first or second pregnancy, the BabyLove Team determined that these women need the most assistance in discovering new maternity products.
- Target Market: Annually there are 28,800 Google searches for the phrase, "pregnancy skin care". Since this number likely represents that population of pregnant women, or friends and relatives looking to purchase items for a pregnant woman, this is BabyLove's immediate target market.[82]

[82] PLUSH (2012). Posh Little Urbanites Show. Los Angeles, CA: June 2012. Retrieved February 2013 from http://www.plushshow.com/about-us/

[83] Hamilton B. E., Martin J. A., Ventura S. J. (2012). Births: preliminary data for 2011. National Vital Statistics Reports. 61(5). Hyattsville, MD: National Center for Health Statistics. 3 October 2012

A promising characteristic of this demographic is that the 4.1 million annual new pregnancies represent 4.1 million potential new customers, and 28,800 million new target customers (i.e., women actively searching for pregnancy-specific skin care products) entering the market each year (See Appendix 3.7).

SECTION FOUR: BABYLOVE BUSINESS MODEL

Business Model

BabyLove is a monthly subscription that delivers maternity-safe health and beauty care samples to new mothers looking to try innovative and high-quality products to fit their new lifestyle.

Customer Segments

BabyLove's customer research found that pregnant women, particularly first-time mothers, felt most compelled to research, find, and adopt new skincare regimens based on factors including health, natural ingredients, and low chemical content. New mothers urgently prioritize health above all else in order to nourish their child, and become instantly averse to dangerous chemicals lurking in their everyday beauty products. These women want and need maternity-safe and effective beauty care, but lack expert advice, clear safety information, and easy access to the products they need the most. BabyLove's primary customers are the estimated 28,800 pregnant women actively searching for pregnancy-specific skin care, as they are more likely to seek out BabyLove's service in finding information and products. BabyLove's Secondary customers include women in their first or second pregnancies, who are aware of dangerous cosmetic ingredients but still struggle with product discovery, and looking to purchase safer alternatives to use on themselves and their babies.

Within those customer segments are two customer archetypes that the Team sees as BabyLove's "earlyvangelists". The Plush Mom is a pregnant or new mother who searches for maternity products that are trendy, popular, luxurious, and innovative. These products will be eco-conscious, pregnancy-safe, and natural, but the priority for this customer is the product effectiveness and the prestige or premium reputation of the brand. She relies on expert opinion, product popularity, and celebrity endorsements for guidance in her product discovery process, but finds that she wastes time and money purchasing premium-priced full-size skin care products that do not work for her specific need.

On the other end of this spectrum, the Crunchy Mom is a pregnant or new mother who takes pride in her eco-conscious lifestyle. She spends a lot of time researching product safety and ingredient hazards, and connects with a broader Crunchy Lifestyle community through social media platforms such as blogs, Facebook, Pinterest, or Twitter. The products and services she seeks are more eco-lifestyle-based, such as cloth diapers, doulas and midwives for a natural birth, and brands that have a more artisanal farmers market appeal. However, she finds these products that are exclusively distributed and hard to come by both time-consuming to locate and expensive to purchase – especially when she tries it and discovers it doesn't work for her.

Both of these customer archetypes feel the customer pain of time wasted in the product search, and money wasted in trial and error, as they purchase up to four different brands to find the one product that works for their individual preferences. While all pregnant or new mothers, especially in their first or second pregnancy, discover they need new products with very specific safety formulations for unprecedented physiological changes, the Plush and Crunchy Moms are typically at the forefront

of the product discovery process. Crunchy Moms spend more time and energy in research while Plush Moms are quick spend more money on products they end up not using.

The Venture's strategic goal is to acquire primary customers (Pregnant Women) and retain them throughout their pregnancy and into motherhood – these women that fill both primary and secondary customer segments are BabyLove's most important customers.

Value Proposition

On a subscription basis, BabyLove focuses on providing pregnant and new mothers with a monthly product-sampling program, supplemented by an educational online interface that provides information and resources. Through this convenient sampling service, BabyLove reduces the risk and cost of maternity health and beauty care product discovery.

It is commonly known that pregnant women have a sense of urgency to find maternity-safe, toxin-free, and effective health and beauty care (HBC) products that address their individual needs and pose no danger to their developing baby. They closely monitor what goes into and onto their bodies, staying away from potentially harmful products. The customer problem BabyLove addresses is the lengthy and frustrating trial-and-error process that new mothers suffer through. These women go through hours of research online and in-store, and spend hundreds of dollars in a trial and error process on dozens of full-size products that end up unused in bathroom cabinets. Some women stated they might spend over three weeks and up to $240 on multiple items and to find a particular beauty care product that works for them.

Increased access to pregnancy and maternity health information has led to increased demand for safer products, causing a proliferation of health-focused personal care items. However, through customer interviews, the Team discovered that despite increased options for HBC products, pregnant and new mothers remain concerned about the credibility of company claims, and find the product selection process overwhelming. Additionally, maternity-specific HBC products are typically sold at a high premium compared to conventional equivalents.[84] BabyLove's website is a one-stop-shop for credible products, information, and advice, helping pregnant and new mothers navigate the market and discover the products they need. BabyLove ensures credibility to customers with an interactive and transparent product information portal, providing product ratings from the Good Guide, ingredient lists and expert analysis, along with user reviews. By sampling verifiably toxin-free, maternity-safe HBC products before committing to an expensive purchase, customers can save both time and money while discovering beauty care products they love.

BabyLove is founded on a product-service platform, aimed at addressing the complete needs of the target customer, who seeks both educational information and the ability to try new products without

[84] Dowd, T. (2011). Natural and Organic Personal Care Products in the U.S., 5th Edition. Packaged Facts. Rockville, MD. December 2011

making expensive commitments to full-size, full-price items. The product is a personalized monthly package of five to seven HBC samples, based upon customer preferences that the client indicates in their personal profile online There are four key components to BabyLove: the subscription service, the online retail shop, the expert panel and third party verification for product safety, and HBC Brand Partners. The subscription service is $20 per month for the monthly bundle. The BabyLove store directs customers to online retailers that offer full-size versions of the products customers received samples of, providing an easy method of brand or product adoption. Incentivizing customers to initiate their purchase process through the BabyLove store (e.g., loyalty programs) will allow for tracking of full-size product sales conversions and customer feedback. HBC Brand Partners face a stringent vetting process based on the GoodGuide's standards (Appendix 4.1), but are vital to the credibility of BabyLove's product.

This package is delivered via US Postal Service straight to the customers' doorstep, and contains earth-friendly packaging materials. The service is provided through an online website that focuses on maternity-safe health and beauty care education, aimed at helping customers change to toxin-free, safe, and eco-friendly lifestyles.

By providing BabyLove with free samples, HBC Brand Partners receive a targeted marketing service that puts their product directly in the hands of their target customer. Additionally, BabyLove's website features an online shop that redirects customers to external retail websites, serving as a potential retail channel for Brand Partner full-size products. BabyLove intends to eventually offer HBC Brand Partners market information, such as the number of samples that lead to a full-size purchase.

Channels

Through customer research, the Team discovered that one of the most effective ways to reach, interact with, and service new mothers is through an online presence. BabyLove delivers both a service and a product. The service comes with the online website that provides customers with information, resources, and the support of a community; this is where the customer enrolls in the subscription service, and the main portal through which customers and BabyLove communicate. The product is the monthly semi-curated package that gets delivered directly to the customer's doorstep through USPS. While a significant portion of marketing will occur online, industry research has lead the Team to believe that partnerships with health care professionals such as doctors, doulas, and holistic wellness coaches would help BabyLove to reach customers. Although research has shown that most women in BabyLove's target demographic seek out information, purchase products, and socialize through online and mobile interfaces, customer and industry interviews have shown that the target customer looks to and is influenced by her healthcare and wellness authorities.

The BabyLove Marketing and Sales Strategy is based on lessons learned through customer outreach throughout the customer research process. By launching online advertising campaigns through Google Ads and Facebook Ads, the Team observed how BabyLove target customers might react to

digital marketing. The Facebook advertisements targeted 38.4 million Facebook users within BabyLove's specified demographic, and reached about 25,000 unique daily viewers. These ads directed traffic to the BabyLove Facebook page. To draw customers to the BabyLove website (babyloveproject.org), the Team utilized Google advertisements, which dramatically increased the volume of website visits (see Appendix 4.2). From these marketing experiments, the Team concluded that online advertisements are effective in reaching large audiences. However, interviews with customers and with industry experts revealed that pregnant women typically search for maternity health and wellness information within their networks of personal friends and family, healthcare providers, and trusted motherhood websites such as Babycenter.com.

Customer Relationship

BabyLove's customers can expect to interact with BabyLove and other customers by participating in the online user community through blogs, social media, and forum discussions. Automated services include the recurring monthly subscription, BabyLove blog posts, e-mail newsletters, and digital marketing (see Appendix 4.2.3). Due to the target customer's changing physical and mental state throughout her Pregnancy Box subscription, BabyLove newsletters, blog posts, and social media posts will include overall health and wellness information and resources. By providing customers with the pregnancy resources necessary – whether beauty and skin care related or not – BabyLove seeks to gain trust and loyalty.

BabyLove will also maintain customer relationships through the retail shop loyalty programs, which includes automatic discounts after a certain amount of money is spent. The loyalty program will include a rewards incentive for referring a friend and purchasing a certain number of items. This program will also include periodic "giveaways", raffles, and contests. These opportunities will be open to the public and conducted via a social media platform (e.g., Twitter, Instagram, or Facebook), and provide a chance to win free products, gift cards, and other prizes. By keeping customers engaged and excited, BabyLove can maximize the customer lifetime value.

Revenue Streams

Primary*:* subscription to service. By targeting newly pregnant women in their second trimester, BabyLove can achieve $60-$120 per customer. These customers will pay $20 per month for the Pregnancy Box for the second and third trimesters of their pregnancy (about 3 to 6 months). By retaining these primary customers as they progress into early motherhood with the Mommy & Me Box ($20/month), BabyLove estimates that customers will continue their subscriptions for a total of about 12 months. This adds $240 of revenue, creating a potential cumulative Customer Lifetime Value of $300-$360 from the subscription service.

Secondary: affiliate revenue from selling full-size products through BabyLove website, via links to external retailer such as Amazon. As an Affiliate Associate, BabyLove will earn fees based on unit

volume and sales growth, with fee rates starting at 4% and increasing to 15% proportionally to monthly units sold. [85]

In order to maintain the BabyLove guarantee of credibility, outside company advertisements will not be allowed to advertise on the BabyLove website and will not be a source of revenue.

Key Resources

The resources BabyLove will require to operate include

- A space to hold product samples and packaging supplies. In initial stages of growth, the necessary space can be limited in size.
- The product samples and promotional items or coupon codes from brand companies.
- An online storefront for customers to visit and sign up for the subscription electronically.
- A data management system to keep customer profiles organized, customer preferences recorded, and to track customer sales conversions (from sample to full-size).
- An expert panel of healthcare professionals and maternity industry experts to curate the product offerings each month.
- Day labor to pack and assemble boxes the week of the shipment date.
- Online sales/CRM software
- PayPal account

The BabyLove team includes Miranda Farley, Elyse Bernstein, and Jessalyn Ishigo. Miranda's experience in the skincare industry is a valuable asset in developing partnerships with beauty care brands. Elyse has a history in sales, which helps her excel in the customer management role. Jessalyn, a seasoned events and program coordinator, takes a detailed systems approach to managing company logistics. All three team members have Master's degrees in Environmental Science, bringing credibility to BabyLove's mission of distributing environmentally-safe, toxin-free products. While the team currently performs all necessary tasks, once the company is operating, additional full-time individuals must fill several key roles: Marketing and Sales, Website and IT Management, Ingredient Data Research, and Content Development. BabyLove team advisors include the President and Founder of a maternity skincare company, a graduate school Professor of Environmental Microbiology, and an experienced entrepreneur who teaches courses in Entrepreneurship at the graduate level.

Key Activities

Product:

- Box assembly is the first key activity required to produce the BabyLove product. Since shipment of boxes occurs one day each month, the box assembly will take place over the course of one or two 8-hour days. External labor will be hired to pack and assemble boxes.

[85] Amazon (2012). Associates Compensation Overview. Retrieved February 2013, from https://affiliate-program.amazon.com/gp/associates/join/compensation.html

- Boxes must be shipped out around the same time each month to avoid a lengthy delay in customer contact.
- Thorough, rigorous criteria to vet products and Brand Partners. The critical criterion for identifying Brand Partners is whether its products received or in-process of receiving an acceptable ranking on the GoodGuide, an authoritative third-party consumer product rating service, transparent ingredient safety, and maternity-safe ingredients.
- The customer personal profile helps determine what products each individual customer receives each month – the data must be managed and individual box content must be determined prior to box assembly. Specific products will vary based on which samples have been provided by Brand Partners for that month.

Customer Interaction and Marketing

- An active and engaging online presence is vital to customer engagement and customer acquisition. This includes blog posts, sweepstakes or special giveaways via social media platforms like Twitter, Instagram and Facebook, and frequent interaction with Brand Partners and organizations with similar missions in the non-profit realm.
- The BabyLove website is the central hub for customers to find information on the products they receive each month. It is also where new customers go to sign up for the subscription and fill out their personal profile.

Key Partners

In addition to being a key resource, individual HBC brands are essential partners to BabyLove's service, as they provide the samples for the monthly boxes. To keep consistent with an environmentally safe mission, BabyLove must identify appropriate packaging supplier partners. In order to ensure credible user-generated content such as reviews, the BabyLove website will link to applicable product reviews on existing online retail sites. Mother influencer networks, such as mother blogging networks, Mommy Meet-Ups, Pre-natal Yoga classes, Pre-natal care centers, etc., will help BabyLove reach potential customers.

Third-party organizations provide credibility and transparency; they may include non-profits like the Environmental Working Group, or government agencies like the US Department of Health and Human Services. An essential partner, the GoodGuide provides the HBC Brand Partner rating system. The Good Guide is a for-profit company that has compiled an extensive database, consisting of 145,000 products ranging from skincare to children's toys to car production. The ingredients for each of these products is externally tested for health and safety. Additionally, this organization ranks the social and environmental impacts not only of the specific product, but also for the company as a whole. The Good Guide gives each of the three categories (health, social, and environmental) an individual score and then averages it for an overall score, which makes it easy for the consumer to understand. More recently, this organization has introduced a mobile application that allows consumers to take a picture of an product's barcode to find more information about the

item while they are shopping.[86] These organizations provide information and data that BabyLove will use to identify harmful product ingredients, and provide additional credibility and transparency to BabyLove's product and service.

