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Interactive Packaging Design and Use of Augmented Reality Technology on Packaging for the Elderly a Case Study of Herbal Tea Products, Doi Mae Salong Subdistrict, Mae Fah Luang District, Chiang Rai

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Interactive Packaging Design and Use of Augmented Reality Technology on Packaging for The Elderly A Case Study of Herbal Tea Products, Doi Mae Salong Subdistrict, Mae Fah Luang District, Chiang Rai

Abstract— **The objectives of this research were to: 1) study the general condition of herbal tea packaging and problems with using packaging among the elderly;2) To design herbal tea packaging with the concept of universal design and use augmented reality (AR) technology to present product information. 3) To evaluate the effectiveness of herbal tea packaging and augmented reality technology (AR). The researcher has collected data from research documents. related theoretical concepts Together with the community participation process on information about the uniqueness of the Doi Mae Salong area, create story telling on the packaging. Then design herbal tea packaging for the elderly consumer group with the concept of universal design in 3 formats, using innovation combining augmented reality technology (augmenter reality) with the idea of allowing consumers to access the aesthetics of drinking herbal tea with all 5 senses: "form, taste, smell, sound, and touch" to show the value of the product, along with presenting the product through packaging that tells the story of the production source. and evaluate the effectiveness of herbal tea packaging and augmented reality (AR) technology. The tools used were: 1) semi-structured interviews to interview manufacturers, 2) a questionnaire on experts' opinions on herbal tea packaging, and 3) a form to evaluate the effectiveness of herbal tea packaging and the use of augmented reality (AR) technology on the packaging. The population and sample consisted of 100 male and female tourists aged 60–69 years by purposive random sampling. Data were analyzed using descriptive statistics, mean, and standard deviation (SD). Results of evaluating the effectiveness of herbal tea packaging and augmented reality (AR) technology in designing packaging suitable for the elderly Convenience Sales promotion Augmented reality (AR) technology has the highest overall level, x = (4.52) s.d. (0.56).**

Keywords—Interactive Packaging, Augmented Reality Technology, The Elderly

I. INTRODUCTION

Currently, Thailand is entering into an aging society, causing a trend of demand for products and services that will support the aging population, which will become a large market in the future. In addition, consumers place importance on being environmentally friendly. This is a megatrend that affects the trade in herbal products. (Office of Trade Policy and Strategy, Ministry of Commerce, 2021). Considering the age grouping of the elderly (aged 60–69 years), the group with the highest number of elderly people - 56% of the total number of elderly people in the next 10 years, or approximately 4.6 million people - is the group with Behavior of interest in health in health promotion Focus on health check and take dietary supplements to nourish and treat disease (Group strengthening and developing network potential, Elderly Empowerment Division, 2021). By the purchasing behavior of the elderly group, especially the Active Senior group, which are elderly people between 55 - 69 years old who are still strong. Do not have any congenital diseases that hinder your daily life. They will have the potential to decide to purchase most of their own products and services. and give more importance to quality than price or product brand. [1] According to a study of elderly health issues based on data on 9,527,054 elderly people in the system, it was found that the most common health problems of the elderly were high blood pressure (46.06 %), followed by diabetes (21.12%), and stroke (2.43 %) (Department of Health, 2021). From the problems and basic needs of the elderly Therefore, it is an important factor that business entrepreneurs can use to develop and solve problems, products, and innovations. To meet the needs of the elderly.

Doi Mae Salong Avocado Fruit Tree Community Enterprise is located in Mae Salong Nok Subdistrict. Mae Fah Luang District, Chiang Rai Province. It is a herbal tea product processing group that has the potential to produce herbal products that are certified to GMP production standards. This can be further developed into producing and selling premium herbal products to tourist customers who want to buy souvenirs in Chiang Rai province. But there are still problems communicating the image of the product on the packaging. Although beautiful, outstanding, and eye-catching packaging design is the first thing consumers see and influences purchasing decisions, [2]. Problems with packaging use among the elderly, such as problems opening or closing packaging. Problems with inconvenient reading of information on packaging, inconvenient lifting, picking up, and handling problems, inconvenient usage, pouring, injection, and measuring problems, etc. [3]

From such problems, the researcher has an idea to develop a herbal tea packaging format suitable for the use of the elderly according to the principles of universal design and using augmented reality technology with the idea that consumers can access the aesthetics of drinking herbal tea with all 5 senses: "form, taste, smell, sound, and touch" so that consumers can recognize important product information and be entertained by interactive packaging, which will create The purchasing decision comes from the experience of augmented reality experiential marketing that takes place on the product, which leads to the decision to travel to see the origin of the product.

