CHAPTER II
LITERATURE REVIEW AND CONCEPTUAL MODEL

2.1 Dietary Supplement Industry Outlook

2.1.1 Modern consumer and Dietary Supplements

People of the new millennium require an overall improvement in their quality of life. Food chain, as one of the answer, can provide what consumers nowadays need as energy for their activities. In fact, what they needed from the products they consume covered more sophisticated aspects, (Roche Vitamins, 2001), as follow:

1. The benefits of preventing certain ailments, in particular, those of chronic diseases.
2. Good nurturing for the whole family, focusing to the maximum potential growth of their children.
3. Better performance when required, mainly for the active and regular exercisers.
4. Overall wellness in general, especially for the aging.

This was where the DS products might play an active role to fulfill the need of consumers. In fact, the definition of dietary supplements had been changed significantly over the past few decades. The original concept of supplements was as "essential nutrients", the vitamins, minerals and proteins needed by the body to stay healthy. Vitamins in pill, capsule, and powder forms are available to consumers for years and the term had now been widened to include food supplements such as fish oil, ginger, garlic, primrose and starflower oil, conjugated linoleic acid (CLA), hydroxy citric acid (HCA), green tea extract, pine bark and grape seed extracts, ginseng, royal jelly and others. As such, the definition then given by the International alliance of dietary supplements associations or IADSA (IADSA, 2002) was much more practical as " Dietary supplements are preparations that contain vitamins and minerals, other nutrients (e.g.

amino acids and fatty acids), plant ingredients or other non-nutrient but edible ingredients, alone or in combinations. Their purpose was to supplement the intake of these ingredients from the normal diet. These preparations were marketed in a variety of forms including, but not limited to, tablets, capsules, powders and liquids.

2.1.2 Market size of Dietary Supplements worldwide

For dietary supplements, the size of the market, worldwide, was estimated at 39 billion US$ in 1997 and 44.8 billion US$ in 2000 (Randy, 2002) and grew to 60.2 billion US$ in 2005 (Simon, 2006). However, 80% of the consumption was confined in the United States, European Union and Japan while 12% was contributed from Asian markets.

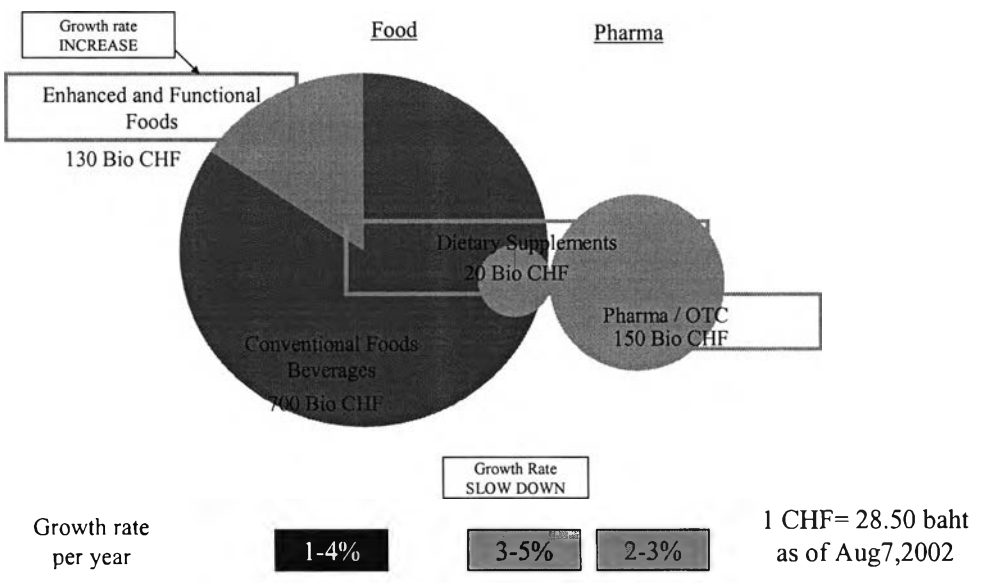


Figure 2.1: Market size and growth of DS in 2001 (Roche Vitamins, 2001).

2.1.2.1 Dietary Supplements Industry in the US

In the United States, the dietary supplements, especially the vitamins and minerals market estimated by European Nutraceuticals (1998) was the biggest so far, in term of value consumed.

Table 2.1: Vitamins & Minerals consumption value in the US

Item in US$ million	**1992**	**1993**	**1994**	**1995**	**1996**	**Cumulative growth 1992-96**
Vitamins & minerals	3745	3935	4309	4607	4972	7.3%

We could see that the growth rate of vitamins and minerals consumption for the American was relatively high (cumulative growth for 1992-1996 = 7.3%). However, the industry, by Roche Vitamins Inc. (1999, 2000, 2001, 2002) had projected an even higher growth from 2000 at 10% annually from 9583 million US$ in 1999 to 14880 in 2004.

From the implication of DSHEA enacted in Oct 1994, USA could then be considered as the most liberal market in term of controlling measures. It was estimated by Ernst (2000) that the public spends almost $4 billion yearly on supplements and it was estimated by Roche Vitamins Inc., (2002) that the sales of Vitamins, Supplement and Mineral could reach almost $15 billion in 2004.

2.1.2.2 Dietary Supplements Industry in European Union

In European Union, data estimated from 8 countries by Datamonitor Europe (1998) including UK, France, Spain, Italy, Germany, Sweden, Netherlands and Switzerland for vitamins and minerals supplement only from 1994-1998 were:

Table 2.2: Vitamins & Minerals consumption value in the EU

Item in US$ million	**1994**	**1995**	**1996**	**1997**	**1998**	**Cumulative growth 1994-98**
Vitamins & minerals	1975	2077	2020	1877	1875	-1.3%

However, should we include all supplement (vitamins, minerals and food supplements) the market size in 2000 could reach 14 billion US$. Germany shares the biggest portion at 38%, followed by France, UK, Italy and others as presented by Randy (2002).

2.1.2.3 Dietary Supplements Industry in Japan

The size of health food industry in Japan was also comparable to those of EU and the US. Besides the functional foods registered under "food for specific health use, FOSHU" regime which was established in 1991 such as low allergenic rice, there were much more products available in the market. They were such as the pre and probiotic groups of products whereas Japanese research activities were second to none in this particular field. The fortified food items with Omega 3 from fish oil, the dairy products and also the dietary supplements (valued at 6.6 US$ billion in 1998 and 9.4 in 2001, Datamonitor Europe (1998)) were also of significance. The market value in 2003 estimated by Atsushi Inaba, NNFA Japan (2004), reached 10.5 billion US$. A good example of this consumption popularity was vitamin C. The total consumption was estimated by Nippon Roche (2002) at 6500 tons per annum (in 2002) from all industries i.e. food, cosmetic and pharmaceutical where consumption in Thailand,, estimated by Rovithai (2002) was recorded around 200-300 tons per annum only.

The development in legislation and regulation in Japan towards the dietary supplement industry was also worth mentioning. Japanese FDA had eased so many restrictions imposed on the industry, thus, facilitated the channel of distribution and flourished the industry

substantially. Nowadays, Japanese people could buy 1000mg of vitamin C tablet with approved health claim from MHLW (2001) as "Vitamin C is a helpful nutritional element for the healthy maintenance of the skin and mucosa, and with the process of anti-oxidation" from any outlet since this item was registered as food product. More detail would be mentioned in the regulatory review.

2.1.2.4 Dietary Supplement Industry in Thailand

The market of DS in Thailand had developed from the imported products from the U.S. from the late 1980's. Since then, the Thai FDA had tried to intervene in the commercial activities of this product category although the clear guidelines and regulations were yet to be imposed. At present, the main groups of DS available in Thailand were Vitamins and Minerals, presented in the forms of single, multiple or combined. Other groups of products were fragmented such as EPO, fish oil, carotenoids, shark cartilage, green tea extract and all the herbal remedies available in pharmaceutical preparations.
This product category was relatively small in term of value, when we compare with other groups or even compare with the consumption in the western countries like the U.S. The most popular items were those of antioxidants such as vitamin C and E. Other items were such as multivitamins and minerals (in which Calcium ranked as the first mineral in consumer perception). Beauty and weight controlling DS also share an important part in the DS industry. The total market size estimated by the industry executives (Post Today, 2004; Bangkok Post, 2004) was more than ten billion baht per annum with 5-10 % growth.