Additionally, to provide BabyLove customers with easy access to full-size versions of the products sampled, the Venture will partner with external online retailers. The primary affiliate retailer BabyLove will partner with is Amazon, an e-commerce industry leader that sells products offered by BabyLove Brand Partners. Additionally, the Venture will enroll in the Amazon Affiliate Partners Program, which provides compensation between 4-8.5% to Affiliate Associates.[87]

Cost Structure

BabyLove does not require large capital investment, as most operational costs will be variable, dependent upon the number of customers each month. Initial costs include software and website creation.

Variable Costs: The Team looked at per-unit variable costs (See Appendix 4.4)

ITEM	COST per unit
Shipping	$3.60
Packaging Materials: Box	$0.49
Packaging Materials: Other	$3.00
Labor	$0.67
PayPal fees	$0.74-$0.88
TOTAL:	$8.01-$8.15

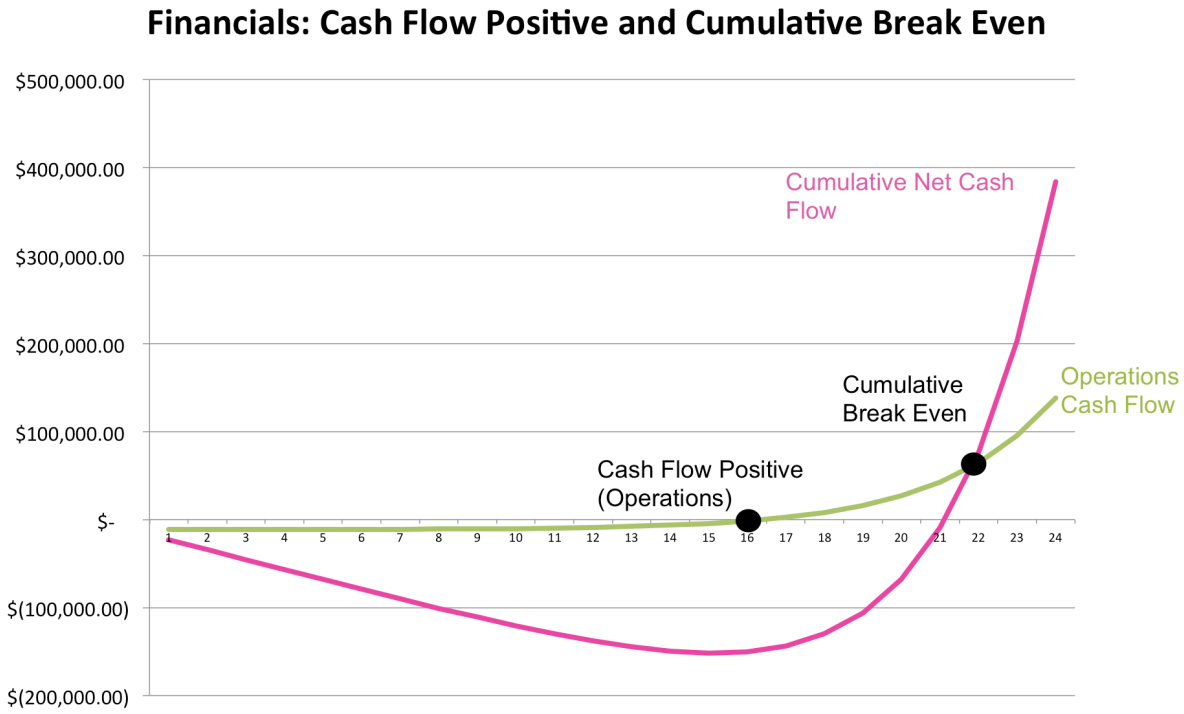
Fixed Costs: The Team looked at fixed costs on a monthly basis.

ITEM	COST per month
Marketing	$1,000
Website	$50
Salaries	$10,000 ($40,000 annual salary for three Team members)
Facility Rent/Storage	$350
TOTAL:	$11,500

[86] Good Guide, Inc. (2011). The Good Guide: About Us.. Retrieved February 2013, from http://goodguide.com
[87] Amazon (2012). Associates Compensation Overview. Retrieved February 2013, from https://affiliate-program.amazon.com/gp/associates/join/compensation.html

Financial Modeling

Considering the various contribution margins (based on increasing customer volume), the projected Cash Flow Positive point comes at around month 14 of Company operations, with 778 monthly units sold; the Cumulative Break-Even point comes at around month 19 with 5,124 monthly units sold. For financial assumptions, see Appendix 4.5, and for financial spreadsheet, see Appendix 4.6.



Competitive Differentiation

BabyLove is uniquely positioned in both the HBC market and the Maternity market. Many large HBC companies offer conventional and natural product lines, but oftentimes do not specifically target pregnant women - despite the fact that they often carry baby care products. Through industry research interviews, the Team discovered that there has been a recent increase in the number of smaller businesses that produce maternity-safe HBC products - however, these companies attach a premium price to their offerings, due to the increased costs of production. The higher price point acts as a deterrent for customers.[88] BabyLove helps large HBC companies reach the pregnant demographic, while also helping smaller maternity companies get their product into the hands of their target customer.

The major competitive edge BabyLove has comes from the emphasis on ingredient safety, based on scientific research. By partnering with the GoodGuide, and only carrying products that have been through the GoodGuide's stringent rating process, BabyLove can offer a unique product that will

[88] Todd, A. M. (2004). The aesthetic turn in green marketing: Environmental consumer ethics of natural personal care products. Ethics & the environment,9(2), 86-102

satisfy customers. Customer interviews revealed that many women in the pregnancy demographic value legitimate safety information and education regarding HBC product ingredients, but do not have the time or resources to comb through the information on their own. Compared with direct and indirect competitors, including Ecocentric Mom, BabyLove stands above the rest in terms of scientific data-backed safety information and in addressing the specific customer need for maternity-safe HBC products.

product features	THE HONEST CO. / citrus lane	MOMMIESFIRST / Ecocentric Mom	babylove.
maternity niche	✓	✓	✓
beauty products sampling service	✗	✗	✓
3rd party safety rating	✗	✗	✓
credible experts	✓	✗	✓

Minimum Viable Product (MVP)

Through customer research including surveys, interviews, and online advertisements, the Team determined what the BabyLove MVP should include.

The BabyLove online presence should include a seamlessly integrated Facebook Business Page and a BabyLove Store website. The BabyLove website, babyloveproject.org, serves as the storefront to potential customers; therefore, the website must be easy to understand, navigate, and attractive. It must also include product information, safety ratings, and links to external online retailers (e.g. Amazon). The BabyLove Facebook Page, along with other social media outlets, will serve as the medium through which customers interact with each other and with BabyLove.

The BabyLove Pregnancy Box will be the first product released in its initial launch. Focusing on one customer segment, pregnant women, allows for in-depth analysis on customer feedback and reduces the cost of operations by simplifying the inventory of Brand Partner HBC samples. In order to reduce the amount of material inputs that will likely be disposed of by the customer, the physical box will be simple in design with a minimal amount of packaging. Each box will contain between five to seven product samples, depending on the inventory obtained from Brand Partners, and a 4"x6" sized card with information for the customer. The customer will have the option to choose up to three product samples, and the remaining two to three samples will be expert-curated, drawing

on BabyLove resources that include dermatologists, wellness or maternity experts, the GoodGuide, and other healthcare professionals. Upon Brand Partner request, boxes will include any marketing collateral provided by Brand Partners.

The BabyLove Marketing Strategy will require diverse methods and outlets in order to recruit the target customer. It will include digital advertising campaigns on Google and Facebook, along with additional advertisements on maternity-specific websites and in local (Santa Barbara County) maternity-specific establishments. The local advertisements may be digital or physical, and will involve cross-promotion through social media.

SECTION FIVE: FUTURE RESEARCH

Future Research

In addition to the in-depth customer, industry, and market research the team has completed to-date, there are two main topics that need further exploration. First, the logistics, content, and aesthetics of BabyLove's product and service need to be tested by potential customers. In terms of logistics, BabyLove's online content, shopping cart, billing system, and community board needs to be reviewed to verify that 1) each component works seamlessly, 2) users enjoy their online BabyLove experience, and 3) the price is acceptable. The content (i.e. the product samples and information sheet) also needs to be approved by potential customers to validate that the Good Guide is a trusted and easily understood rating system, the brands and type of products are attractive to expectant and new mothers, and the information care contains the type of information most relevant to customers' concerns. Aesthetically, the Team needs to verify that the BabyLove branding and packaging is appealing to this demographic and meets their expectations in terms of eco-friendliness. To test these hypotheses, the team will conduct a three-tiered pilot program. The participants will be asked to explore our site, order the product for our website, and then fill out a survey asking about their experience. Once the product arrives, another survey will be administered that asks participants to review the content and aesthetics of the product. Lastly, a one-hour focus group will be held with ten participants to further discuss the participants' perception of BabyLove's product and service.

Secondly, on a broader scale, specific market research for new or expecting mothers' shopping trends in the natural HBC industry may provide new insights into important trends. This information may provide key insights into the preferences of the target customer and untapped opportunities to solve the underlying customer problem. Specifically, research that focuses on the shifts in purchasing habits that are made once a woman becomes pregnant would be invaluable resources for the Team as well as other businesses within this space. This research is outside the scope of this business, and thus ought to be conducted by an external entity.

Expanding these bodies of knowledge will enhance the Team's understanding of the target customer and the market, which can improve the overall BabyLove product, service, and overall experience for the customer.

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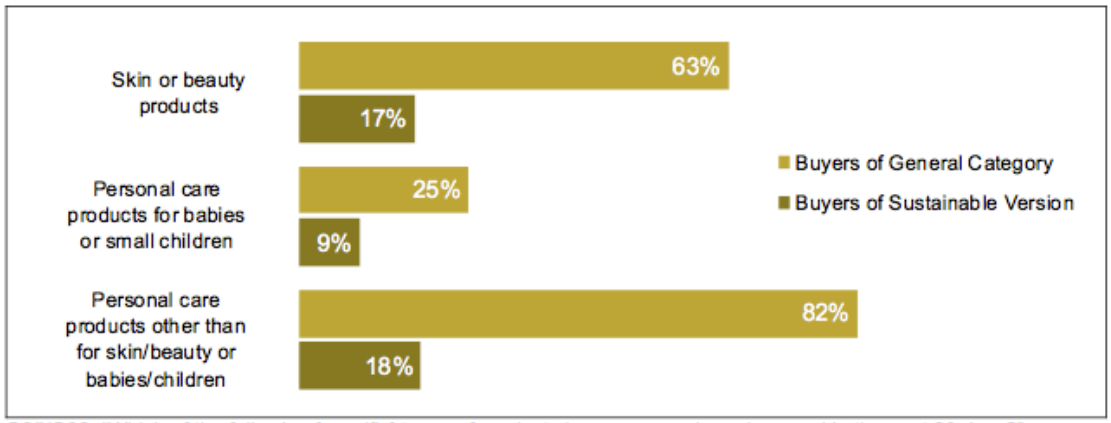
Section Seven: Appendices

Appendix 3.1: Secondary Research: Quantitative Findings on Sustainable Personal Care Purchasing

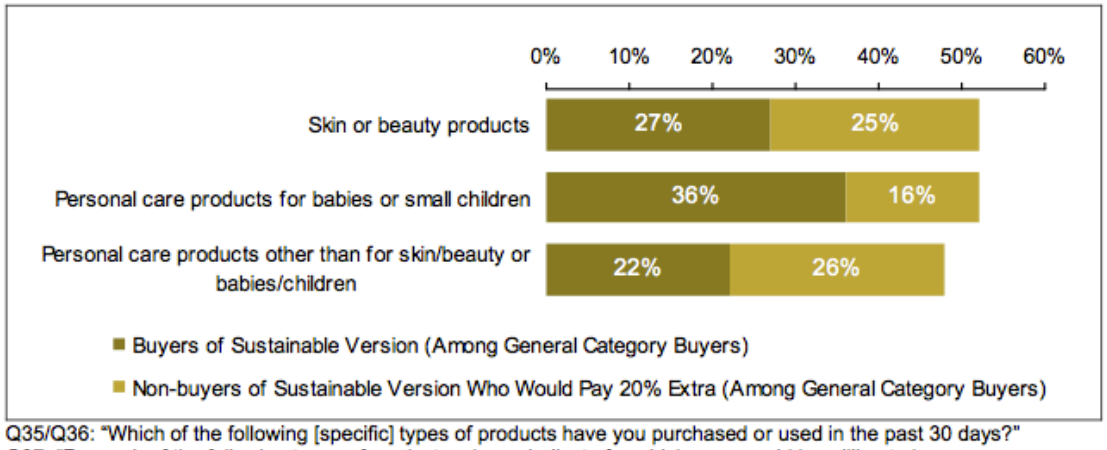
Purchases of Personal Care Products
(By Product Category: General Category vs. Sustainable Versions)



Q35/Q36: "Which of the following [specific] types of products have you purchased or used in the past 30 days?"
For descriptions of general product categories and their sustainable versions, see Table 3-4.
Base: Significant shoppers inside the World of Sustainability (n=1,591).
Source: The Hartman Group, *Sustainability 2008 Survey*, Sept. 2008.

Appendix 3.1.1

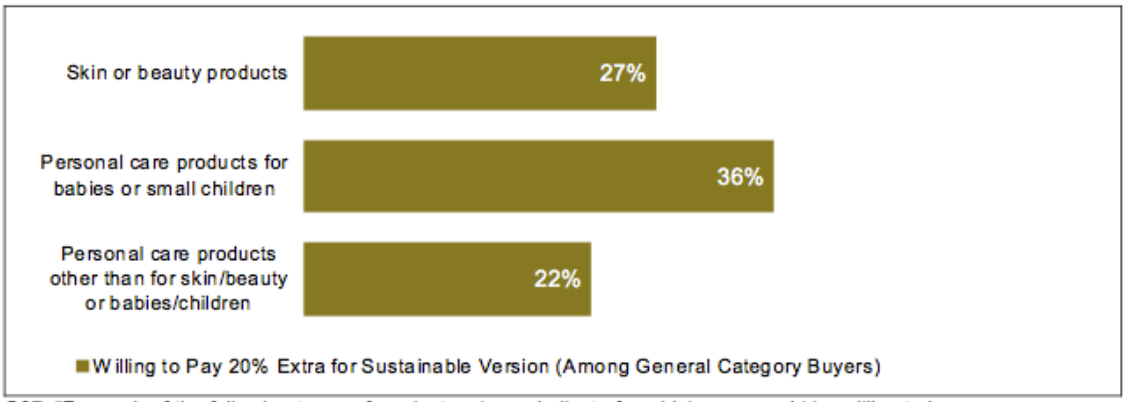
Current Market Reach and Immediate Growth Opportunity of Sustainable Personal Care Products
(By Product Category)



Q35/Q36: "Which of the following [specific] types of products have you purchased or used in the past 30 days?"
Q37: "For each of the following types of products, please indicate for which ones you'd be willing to buy a sustainable version, even if it cost 20% more than the conventional (non-sustainable) version."
For descriptions of general product categories and their sustainable versions, see Table 3-4.
Base: Significant shoppers inside the World of Sustainability who purchased general product category; base size varies by category: skin or beauty products (n=1,029); personal care products for babies or small children (n=326); personal care products other than for skin/beauty or babies/children (n=1,311).
Source: The Hartman Group, *Sustainability 2008 Survey*, Sept. 2008.

