A CONTENT ANALYSIS OF THE DIETARY SUPPLEMENT INFORMATION ON DIGITAL MEDIA

Phachaya Chaiwchan*, Jarumon Nookhong*, Wanwadee Hemnithi*, Chutikarn Sriviboon**

** Phachaya Chaiwchan, Jarumon Nookhong and Wanwadee Hemnithi, Information Science Program concerned with Management Information System, Faculty of Humanities and Social Science, Suan Sunandha Rajabhat University, Bangkok, Thailand*

E-Mail: phachaya.ch@ssru.ac.th, jarumon.no@ssru.ac.th, s58123425035@ssru.ac.th

*** Chutikarn Sriviboon Human Capital and Organization Management, College of Innovation Management, Suan Sunandha Rajabhat University, Bangkok, Thailand, E-Mail: chutikarn.sr@ssru.ac.th*

ABSTRACT

Abstract—Nowadays, there are many ways to get information on dietary supplements, so most consumers will get information without studying the right information. This may put them in a position of victim from advertisement. This research aims to study information behavior of consumers about the dietary supplement and to analyze the content of the dietary supplement information. In this research, 80 articles published between July-September 2018 on the website were studied to analyze the issues and credibility of the dietary supplement information. They were divided into 4 groups as: Vitamins, Minerals, Protein groups and Herbs by using tools for content analysis (Coding Sheet) to record frequency data on the issues of content analysis in 6 issues include: 1) Properties and features 2) Ingredients 3) How to use 4) Manufactured and Distributed 5) Price and 6) Quality standards. The research found that most dietary supplements consumers are in the age group of 23 to 40 years old and the most available dietary supplements information on the internet. The results of the reliability analysis of the article found that most articles have an average reliability of 79 percent. Consumers should focus on the credibility of information and be the media and information literacy behavior in the digital age for choose to get the right information and appropriate with information need of consumers.

Keywords—Content analysis, Dietary Supplement Information, Reliability.

INTRODUCTION

According to a survey by the National Statistical Office found that the amount of population in Thailand who consume dietary supplements has increased from 10.1% in 2005 to 16.0% in 2009. The supplement industry in the United States has surpassed $37 billion dollars in annual sales and is growing at a rate of 7-10% annually (Nutritional Products International, 2018). Dietary supplement products business in weight control, Vitamins and Herbal are a fast growing business. Nowadays, due to the trend in consumer health. Trading channels are available online. The current channel is easy to access through online (TMB Analytics, 2018). While supplements can offer immeasurable health benefits, it is important that when labeling products, the claims are not overstated or exaggerated. What they may not realize is that the supplements they consume on a daily basis can be risky business. Their active ingredients can have serious and unwanted biological effects on the human body, especially when combined with medications and other supplements. Perhaps more importantly, supplements are essentially unregulated by the federal government. In addition, the problem with advertising the product is using untruthful information and pretends properties of product unnecessarily. Consumers can be victims and be naive in dietary supplemented information by online businesses.

What you need to know when you decide to take or buy the dietary supplement products include: 1) The dietary supplement label; all products labeled as a dietary supplement carry a supplement facts panel that lists the contents, amount of active ingredients per serving, and other added ingredients. The manufacturer suggests the serving size, but you or your health care provider might decide that a different amount is more appropriate for you. 2) Effectiveness; if you don't eat a nutritious variety of foods, some supplements might help you get adequate amounts of essential nutrients. However, supplements can't take the place of the variety of foods that are important to a healthy diet. 3) Safety and Risk; supplements are most likely to cause side effects or harm when people take them instead of prescribed medicines or when people take many supplements in combination. Dietary supplements can also interact with certain prescription drugs in ways that might cause problems. 4) Quality; dietary supplements are complex products. The FDA has established good manufacturing practices (GMPs) for dietary supplements to help ensure their identity, purity, strength, and composition. 5) Keep in mind; don't decide to take dietary supplements to treat a health condition that you have diagnosed yourself, without consulting a health care provider. 6) Talk with your health care provider; let your health care providers know which dietary supplements you're taking so that you can discuss what's best for your overall health. Your health care provider can help you determine which supplements, if any, might be valuable for you. And 7) Federal regulation of dietary supplements;

they are products intended to supplement the diet. They are not drugs and, therefore, are not intended to treat, diagnose, mitigate, prevent, or cure diseases. [7] [9]

Therefore, to reduce the problem of incorrect information on dietary supplements and to be tricked into advertising. It also supports the decision to receive reliable dietary supplementary information for consumers. This research was conducted to study and analyze the content of dietary supplement information to support the decision to buy reliable and safe supplement to consumers. To enhance information literacy and online media usage behavior of consumers for choose to get the right information and appropriate with information need in the digital age. [16]