The growth of this industry in Thai market could be attributed to certain driving forces as follow:

1. The purchasing power and growing demand of the new & affluent middle class population whom would like to provide a better quality of life to their families.

2. The effective distribution channels like modern health stores or the very efficient direct marketing practices.
3. The powerful accessibility of the media.
4. The inundated flow of information from globalization phenomenon.
5. The increasing number of potential consumers.
6. The availability of local raw materials for production process.
7. The advancement of Food & Pharmaceutical technologies to provide the new and attractive innovations to the market.
8. The positive trends of relevant new regulations that will come out and accommodate the growth of the industry.

These factors contributed to the sustainable growth of the industry even after the country moved into the economic crisis starting from July 2, 1997 onwards. The opportunity for the growth of local dietary supplement industry was optimistically foreseen together with high annual growth. The main products driving the market were those of fashionable item such as slimming products, followed by vitamins and minerals dietary supplements. On the other hand, certain obstacles need to be addressed immediately. These obstacles were mainly confined to the registration and legislation procedures, responsible by Thai FDA. To properly educate the consumer and provide them with the correct attitude towards the industry come as the next issue. By only addressing these current issues painstakingly, then the benefit of consumer protection would then be achieved.

2.1.3 DS industry for the beauty of body and skin

2.1.3.1 DS industry for the beauty of body and skin worldwide

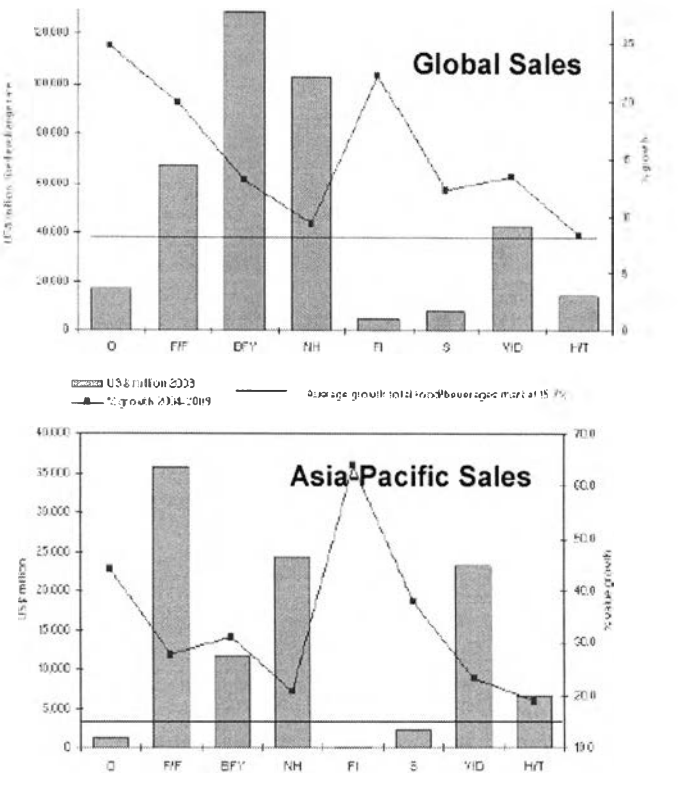
Dietary Supplements for the Beauty of Body and Skin including the weight controlling DS were now getting more popular around the world especially for the women population. The market size of this group of supplements was estimated at 3.5 billions Euros worldwide and represented 9% of food supplements market. The growth rate was estimated at 15% per annum (Marketing Intelligence Inc., 2003). A

comparative data between cosmetics and beauty supplement markets in 2001 was shown in table 2.3.

Table 2.3: Cosmetics and Supplement for Beauty in 2001

Cosmetics market	**Cosmetics market (billion Euro, 2001)**	**Beauty supplement market (million Euro, 2001)**
Japan	17	1200
US	33	710
France	10	300
Germany	11	216
UK	8	71

As well, the projected growth by Euromonitor International (2005) for wellness products up to 2009 was of significant. In particular, the projected growth of 43% of slimming products over the forecast period indicates that there seems little reason to believe that the global problem of obesity was going to be solved overnight. Indeed, with obesity rates for both adults and children predicted to climb still further by 2010, the slimming market was likely to sustain sales throughout the forecast period. While it was not necessarily true that obesity rates alone drive forward the slimming market as the clinically obese were more likely to opt for prescription slimming pills rather than OTC versions, the increased awareness of diet, health and weight that the issue engenders would ensure that the number of people watching their weight remains high. For Asia in particular, despite having some of the lowest body mass indices in the world, the region would see continued demand for slimming products, with the sector expected to reach sales of US$ 2.3 billion by 2009. And for Australia, the slimming market was expected to increase by 32% by 2009, with sales predicted to reach US$ 137 million. The Global/Asia Pacific sales growth forecast in 2009 for wellness products was shown in figure 2.2.



O = Organic products;
F/F = Fortified/functional products;
BFY = Better-for-you (BFY) products e.g. whole grains, low Glycaemic Index, low fat ect.;
NH = Naturally healthy products;
FI = Food intolerance products;
S = Slimming products;
V/D = Vitamins and dietary supplements
H/T = Herbal/traditional products

(China, HK, Japan, South Korea, Taiwan, Thailand, Australia)

Source: Euromonitor International

Figure 2.2: Global sales / Asia Pacific Sales growth forecast in 2009 for wellness products

2.1.3.2 DS for Slimming in Thailand

One of the values of Thai consumer on beauty, especially for female, was to have a perfect shape and one aspect of perfection was to have a slimming body (Sakunsonkdat, 2003). This was the reason why the growth of slimming and beauty DS in Thailand was much faster than other DS categories. The market size estimation from the executive in an important player in this field was shown in table 2.4 (Thansetakij, 2005).

Table 2.4: Estimation of DS market in Thailand

Channel of distribution	**Product Category**	**Market value (million baht)**
Drug store	Slimming DS	500
	Beauty DS	500
	Vitamins & Minerals	1000
Direct Sales and others	Miscellaneous	3000
	Total market value	5000

2.1.3.2.1 Type of Slimming DS available in Thailand

Weight management DS available in Thailand could be presented in many forms and could be single or combined ingredients. The mode of action for this group of DS could be by reducing energy intake or increasing energy expenditure or both (Mason, 2002).

Weight Management DS that reduced the energy intake, classified by their active ingredients were such as:

Fiber: including pectin and glucomannan are normally used as ingredients in weight management DS. The suggested mechanism of action was to increase satiety resulting in the reduction of energy intake (Mason, 2002)

Chitosan: the deacetylated polymer of N-acetyl-D-glucosamine (chitin), water soluble and chemically similar to cellulose. Chitosan was believed to affect cholesterol and weight because of its positive charged amino groups at the same pH as the gastrointestinal tract. These amino groups are believed to bind to negative charged molecules, such as lipids and bile, preventing them from absorption and storage in the body (Shileds, 2003).

Garcinia: Hydroxycitric acid (HCA) is a phytochemical found in Garcinia cambogia and G. indica. HCA is purported to reduce lipogenesis by inhibiting the enzyme adenosine triphosphate (ATP)-

citrate lyase that converts citrate to acetyl-CoA. Limitation of acetyl-CoA for lipid synthesis from carbohydarate diet resulting in an increase of hepatic glycogen synthesis, which might lead to the reduction of energy intake (Westerterp, 2002)

Weight Management DS that increased in energy expenditure, classified by their active ingredients were such as:

Chromium: an essential trace element required for normal carbohydrate, protein and fat metabolism. Chromium has been suggested to potentiate the action of insulin, possibly by increasing insulin binding, insulin binding receptor number, improving insulin internalization and increasing insulin sensitivity. Insulin functioning transporting glucose and amino acids into muscle cells regulating protein metabolism and synthesis. Therefore, improvements in insulin utilization should theoretically lead to the increase of muscle mass and the reduction of body fat (Volpe, 2001).