Appendix 3.1.2

Willingness to Pay a Premium (20% More) for Sustainable Personal Care Products (By Product Category)



Q37: "For each of the following types of products, please indicate for which ones you'd be willing to buy a sustainable version, even if it cost 20% more than the conventional (non-sustainable) version."
Note that this question refers to a generic sustainable version rather than the specific sustainable versions listed in Table 3-4.
Base: Significant shoppers inside the World of Sustainability who purchased general product category; base size varies by category: skin or beauty products (n=1,029); personal care products for babies or small children (n=326); personal care products other than for skin/beauty or babies/children (n=1,311).
Source: The Hartman Group, *Sustainability 2008 Survey*, Sept. 2008.

Appendix 3.2: Secondary Research: Categories for Consumer Segments

Motivations and Barriers for Sustainable Purchases

Periphery	Mid-level	Core
1. Convenience	1. Expert Opinion	1. Knowledge
2. Price	2. Convenience	2. Experience
3. Expert Opinion	3. Knowledge	3. Expert Opinion
4. Experience	4. Price	4. Price
5. Knowledge	5. Experience	5. Convenience

Source: The Hartman Group, *Sustainability: The Rise of Consumer Responsibility*, 2009.

Appendix 3.3: Primary Research: Industry Interviews – Questions List

- What regulations or laws constrain you the most?
- What are your most challenging problems?
    - How do you address them? Are there any that you don't see solutions for?
- How does your company measure success?
    - How do you know your end-users/customers are happy?
    - What issues do you have in serving your end-users?
    - What feedback/assessment mechanisms do you use to measure your customer satisfaction?
- How do you go about deciding which product inputs to buy?
- Have you had any experiences in the past that made you consider changing suppliers?
- Do you produce samples?
    - If yes, have they been effective in reaching customers? Why/why not?
    - If no, why not?
- Budget: Are any significant areas decreased/increased over past years?
- What changes do you see for your industry in the future? (Over the next three years.)
- If you could change three things in your industry, regardless of technology, what would they be?
- If we were to ask your end-users what improvements would make their life easier, what would the say?

Appendix 3.4: Primary Research: Customer Interviews – Questions List

· Is it time-consuming to find new products? How do you find new products? Tell me about your process.
· What baby care product is most important? Why, and how do you determine the best "brand" or "type"?
· Do you consider the effect of products that you use on your child? What worries you the most?
· How much time do you spend searching for products before making a purchase?
· What makes you look for or want to try new products?
· Do you use/prefer natural products? How do you define "natural?"
· Do you buy products for yourself and/or your baby online?
· Do you prefer buying online or in a store? In a store, what do you think of the "testers?"
· Do you look at labels when you purchase a product? Tell me about how you evaluate a product.
· Are their particular ingredients you look for or try to avoid when you purchase cosmetic products?
· What do you think of organic products for your personal use? For use on your baby?

Baby-Related Questions:

- Please describe your process to find new baby care products.
- What is the best product you adopted for yourself during your pregnancy and/or for your baby during infancy? How did you hear about or find this product?
- **Is finding effective natural baby care products a problem for you?**
- Is this an effective method for you? What are the problems affiliated with this method you use?
- How much time does it take to find natural baby care products? (can re-phrase once we know what the person currently is doing)

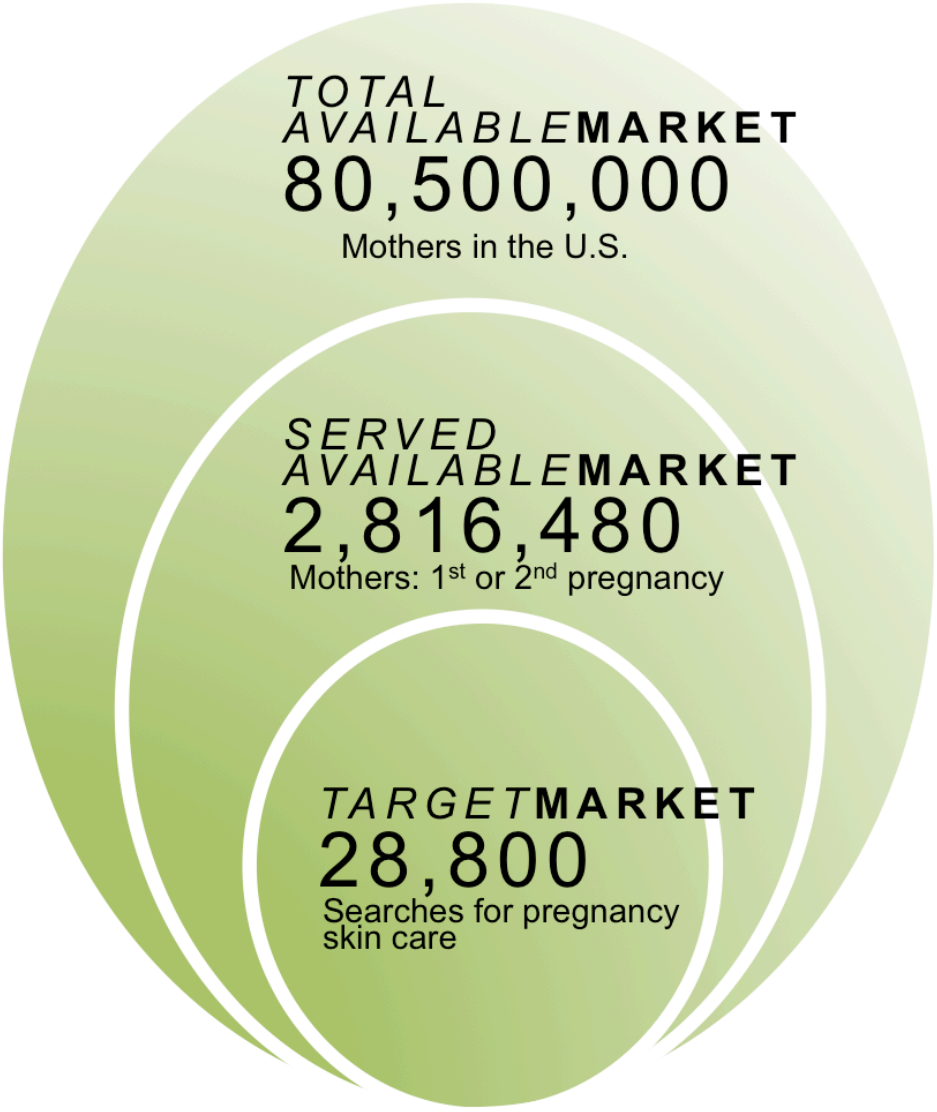
- What other methods have you personally tried?
- How did they work? What about these methods did not work?
- Have you heard of other ways that you have not tried?
- How much do you pay for your current solution?
- If we were to develop a way to find new natural care care items, what components of the product would be most important to you? *(ask first, then proceed to following question)*
- How much would you be willing to pay for a better product? (start high with all desired features)
- Is there anything else you would like us to know?
- Do you have any questions for us?
- How do you feel about new mother community groups like Mommy and Me?
- What is your job outlook like after giving birth?

Appendix 3.5: Primary Research: Customer Survey

Category	Is it time consuming to find new products? How do you find new products? Please tell me about your process	Do you consider the effect of products that you use on your health? What worries you the most?	How much time do you spend searching for products before making a purchase?	What makes you want to try new products?	Do you use/prefer natural products? How do you define "natural"	Do you prefer buying online or in a store? In a store, what do you think of "testers"?	Do you look at labels when you purchase a product? Please tell me about how you evaluate a product	What do you think of natural or organic products for your personal use? Do you look for them when purchasing	What baby care product is the most important? Why, and how do you determine the best "brand" or "type"?	Do you consider the effect of products that you use on your child? What worries you the most?	What do you think of natural or organic products for your baby? Do you look for them when purchasing products?
"Older" (45+)	friend/family recommendation; use mass retail; open to trying new; asks hairdresser; magazine; online research; online reviews; brand-loyal; mail; cruelty-free; samples	Effective; allergic/skin reactions; adverse health effects; bad reviews	couple of days; one day; 15 mins-1 hr	specific need; new breakthrough or innovation; new needs as aging; other recommendations	less chemicals; unsure of definition	Online: hair products. In-Store; either; love testers; don't use testers-dirty	what works; worth the money; description of use	Haven't thought about it; probably should use; focus on what works; price difference			
"New Mother" (pregnant women, mothers of infants (age 0-4)	other moms; word-of-mouth; research; Dr recommendations; reviews; TV ads	Yes	depends; 2-3 days; week	run out; recall; dissatisified; celebrity endorsements; reviews	Don't mind as long as product works	Online: ccasionally; in-store; don't use testers-not clean;	depends, what works	tries to use; no preference	diaper cream; comfort for very sensitive skin	sunscreen; harmful effects; rash/allergy	natural ingredients; no chemicals;
"Younger" (23-26)	Friend/family Recommendation; use mass retail; open to trying new; asks hairdresser; magazines; online research; online reviews; brand-loyal; cruelty-free; samples; price	Runoff down drain; unknown effects; allergy; health; hard to find natural alternatives; trusts high-end brands; FDA-approved; chemicals; don't research	"depends"; Up to 30 min; more on makeup/perfume; few minutes; as little as possible; don't want to spend $ to experiment	Run out; Dissatisfied/bored w/ current prods; specific need; got recommendation from friend/stylist; tried a friend's product; brand loyal; commercial/ads; nice packaging	few/no chemicals; wants to but doesn't know where to start; known ingredients; % naturally based; skeptical of "natural" label; biodegradable/li fecycle	Amazon bc cheaper & free fast shipping; Only if tried before; hair productsIn-Store; Depends; doesn't use testers; not full effect; testers dirty; can be helpful @ dept store; use for lotions; wants more trial sized soap/shampoo; can get product immediately; shipping costs	Check certifications; Don't buy new prods often; Ingredients; meet personal criteria; doesn't understand chem names; price is big factor; size; easy directions	Love them/Preferable; Would love to switch to natural; price barrier; Depends on product; doesn't work like conventional; not educated; goes for what feels right not organic; not effective, chems work; skeptical of label; do not look for them			

50 total respondents returned the survey. Survey goal: gain insight on customers' views and behavior. Qualitative statements taken directly from respondents' answers. Lack of "yes/no" responses.

Appendix 3.6: Market Sizing



Target market sizing based on internet searches for the key words "pregnancy skin care."

Appendix 3.7: Customer Archetype

Crunchy Mom	Plush Mom
	
-**Customer demographic:** Pregnant/new mother. She takes pride in her eco-conscious lifestyle. She's already planning on having a home birth and using cloth diapers, but she's still unsure on what skincare ingredients are actually safe. She spends hours researching safety information before making a purchasing decision and relies extensively on advice from her social media community. -**Customer need:** Faster, easier, more economical method of finding natural personal care products that suit individual preferences and/or address an identified specific need. -**Current method:** Hours of online research, word of mouth recommendations, digitally communicating with friends and natural or holistic healthcare experts. She spends money on recommended products, or expensive ingredients for Do-It-Yourself at-home remedies, but is unable to test these products or remedies out beforehand. It's an experiment every time. She recycles and composts what she can from her unused products and ingredients, but must inevitably throw some away, and feels	-**Customer demographic:** Pregnant/new mother. Always on top of the latest beauty and fashion trends, so beauty and appearance is still a top-priority. She searches for pregnancy products that are luxurious, innovative, and eco-friendly. She looks for expert opinion and celebrity endorsements when searching for new products. The recent change in hormones has lead to new skin issues, so effectiveness is essential. -**Customer need:** Faster, easier, more economical method of finding natural personal care products that suit individual preferences and/or address an identified specific need. -**Current method:** Some online and in-store research, word of mouth recommendations, and expert consultations. She also is heavily influenced by marketing or media advertisements that feature a celebrity endorsing or using a particular product. She seeks the newest, greatest, trendiest items, and spends money on those products without the ability to test them first. When the product doesn't work, she purchases other brands until finding one that works. Her bathroom cabinet is filled with partially used

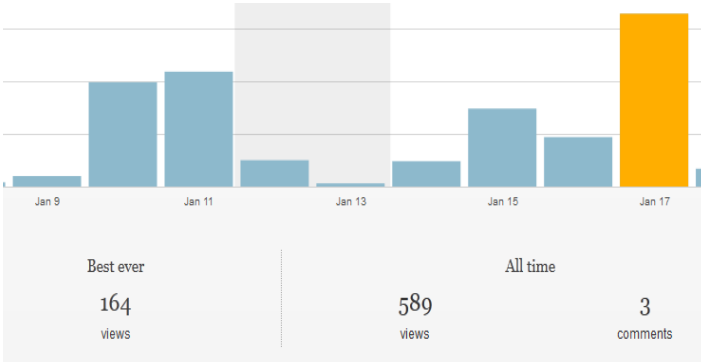
unhappy that she wasted time, money, and resources. -**Target Criteria:** -Spends unwanted amount of time finding products: Yes/Usually -Wants an easier and cheaper method of finding a product: Yes -Researches product: Yes -Willing/able to pay premium: Yes -Considers product health effects: Yes -Wants to try new products: Yes -Values ability to sample: Yes -Likes/wants to use healthy/natural products: Yes	expensive face creams, makeup, and other HBC products. -**Target Criteria:** -Spends unwanted amount of time finding products: Yes/Usually -Wants an easier and cheaper method of finding a product: Yes -Researches product: Yes -Willing/able to pay premium: Yes -Considers product health effects: Yes -Wants to try new products: Yes -Values ability to sample: Yes -Likes/wants to use healthy/natural products: Yes