LITERATURE & THEORY

2.1. Content Analysis

2.1.1. Principle of Content Analysis

Content analysis is a research method for studying documents and communication artifacts, which might be texts of various formats, pictures, audio or video. Social scientists use content analysis to examine patterns in communication in a replicable and systematic manner. [5] This enables a more objective evaluation than comparing content based on the impressions of a listener. The systematic reading of a body of texts, images, and symbolic matter, not necessarily from an author's or user's perspective. Content analysis, though it often analyses written words, is a quantitative method. The results of content analysis are numbers and percentages.

2.1.2. Type of Content Analysis

There are two general types of content analysis: conceptual analysis and relational analysis. Conceptual analysis determines the existence and frequency of concepts in a text. Relational analysis develops the conceptual analysis further by examining the relationships among concepts in a text. Each type of analysis may lead to different results, conclusions, interpretations and meanings. [1] Content analysis can range from the simplest form of word count to thematic analysis, referential analysis, and prepositional analysis. [2]

2.1.3. Uses of Content Analysis

Perhaps due to the fact that it can be applied to examine any piece of writing or occurrence of recorded communication, content analysis is currently used in a dizzying array of fields, ranging from marketing and media studies, to literature and rhetoric, ethnography and cultural studies, gender and age issues, sociology and political science, psychology and cognitive science, and many other fields of inquiry. [1]

Additionally, content analysis reflects a close relationship with socio- and psycholinguistics, and is playing an integral role in the development of artificial intelligence. [1]

2.2. Dietary Supplement Information

Encouraging a critical attitude towards dietary supplement information might prevent people from starting harmful or unnecessary supplements. [4] Making informed decisions about the usage of dietary supplements can be difficult. Today, patients, consumers, members of the health care team, and other care providers have authoritative online resources to help guide them in their choices and recommendations. It is important for patients and consumers to communicate their usage of or desire to begin a dietary supplement regime with their care providers. Dietary supplements are not required by federal law to be tested for safety and effectiveness before they are released on the market, and companies may not claim in marketing that their supplements are intended to diagnose, treat, cure, or prevent any disease. The information can be confusing and unclear, but there are resources available to help individuals learn about supplements to make more informed decisions about their usage. [8] One of the problems with information about dietary supplements is advertising, both from information sources that are reliable and exaggerated which the supervisory authority may not be able to control and monitor. Another important obstacle that makes governance of these products difficult is business benefits.

2.3. Information Sources

Information sources are now available both in tangible and intangible forms. Information sources in tangible form are mainly traditional print sources, while those in intangible form are digital sources. Information sources can be broadly categorized as: Human Information Sources, Institutional Information Sources, and Documentary Information Sources.[14]

2.3.1. Human Information Sources

Human sources are the experts and researchers in different subject fields. There are also some other human

information sources, who are specifically engaged in supply or transfer of information, such as technological gatekeepers, information brokers, or consultants. Different organizations and institutions working in various fields serve as institutional sources.[14] It is a source of information that exists in the person who is knowledgeable. The result of the processing of ideas knowledge and experience of the individual.

2.3.2. Institutional Information Sources

A source of information that belongs to a group of institutions/organizations, which may belong to the government, state enterprise, private association or international organization. The basic function is to collect, manage and provide information services in accordance with the objectives of the institution is called the Institute of Information Services. There are many different types of names, such as libraries or libraries, archives, information centers, etc. Most institutions call different names such as libraries, archives, information centers, etc.

2.3.3. Documentary Information Sources

In the present, a documentary source is a record of a body of information created on paper or some paper like material manually by hand or by using a typewriter, or mechanically by using any technique of printing, copying or duplicating; or a record created electronically by using analogue technology or digital technology on a suitable medium; or a virtual record stored in a computer hard disk or a server. The recording media and technology of documentary sources have undergone changes for time to time. [14] Including Internet resources where are linked several databases, an effective source of information to search and share information.