Carnitine: Carnitine (beta-hydroxy-gamma-trimethylaminobutyric acid) is a small water-soluble quaternary amine. In non-vegetarians, approximately 75% of body-carnitine is derived from the diet and 25% from de novo biosynthesis in the liver and kidney from the amino acids, lysine and methionine (Xuan, 2003)

Conjugated Linoleic Acid or CLA (the product of selection for this study)

Description: Conjugated Linoleic Acid or CLA is a natural mixture of positional and geometric isomers of linoleic acid (LA) with conjugated double bonds at position 9 and 11 or 10 and 12 in its structure, each double bond may be in the cis or trans configuration (Jahreis, 2000; Berven, 2000; Watkins, 2000). An important biologically active isomer of CLA is cis-9 and trans-11 octadecadienoic acid, which is now referred to as rumenic acid (Jahreis, 2000). CLA had attracted considerable attention because of its potential beneficial

health effects. CLA was first studied about its effects on prevention of cancer induced by carcinogen (anticarcinogenic effect) and immune modulation, but after that almost researches pointed to the effects on reduction of body fat and increasing of lean body mass. A few published studies of CLA supplementation in humans concerned about CLA and body builder in athletes (Jahreis, 2000). A researcher suggested that CLA was a nonessential dietary antioxidant (Decker, 1995).

Sources: CLA had been identified in human tissues, dairy products, meats and certain vegetable oils (Jahreis, 2000; Bason, 2000; Berven, 2000). A variety of animal products are good sources of CLA, but plant oils contain much less. However, plant oils are rich source of LA, which may be isomerized to CLA by intestinal microorganisms in human. Consumption of plant oil did not increase blood CLA level in humans (Herbel, 1998) so the concentrated CLA in capsule form was available as a dietary supplement. The plant that is usually used for commercial CLA production is sunflower and some used safflower. During the second half of nineties, the commercially produced CLA supplements consisted of approximately 20-40% of cis-9 and trans-11 as well as trans-10 and cis-12 isomer (total CLA = 100%). The present generation of CLA products contains nearly 100% of the two active isomers and only traces of all-cis and all-trans isomers (Jahreis, 2000). Its effect on growth (less fat, more protein) was also a subject of active research (Kritchevsky, 2000).

Health benefits of CLA:

- Cancer prevention: CLA showed anticarcinogenic activity, antimutagenic activity and inhibition of tumor promotion in various studies (mammary carcinogenesis, skin tumor, etc).(Jahreis, 2000; Kritchevsky, 2000; Decker, 1995)
- Immune enhancement (Jahreis, 2000)
- Reduction of body fat and increasing of lean body mass (Jahreis, 2000; Bason, 2000; Herbel, 1998; Berven, 2000)

- Inhibition of cholesterol-induced atherosclerosis (Jahresi, 2000; Kritchevsky, 2000; Munday, 1999)
- Bone modulation (Watkins, 2000; Seifert, 1997)

Dosage: For body weight management, the dosages that had been studied ranged from 0.7-4.2 gm per day. A short summary of 6 studies were shown below:

Table 2.5: Placebo-Controlled, Randomized Double-Blind Human Clinical Studies on the Body Composition Effects of CLA

Reference	**Study subjects**	**CLA (gm/ day)**	**Dura-tion**	**Para-meters measures**	**BFM Reduc-tion (%)**
J-M Gaullier et al., 2004	Obese-M/F	3.4	12 months	BFM, LBM, BW, BMI	9.0
Blankson et al., 2000	Obese-M/F	≥ 3.4	12 weeks	BFM	5.0
Smedman and Vessby,2001	Healthy- M/F	3.2	12 weeks	BFM	3.8
Riserus et al., 2001	Obese-M	4.2	4 weeks	SAD	2.0
Berven et al., 2000	Obese-M/F	3.5	12 weeks	BW, BMI	1.0
Thom et al., 2001	Healthy- M/F	1.8	12 weeks	BFM	20

(BW= body weight, BMI= body mass index, BFM= body fat mass, LBM= lean body mass, SAD= sagittal abdominal diameter, M=male, F= female.

Side Effect: The intake of CLA 3.4 g. daily for 12 weeks in obese volunteers showed no side effect except the mean weight of subjects was reduced by 1.1 kg while body mass index (BMI) was reduced by 0.4 km/m2. The conclusion of this paper indicated that CLA in the given dose was a safe substance in health populations with regard to the safety parameters investigated (Berven, 2000).

2.2 Regulatory aspects for Dietary Supplements

The differences in regulatory aspects send a strong impact to the consumption of vitamins; of course, some good examples were the figures of vitamins and minerals consumption of the US population estimated in 1996 from European Nutraceutical (1998) which was 4972 million US$ and 42.75 billion yen in 1999 for Japan from Nippon Roche (2002). These high consumption values of these two countries, when compare to Thailand, were substantial. The estimation of vitamin C consumption for Thai people was around 300 tons per annum while it was more than 6500 tons in Japan in 2002. Although the difference in consumption of Thailand and Japan derived from many contributing factors (such as the belief, knowledge and culture), but the regulatory implication had significantly contributed to this difference as well. Anyway, we would consider the local regulation aspect only since we had confined our study in Thailand.

2.2.1 Regulatory Status of Dietary Supplement in Thailand.

Dietary Supplement products were relatively new products to Thai consumers. The very first product officially fell under this specific category was Garlic which was registered in 1987 under the Ministry Notification: Garlic Products. The Notification stated out that "Products using garlic for preparations or for making in liquid or dried form, and may be mixed with other things and packed in capsule or tablet form" and this was the very first of statements accepting the new food category presented not in general food form/presentation.

In 1992, Food Control Division, Thai FDA, had received many applications for the purpose of product classification such as fish oil, EPO, lecithin and others. Therefore, in 1993, Thai FDA had set up the working group so to separately classify the products between food and pharmaceutical products and drawn the guideline for product classification. As a result, the product called Dietary Supplement was

officially started in 1995 under the MOPH Notification: Food for special dietary use.

2.2.1.1 Dietary supplement definition (1995-2005):

"A product directly consumed other than normal staple food of which often presented in the forms of tablets, capsule, powder, liquid or other forms. The products are intended for general person whose health status is normal". Ingredient components must be safe to use as food.

2.2.1.2 Labeling and claim

Label of dietary supplement must comply with MOPH Notification on Label. As well, the warning statement is mandatory if that specific dietary supplement needs such a warning statement. The food consumption suggestion statement of "Consumer are recommended to take all 5 food groups" is also required on the label.

For product and health claim statement, the claim must comply with MOPH Notification on: Nutrition labeling. The claims that are not allowed comprise of misleading claim, other health claim than specified and medicinal claims.

Before market the product, producers/suppliers or exporters must apply for the FDA approval for the following subjects.

- Manufacturing /importation license
- Product and labeling approval
- Advertisement approval

The records of dietary supplement products being registered and approved by Thai FDA from 1995 to the November of 2005 were shown below:

Table 2.6: Record of registered DS with Thai FDA during 1995-2005

Year	Locally produced	Imported	Total
1995	0	35	35
1996	49	71	120
1997	150	264	414
1998	377	245	622
1999	408	185	593
2000	243	160	404
2001	267	136	403
2002	1420	819	2241
2003	621	221	833
2004	648	229	877
2005*	613	209	822
Total	4819	2539	7362

(* 2005 figure was for Jan-Nov only)

2.2.1.3 The newly imposed Dietary Supplement Regulation (2006)

The MOPH Notification No. 293 (AD2005) on Dietary Supplement had been notified on Dec, 15 2005. It needed 90 days after being announced in the Royal Thai Gazette, before becoming effective which fell on March, 14 2006.