Appendix 4.1: The GoodGuide, Inc. Ratings Methodology

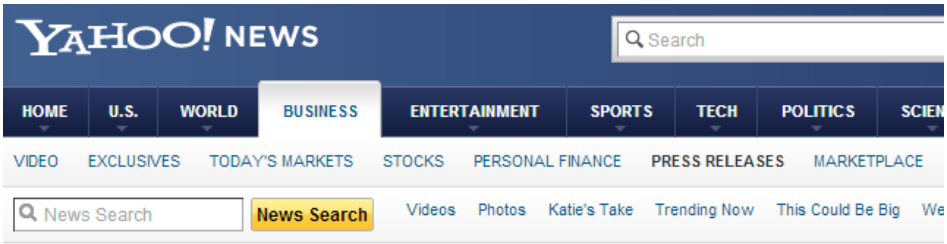
The Good Guide, Inc. Ratings Methodology		
Score type	**Indicators**	**Explanation**
Health	Human health impact	Assess degree of health concern regarding product ingredients and the overall nutritional value of a product
	Data adequacy	Determine whether the information needed to assess health risks is available for a product
	Other negative aspect	Address product production and regulation, including use of banned or restricted ingredients, use of "bad-actor" chemicals targeted for phase-out in production processes, and whether product contains contaminants from production processes
	Product management	Use third-party certifications that verify health or environmental performance
Environment	Environmental management	Characterize overall corporate governance - the company's policies and practices, compliance record, involvement in controversies, any exemplary practices
	Transparency	Assess whether the information needed to evaluate environmental issues is made available by the company. Track natural resource inputs used by the company to manufacture products (materials, water, energy)
	Environmental impact	Track the outputs of the company's manufacturing processes, including whether emissions or production practices contribute to anthropogenic climate change, air/water pollution, waste generation, or ecosystem/biodiversity degradation
Society	Management	Characterize overall corporate governance - the company's policies and practices, compliance record, involvement in controversies, any exemplary practices
	Transparency	Assess whether the information needed to evaluate environmental issues is made available by the company. Track natural resource inputs used by the company to manufacture products (materials, water, energy)
	Consumer	Consider customer health and safety policies and controversies and product recalls, and information about labeling and marketing practices
	Community	Track the company's community relationships, stakeholder engagement initiatives, and public policy positions
	Worker	Consider company performance on occupational safety and health, diversity and equal opportunity, and human and labor rights

Retrieved February 2013 from http://www.goodguide.com/about/ratings

Appendix 4.2: BabyLove Online Presence – Data



Appendix 4.2.1: Press Release



Pretty Mommies And A Group Of Graduate Students Help Expecting Moms Make Safe Choices

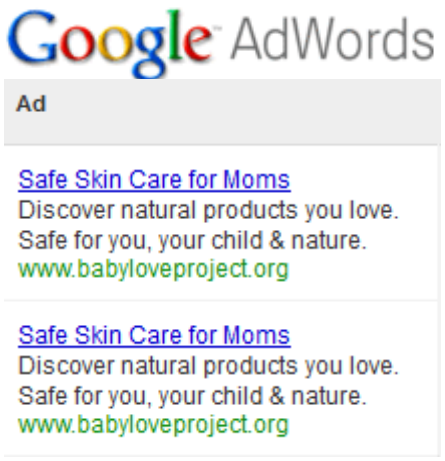
PRWeb – Sat, Jan 12, 2013

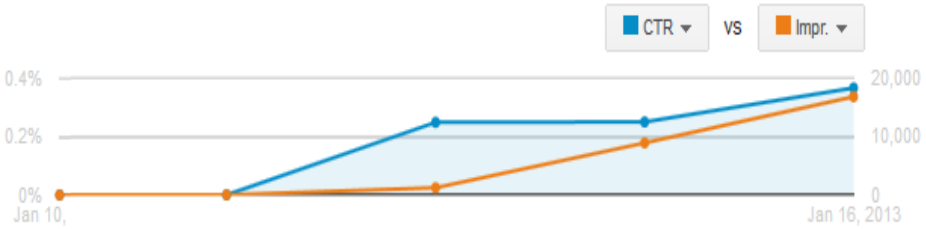
Email Share Tweet Share Print

Pretty Mommies maternity skin care discusses the soon to be launched BabyLove that was created by three innovative graduate students at the University of California, Santa Barbara. Baby Love combines a proven and highly successful business model with a brand new concept of allowing expecting women to sample pregnancy safe products before purchasing them.

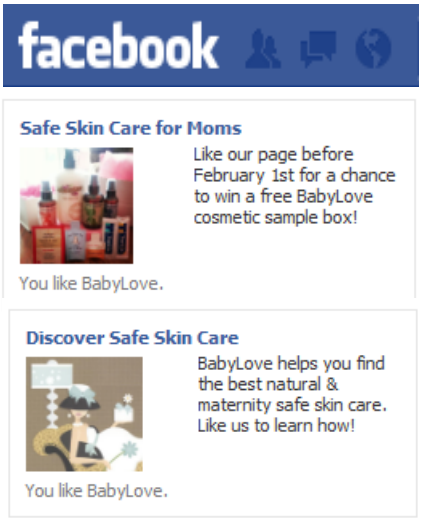
Santa Barbara, CA (PRWEB) January 10, 2013
There are many companies that sell and sample skin care products. Some of these companies are found online, in department stores and even physicians' offices. There are others that have taken it a

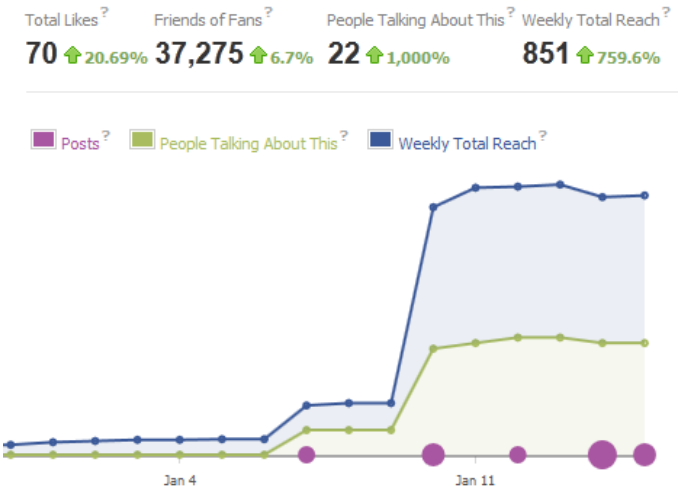
Appendix 4.2.2: Google Adwords Campaign

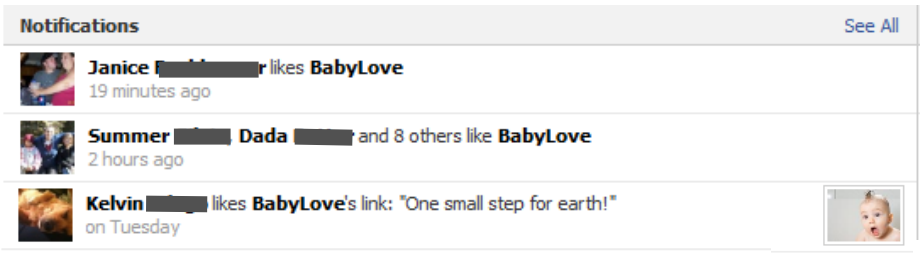




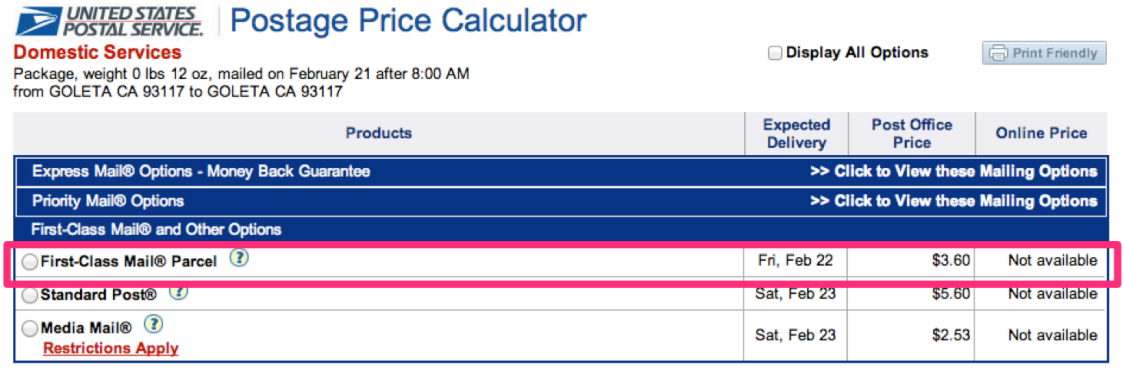
Appendix 4.2.3: Facebook Ads Campaign







Appendix 4.3: USPS Shipping Estimate – Goleta and Santa Barbara; EcoBox Invoice



UNITED STATES POSTAL SERVICE. | Postage Price Calculator

Domestic Services

Package, weight 0 lbs 12 oz, mailed on February 21 after 8:00 AM
from GOLETA CA 93117 to GOLETA CA 93117

Display All Options | Print Friendly

Products	Expected Delivery	Post Office Price	Online Price
Express Mail® Options - Money Back Guarantee			>> Click to View these Mailing Options
Priority Mail® Options			>> Click to View these Mailing Options
First-Class Mail® and Other Options			
First-Class Mail® Parcel	Fri, Feb 22	$3.60	Not available
Standard Post®	Sat, Feb 23	$5.60	Not available
Media Mail® Restrictions Apply	Sat, Feb 23	$2.53	Not available

[Retrieved February 2013 from: http://postcalc.usps.com/MailServices.aspx?m=6&p=0&o=12&dz=93117&oz=93117&pob=0&MailingDate=2/21/2013&MailingTime=8:00%20AM]

EcoBox
Buy Green. Save Green.

EcoBox - Distribution Center
3816 Binz Engleman Rd. B-101
San Antonio TX 78219
United States
(210) 957-8833
www.ecobox.com

Bill To
Jessalyn Ishigo
Bren School of Environmental
Science Management
447 Mills Way
Goleta CA 93117
United States

Ship To
Bren School of Environmental
Science Management
447 Mills Way
Goleta CA 93117
United States

Quote Date	10/18/2012
Quote #	SAT2-221
Expires	11/17/2012
Sales Rep	Lee, Sam T
Project	
Shipping Method	Drop Ship - Vendor
Subsidiary	San Antonio, TX Territory
Customer Fax#	
Customer Phone#	(310) 874-5420
Special Delivery Instructions	
Customer Email	jishigo@bren.ucsb.edu
CSR Name	Lee, Sam T
Purchaser	Jessalyn Ishigo

Quantity	Item	Units	Description	Bundle Qty	Case Qty	Unit Price	Amount
1,000	V-5251	each	8 x 6 x 3, RSC, 32 ECT, white			0.499	499.00
3,000	V-5251	each	8 x 6 x 3, RSC, 32 ECT, white			0.476	1,428.00
5,000	V-5251	each	8 x 6 x 3, RSC, 32 ECT, white			0.429	2,145.00
						Subtotal	4,072.00
						Shipping Cost (Drop Ship - Vendor)	0.00
						Total	$4,072.00

Hi Jessalyn, here is a quote for 1,000, 3,000 & 5,000 qty of the 8 x 6 x 3 white box. I can waived the freight charge if you order 3,000 qty or more. You should be receiving the 25 qty today according to UPS tracking. I will email you a quote on the custom 8 x 5 x 3 but the cost is quite a bit more plus I have to ship them from our Texas facility vs. the stock 8 x 6 x 3 is being shipped from our sister plant in CA. Please let me know if you have any questions. Thanks, Sam

PLEASE NOTE: By signing this quotation, customer accepts purchasing terms and conditions of EcoBox Company, including a 10% quantity under/overrun margin on all custom box orders. ALSO NOTE: Unless quoted otherwise, all pricing includes FREE SHIPPING to the greater Austin and San Antonio, TX area w/ a $95min order.

RECEIVED BY:

Signature:_____ Last Name (Print):_____ Date:_____

Appendix 4.4: Variable Costs Breakdown

ITEM	COST per unit	DETAILS
Shipping	$3.60	If weight kept under 13 oz. (See Appendix 4.3)
Packaging Materials: Box	$0.49	See Appendix 4.3
Packaging Materials: Other	$3.00	Based on industry knowledge
Labor	$0.67	Assemble 12 boxes/hour with wage: $8/hour
PayPal fees	$0.88	2.9% + $0.30 for up to $3,000 monthly sales (estimated 150 customers)
	$0.80	2.5% + $0.30 for $3,001-$10,000 monthly sales (estimated 150-500 customers)
	$0.74	2.2% + $0.30 for $10,001+ monthly sales (estimated 500+ plus customers)
TOTAL for 150 customers:	$8.15	
TOTAL for 150-500 customers:	$8.07	
TOTAL for 500+ customers:	$8.01	

Appendix 4.5: Financial Assumptions

Using PayPal, there are varying per-unit costs based on customer volume:

- For the first 150 monthly customers, the per-unit cost of the subscription boxes is $8.15. Given that the typical stated customer willingness to pay (obtained in customer research interviews) is $20, the per unit contribution margin is 59.25% ($11.85).
- For between 150 – 500 monthly customers, the per-unit cost of the subscription boxes is $8.07. At $20 per box, the per-unit contribution margin is 59.65% ($11.93).
- For 500 or more monthly customers, the per-unit cost of the subscription boxes is $8.01. At $20 per box, the per-unit contribution margin is 59.95% ($11.99).

Financials: Cash Flow Positive and Cumulative Break Even

These projections were obtained using a financial model that includes the following assumptions (see Appendix 4.6 for model spreadsheet):

- **Sales Volume**: Beginning with 5 initial customers, there is a 50% monthly customer growth rate and a 10% monthly customer loss rate (based on previous month's total customers). One customer represents one $20 unit sold.
- **Affiliate Revenue**: 10% of monthly customers will spend $60 on full-size products via external online retailers; 4% commission is assumed.[89]
- In a two-year period, costs stay constant (no increase or decrease in either fixed or variable costs).