RELATED WORKS OR DISCUSSION

Content analysis was used to explore a way to measure the value added of mixed methods research by comparing the quantity and types of inferences drawn by authors of research articles using quantitative, qualitative, and mixed methods. No justification was found to support the argument that the three methods are distinguishable by inferential quality. These results have methodological significance because they challenge the accuracy of distinguishing qualitative research as high inference and quantitative research as low inference. [3] [6] Using Content Analysis on Web-based content, in particular the content available on Web 2.0 sites, is investigated. The relative strengths and limitations of the method are described. To illustrate how content analysis may be used, we provide a brief overview of a case study that investigates cultural impacts on the use of design features with regard to self-disclosure on the blogs of South Korean and United Kingdom's users. In this study we took a standard approach to conducting the content analysis. Based on our experience in using content analysis, in that study we make several suggestions on the benefits of using content analysis and on how content analysis of the material from the Web can be improved. [5]

Online sources for health information are becoming increasingly diverse, and these sources impact healthcare decision making. However, little is known about the factors influencing people's selection of online sources. Using the survey method, this study investigated how the individual characteristics of users influence their selection of 5 internet sources (search engines, social Q&A sites, online health communities (OHCs), social networking sites, and crowdsourcing sites), for 3 distinct types of health search tasks (factual, exploratory, and personal experience). We found that individuals' source experience consistently predicted the selection of the four established sources (search engines, social Q&A sites, OHCs, and SNSs) for all types of tasks, whereas the selection of the comparatively new source, crowdsourcing sites, for all task types, was consistently predicted by race and preference for information. Health literacy was positively associated with the selection of search engines for all three types of search tasks, the selection of social Q&A sites for personal experience tasks, and the selection of OHCs for both exploratory and personal experience search tasks. Individuals with better health status were more likely to use SNSs for factual tasks. We also found some influence of personality. The findings suggest a need for interventions to reduce the divides in information access among user groups and for the development of technological innovations to tailor information delivery based on individual differences.[9] Understanding health information needs and health-seeking behavior is a prerequisite for developing an electronic health information literacy or eHealth literacy program for nondegree health sciences students. At present, interest in researching health information needs and reliable sources paradigms has gained momentum in many countries. However, most studies focus on health professionals and students in higher education institutions. [4]

At least 25 percent of adults who take prescription medications also take dietary supplements, and in people over 70 years old the percentage triples. Nearly half of all U.S. preschoolers are given a multivitamin, and many pregnant and lactating women take dietary supplements. These products are widely available, from the Internet, the grocery store, even the gas station. Dietary supplements are not required by federal law to be tested for safety and effectiveness, and coupled with the fact they are easily obtainable, the possibilities for adverse effects are not often considered. This article highlights

potential side effects and cautions for select dietary supplements and provides a variety of free and authoritative resources for researching the gamut of dietary supplements on the market.[8]

Content analysis is used to analyze various aspects of Public relations and Mass media, Medical and Scientific, Arts and Culture, Humanities and Social Sciences. In addition, research is conducted to study the development and trends or perspectives of topics in the subject that researchers prefer or choose to conduct research.

METHODOLOGY

Model of the study is literature review and content analysis is applied to collect data. Studies published between July- September 2018 on the websites are scanned and examined for this study to analyze the issues and credibility of the dietary supplement information, 80 articles that matched with the criteria of this study are analyzed. They were divided into 4 groups as: Vitamins, Minerals, Protein groups and Herbs.

Research procedures:

- Study and analyze the information behavior of consumer the content of information from information resources as follows: 1) Personal sources 2) Information services sources 3) Media sources and 4) Internet sources.
- Collect articles and studies on the contents of dietary supplement information 80 articles published between July-September 2018 on the websites.
- Analyze the issues and credibility of the dietary supplement information. That were divided into 4 groups as: Vitamins, Minerals, Protein groups and Herbs by using Coding Sheet tools for content analysis to record frequency data on the issues of content analysis in 6 criteria include: 1) Properties and features 2) Ingredients 3) How to use 4) Manufactured and Distributed 5) Price and 6) Quality standards.

RESULTS

Based on the results of the analysis of behavioral information, information and information content of all 4 groups of dietary supplement, it can be divided into 3 groups of users of information sources: 1) Teenagers between 13-22 years 2) Adults between 23-40 years 3) Middle-aged people between 41-60 years who use the personal information source to find the most information is the family and friends.

Most consumers will choose to search for dietary supplement information from information source that is the pharmacy with studying and trusting information from print media such as magazines, newspapers, brochures. And choose to search information from the Internet on the product website.

As a result of the analysis of the content of the information, it is found that most consumers choose to consume information or various media via the internet information source which is the largest information source in the world and easily accessible. The main factors of reliability and standards that cause the reliability of information content is used to analyze the content of dietary supplement information for consumers to receive information or content that is standard and reliable in 6 criteria include: 1) Properties and features 2) Ingredient 3) How to use 4) Manufactured and Distributed 5) Price and 6) Quality standards. In total 80 articles published in on the website are scanned and examined for this study to analyze the issues and credibility of the dietary supplement information are analyzed. In accordance with the purpose of the study, the data of each criterion is given below in tables.