Detail inside the Ministry Notification on Dietary Supplement comprises of:

1. Definition
2. Quality/ standard
3. Labeling
4. Health Claim / Warning
5. There is a two years period allowable timeline for current products to amend the detail so to comply with the new Notification.

1. Definition

Dietary Supplement is defined as a product physically consumed apart from normal food consumption. The product contains food nutrients or other edible substances in the form of tablet, capsule, powder, crystallized powder, fluid, or other forms different from conventional foods. The product is meant for consumers who expect to improve health when taking this group of products.

Food nutrients or other edible substances meaning:

(1). Vitamins, amino acids, fatty acids, minerals, and product from plants or animals origins.
(2). Concentrated substances, metabolites, ingredients or extract of substances from (1).
(3). Synthetic substances replicating substances in (1) or (2)
(4). Mixture of any substances in (1) ,(2) or (3)
(5). Other substances approved by Thai FDA

2. Quality/ Standard

The quality and standard of dietary supplement to be distributed in the kingdom are to apply with :

2.1) Recommendation for contaminants
2.2) Recommendation for min. /max. levels of vitamins and minerals in the product.
2.3) Recommendation for the use of food additives
2.4) Establishment positive list for active ingredients

More detail of certain items of this standard and quality are such as:

2.1) Recommendation for contaminants

- E. coli : less than 3/g by MPN. method
- No detection of Staphylococus aureus in 0.1g
- No detection of Clostridium spp.in 0.1g.
- No detection of Salmonella spp. in 25 g.
- Other contaminant should not exceed the guideline in such particular Notification.

2.2) Recommendation for min. /max. levels of vitamins and minerals in the product.

The product should contain vitamins and /or minerals only in the level range of 15%-100% of Thai RDI. (Recommended Daily Intake for Thai, 6 year up)

2.3) Establishment positive list for active ingredients.

The list will be drawn and continuously updated by FDA.
For other substances not in the list and new active ingredients, JECFA 's Safety Evaluation Criteria is required.

3. Labeling

- Label must comply with MOPH. on Label
- Wording must be in Thai characters, clear and eligible.
- "Dietary Supplement Product" statement should be posted next to product name.
- Product name should not mislead the consumer, deceive and being fraud

Details of Label

- Product name
- Ingredient list
- Nutrition labeling/claims

- Name and address of producers
- Manufacturing and Expired/Best use before date
- Net quantity
- Suggestion and warning statement
- Registration number

4. Claim and warning

There were certain MOPH Notifications for this claim and warning such as the Nutrition Labeling Notification (#182) and there will be more Notifications assigned to cover Health Claims/Warning in the near future

Currently allowable Claims for DS are:

-Nutrition/Nutrient Function Claims such as Calcium is good to bone health

-Defined Health Claims which could cover the reduction of disease risk claims

At the same time, medicinal and misleading claims are not allowed. In fact, Thai FDA guideline for DS claims would comply with Codex Alimentarius commission (www.Codexalimentarius.net) on the Joint FAO/WHO Food Standard programme. This standard had covered two relevant subjects i.e.

-Guidelines for Use of Nutrition and Health Claims.
-Recommendation on Scientific Basis of Health Claims.

For warning statement, it will be set up by Thai FDA on a case by case basis such as: For an example, the warning statement for Royal Jelly and royal jelly products was:

"Those who are allergic to pollen grain should not consume"

Conclusions for regulatory status for DS by Thai FDA, currently, are as follow:

- Dietary supplements are classified as food by Food Act B.E. 2522(A.D.1979)
- Is under the Notification of MOPH. No.293 (AD.2005) notified on Dec.,15 2005 and would be effective on March,14 2005
- Pre-marketing approval is mandatory.
- Production site/facility must comply with GMP standard.
- For imported product, manufacturing certification issued by the authority or other relevant certification from original country is required
- Registration of the product is required.
- Establishment of the positive list for active ingredient
- Establishment of the guideline for safety evaluation for new active ingredient.
- Establishment of the guideline on the substantiated scientific basis of health claims comply with codex standard.
- Establishment of the standard for health claims/warning statements.

Conjugated Linoleic acid or CLA was classified under this regulation as well from the start where it was introduced into Thai market a few years ago. As there was no specific Notification imposed for CLA like what we had with Royal Jelly, fish oil or Garlic, therefore, CLA in the past was registered under MOPH Notification of food for special dietary use and would be included in the newly imposed Notification number 293 as described above.

2.3 Consumer behavior regarding the consumption of DS

2.3.1 Demographic review of DS users

The market outlook of vitamins and food supplements was quite promising. There were always opportunities to market new brands for this kind of products, by placing emphasis on providing knowledge and understanding to consumers about the products as much as possible in order to induce purchasing decision.

Dietary Supplements for the Beauty of Body and Skin were now getting more popular around the world especially for the women population. The market size of this group of supplements was estimated at 3.5 billions Euros worldwide and represented 9% of food supplements market and the growth rate was 15% per annum (Marketing Intelligence Inc., 2003). Related information from Roche Vitamins Inc., (2002) was such as healthy skin was 75% of top 5 health benefits associated with Vitamin E, whereas the consumers also associated vitamin E as an antioxidant at 28%.

Demographic characteristics (Gladys et al, 1988) that positively influence dietary supplements consumption cover certain characteristics including: female than male, older age, greater nutrition activity, less physician involvement, more frequent visit to health food stores, more years of education, relatively low body mass indices, active lifestyles, frequent exercisers, less or not smoke, moderate alcohol consumption, higher intake of micronutrients from foods, perceived more health benefits of food supplements, consumer at risk of certain disease such as cancer and white race (in the US).

Characteristics of dietary supplements consumption of consumers were attributed into many areas such as: socioeconomic status including demographic variables (age, gender, and race), region, income, educational background, belief and culture, nutritional habit, or even personal characteristics like body mass index, alcoholic

consumption and so on. We would then review the consumption behavior based on these demographic variables.

From Alan's (1987) study, he found out that young supplement users (aged 16 to 25) tended to be in the light user group. Older adults (aged 41 to 64) and residents of the western United States tended to be in the heavy and very heavy user groups. These user groups were typically taking two or more specialized vitamin and mineral products at a time as part of a personalized supplement regimen and associated with more frequent visits to health food stores, greater nutrition activity and less physician involvement. Light and moderate nutrient intakes were more likely to be associated with a defensive interest in avoiding nutritional deficiencies. This difference in motivations could lead to the context of public information strategies.

Certain study (Barbara et al., 1998) demonstrated that supplement users differ from nonusers in demographic, lifestyles, dietary and health characteristics. What they found were of interest that the use of supplements was more prevalent among women, persons with more than 12 years of education, those with relatively low body mass indices, persons with active lifestyles and persons who never smoked as compared to current smokers. Moreover, supplement users had higher intakes of most of the micronutrients from food that were examined in the study, including the antioxidant vitamins (vitamin C and E and certain carotenoids). Intakes of dairy products and also foods that were important sources of vitamins and carotenoids were higher among users of supplements, but relationships differed by gender and by the type and level of supplement intake. Therefore, the study suggests that several factors need to be considered as potential confounders (gender, age, and education, weight for height, physical activity, smoking alcohol consumption and diet) in observational studies that examine the etiologic role of supplements in the occurrence of chronic disease.

In particular for dietary supplement consumption, the data presented in the paper suggested that the use of multinutrient supplements and supplemental antioxidant vitamins may be associated with certain chronic diseases of aging either in the total population or in gender and age strata.

In another research article of Alison et al (1994), conducted in 502 community college students from Arizona, had reported that the most popular supplements were vitamin C, multiple vitamins, multivitamins plus minerals, calcium and vitamin E. For the most popular unconventional supplements reported were amino acids, garlic, Aloe vera, yeast and fish oil. Significantly, more users than nonusers believed that

- food supplements increased pep and energy,
- reduced stress,
- were necessary to ensure proper nutrition,
- were needed if people felt tired and run down, and that
- Vitamin C could prevent colds.