[89] Amazon (2012). Associates Compensation Overview. Retrieved February 2013, from https://affiliate-program.amazon.com/gp/associates/join/compensation.html

Appendix 4.6: Financials: Excel Model Spreadsheet

Financials: Excel Model Spreadsheet
Page 1 of 3

Revenue		Month				1		2		3		4		5		6
	$ per unit				$	20.00	$	20.00	$	20.00	$	20.00	$	20.00	$	20.00
	# customers					5		7		10		14		19		27
	customer gain					5		3		4		5		7		10
	customer loss							1		1		1		1		2
	# units/cust					1		1		1		1		1		1
	Affiliate Revenue		$	0.02	$	1.20	$	1.68	$	2.35	$	3.29	$	4.61	$	6.45
Total monthly	sales volume					5		7		9.8		13.72		19.208		26.8912
Total monthly	revenue				$	101.20	$	141.68	$	198.35	$	277.69	$	388.77	$	544.28
Variable Cost																
	shipping		$	3.00	$	3.00	$	3.00	$	3.00	$	3.00	$	3.00	$	3.00
	packaging		$	3.00	$	3.00	$	3.00	$	3.00	$	3.00	$	3.00	$	3.00
	labor		$	0.67	$	0.67	$	0.67	$	0.67	$	0.67	$	0.67	$	0.67
	PayPal		$	0.88	$	0.88	$	0.88	$	0.88	$	0.88	$	0.88	$	0.88
Total (unit)			$	7.55	$	7.55	$	7.55	$	7.55	$	7.55	$	7.55	$	7.55
Total					$	37.73	$	52.83	$	73.96	$	103.54	$	144.96	$	202.94
Fixed Cost																
	website		$	50.00	$	50.00	$	50.00	$	50.00	$	50.00	$	50.00	$	50.00
	marketing		$	500.00	$	500.00	$	500.00	$	500.00	$	500.00	$	500.00	$	500.00
	ads		$	50.00	$	50.00	$	50.00	$	50.00	$	50.00	$	50.00	$	50.00
	facility		$	700.00	$	700.00	$	700.00	$	700.00	$	700.00	$	700.00	$	700.00
	insurance		$	200.00	$	200.00	$	200.00	$	200.00	$	200.00	$	200.00	$	200.00
	salaries		$	10,000.00	$	10,000.00	$	10,000.00	$	10,000.00	$	10,000.00	$	10,000.00	$	10,000.00
Total (month)			$	11,500.00	$	11,500.00	$	11,500.00	$	11,500.00	$	11,500.00	$	11,500.00	$	11,500.00
Total Cost					$	11,537.73	$	11,552.83	$	11,573.96	$	11,603.54	$	11,644.96	$	11,702.94
net cash flow					$	(11,436.53)	$	(11,411.15)	$	(11,375.61)	$	(11,325.85)	$	(11,256.19)	$	(11,158.66)
					$	(11,436.53)	$	(22,847.68)	$	(34,223.29)	$	(45,549.13)	$	(56,805.32)	$	(67,963.98)

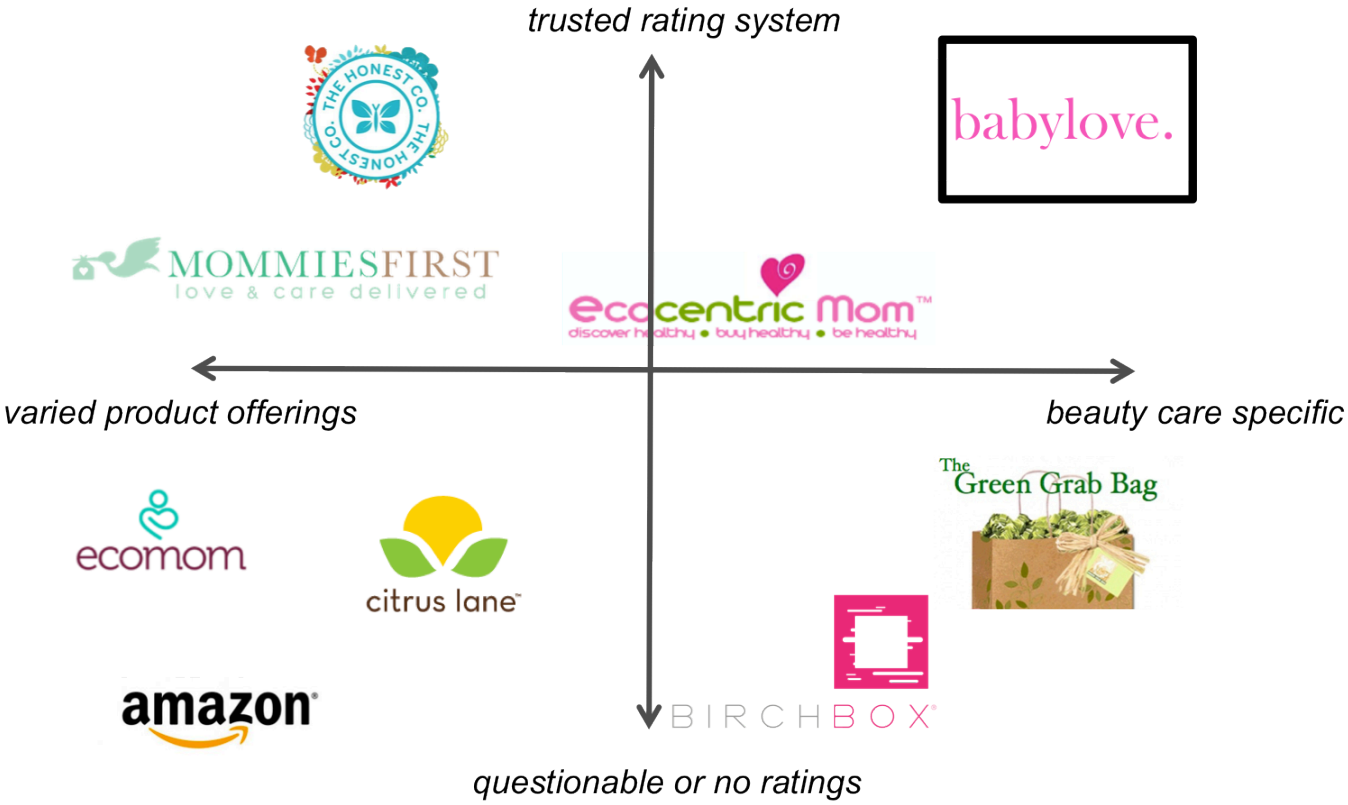
Financials: Excel Model Spreadsheet
Page 2 of 3

	7	8	9	10	11	12	13	14	15
	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00
	38	53	74	103	145	202	283	397	556
	13	19	26	37	52	72	101	142	198
	3	4	5	7	10	14	20	28	40
	1	1	1	1	1	1	1	1	1
	$ 9.04	$ 12.65	$ 17.71	$ 43.39	$ 60.74	$ 85.04	$ 119.06	$ 166.68	$ 233.35
	37.64768	52.706752	73.7894528	103.3052339	144.6273275	202.4782585	283.4695619	396.8573866	555.6003413
	$ 761.99	$ 1,066.78	$ 1,493.50	$ 2,109.49	$ 2,953.29	$ 4,134.61	$ 5,788.45	$ 8,103.83	$ 11,345.36
	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00
	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00
	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67
	$ 0.88	$ 0.88	$ 0.88	$ 0.88	$ 0.88	$ 0.80	$ 0.80	$ 0.80	$ 0.80
	$ 7.55	$ 7.55	$ 7.55	$ 7.55	$ 7.55	$ 7.47	$ 7.47	$ 7.47	$ 7.47
	$ 284.11	$ 397.76	$ 556.86	$ 779.61	$ 1,091.45	$ 1,511.84	$ 2,116.57	$ 2,963.20	$ 4,148.48
	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00
	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00
	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00
	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00
	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00
	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00
	$ 11,784.11	$ 11,897.76	$ 12,056.86	$ 12,279.61	$ 12,591.45	$ 13,011.84	$ 13,616.57	$ 14,463.20	$ 15,648.48
	$ (11,022.13)	$ (10,830.98)	$ (10,563.37)	$ (10,170.12)	$ (9,638.16)	$ (8,877.23)	$ (7,828.12)	$ (6,359.37)	$ (4,303.12)
	$ (78,986.11)	$ (89,817.08)	$ (100,380.45)	$ (110,550.56)	$ (120,188.73)	$ (129,065.96)	$ (136,894.08)	$ (143,253.46)	$ (147,556.58)

Financials: Excel Model Spreadsheet
Page 3 of 3

	16	17	18	19	20	21	22	23	24
	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00	$ 20.00
	778	1089	1525	2134	2988	4183	5857	8199	11479
	278	389	544	762	1067	1494	2092	2928	4100
	56	78	109	152	213	299	418	586	820
	1	1	1	1	1	1	1	1	1
	$ 326.69	$ 457.37	$ 640.32	$ 896.45	$ 1,255.02	$ 1,757.03	$ 2,459.85	$ 3,443.79	$ 4,821.30
	777.8404778	1088.976669	1524.567336	2134.394271	2988.151979	4183.412771	5856.77788	8199.489032	11479.28464
	$ 15,883.50	$ 22,236.90	$ 31,131.67	$ 43,584.33	$ 61,018.06	$ 85,425.29	$ 119,595.40	$ 167,433.57	$ 234,406.99
	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00
	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00	$ 3.00
	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67	$ 0.67
	$ 0.80	$ 0.80	$ 0.80	$ 0.80	$ 0.80	$ 0.80	$ 0.74	$ 0.74	$ 0.74
	$ 7.47	$ 7.47	$ 7.47	$ 7.47	$ 7.47	$ 7.47	$ 7.41	$ 7.41	$ 7.41
	$ 5,807.88	$ 8,131.03	$ 11,383.44	$ 15,936.81	$ 22,311.53	$ 31,236.15	$ 43,379.20	$ 60,730.88	$ 85,023.23
	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00
	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00	$ 500.00
	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00	$ 50.00
	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00	$ 700.00
	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00	$ 200.00
	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00
	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 11,500.00
	$ 17,307.88	$ 19,631.03	$ 22,883.44	$ 27,436.81	$ 33,811.53	$ 42,736.15	$ 54,879.20	$ 72,230.88	$ 96,523.23
	$ (1,424.37)	$ 2,605.88	$ 8,248.23	$ 16,147.52	$ 27,206.53	$ 42,689.14	$ 64,716.20	$ 95,202.68	$ 137,883.76
	$ (148,980.96)	$ (146,375.08)	$ (138,126.85)	$ (121,979.33)	$ (94,772.80)	$ (52,083.66)	$ 12,632.54	$ 107,835.23	$ 245,718.98

Appendix 4.7: Competitive Positioning Map and Grid



Appendix 5: Literature Review

Introduction

The health and beauty care (HBC) industry has relied heavily on synthetic chemicals to formulate skin, hair and dental care products. Recently, much attention has been drawn to the potential negative human and environmental health impacts of these synthetic chemical compounds over short and long-term periods of exposure. Of cosmetic users, pregnant women in particular face heightened associated health risks given the vulnerability of the developing child. The synthetic chemicals found in PCPs also threaten environmental health as they enter ecosystems through various pathways. Several categories of synthetic compounds found often in daily use cosmetics are analyzed in the following report. These include musk fragrance, antimicrobials, ultraviolet filters and parabens. Research has indicated possible harmful side effects of these compounds both for humans and ecological functioning. The problem of synthetic compound misuse stems from insufficient federal regulation. The safety issues associated with an unchecked industry indicate a pressing need both for the consumer and the environment. An opportunity is available for a social venture to address these needs. In addition, a feasible opportunity for a budding venture exists in the established HBC industry as well.

Personal Care Products and Eco-Toxicity

There is a growing concern for the fate and potential impacts of synthetic organic chemicals found in personal care products (PCPs).[90 & 91] 80,000 thousand chemicals are registered for commercial use in the United States, with very little pre and post market safety testing.[92] Soaps, sunscreens, hair styling and dental care products are a few examples of the many cosmetics formulated with synthetic chemicals that are consumed in vast quantities globally.[4] In the early 1990s, Germany alone produced more than 550,000 metric tons of these personal care items annually.[93] The synthetic compounds contained in PCPs enter the environment indirectly via wastewater treatment plant outflow, after the products are washed off the body in the shower or sink and directed to treatment plants.[94] There is also a chance these compounds will enter the environment directly from recreational activities such as swimming in an aquatic ecosystem, or if domestic wastewater flows into the environment untreated.[7]

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90 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

91 Ternes, T. A., Joss, A. & Siegrist, H. (2004). Scrutinizing pharmaceuticals and personal care products in wastewater treatment. Environmental Science & Technology. 38 (20): 392A-399A.

92 Nel, A., Xia, T., Madler, L. & Li, N. (2006). "Toxic Potential of Materials at the Nanolevel." Science. 311: 622-627.

93 Daughton, C.G. & Ternes, T.A. (1999). Pharmaceuticals and Personal Care Products in the Environment: Agents of Subtle Change? Environmental Health Perspectives. 107 (Supp 6): 907-938. Retreived from http://www.jstor.org/stable/3434573

94 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

Of the synthetic compounds used to formulate PCPs, several categories have been defined to better focus analyses of potential biological effects and prevalence. Given the thousands of such compounds used in the PCP industry, specific categories are useful for understanding the general potential impacts of compounds that have slight variations in composition. This review will forcus on musk fragrances (or musks, or fragrances), antimicrobials, ultraviolet filters and parabens, due to their frequent inclusion in PCP formulas and studied biological effects.[3 & 4]

Musk Fragrance

Synthetic musk fragrances are used to scent many products, such as deodorant, shampoos or detergent.[3] Production of these compounds exceeds 1 million pounds annually in the United States, and more than 7600 metric tons globally in 1996. [3] Synthetic musk fragrances were first detected in the environment in 1980, when concentrations of the compounds were discovered in freshwater fish found in Tama River, Tokyo, Japan. [3] Similarly, musk fragrance compounds were measured in surface water and wastewater treatment plant effluent, as well as in marine shellfish around Tokyo.[95]

The potential toxicity and environmental risks of musk fragrance chemicals have been regarded as low.[96] Though synthetic musks are detected widely in marine and freshwater environments and have been observed to bioaccumulate to a high degree in fish and invertebrates, the chronic toxicity thresholds for these compounds in fish and invertebrates are higher than levels measured in the environment.[9] Nevertheless, Luckenbach & Epel were able to demonstrate certain harmful biological effects of specific musk compounds.[9] Nitromusk and polycylic musk were analyzed for their potential to inhibit the activity of multidrug/multixenobiotic resistance (MDR/MDX) efflux transporters in the marine mussel Mythilus californianus. They determined both compounds inhibited the activity of the efflux transporters, obstructing the defense mechanism that prevents accumulation of xenobiotic in cells.[9] The result is increased sensitivity of cells to xenobiotics by permitting normally excluded toxicants to enter the cell.[97&98] In addition, Luckenbach & Epel were able to positively confirm that the constructed laboratory scenario could mimic real-world situations.[9]

Antimicrobials

Triclosan and triclocarban are commonly reviewed antimicrobial compounds found in toothpaste,

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[95] Yamagishi, T., Miyazaki, T., Horii, S. & Akiyama, K. (1983). "Synthetic musk residues in biota and water from Tama River and Tokyo Bay (Japan)." Environmental Contamination and Toxicology. 12(1): 83-89.