1. *Properties and features*

In total 80 studies published in on the website have these keywords in the content of supplementary information can indicate the properties and feature of the product.

Table 1
Properties and features of dietary supplement

No.	Properties	Number of Studies	%	No.	Properties and features	Number of Studies	%
1	Prevention	40	50.00	11	Good results	58	72.50
2	Relief	52	65.00	12	Treatment	49	61.25
3	Helping	71	88.75	13	Important	53	66.25
4	Nourishing	65	81.25	14	Safe	76	95.00
5	Care	77	96.25	15	Health	80	100
6	Strengthen	72	90.00	16	Control	74	92.50
7	Protect	75	93.75	17	Metabolism	39	48.75
8	Helps reduce	59	73.75	18	Stimulation	38	47.50
9	Benefits	78	97.50	19	Free radicals	35	43.75
10	Values	70	87.50	20	Immunity	59	73.75

As shown in Table 1 all of articles studied with the highest number of keyword is “Health” at 100% followed by “Care” at 96.25% and the lower is “Free radicals” at 43.75%. They are found mostly in the dietary

supplements information of vitamin group.

2. *Ingredients*

Dietary supplements include such ingredients as vitamins, minerals, herbs, amino acids, and enzymes.

Table 2
Type of Ingredients

No.	Type of Ingredients	Number of Studies	%
1	Vitamins (A,B,C,D,E,K)	72	90.00
2	Minerals (such as magnesium, iron, iodine, zinc, and calcium)	68	85.00
3	Herbs (such as flaxseed, garlic ginseng, and ginkgo)	71	88.75
4	Amino acids	62	77.50
5	Enzymes (such as protein)	50	62.50

As shown in Table 2 indicates that most supplements contain vitamin as one of the ingredients and follow by herbs which is because of the popularity of people in today's society who are increasingly interested in health and nutrients.

3. *How to use/consume*

Some websites or some information sources will explain how to consume, the amount that should be consumed, the duration of consumption, as well as the side effects of consumption of that type of supplement.

Table 3
How to use/consume

No.	How to use/consume	Number of Studies	%
1	How to consume	80	100
2	Amount	80	100
3	Duration	78	97.50
4	Side effects	50	62.50
5	Caution or avoid	54	67.50

As shown in Table 3, it is indicates that most of the dietary supplemental information on websites contains explanations about methods and amounts for consumption which may be further explained by the age range of consumers.

4. *Manufactured and Distributed*

The dietary supplement products that have good quality should clearly identify the manufacturer and distributing company.

Table 4
Manufactured and Distributed

No.	How to use/consume	Number of Studies	%
1	Manufactured	80	100
2	Distributed	72	90
3	Company	79	98.75
4	Factory	65	81.25
5	City/Province	77	96.25

As shown in Table 4, it is indicates that all articles obvious specify the details of the manufactured, most of which are specified in conjunction with the distributed source of product.

5. *Price*

Price issues are important things that consumers should know or compare, other stores or similar products of other brands before making a purchase.

Table 5
Price

No.	How to use/consume	Number of Studies	%
1	Price	78	97.50
2	Discount	45	56.25
3	Currency unit	78	97.50
4	Compare price	32	40.00

6. Quality standards

The quality standards are important to control the quality of various aspects of dietary supplement products such as production processes, type and amount of raw materials which make consumers ensuring safety, efficiency and quality.

Table 6
Quality Standard

No.	How to use/consume	Number of Studies	%
1	GMP	77	97.50
2	HACCP	74	56.25
3	FDA	80	97.50
4	ISO 22000/ ISO 9001	65	40.00
5	OHSAS 18001	59	73.75
6	Other	43	53.75

As shown in Table 6, it is indicated that the FDA of each country is organization which is given authority to regulate the industry through the Dietary Supplement Health & Education Act. And, the FDA monitors the marketing claims made by dietary supplement companies. They make sure dietary supplement companies do not claim their products prevent, reduce the symptoms of, or cure diseases. In addition, other standards are important, especially GMP is the basic criteria or requirements needed to produce and control Allow manufacturers to follow and make food production safe, and HACCP is a production standard that has measures to prevent the danger that consumers may receive from food consumption. And is a concept of measures to prevent hazards that may occur at each stage of any activity, with a scientific process.