This finding revealed that supplement use was prevalent among young adults and those supplement users perceived more health benefits of food supplements than nonusers.

In the more recent marketing surveys on vitamin consumption in the U.S. which were conducted annually during 1999-2002 by Roche Vitamins Inc., some other interesting points were reported by basing on the commercially attributable variables.

These reports did compile and rearrange the information sources from Gallup, Health Focus, National Institute of Health, Packaged Facts and US Census Bureau.

Profiles of US Vitamin users were quite similar to the aforementioned studies such as 50% of the Americans were vitamin

users. However, the number of current regular users (adults who currently take vitamins everyday or almost everyday) had gone up from 39% in 1998 to 44% in 2001, clearly expressing the popularity of vitamin consumption in the US.

The frequency of exercising, which was not reported in other studies, was also tally and well above to the use of vitamin i.e. 39% were frequent exercisers against 36% all adults using vitamins in 1992 and 52% against 45%, similar result were found in 1998.

The last study was a local one conducted by the late Siam Commercial Bank Research Institute, Market Research Magazine (1998). By using the field survey method and randomly selecting via quota sampling, the researcher collected the information from face to face interview from 400 Bangkok residences, male and female in equal number. These people were all care about their health. Demographic details were such as the age ranges from 20-50, educational ranges from primary to beyond bachelor with all types of occupation. Household incomes were from 17500 up to 35000 baht/ month.

The result showed that the way these health conscious consumers were looking after the health by taking vitamin was 10% only (compared to 23% in EU and 50% in the US (Roche Vitamins Europe, 1999; Roche Vitamins Inc., 2002)). However, the similar vitamin intake pattern were similar to other countries such as multivitamins and minerals were the most popular preparation (35%), followed by vitamin C at 30%. The consumption of dietary supplements indicated for slimming was 14% and 5% was for beauty purpose.

During the beginning of IMF era in Thailand (Market Research Magazine Vol 2, no4; 1997), consumers still considered that health concern was of importance. The reasons to buy these health products were to strengthening the physical status at 69%, quality to price paid for was 59%, and similar percentage was given to what the price

worth spending. Brand name and outlet type took 28% and good service was 7%.

2.4 Influences of Marketing and other activities on consumption of Dietary Supplements

Consumption of certain products could be positively or negatively influenced by marketing and other activities implemented to the consumer. However, for particular items, impact from these activities might be different. Health product may need a special treatment so to convince the consumer since they were considered as the high involvement goods (products that consumer would take a serious look when come to a decision making process) (Kotler, 2005).

Although there were certain surveys and study on the marketing activities that influence the consumers to consume DS, the other influences on other product groups might be of interest as well. They were such as consumer products including food and beverage, snack or even toiletries and cosmetics. The trends that were observed from these surveys could be applied to health products, at least one way or another.

There was a set of consumer surveys conducted by the late Siam Commercial Bank Research Institute during 1997-2001 that worth mentioning. Most of the surveys were conducted in Bangkok and perimeters on 400 samplings upward, although quota sampling was employed, we could, draw out some significant trends of the influence on how consumer pursue their decision process.

2.4.1 Influence of the product (DS)

One consumer survey, Market Research Magazine Vol 3 no 3&4 (1998) had revealed some interesting information that related consumer and dietary supplement consumption as follow:

About vitamins and food supplements consumption, consumers take these items in order to be in good health. Their motives were to be physically fit, to replace what the body lacks, to prevent and cure diseases, to nourish skin, to delay aging and to control weight.

The market of vitamins and food supplements had been expanding due mainly to the problems of pollution, the health awareness, and the fashionable consumption of foods produced from natural environment, all of which had prompted consumers to concentrate on nourishing their health by natural means. Results of the study indicate that product quality was the most important factor considered by consumers in choosing vitamins and food supplements. By the way, free trail was the best marketing strategy to induce consumers to purchase vitamins and food supplements due to the fact that consumers could learn about the benefits derived from a product on their own.

Taking a closer look on the activities that would influence the buying of vitamin, (Market Research Magazine Vol 3, no3; 1998) good quality came first at 47%, FDA approval endorsement took the second importance of 30%. Good price (Market Research Magazine Vol 3, no3; 1998) took 11% and 6% for presentation and form while 5% was given to brand and left 1% only to packaging.

2.4.2 Influence of distribution channels for DS

Drug stores were the outlets where consumers buy vitamins and food supplements more than other channels. Modern drug stores had been expanding and targeting more on consumers who take these groups of products.

However, for Beauty and Slimming Dietary Supplements, the most effective distribution channel could be via direct marketing especially the so called Multilevel Marketing (MLM) pattern. Amway, as the largest MLM Company in Thailand, had recorded the sales of

nearly 10 billion baht in 2003 in which more than 1billion were from Nutrilite, brands of Supplements.

The last item to be compared was the retail outlets where consumers shop for vitamins, which, again, difference in consumer preference could be observed from these three areas shown in table 2.7.

Table 2.7: Channels of distribution for Vitamins: US/EU/Thailand

Retail Outlets where consumers shop for vitamins (%)	**The US (2000)**	**The EU (1999)**	**Thailand (1998)**
Discount store	33		
Drug store/ pharmacy	29	74*	53
Supermarket	13	18	
Health food store	7	16	
GNC	7		
Mail order	4	3	2
Direct to home	3		16
Warehouse club	3		
Direct from doctor	2		29**

* Drug store 8%, pharmacy 66%

** In Thai survey, this item was read as clinic/hospital

Looking for vitamin and supplements outlets, or channel of distribution, (Market Research Magazine Vol 3, no3; 1998) drug store was the first choice of 53% where hospital and clinic took 29%. Direct sales contributed 16% and mail order just took 2%. This was different to other DS where direct sales took 30% of the popular outlets. One of the reasons was that DS are registered as food products while vitamins are mostly classified as medicines, by FDA categorization regulation.

2.4.3 Influence of the advertisement and company communication

Information via various media played an important role in helping consumers to understand about health care as well as benefits derived from the products consumed, which were fundamental for consumers in making a buying decision. TV and radio were the sources of information where consumers acquire knowledge about health care the most.

An interesting aspect that worth considering was the sources of vitamin and supplement information. In the US, doctor ranked the very first source of informant on vitamin, followed by friend/relative then magazine articles, television and so on. We could then compare this subject with the information from EU country by Roche Vitamins Europe (1999) and Thailand by Market Research Magazine (1998) on the same question, as follows:

Table 2.8: Sources of Vitamin Information: US/EU/Thailand

Sources of vitamin information (%)	**The US (2000)**	**The EU *(1999)**	**Thailand **(1998)**
Doctor	35	82	6
Friends/relatives	34		18
Magazine/Newspaper articles	26		8
Newspaper/magazine ads	23	45	15
Pharmacist/druggist	21	11	6
Television	17	31	68
Health food magazines	16		9
Health food store	13		
Books/catalogues on vitamins	12		16
Internet	12		
Dietitian/nutritionist	9		6
Radio	7	31	4
Clerk in drug store	7		
Leaflets in the store	6		2
Manufacturers		5	
Government		1	

* Information from the EU were based on the combination of sources of vitamin information + advice to make you more likely to take vitamins

** Doctor, pharmacist and dietitian/nutritionist were collectively called specialist in the survey

Influence of this advertisement towards the consumers was also observed with other consumer products such as snack (Market Research Magazine, Vol 5 no 2; 2000). The factors that influenced consumption were by self-evaluation (33%), friends (29%) and advertisement (24%) while parents and brother/sisters shared only 8 and 6% respectively. But when consider the promotional activities that would attract them to consume, TV advertisement outweighed other means by far (91%), followed by sales promotion at 3% and other channels of media (radio, movies, posters and pamphlets or even

billboards) shared only 1% each. This result showed the strongest impact of TV media.