[96] Luckenbach, T., & Epel, D. (2005). "Nitromusk and Polycyclic Musk Compounds as Long-Term Inhibitors of Cellular Xenobiotic Defense Systems Mediated by Multidrug Transporters." Environmental Health Perspectives. 113(1): 17-24. National Institue of Environmental Health Sciences. Retrieved from http://www.ehponline.org/ambra-doi-resolver/10.1289/ehp.7301

[97] Epel D. (1998). Use of multidrug transporters as first lines of defense against toxins in aquatic organisms.Comparative Biochemistry and Physiology-Part A. 120:23–28.

[98] Kurelec B. (1992). The multixenobiotic resistance mechanism in aquatic organisms. Critical Reviews in Toxicology. 22:23–43.

soaps, lip balms, lotions and many other PCPs.[99] Triclosan has been found to react under certain conditions to form chlorinated products, which are further readily converted into polychlorinated dibenzo-p-dioxins (PCDDs) by heating.[100] This is significant because these resulting products have been determined toxic under certain concentrations.[13&101] In addition, triclosan has been described as persistent, and often survives several degradation steps in wastewater treatment plant processes.[14] The treated water outflow from such plants will therefore enter the environment still containing these persistent compounds, potentially altering the water quality of receiving river systems and subsequently effecting ecosystem health. [14]

Triclosan has been discovered in several environmental systems, such as marine and freshwater ecosystems as well as in sediments.[102&103] The synthetic antimicrobial agent has been determined toxic to bacterial and agal communities at environmentally realistic concentrations.[104] Ricart et al. found that triclosan destroys enzymes involved in the synthesis of fatty acids in bacteria cell walls which ultimately increases mortality rates, leading to changes in bacterial community composition and ecosystem health.[17] Toxicity to bacteria was measured to be greater than for algae in the study, yet Ricart et al. suggests triclosan damages the photosynthesis apparatus in algal organisms, as supported by a measurable decrease in photosynthetic efficiency.[17] This could be considered a precursor of a toxic effect that may take place at the structural level of the organism. [17]

Ultraviolet (UV) Filters

Ultraviolet (UV) filters, or sunscreen agents, have been added to an increasing number of cosmetic products to protect the user from UV radiation (Peck, 2006).[105] The concentration of UV filters in containing products can range from 0.1%-10% and are either organic or inorganic

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99 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

100 Kanetoshi, A., Ogawa, H., Katsura, E., & Kaneshima, H. (1987). "Chlorination of Irgasan DP300 and formation of dioxins from its chlorinated derivatives." Journal Of Chromatography. 389(1): 139-153. Retrieved from http://www.sciencedirect.com/science/article/pii/S0021967301944188

101 Ricart, Marta, Helena Guasch, Mireia Alberch, Damià Barceló, Chloé Bonnineau, Anita Geiszinger, Marinel•la Farré, Josep Ferrer, Francesco Ricciardi, Anna M. Romaní, Soizic Morin, Lorenzo Proia, Lluís Sala, David Sureda, Sergi Sabater, Triclosan. (2010). Persistence through wastewater treatment plants and its potential toxic effects on river biofilms. Aquatic Toxicology, 100 (4): 346-353.

102 Ishibashi, H., Matsumura, N., Hirano, M., Matsuoka, M., Shiratsuchi, H., Ishibashi, Y., Takao, Y., et al. (2004). "Effects of triclosan on the early life stages and reproduction of medaka Oryzias latipes and induction of hepatic vitellogenin." Aquatic toxicology Amsterdam Netherlands. 67(2): 167-179. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/15003701

103 Kanetoshi, A., Ogawa, H., Katsura, E., & Kaneshima, H. (1987). "Chlorination of Irgasan DP300 and formation of dioxins from its chlorinated derivatives." Journal Of Chromatography. 389(1): 139-153. Retrieved from http://www.sciencedirect.com/science/article/pii/S0021967301944188

104 Ricart, Marta, Helena Guasch, Mireia Alberch, Damià Barceló, Chloé Bonnineau, Anita Geiszinger, Marinel•la Farré, Josep Ferrer, Francesco Ricciardi, Anna M. Romaní, Soizic Morin, Lorenzo Proia, Lluís Sala, David Sureda, Sergi Sabater, Triclosan. (2010). Persistence through wastewater treatment plants and its potential toxic effects on river biofilms. Aquatic Toxicology, 100 (4): 346-353.

105 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

micropigments.[18&106] In the United States, sixteen different compounds are permitted for use as sunscreen agents, and several of these have portrayed estrogenic activity and potential for bioaccumulation.[18,107,108&109] Typically, three to eight unique UV filters are found in sunscreen and PCP formulas.[19]

In a local study in Switzerland, Poiger, et al. estimated that up to 1263 mg of UV filters are applied per person each day, which results in as much as 966 kg of UV filters directly released into a small lake each year.[110] Balmer, et al. examined the presence of four UV filters in wastewater outflow, surface water and fish tissue in Switzerland. 77% to 95% of water samples tested positive for various UV filter compounds.[111] In another report, Nagtegaal, et al. found UV filters in fish lipid tissue at concentrations up to 2 ppm.[112] Additionally, UV filters were determined to have bioaccumulation factors of greater than 5000 in fish.[113] While these compounds do not appear to be acutely toxic to aquatic organisms, there have been observed reductions in reproduction and increases in mortality in certain benthic and invertebrate species monitored for long-term exposure effects.[114] Various UV filters have also been seen to demonstrate estrogenicity or antiestrogenicity, adversely affecting fecundity and decreasing fertilized egg hatchability, among other reproductive disorders for fish species.[27]

Parabens

Parabens are the most common preservatives used in PCPs, in addition to several other consumer products such as food and pharmaceuticals.[115] There are seven different paraben compounds in this group, including methyl, propyl, ethyl, isobutyl, isopropyl, benzyl and butyl, which are often used together in cosmetic formulations for their synergistic preservative effects.[27] They exhibit a strong

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106 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

107 Reisch MC. (2005). "New-wave sunscreens active ingredient makers are frustrated by the long list of sunscreen and UV-A treating protocols that are still waiting FDA decisions." Chemical and Engineering News. 83(15):18-22.

108 Suzuki T, Kitamura S, Khota R, Sugihara K, Fujimoto N, Ohta S (2005) Toxicology and Applied Pharmacology 203:9–17.

109 Maerkel K, Lichtensteiger W, Durrer S, Conscience M, Schlumpf M (2005) Environmental Toxicology & Pharmacology. 19:761–765.

110 Poiger, T., Buser, H.-R., Balmer, M.E., Bergqvist, P.-A., Muller, M.D. (2004) Occurrence of UV filter compounds from sunscreens in surface waters: regional mass balance in two Swiss lakes. Chemosphere 55: 951–963.

111 Balmer, M.E., Buser, H.-R., Muller, M.D., Poiger, T. (2004). Occurrence of some organic UV filters in wastewater, in surface waters, and in fish from Swiss lakes. Environmental Science and Technology 39: 953–962.

112 Nagtegaal, M., Ternes, T.A., Baumann, W., Nagel, R. (1997). Detection of UV-sunscreen agents in water and fish of the Meerfelder Maar the Eifel, Germany. Umweltwissenschaften und Schadstoff-Forschung. 9: 79–86.

113 Kunz, P.Y., Gries, T., Fent, K. (2006). The ultraviolet filter 3-benzylidene camphor adversely affects reproduction in fathead minnows (Promelas pimephales). Toxicological Sciences. 93: 311.

114 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

115 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

resistance to antimicrobial degradation, which allows these compounds to enter the environment after the consumer has used and disposed of the containing product.[28] In 1987, over 7000 kg of parabens were used in PCPs.[27] This figure has only increased over the last 25 years.[27]

Parabens have been measured in varying concentrations in wastewater treatment plant effluent and surface water.[27] The different paraben compounds have individual levels of acute toxicity, with benzylparaben of highest toxicity to organisms, when tested on invertebrates and fish.[116] It has also been reported increasing chain length of paraben's substituents can increase paraben toxicity to bacteria, while chlorination also substantially increases toxicity of parabens to D. magna as well as bacteria.[117&118] There is limited research on the chronic effects of parabens on aquatic organisms, however based on evidence gathered thus far, these compounds are likely to cause adverse effects if in contact with such organisms.[119] Aside from acute toxicity, parabens can elicit estrogenic responses or vitellogenin (VTG) synthesis in fish when exposed to low concentration levels.[120&121] These levels studied are environmentally relevant, meaning such effects are likely to occur under current conditions of anthropogenic use and disposal of paraben containing cosmetic formulas.[32]

Addressing the Issue

Scientific research regarding eco-toxicity of synthetic chemicals in PCPs is lacking relative to the overwhelming daily presence of these compounds.[32,122&123] Of the 80,000 chemicals that are currently registered for commercial use in the United States, just 530 have been subjected to long-term testing, while only 70 have undergone short-term testing by the National Toxicology Program (NTP).[124] In addition, the resource-intensive nature of chemical testing results in prolonged and costly assessments which often take more than 3 years and $2 to $4 million per chemical to complete.[37] This substantially low rate of testing within NTP and associated high costs indicates a serious discrepancy in institutional ability to verify safety of synthetic chemical ingredients in PCPs. In addition, there are no monitoring requirements in the United States and most other countries for

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116 Madsen, T. (2009). Environmental and Health Assessment of Substances and Household Detergents and Cosmetic Detergent Products. Danish Environmental Protection Agency. Project No. 2001-615.

117 Dymicky, M., Huhtanen, C.N. (1979). Inhibition of Clostridium botulinum by phydroxybenzoic acid n-alkyl esters. Antimicrobial Agents and Chemotherapy. 15: 798–801.

118 Terasaki, M., Makino, M., Tatarazako, N. (2009). Acute toxicity of parabens and their chlorinated by-products with Daphnia magna and Vibrio fischeri bioassays. J. Applied Toxicology. 29: 242–247.

119 Brausch, J. M., & Rand, G. M. (2011). "A review of personal care products in the aquatic environment : Environmental concentrations and toxicity." Chemosphere. 82(11): 1518-1532. Elsevier Ltd. Retrieved from http://dx.doi.org/10.1016/j.chemosphere.2010.11.018

120 Dobbins, L.L., Usenko, S., Brain, R.A. & Brooks, B.W. (2009). Probabilistic ecological hazard assessment of parabens using Daphnia magna and Pimephales promelas. Environmental Toxicology and Chemistry. 29: 242-247.

121 Oishi, S. (2002). Effects of propyl paraben on the male reproductive system. Food and Chemical Toxicology. 40(12): 1807-1813.

122 Peck, A. M. (2006). Analytical methods for the determination of persistent ingredients of personal care products in environmental matrices. Analytical and Bioanalytical Chemistry. 386: 907-939.

123 Nohynek, G.J., Antignac, E., Re, T. & Toutain, H. (2010). Safety assessment of personal care products/cosmetics and their ingredients. Toxicology and Applied Pharmacology. 243: 239-259.

124 Nel, A., Xia, T., Madler, L. & Li, N. (2006). "Toxic Potential of Materials at the Nanolevel." Science. 311: 622-627.

PCPs in water or biosolids.[125&126] A system that circumvents the costly and time intensive process of chemical testing is therefore a very attractive option for confronting synthetic chemical over-use.

Physiological Concerns for Mother During Pregnancy

When a woman transitions into motherhood, her life can change dramatically, shifting her priorities, preferences, and social circles. Pregnancy can bring great changes in both lifestyle and physical well-being. Specifically, skin changes occur - and while considered normal, they can cause a significant amount of stress for the pregnant mother, as many changes do not naturally regress completely postpartum, and require some sort of external treatment. For example, common physiological ailments include changes in skin pigmentation, hair and nails, glandular activity, vascular and hematological changes, and mucous membranes. Some key pregnancy skin changes to consider:

Hyperpigmentation
In up to 90% of women, pigmented areas such as areolae, genitalia, neck, axillae, inner thighs, and periumbilical skin may become darker; this applies to recent scars, freckles, and nevi, which may also enlarge in size. Although under discussion still, increased levels of progesterone, estrogen, and melanocyte-stimulating hormones are thought to cause these changes in pigmentation. Hyperpigmentation can fade after childbirth, but is unlikely to completely disappear.

Melasma
Occurring in 45%-75% of pregnant women, a centrofacial pattern (cheeks, forehead, upper lip, nose, and chin), malar pattern (cheeks and nose), or mandibular pattern (chin) of symmetric, blotchy brown hyperpigmentation occurs. This facial change is believed to occur from genetics, increased estrogen, progesterone, and melanocyte-stimulating hormones, and exposure to the sun and cosmetics. Treatment for melasma can be difficult if it does not fade naturally postpartum, and includes use of hydroquinone, retinoic acid, and corticosteroid creams. Prevention measures include use of sunscreen and avoidance of UV radiation and irritating cosmetics.

Striae Distensae
Otherwise known as "stretch marks", this skin condition can occur on the abdomen, breasts, axillae, lower back, buttocks, arms, and thighs in up to 90% of pregnant women later in the second trimester of pregnancy. These can result from genetics, hormones, and weight gain. There is no proven method of treatment.

Cutaneous tumors

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125 Daughton, C.G. & Ternes, T.A. (1999). Pharmaceuticals and Personal Care Products in the Environment: Agents of Subtle Change? Environmental Health Perspectives. 107 (Supp 6): 907-938. Retreived from http://www.jstor.org/stable/3434573

126 McClellan, K. & Halden, R.U. (2010). Pharmaceuticals and Personal Care Products in Archived U.S. Biosolids from the 2001 EPA National Sewage Sludge Survey. Water Research. 44(2): 658-668.

Molluscum fibrosum gravidarum, small benign skin tags on the face, neck, chest, axillae, and inframammary areas appear in the second half of pregnancy and either disappear naturally after childbirth or can be surgically removed. Granuloma gravidarum, are smooth, soft, pedunculated or sessile lobules that can form in the mouth or head and neck regions. These can cause pain, ulcerate, and bleed, but disappear naturally.[127]

Additionally, although researchers have difficulty in studying the effects of chemical exposure on miscarriages, it is widely believed that exposure to chemicals that cause reduced fertility also cause miscarriages. A primary cause of miscarriage - linked to at least 50% of first trimester miscarriages, 15% of second trimester miscarriages, and 5% of third trimester fetal losses - is chromosomal abnormalities, which are linked with exposure to certain chemicals like Bisphenol-A.[128]

Physiological Concerns for Developing Baby During Pregnancy

By applying conventional health and beauty care products, a pregnant mother may expose developing baby to chemicals during neonatal and fetal development. Even low levels of chemical exposure can disrupt reproductive development. This results in abnormal function in adulthood due to changes in the DNA methylation pattern.[129] A developing baby is highly susceptible to potential health risks - exposure during particular windows of development can cause irreversible brain and organ damage. Not only does the placenta fail to adequately filter toxins and shield the fetus, but fetal blood contains lower levels of proteins that neutralize harmful chemicals by binding to them, and the blood-brain barrier's ability to block harmful chemicals from entering the brain does not fully develop until post-birth.[130] This heightened vulnerability puts developing babies at extreme risk if mothers are not aware of the dangers of cosmetic ingredients, or do not have access to better alternatives.