CONCLUSION AND FUTURE WORK

According to a study of 80 articles on the website by analyzing from 6 criteria, it is found that the majority of issues that consumers used to view reliability are in terms of the properties and features of dietary supplements that indicate benefits to consumers. Followed by the ingredients or raw materials that indicate the details of the ingredients in the dietary supplement, adding that the raw materials are safe for consumers include viewing standards in various areas that have been certified for the safety of dietary supplement products to increase the reliability of the product. This includes advertising media related to dietary supplement, with a sign or advertising license number to check for advertising that is over-fact or false in order to reduce the exploitation of consumers. And another important issue is the quality standard which is one of the issues that guarantee the quality and reliability of the product. Based on the content analysis of supplementary information, it is found that the articles that identify the information based on all 6 issues analyzed above are reliable articles and show complete and accurate information to create knowledge, understanding and support in decision making to choose the dietary supplement products and choose to receive consumer information. The information can be confusing and unclear, but there are resources available to help individuals learn about supplements to make more informed decisions about their usage. [8] Consumers will also need to develop information literacy skills and have critical knowledge in analyzing the content of information to prevent themselves from becoming victims of information that is false or propaganda.

ACKNOWLEDGMENTS

The authors would like to thank Suan Sunandha Rajabhat University, Bangkok, Thailand to provide funding support to attend the dissemination of research on this and thank family, friends, colleagues and students in the field of Management Information System for cooperation in research, all of you. (http://www.ssru.ac.th)

REFERENCE

[1] Colorado State University (2004), An Introduction to Content Analysis, URL:http://www.umsl.edu/~wilmarthp /mrpc-web-resources/content-analysis.pdf

[2] Klaus Krippendorff (2004), Content Analysis: An Introduction to Its Methodology, Thousand Oaks, CA: *Sage*. 2nd edition.

[3] Hsiu-Fang H., Sarah E., S. (2005), Three Approaches to Qualitative Content Analysis, Qualitative Health Research, Vol.15, No.9, Pp.1277-1288.

[4] Deborah Dillon McDonald and Nicholas R. Nicholson (2006), Dietary supplement information and intention to continue and recommend supplements, *International Journal of Nursing Studies*, No.43, Pp.51-57.

[5] Inhwa, K., & Jasna, K. (2010), Applying Content Analysis to Web-based Content, *Journal of Computing and Information Technology*, Vol.18, No.4, Pp.369–375.

[6] Alan Bryman & Emma Bell (2011), Business research methods, Chapter 12, Cambridge: *Oxford University*, 3rd edition, Press, Pp.288-289.

[7] Office of Dietary Supplements, National Institutes of Health (2011), Dietary Supplements: What You Need to Know, URL: https://ods.od.nih.gov/HealthInformation/DS_WhatYouNeedToKnow.aspx.

[8] Dana Abbey (2013), Dietary Supplement Information Resources for the Life Span, *Journal of Consumer Health On the Internet*, Vol.17, No.3, Pp.333-340.

[9] Philipp Mayring (2014), Qualitative content analysis: theoretical foundation, basic procedures and software solution, URL: http://nbn-resolving.de/urn:nbn:de:0168-ssoar-395173.

[10] Nuket, G., & Cigdem, H. (2015), Constructivism in Teaching and Learning: Content Analysis Evaluation, *Procedia– Social and Behavioral Sciences*, No.191, Pp.526 – 533.

[11] Elizabeth, G., C., & Chosang, T. (2016), Using inferences to evaluate the value added of mixed methods research: a content analysis, *International Journal of Multiple Research Approaches*, Pp.1-16.

[12] Feng-Kuang C., Gaoxia Z.,Qi W.,Zhenfeng C., Su C., & Shengquan Y. (2016), Research and trends in mobile learning from 1976 to 2013: A content analysis of patents in selected databases, *British Journal of Education Technology*, Vol.47, No.6, Pp.1006-1019.

[13] Yan Zhang , Yalin Sun & Yeolib Kim (2016), The influence of individual differences on consumer's selection of online sources for health information, *Computers in Human Behavior*,Pp.1-10.

[14] Amitabha Chatterjee (2017), Information Sources, Chapter B, Elements of Information Organization and Dissemination, Chandos Publishing, Pp.9-45.

[15] Hussein Haruna, Ndumiso Tshuma & XiaoHu (2017), Health Information Needs and Reliability of Sources Among Nondegree Health Sciences Students: A Prerequisite for Designing eHealth Literacy, *Annals of Global Health*, Vol.83, No.2, Pp.369-379.

[16] Siriporn Poolsuwan (2019), Online Social Media Addictive Behavior: Case Study of Thai Military Officers, In: Ahram T. (eds) Advances in Artificial Intelligence, *Software and Systems Engineering*. AHFE 2018. Advances in Intelligent Systems and Computing, vol.787, Springer, Cham.