Then when we consider on the source of information for Thai youngsters (Market Research Magazine Vol 3, no2; 1998), from the survey, close friends contributed 40%, followed by TV and magazine at 22 and 12% respectively. Buying outlet took 10%, followed by newspaper, brochure and distributor at 6, 4 and 3%. Only 1% was shared by radio and Internet. However, this survey was conducted in 1998 and this may be changed substantially because of new technology as of today (2006). Therefore, just 2 years later, a similar survey was conducted again (Market Research Magazine Vol 5, no4; 2000). Now, TV shared 44% and close friends were down to 27%. Magazine and newspaper took 15 and 14%. Internet increased their influence to 2% together with other types of media. We could conclude that the influences of modern media play a crucial role to influence the consumer much more than they did in the past. However, by comparative data, the usage of Internet to explore the information was higher in the western countries. From an example of the survey on Vitamin E consumer research, conducted in Australia (Roche Vitamins Australia, 2000), it was found out that 33% of the sample quoted Internet as a source of information. For healthcare business in Thailand, the effective media were shown in figure 2.3.

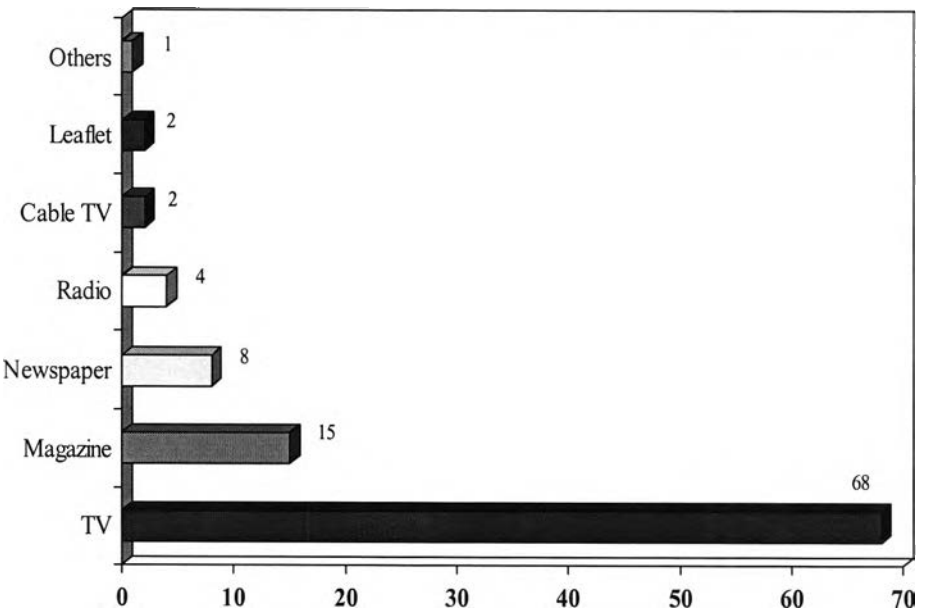


Figure 2.3: Effective media for healthcare business (Market Research Magazine Vol 3, no3; 1998

Advertisement played an important role in selling the products; DS advertisement in Thailand was used as an effective Marketing activity to attract consumers to use the products. The total value of advertisement for DS in Thailand had gone beyond 800 million baht per annum (Econnews, 2003). Media use cover various types such as TV, radio, Newspaper, Magazine, Billboard, Cinema and Internet as shown in table 2.9.

Table 2.9: DS advertisement spending, classified by type of media in 2002 (Econ News, 2003) the unit was in million baht

Product	TV	Radio	Newspaper	Magazine	Billboard	Cinema	Internet	Total
Vitamins	147	44	7	40	1	0	0	240
Slimming	76	35	9	8	2	0	0	130
Chicken Essence	226	32	8	7	17	0	0	290
Bird nest	124	27	5	2	2	2	0	160
Total	572	138	29	57	22	2	0	821

2.4.4 Influence of sales promotion

The influences on sales promotions to toiletries and cosmetics items (Market Research Magazine, Vol 6, no 1 and no2; 2001) was clearly seen that price discount shared more than 50%, followed by advertisement on the quality of the products (40+ %). The free sample trials and give away took more than 20% each. The showcase also contributed of somewhere below 20% while coupon and lucky draw couldn't do that much (in the range of 5%).

The next survey was on the buying pattern of groceries in the supermarket (Market Research Magazine Vol 4, no 4; 1999). The price-off gave the strong impact to the buyers at 87%, followed by free sampling of 44%. Coupon got 38% and quite similar of 34% to those of give away. Lucky draw took 20% and especially seasonal activity shared 18% while 16% to coupon for exchange for something. Personal consultant (PC) to introduce the goods and non-seasonal activities could draw 12 and 11% respectively.

Back to the same survey (Market Research Magazine Vol 5, no4: 2000), the effective sales promotion strategies were the price-off at 48%, followed by 19% of free trial, 17% for money back guarantee if not satisfied, give away took 12% and 4% to lucky draw.

But the real purchasing power was with the working adults (Market Research Magazine Vol. 5, no1; 2000). Separately, for women, the price-off took control of 69% followed by advertisement at 16%. Give away shared 10% and free sample and demonstration of the products contributed 3 and 2% respectively. For working men in Bangkok (Market Research Magazine Vol 2, no 1; 1997), we found that most of them regularly monitor the political and sport news, therefore, to apply the marketing activities into these areas of interest would worth the resource spending.

From the recent survey conducted before the brink of Middle East war (2001, after the Sep11,2001 incident) (Market Research Magazine Vol6, no 4; 2002), we found out that cost consciousness dominated the consumer feeling that the price-off took 47% of the strategy to draw the consumer to buy goods. This was followed by free trial at 25%, coupon 13% while other strategies couldn't take strong impact in consumer's mind. And in the same survey, TV was the strongest media, controlled 64% of the impact while other media shared only a few percentages.

About the strategy to draw the consumer to buy vitamin (Market Research Magazine Vol 3, no3; 1998) were 30% to free sampling, 23% to publicity, 20% to consumer awareness, 11% to seminar and product demonstration, 6% to discount, 4% to trade promotion and give away. The last item was discount coupon that took 2%.

2.5 Theoretical Model and Hypothesis

2.5.1 Theoretical Model

The conceptual model of influences of marketing and non-marketing activities on the attitude toward the slimming dietary supplements and intention to continue to use the products had been developed for this study. The main components in the model are based on the Tricomponent Attitude Model (Batra and Ahtola, 1990; Zanna and Rempel, 1998) together with the concept of Marketing Management, focus on marketing mix (Kotler, 2005) concept. These two models together provide a suitable framework for conceptualizing such behavior. The conceptual model used to investigate factors affecting consumers' intentions to continue to use the weight management DS in this study (CLA 600 and CLA Advance) is derived from the contemporary view of the tricomponent attitude model.

From a consumer behavior perspective, attitude was defined as a learned predisposition to behave in a consistently favorable or unfavorable way with respect to a given object (Batra and Ahtola, 1990; Zanna and Rempel, 1998; Schiffman and Kanuk, 1994). Attitude had traditionally been viewed as consisting of three components: cognitive, affective, and conative. A person's knowledge and beliefs (or perceptions) about some attitude object reside within the cognitive component. The affective component represents a person's feelings about the attitude object. The conative component refers to the person's actions or behavioral tendencies toward the attitude object.

The more contemporary view of attitude is reflected in Figure 2.4. From this perspective, attitude is viewed as distinct from its components, , with each component being related to attitude. Both the cognitive component (beliefs/perceptions) and the affective component (feelings) are conceptualized as determinants of attitude. In other words, a person's overall evaluation (attitude) of an attitude object is seen as being determined by the person's beliefs and/or

feelings about the attitude (Batra and Ahtola, 1990; Zanna and Rempel, 1998). For some products, attitude will depend primarily on belief or perceptions. For other products, however, feelings may be the primary determinants of attitude. It is also possible for both beliefs and feelings to influence attitudes. From the preliminary study, the slimming DS fits nicely into the situation where consumers use their beliefs/perceptions rather than their feelings about the product to form their attitudes toward the products. As such, only beliefs/perceptions about the brand are included in the conceptual model in the study.