Synthetic and natural environmental compounds such as pesticides (DDT, MXC, atrazine), detergents and surfactants (octyphenol, nonylphenol, and bisphenol-A), plastics (phthalates), industrial compounds (PCB, TCDD), and natural plant estrogens (genistein, coumesteral) can mimic or disrupt endogenous hormones by binding to steroid hormone receptors.[42] These disruptors target oocyte maturation and maternal sex chromosomes, which affect developmental processes controlling gonadogenesis. Alarmingly, such abnormalities are passed on to the next generation, materializing in both genders.[42]

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127 Barankin, B., Silver, S.G., Carruthers, A. (2002). The skin in pregnancy. Journal of Cutaneous Medicine and Surgery. 6(3): 236-240

128 Schwartz, J.M. and Woodruff, T.J. (2008). Shaping our legacy: reproductive health and the environment. UCSF Program on Reproductive Health and the Environment

129 Uzumcu, M. & Zachow, R., (2007). Developmental exposure to environmental endocrine disruptors: consequences within the ovary and on female reproductive function. Reproductive Toxicology. 23(3): 337-352

130 EWG (2009). Pollution in people: cord blood contaminants in minority newborns. Environmental Working Group. Retrieved February 2013 from http://static.ewg.org/reports/2009/minority_cord_blood/2009-Minority-Cord-Blood-Report.pdf

In females, a specific example is development of *fibroids*, or non-cancerous uterine tumors, which affect between one half to three quarters of all women of reproductive age. These are painful and cause hysterectomies, infertilities, miscarriages, abnormal fetal positioning in the womb, premature labor, and placentia complications. Female fetuses exposed to estrogenic chemicals while in the womb are two and a half times more at risk for fibroid development in adulthood. Other female-specific problems with reproductive development include menstrual cycle irregularities, early or delayed puberty, reproductive organ deformities, cervical and vaginal cancers, infertility, and premature menopause.

In male fetuses, healthy reproductive system development depends on androgen hormones such as testosterone, dihydrotestosterone, Mullerian inhibiting hormone, and insulin-like 3. Chemical exposure can interfere with hormone production or signaling, damage and destroy cells, and change gene expression, which can cause deformities, diseases, and abnormalities in sperm production. In fact, malformations of male reproductive organs rank second and third among the most common birth defects. For example, interference with testosterone production can cause testicular dysgenesis syndrome, characterized by four symptoms: birth defect of the penis (hypospadias), birth defect of the testes (undescended testes), low sperm counts, and testicular cancer.[131]

Regulations Overview

The US Food and Drug Administration (FDA) is the federal agency in charge of cosmetic regulation. However, this agency lacks the legal authority to test cosmetics prior to their entry to market or recall faulty products after released.[132] Due to its budgetary deficiencies, the FDA has relied on the cosmetic industry to self-regulate for product safety for almost a century.[133] The insufficiencies of this system have been well documented. In 1977, AETT, a once commonly used synthetic fragrance material, was discovered to be a neurologically debilitating compound, yet the industry lead organization International Fragrance Association (IFRA) listed it as "safe" for nearly 20 years (Elermann, 1980).[134] In 1996, severe phototoxicity problems were discovered to be associated with exposure to musk ambrette (another synthetic fragrance material), but it took over five years for industry to discontinue its use.[135] Last year, the Campaign for Safe Cosmetics published a report that found 400 lipsticks on the market to contain levels of lead considered by the FDA to be unsafe; the

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131 Schwartz, J.M. and Woodruff, T.J. (2008). Shaping our legacy: reproductive health and the environment. UCSF Program on Reproductive Health and the Environment

132 FDA. (2012). Cosmetic Labeling and Label Claims. US FDA Food and Drug Administration website. Retrieved from http://www.fda.gov/Cosmetics/CosmeticLabelingLabelClaims/default.htm

133 Donegan Jr, T. J. (1995). Fifty Years of Comestic Safety: A Government and Industry Partnership. Food & Drug LJ, 50, 151.

134 Elermann, H. (1980). Regulatory issues concerning AETT and 6-MC.. Contact Dermatitis Journal, 6(2), 120-122. Retrieved February 9, 2013, from pubmed.gov

135 Reiner, J., C. Wong, , K. Arcaro, & K. Kannan. (2007). Synthetic Musk Fragrances in Human Milk from the United States. Environmental Science & Technology 41 (11), 3815-3820, Retreived December 11, 2013 from pubs.acs.org

worst offender contained 275 times more than lead than the safest alternative.[136] Despite these violations, the FDA is constrained by the existing legal framework to ensure cosmetic product safety.

The FDA's authority to actively regulate cosmetic and personal care industry is governed by two laws. The first is the Federal Food, Drug, and Cosmetic Act of 1938 (FDC). In addition to defining a cosmetic, this law primarily gave the FDA the legal capacity to fine a firm, pursue judicial action against a firm, or seize merchandise for marketing an adulterated or mislabeled cosmetic product.[137] The second is the Fair Packaging and Labeling Act (FPLA), which intends to protect consumers from misleading labels and requires manufacturers to include certain information: a product identity statement, a net weight of contents, name and address of the business, material facts (i.e. directions), appropriate warning statements, and ingredients (FDA, 2012).[138]

In 1971, the federal government added an important addition to the FPLA, which is known as the Administrative Procedures Act.[51] This established the Voluntary Cosmetic Registration Program (VCRP). This supplement had two intentions: one, to reduce the need for earmarking government resources to this agency, and, two, to encourage transparency within this industry.[139] However, the VCRP included a clause that did not require cosmetic manufacturers to disclose ingredients that produced flavors, fragrances or deemed by the firm to be trade secrets.[140] Resultantly, many harmful ingredients were not registered in the public database. The Environmental Working Group found that the average product tested contained fourteen hidden ingredients not listed on the label, including known hormone disruptors, neurotoxins, and carcinogens.[141] Despite their inadequacies, the FDC and FPLA are the most current legislations that govern the FDA's authority.

The deficiencies in the federal legislation lead some states such as California, New York, and Maine to pass statewide regulation for cosmetics.[54] Each of these states' laws differs slightly, causing complications for cosmetic manufacturers to distribute their products into these regions.[142] Consequently, cosmetic industry representatives have recently asked Congress to draft federal laws for cosmetics in hopes to ensure uniformity throughout the US.[55] At the Energy and Commerce

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136 Campaign for Safe Cosmetics (2012). Hundreds of lipsticks contaminated with lead, reports new FDA study [Press Release]. Retrieved from http://safecosmetics.org/article.php?id=952

137 FDA. (2005). FDA Authority Over Cosmetics. US FDA Food and Drug Administration website. Retrieved from http://www.fda.gov/Cosmetics/GuidanceComplianceRegulatoryInformation/ucm074162.htm
138 FDA. (2012). Cosmetic Labeling and Label Claims. US FDA Food and Drug Administration website. Retrieved from http://www.fda.gov/Cosmetics/CosmeticLabelingLabelClaims/default.htm
139 Donegan Jr, T. J. (1995). Fifty Years of Comestic Safety: A Government and Industry Partnership. Food & Drug LJ, 50, 151.
140 Fischer R. (1974) Cosmetic Labeling: The FDA's Response to Consumer Needs, Santa Clara Lawyer (14) 542.
141 EWG (2009). Pollution in people: cord blood contaminants in minority newborns. Environmental Working Group. Retrieved February 2013 from http://static.ewg.org/reports/2009/minority_cord_blood/2009-Minority-Cord-Blood-Report.pdf
142 Westervelt, A. (2012). "As FDA rejects BPA ban, Congress looks to set to punt chemical reform". Forbes Online. Retreived from http://www.forbes.com/

subcommittee on health annual meeting, Curran Dandurand, the CEO of a men's personal care products company stated that "the myriad diverse state regulations would substantially increase the cost of producing and distributing personal care products. The consequences for small business owners would be disastrous."[55] In spite of this recent attention, none of the proposed cosmetic regulations were passed in 2012.[55]

Stringent Rating System Options

To address this lack of federal regulation, many third party certification bodies have emerged to simplify the decision-making process for consumers. Certification bodies such as Fair Trade, Cruelty Free, and USDA Organic each have different guidelines used to evaluate products and address particular health, social, or environmental issues. Consequently, this market space is cluttered and often confusing to consumers. For examples, Abrams et al. found that participants misunderstood the meaning of the USDA Organic certification seal and regularly felt bombarded with labels regarding how their products are produced, processed, and regulated.[143] For consumers to make better purchasing decisions, a streamlined tool is needed. Listed below are three of the most prominent organizations tackling this problem. Currently, BabyLove intends to use the Good Guide's rating system to screen products, offering only items with health scores between 8 and 10 to its customers.

The Good Guide

The Good Guide is a for-profit company that has compiled an extensive database, consisting of 145,000 products ranging from skincare to children's toys to car production.[144] The ingredients for each of these products are externally tested for health and safety. Additionally, this organization ranks the social and environmental impacts not only of the specific product, but also for the company as a whole. The Good Guide gives each of the three categories (health, social, and environmental) an individual score and then averages it for an overall score, which makes it easy for the consumer to understand (See Appendix 3.1). Items with no probable health concerns are ranked between eight and ten, with ten being the absolute safest. More recently, this organization has introduced a mobile application that allows consumers to take a picture of a product's barcode to find more information about the item while they are shopping.[79]

Environmental Working Group's Skin Deep Database (EWG)

EWG's Skin Deep Database is a non-profit science and policy advocacy organization that tests skincare product for health and safety internally. Like the Good Guide, the EWG ranks products on a scale of 1-10 so consumers can easily evaluate the health risks associated with the product. It also

143 Abrams, K. M., Meyers, C. A., & Irani, T. A. (2010). Naturally confused: consumers' perceptions of all-natural and organic pork products. Agriculture and Human Values, 27(3), 365-374.
144 Good Guide, Inc. (2011). The Good Guide: About Us.. Retrieved February 2013, from http://goodguide.com

provides easy access to peer-reviewed journal articles related to specific ingredients effect on human and ecosystem health. However, it does not provide rankings of social and environmental impacts.[145]

Whole Foods' Whole Body

Whole Body is an arm of the for-profit company Whole Foods. With a blacklist of over 400 ingredients, the Whole Body certification seal is a stringent system Whole Foods Market uses to decide which products will be stocked on their shelves. This ranking system includes 2,800 products and takes into account the environmental impact, but does not evaluate an item or brands' social impact.

The rising popularity of these rating entities suggests that consumers trust these sources because of their transparency, rigorous methodology, and easily understood ranking system[146]. While BabyLove's early evangelists are most concerned with the health risks affiliated with beauty care products, other potential early adopters voiced their environmental and social concerns in interviews and surveys. Additionally, the company intends to expand vertically into other sectors, including baby toys and cleaning products. Thus, the team deemed the Good Guide's database to best fit for the company's needs. BabyLove is the first subscription sampling service to use a scientifically tested, third party ranking system to filter its products before offering them to its target customers.

Market Overview

While the government bundles all personal care items under the umbrella term cosmetic, many segments comprise the entire cosmetic industry. BabyLove intends to focus on the pregnancy segment of the growing Natural Health and Beauty Care Market (NHBC), a subset of the Health and Beauty Care Industry.

The Overall Health and Beauty Care Industry (HBC)

The US Health and Beauty Care Industry (HBC) consists of about 750 companies with a combined total annual revenue of about $40 billion.[147] Several product categories exist within this industry, including makeup (33% of annual revenue), hair care (25%), and lotions/creams (21%).[148] The remaining 21% comes from perfumes, mouthwash, and other products related to skincare.[57] Following the stagnant years of an economic recession, in 2010, Americans still spent $33.3 billion

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145 EWG (2009). Pollution in people: cord blood contaminants in minority newborns. Environmental Working Group. Retrieved February 2013 from http://static.ewg.org/reports/2009/minority_cord_blood/2009-Minority-Cord-Blood-Report.pdf

146 IBM Software. (2011) Good Guide supercharges user acquisition, growth, and retention. IBM Case Study ZZC0314-USEN-01. Somers, NY: IBM Corporation Publishing.

147 Dowd, T. (2011). Natural and Organic Personal Care Products in the U.S., 5th Edition. Packaged Facts. Rockville, MD. December 2011

148 Finn, K. (2011). "Beauty and Personal Care Products Industry Overview". Business.com. Retrieved November 22, 2012 from http://www.business.com/guides/beauty-and-personal-care-products-industry-overview-21128/

on HBC products, indicating an industry growth of 6% that is anticipated to stay consistent to 2016.[149]

HBC Trends

Packaged Facts (2011) highlighted four trends emerging throughout the HBC industry.

1. Long-Lasting Features: in response to demand from today's time-poor consumers looking to reduce the amount of time and money spent on beauty routines.
2. Increased Internet Beauty Shopping: online total beauty retail achieved stronger absolute value growth (over $11 billion in 2010) than department stores.[150]
3. Increased Internet Beauty Consultations: Department store makeup counter consultations increasingly move online.[151]
4. Consumer Demand for Healthy: the use of "organic", "natural", or "free-from __" claims are increasingly being used manufacturers due to increased consumer demand. The trend also includes manufacturing commitments to recycling and eco-friendly materials.[152&153]

This market segment's growth is supported by the fervent customer loyalty that is characteristic of the Natural HBC consumer.[154] It has been well-documented that certain consumers have a higher willingness to pay for some natural products and the organic industry.[62] However, the magnitude of this price difference varies considerably between consumer groups.[62] In particular, women who are pregnant or have at least one child at home are the most likely pay this price premium, especially for personal care items.[155] According to the joint market research study from Babycenter and comScore, Inc., nearly 50% of American mothers preferred to purchase organic or natural alternatives when they shop and look for "natural" and "wholesome" ingredients.[64] The fear of exposing their children to toxic and harmful substances--either by baby or adult products--lead many parents to buy natural

[149] Andriotis, A. (2011). "10 Things the Beauty Industry Won't Tell You." Smart Money Magazine. Retreived Apirl 22, 2012. http://www.smartmoney.com/spend/family-money/10-things-the-beauty-industry-wont-tell-you-1303249279432/#articleTabs

[150] Lennard, C. (2011). "Global Beauty Industry Trends 2011". Skin Inc. Magazine. http://www.skininc.com/spabusiness/trends/126516783.html?page=2

[151] Mintel Corporate (2011). "Mintel Beauty Innovation Reveals 'Down-to-Earth' as Key Trend to Impact Beauty Industry in 2011". Corporate News: Mintel Press Release. January 2011. http://www.mintel.com/press-centre/press-releases/645/mintel-beauty-innovation-reveals-down-to-earth-as-key-trend-to-impact-beauty-industry-in-2011

[152] Todd, A. M. (2004). The aesthetic turn in green marketing: Environmental consumer ethics of natural personal care products. Ethics & the environment,9(2), 86-102.