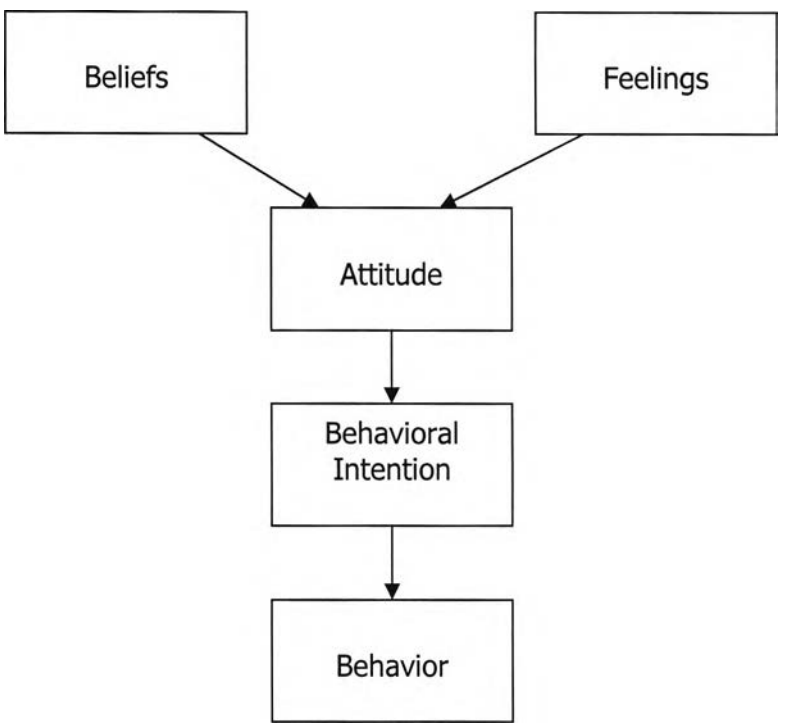


Figure 2.4: Contemporary view of the relationships among beliefs, feelings, attitude, behavioral intention and behavior

Unlike the cognitive and affective components, the conative component is not seen as a determinant of attitudes (Batra and Ahtola, 1990; Zanna and Rempel, 1998). Instead, attitudes are viewed as determinants of the conative component; that is, a person's behavioral intention will depend on his or her attitudes. Consequently, consumers' intentions to perform some behavior (such as purchasing a brand) should increase as their attitudes become more favorable. Even

in DS consumption, attitudes were a better predictor of intentions to use DS than were other influence such as subjective norms (Michael, 2001). Behavioral intention, in turn, determines future behavior.

"Attitude is a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" is the definition given by Fishbein and Ajzen (1980). Attitude is influenced by beliefs (or perceptions) and affect concerning the object. Attitude is a mental construct which could be studied by observing verbal responses and behavior in relation to the object. According to Ajzen and Fishbein (1980) and Batra and Ahtola (1990), attitudes are the determinants of behavioral intention. As such, it is hypothesized in this study that attitude toward the slimming DS had a direct positive effect on behavioral intention to continue to use the slimming DS.

2.5.2 Marketing Activities

Marketing management concept is generally accepted and being implemented worldwide. Most of the modern organizations, including private or public sectors, NGO or non NGO, are adopting the marketing management concept to their day to day operation. The marketing program or activities are implemented so to achieve company's desired objectives. The marketing program consists of numerous decisions on the mix of marketing tools to use as suggested by Kotler (2003). The marketing mix is the set of marketing tools the firm uses to pursue its marketing objectives in the target market. McCarthy (1996) classified these tools into four groups that he called the four Ps of marketing i.e. product, price, place (distribution channel) and promotion (communication). Marketing mix decisions must be made for influencing the trade channels as well as the attitude of final consumers as shown in figure 2.5.

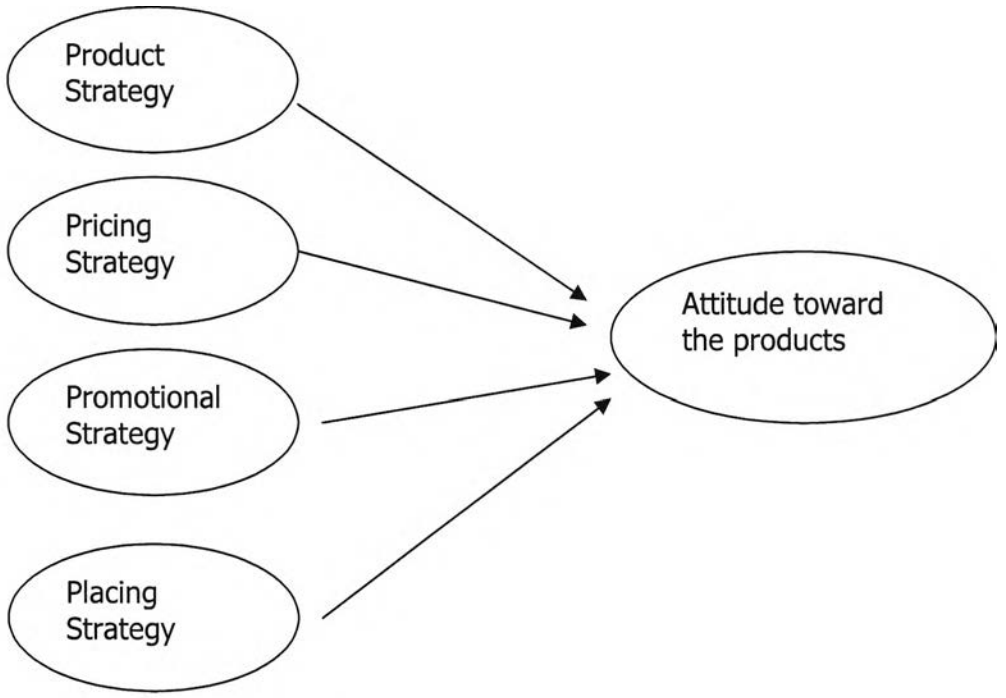


Figure 2.5: Marketing Mix Model (McCarthy, 1996)

When we specify this marketing mix concept to Dietary Supplement consumption, we can identify the concepts and their constructs as follows:

2.5.2.1 Product

Dietary Supplement product concept comprises of presentation (capsule, tablet, powder or liquid), pack size and packaging, strength, brand name, quality, administration, safety, reputation of the company. Many of these concepts create confidence towards the product in consumer perception. There are three product strategies to be considered for the company as follows:

1. If the consumer perception toward the product is good, maintaining strategy is to be employed
2. If the consumer perception toward the product is bad, modifying the current product is to be considered or

3. If the consumer perception toward the product is bad, developing the new product is to be chosen

The perception on the product attributes by consumer had an effect on attitude toward the product. As such, it is logical to assume that the "high product attributes" have a positive effect on attitude toward the slimming Dietary Supplement.

The definition of "product attributes" includes quality, safety, effectiveness, convenient to consume, attractive packaging and come from the good image company. In short, these attributes can be grouped as the extrinsic (such as packaging) and intrinsic factors (such as confidence in the product and the company).

2.5.2.2 Price

For pricing strategy, the company has to start by identifying the base price or listed price. This base price is determined by:

1. Demand which indicates the ceiling price
2. Cost which indicates the floor price and
3. Other factors such as company objectives and Product life cycle, these other factors will move the base price somewhere between the floor and the ceiling

Dietary Supplement price concept comprises of retail price and discount. However, in consumer perception, they will consider the price in term of reasonableness, such as whether the product is expensive or cheap, good value for money, or whether it is affordable.

The perception on reasonableness of price by consumer has an effect on attitude toward the slimming Dietary Supplement. As such, it is logical to assume that the reasonableness of price has a positive effect on attitude toward the slimming Dietary Supplement.