[153] Batte, M. T., Hooker, N. H., Haab, T. C., & Beaverson, J. (2007). Putting their money where their mouths are: Consumer willingness to pay for multi-ingredient, processed organic food products. Food Policy, 32(2), 145-159. BirchBox (2013). "About Us." What Is Birchbox? BirchBox, Web. 22 Feb. 2013.

[154] Todd, A. M. (2004). The aesthetic turn in green marketing: Environmental consumer ethics of natural personal care products. Ethics & the environment,9(2), 86-102.

[155] Baby Center Solutions (2012). "2012 American Media Mom Report". Retrieved on from http://www.babycentersolutions.com/assets/download/BabyCenter_21st_Century_Mom_Insights_Series_2012.pdf

items.[156] The lack of available information regarding the purchasing trends of pregnant women lead the team to conduct in-person interviews and distribute surveys to learn more about this demographic, which is discussed in Section Three.

Consumer and industry reports revealed that overall, consumers strive to live healthy lives, and to remain consistent with this goal, they increasingly seek out natural brands. Additionally, they tend to remain loyal to the natural cosmetic industry once they have made the switch from non-natural alternatives. Various experiences can trigger a new awareness regarding environmental, social, economic, or personal benefit for consumers. These can be personal or experiential triggers that include having children, or informational triggers that include product labels or mass media. According to a recent study, the top three sources for informational triggers in regards to sustainability are product labels, internet search engines, and in-store information.

Additionally, The Hartman Group ranked consumer sustainability lifestyles on three levels, Core, Mid-Level, and Periphery, according to five factors, Price, Convenience, Knowledge, Expert Opinion, and Experience.[157] Key indicators for BabyLove's customer discovery were the that Mid-Level and Core segments would be most likely to find value in BabyLove's proposed solutions, due to a low priority ranking for Price, and high priority rankings for Expert Opinion and Knowledge (Appendix 3.2). Consumers shopping for natural HBC products do so in order to meet personal health and wellness needs – considerations of environmental stewardship come secondary and aare of much lower importance to the consumer.[66] In fact, the health effects from product use emerged as a major factor in purchasing decisions, as shown by the 86% of American women who used a makeup product co-positioned on its benefit to skin health.[158]

Price Point as a Barrier and Willingness-to-Pay

In a 2008 Datamonitor Consumer Survey, over a third of US respondents believed natural or organic claims in cosmetics were "not credible" or "not at all credible." [67] However, this skepticism did not seem to preclude failure to purchase cosmetic products promoting such claims, as consumers continued to purchase natural or organic HBC products. In fact, in determining the reasons for natural/organic purchasing preferences, the study reported that 45% of 1,800 surveyed female consumers cited their fear of chemicals as the major driver in purchasing natural/organic beauty products. For skin application, 80% believed that naturally based products were better, 64% did not want chemicals, and 27% felt traditional products contained harmful ingredients. [67] This suggested that even though consumers were wary of company claims, their desire to use natural,

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156 Lennard, C. (2011). "Baby Care Market Report: Euromonitor International". GCI Beauty Business, Brand Impact Magazine. 20 January 2011.

157 Sprinkle, D. and The Hartman Group, Inc. (2009). Consumers and Sustainability: personal care. Packaged Facts. Rockville, MD. September 2009

158 Dowd, T. (2011). Natural and Organic Personal Care Products in the U.S., 5th Edition. Packaged Facts. Rockville, MD. December 2011

organic, chemical-free, and safe HBC products was strong enough to warrant purchases of these items.

In a 2011 Natural HBC industry report, price proved to be a deterrent for over 44% of HBC consumers. Despite this barrier, the natural HBC market increased by 61% from 2005-2010, reaching $7.7 billion. [67] When it comes to cosmetics, consumers tend to value efficacy over sustainability, and are skeptical of the performance abilities of natural HBC products. In a report studying consumer behavior as it relates to sustainable personal care products, consumer perception of natural HBC cosmetics quality is most affected by efficacy and entertainment value. [159] However, quality is also directly affected by both brand reputation and price point or retail location, with drug store brands deemed lowest quality, and boutique brands and farmers market or artisanal products perceived as highest quality. Boutique brands, along with spa-only cosmetic brands, achieve their high-quality reputation through exclusive distribution and claims to natural ingredients. Cosmetic products sold at farmers markets are valued for their handcrafted and natural ingredient appeal, since they are not sold in typical retail outlets. These findings show that given consumer value for natural HBC on efficacy, brand reputation, and retail outlet, the most credible products have the highest price points and are the hardest to obtain.

The study also included a consumer survey on 1) sustainable cosmetic purchases recently made in a 30-day period, 2) immediate growth opportunity based on non-sustainable purchasers' willingness to pay for sustainable products, and 3) survey-wide willingness to pay a 20% premium for sustainable products.

1. Results showed that 17% of respondents had bought a natural or chemical-free skin or beauty product in the previous 30 days. However, compared with the 63% of all respondents who had bought a conventional version of such products during that same period, this meant that only about 27% of consumers purchasing HBC items were purchasing natural or chemical-free products remaining (Appendix 3.1.1).
2. However, to project the potential immediate growth for the sustainable cosmetics category, the 73% of respondents who did not purchase a sustainable HBC version were asked if they would be willing to pay a 20% premium for a sustainable version, and 25% of respondents said they would (Appendix 3.1.2).
3. This willingness to pay was measured more generally as an overall percentage of cosmetics purchasers, regardless of whether they had recently purchased a sustainable version or not. In this quantification, 27% of respondents said they would be willing to pay a 20% premium on skin and beauty products (Appendix 3.1.3).

Interestingly, a category for "Personal Care Products for babies or small children" was also included in this study – this category received the largest percentage of positive respondents in all three

[159] Sprinkle, D. and The Hartman Group, Inc. (2009). Consumers and Sustainability: personal care. Packaged Facts. Rockville, MD. September 2009

categories of consumers who recently purchased sustainable products, potential growth opportunity, and willingness to pay a premium.[160]

The Solution

BabyLove provides pregnant women and new mothers with a monthly cosmetic sampling program, supplemented by an educational online interface offering information and resources. Through this convenient sampling service, BabyLove reduces the high cost associated with maternity health and beauty care (HBC) product discovery.

BabyLove's website is a one-stop-shop for credible products, information and advice to help pregnant and new mothers navigate the market and discover the products they need. BabyLove ensures credibility to customers with an interactive and transparent product information portal, providing product safety ratings from the Good Guide, harmful ingredient lists and expert analysis, along with user reviews. By sampling verifiably toxin-free, maternity-safe HBC products before committing to an expensive purchase, customers can save both time and money while discovering beauty care products they love.

BabyLove solves a twofold problem: the incidence of endocrine disrupting chemicals found in humans and ecosystems, and the expensive product discovery process new mother experience in switching to a maternity-safe health and beauty care regimen. Health risks in fetal development associated with harmful skincare product ingredients – infertility, hormone disruption, and cancer – contribute to increasing consumer demand for safer products in the HBC industry. The maternity market is increasingly saturated with maternity-specific products, and new mothers often worry about product safety, and are frustrated by the lack a reliable source of information, often spending hours researching a single product online. This time-intensive search for credible brands becomes a barrier to purchasing safer alternatives for overwhelmed shoppers. Additionally, NHBC products are typically sold at a high premium compared to their conventional equivalents. Shoppers have stated that they want to try these expensive products before committing to a full-sized investment, and the inability to do so creates another purchasing barrier. The current process of buying several full-sized products in order to discover the one brand that meets an individual's specific need creates an expensive trial-and-error process that forces a choice between money and health.

With the help of their advisory panel of health care professionals and maternity industry experts, BabyLove anticipates customer needs and delivers a personalized package each month on a subscription basis. Each month's sample bundle is based on a personal profile the customer fills out when they first enroll in the subscription, to ensure the monthly deliveries contain products that match user preferences and hair and skin types. This subscription e-commerce model empowers mothers to make informed decisions in their product discovery process, providing them with a streamlined search method for maternity-safe brands, safety information, and user reviews, on an

[160] Sprinkle, D. and The Hartman Group, Inc. (2009). Consumers and Sustainability: personal care. Packaged Facts. Rockville, MD. September 2009

online platform they already use and are comfortable with. BabyLove ensures product safety credibility through 3rd party verification via the Good Guide, a trusted scientific data based product rating entity. While both the maternity market and the subscription e-commerce industry are crowded and growing spaces, BabyLove stands out to new mothers. Through its simple online educational forum and the product safety credibility achieved through an expert panel combined with ratings from the Good Guide, BabyLove provides new mothers with the targeted maternity-safe product discover process they are unable to find elsewhere.

Case Study: Birchbox

Company Overview

A cosmetics online retailer, Birchbox launched in 2010 and reports current revenues of $7 million.[161] This company's core value proposition is to help women identify and experience the "newest" and "best" in beauty care. Birchbox offers a monthly subscription service of expert-selected beauty care samples that are mailed directly to the customer's doorstep. The company is comprised of three main components: the subscription service, the editorial online content, and the online retail shop where customers purchase full-size versions of products. To differentiate the business and create customer value, the company generates original content that is disseminated almost exclusively through various social media outlets. Birchbox gains and maintains customer trust by delivering useful, relevant content that cannot be obtained through other means. Additionally, Birchbox offers loyalty programs to those who contribute to the Birchbox online community and frequently make purchases from the site.

Financial Structure

Customers have the option to purchase a monthly subscription for $10 per month or a yearly subscription for $110.[162] The company also generates affiliate revenue from every full-size purchased through the online store.[163] In exchange for customer research information, Birchbox receives deluxe samples at no cost, which allows them to keep their per unit costs relatively low.[164]

Business Development Phases

Before developing an entire business plan, the Birchbox founders tested the model with their minimum viable product to validate its core business hypotheses, answering three main questions:

1. Would (established) beauty brands work with Birchbox?
2. Would customers pay for samples?

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[161] Rubin, C. (2011). "Hayley Barna and Katia Beauchamp, Founders of Birchbox". Inc. Magazine Online. Retrieved from http://www.inc.com/30under30/2011/profile-hayley-barna-and-katia-beauchamp-founders-of-birchbox.html

[162] BirchBox (2013). "About Us." What Is Birchbox? BirchBox, Web. 22 Feb. 2013.

[163] Coles, P., B. Edelman (2011). Attack of the Clones: Birchbox Defends Against Copycat Competitors. HBS 9-912-010. Boston, MA: Harvard Business School Publishing.

[164] Pietka, A. (2012). "Birchbox the perfect subscription business". Subscrea Subscription Sales Platform. Retrieved from http://www.slideshare.net/AnnaPietka/birchbox-the-perfect-subscription-business-13899217

3. Would samples drive full-size purchases? [165]

During this two-month beta phase, the company reached 200 potential customers and partnered with eight brands.[166] The positive response from participants garnered the attention of several investing firms and the founders raised nearly $12 million dollars in seed funding in less than a year.[75] Birchbox officially launched in October 2011, a mere eight months after its conception.[167]

Current State of the Business

As of late 2012, Birchbox had over 100,000 paying subscribers and over 164,000 likes on Facebook.[75] Birchbox's success over the last two years has lead the company to expand into other product categories (such as male beauty and home décor subscription models) and geographic regions outside of the US. [75] Its growing popularity has also attracted more brands seeking to better target their customers. [74] However, numerous competitors have emerged in the last two years, including Glossy Box, RedMeow, and Loose Button. [72] To remain a leader in the online subscription sampling market, Birchbox recently acquired its closest European competitor, JolieBox.[168]

Key Insights

Learning from example, the company BabyLove structured its core business model to closely mirror the successful elements of Birchbox. The company Babylove adapted the subscription service, affiliate revenue streams, active online community, and loyalty program because of its demonstrated success. Similarly, BabyLove developed strong brand partnerships and receives free samples in exchange for marketing opportunities to decrease costs. The fierce competition Birchbox continues to face underscores the need to create strong barriers for entry into this flooded market. To better position BabyLove within the market, the team relies on a stringent rating system, a trusted and transparent source, to select products. The Team also is exploring potential opportunities to partner with healthcare providers to distance BabyLove from the crowded marketplace. Overall, Birchbox's rapid growth and high customer satisfaction reports showcase the strength of this business model.

Conclusion

BabyLove solves a twofold problem: the incidence of endocrine disrupting chemicals found in humans and ecosystems, and the expensive product discovery process new mother experience in switching to a maternity-safe health and beauty care regimen. Health risks in fetal development

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[165] Baldwin, T (2012). ""Entrepreneur's Corner: Birchbox"". Wharton Journal [blog posting]. Retreived from http://whartonjournal.com/?p=1063.

[166] Pietka, A. (2012). "Birchbox the perfect subscription business". Subscrea Subscription Sales Platform. Retrieved from http://www.slideshare.net/AnnaPietka/birchbox-the-perfect-subscription-business-13899217

[167] Rubin, C. (2011). "Hayley Barna and Katia Beauchamp, Founders of Birchbox". Inc. Magazine Online. Retrieved from http://www.inc.com/30under30/2011/profile-hayley-barna-and-katia-beauchamp-founders-of-birchbox.html

[168] DOW Jones & Company (2012). "Birchbox Hits Europe, Acquires Joliebox". Dow Jones Online. Retrieved from http://pevc.dowjones.com/

associated with harmful skincare product ingredients – infertility, hormone disruption, and cancer – contribute to increasing consumer demand for safer products in the HBC industry. The maternity market is increasingly saturated with maternity-specific products, and new mothers often worry about product safety, and are frustrated by the lack a reliable source of information, often spending hours researching a single product online. This time-intensive search for credible brands becomes a barrier to purchasing safer alternatives for overwhelmed shoppers. Additionally, Natural Health and Beauty Care products are typically sold at a high premium compared to their conventional equivalents. The current process of buying several full-sized products in order to discover the one brand that meets an individual's specific need creates an expensive trial-and-error process that forces a choice between money and health.

BabyLove is a graduate student project started by three young women studying environmental science and management. Educated on the social and environmental implications of an unregulated chemicals industry, and witnesses to the health risks associated with harmful cosmetic ingredients, we seek to leverage our passion and education to create a business plan that has a positive, lasting effect on women and unborn children everywhere. Women and children disproportionately bear the burden of unsafe cosmetic products, and we believe we can offer them a better alternative, and reduce the number of babies born with chemicals already polluting their bloodstream.