2.5.2.3 Promotional program

Promotional program concept, in the more contemporary view, comprises of advertisement and public relation activity (collectively called company communication) and promotional program such as discount, prize draw, free gift etc, collectively called promotional program). The consumer perception will be measured by such as the level (intensity) of advertisement, whether the advertisement is attractive, whether the detail inside the advertisement is easy to understand (comprehensibility), reliability, adequacy of information or whether the sales promotional program is attractive enough.

The perception on effectiveness of communication activities and sale promotion from the Slimming Dietary Supplement company by consumer has an effect on attitude toward the product. As such, it is logical to assume that the effectiveness of communication from the company has a positive effect on attitude toward the Slimming Dietary Supplement.

2.5.2.4 Place

Place or distribution channel is the strategy that related to the convenience to get the product. Therefore, the company objective on this strategy is to create the convenience in term of accessibility to their products. In this regard, two main strategies could be employed:

1. Direct distribution by setting up their own sales force
2. Indirect distribution by using the existing channel for distribution

The other concern for deciding distribution strategy is to decide on the intensity of distribution. In this regard, cost could play a major role to the decision, they are as follows:

1. Extensive distribution, a mass and most costly strategy

2. Selective distribution, a short list of channels will be selected
3. Exclusive distribution, a much focused distribution strategy by giving the exclusivity to one channel.

Consumer perception for this concept that we will measure are such as whether it is easy to find the product, the product is marketed in the shop that the consumer normally do the shopping or the whether product is easy to buy.

The perception on convenience of accessibility of Slimming Dietary Supplement by consumer has an effect on attitude toward the product. As such, it is logical to assume that the convenience of accessibility of Slimming Dietary Supplement has a positive effect on attitude toward the product.

2.5.3 Non-Marketing Activity/Influence

2.5.3.1 Positive experiences/Satisfaction

Attitude-behavior researchers asserted that inclusion of positive experiences/satisfaction in the model significantly improves the prediction of behavior (Bentler & Speckart, 1979; Sutton & Hallett, 1989). Past experience comprises of the actual encountering that consumers had pertinent to the product consumption. Therefore, it is logical to assume that past experiences has the positive effect on the attitude toward Slimming Dietary Supplement, the higher the past experience, the more favorable the attitude toward the Slimming Dietary Supplement.

2.5.4 Why do we have to measure the consumer perception?

Consumers do not pay attention to the company strategies, they; in fact, conceive the perception toward the impact of these strategies instead. Thus, we have to measure the consumer perception

so to understand the influences of these strategies, program, activities and marketing mix related aspects.

2.5.5 Conceptual Framework:

The conceptual framework for this study is the more contemporary view of attitude. According to this view, intention is a function of attitude, which in turn, is a function of the beliefs (or perceptions) about the attitude object and the feelings about the attitude object.

In this study, intention to continue to use the Slimming Dietary Supplements is a function of attitude toward the products. Attitude toward the products is a function of beliefs or perceptions about the company's marketing and non marketing (experience) activities.

Since marketing activities concern with the marketing mix, the consumer's beliefs or perceptions are those related to the four elements of marketing mix. Specially, product strategy, pricing strategy, distribution strategy, and communication strategy are expected to create perceived product attributes, perceived reasonableness of price, perceived convenience in buying, and perceived effectiveness of communication and sales promotion, respectively. The conceptual frame work was shown in figure 2.6.

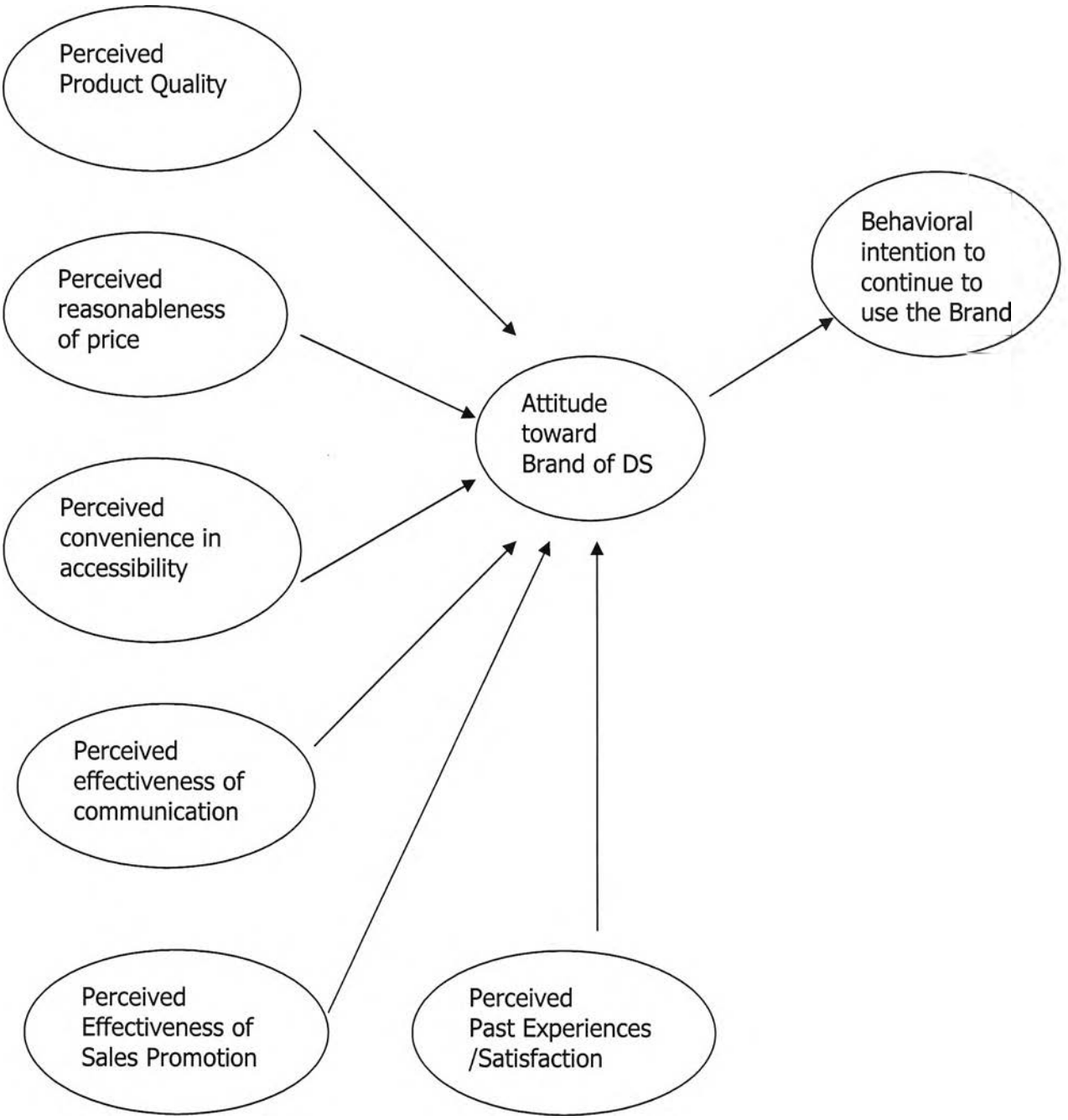


Figure 2.6: The conceptual Framework: Influences of Marketing and Non-Marketing Activities on the Attitude toward the Brand and intention to continue to use the Brand of Dietary Supplements in Thailand

2.5.6 Hypothesis

The following hypotheses would be tested:

H1: There is a positive relationship between perceived quality and attitude toward the brand.

H2: There is a positive relationship between perceived value for money and attitude toward the brand.

H3: There is a positive relationship between perceived convenience in accessibility and attitude toward the brand.

H4: There is a positive relationship between perceived effectiveness of advertising and attitude toward the brand.

H5: There is a positive relationship between perceived effectiveness of sales promotion and attitude toward the brand.

H6: There is a positive relationship between positive experience and attitude toward the brand.

H7: There is a positive relationship between attitude toward the brand and intention to continue to use the brand.