II. Related Work

Related theories and research have been studied as follows: *1)* Packaging design for the elderly must give importance to both packaging structure and design. For example, choosing the right shape and size for handling Easy to use, open, and close. The graphic design on the packaging responds to the use of packaging by the elderly. Must consider the size of the letters. Illustrations that clearly communicate Colors that do not affect vision, clarifying information that is easy to understand and clear, etc. These will make it convenient for the elderly to use the packaging. It is truly packaging for the masses and the elderly. [4]. "Packaging Design for Seniors"

2) Universal Packaging Design (UD) is based on the principles of Ronald Mass, an architect who wanted to design products and environments that facilitate product use by people of all genders and ages. No limitations on physical defects This concept emphasizes seven principles: 1) Equitability 2) Flexibility 3) Simple, intuitive use 4) Perceptible information 5) Tolerance for error 6) Low physical effort 7) Appropriate size and space for approach.

3) Using augmented reality technology on product labels Can choose to use them to publicize and build brands and use them as distribution strategies that are more appropriate for consumer groups. It is also an opportunity to expand the business in the form of information services on product labels that will present the location of the production source and the production process. Including sources for producing raw materials that are non-toxic.[5]

4) The research on packaging design using AR application technology for community product marketing communication. [6] The objective is to study the identity of community products. and graphic elements on packaging that can be used as guidelines for designers. To create a product image by applying AR application technology to design graphics for modern packaging. To create an image from the packaging design of community products that focus on marketing communications. By focusing on strategies and adjusting product formats with packaging that uses AR application technology to create awareness, Access useful information about important products and operators. and create markers for easy and clear access.

5) The Unit Package Opening Design for the Elderly by Applying the Principles of Universal Design. [7] This problem will grow in the future due to demographic changes and the increasing proportion of elderly people in society. activities such as opening bottles or handling keys become problematic. The problem is exacerbated in particular in the case of packages which need to safeguard against leakage or unauthorized opening e.g.,. To solve the problem, a method of biomechanical modeling enriched with the heuristic approach in the field of developing solutions to facilitate the opening of packaging is assumed, and the development of which is grounded in the principles of universal design. a summary of the existing solutions facilitating the opening of packages as well as allowing to obtain data in this respect for the elderly. As a result, a universal design enriched with principles of solving technical conflicts is presented.

III. Methods

Research methods in the topic of interactive packaging design and the use of augmented reality technology in packaging for the elderly In a case study of herbal tea products in Doi Mae Salong Subdistrict, Mae Fah Luang District, Chiang Rai Province, there are steps as follows:

1) Study and collect basic information from related documents, research, and various concepts and theories.

2) Organize a small group discussion meeting to inquire about the problems with traditional herbal tea products. Analyze the strengths and opportunities in developing herbal tea products for the elderly. Analyze the identity for use as an illustration on the packaging. Semi-structured interviews were used to collect information on packaging design and development.

Fig 1. Group discussion activity to analyze the general condition of herbal tea products.

3). Prepare a mood tone board to provide an overview of the use of colors, illustrations, and target audience. Packaging materials and concepts and guidelines for designing packaging structures With the concept of universal design, using augmented reality technology on packaging To present a group of herbal tea producers and design experts.

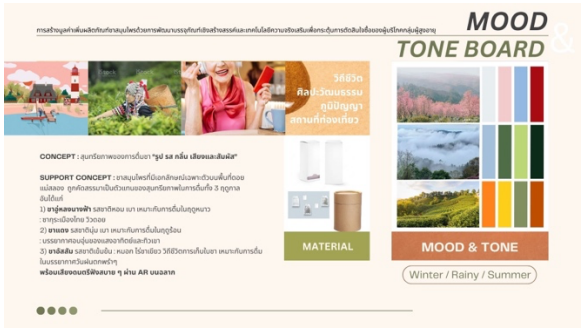

Fig 2. Mood and Tone Board

Fig 3. Sketch design for universal design packaging

Fig 4. Logo design 3 style

4). Design a logo that represents herbal tea products in 3 styles, consisting of 1) a formal style, 2) a pared-down style, and 3) a line style. Then, business owners, marketers, and graphic design experts choose them. Number of people: 5 people. They are choose a formal style

5). From the concept, images, tastes, smells, and sounds, select mp3 songs that express the mood of relaxation in a natural way. Then press download from a free copyright website and upload the.mp3 file to the website for generating QR codes to display images and sounds. Instrumental music in E-card format Customize the format by entering a greeting message.

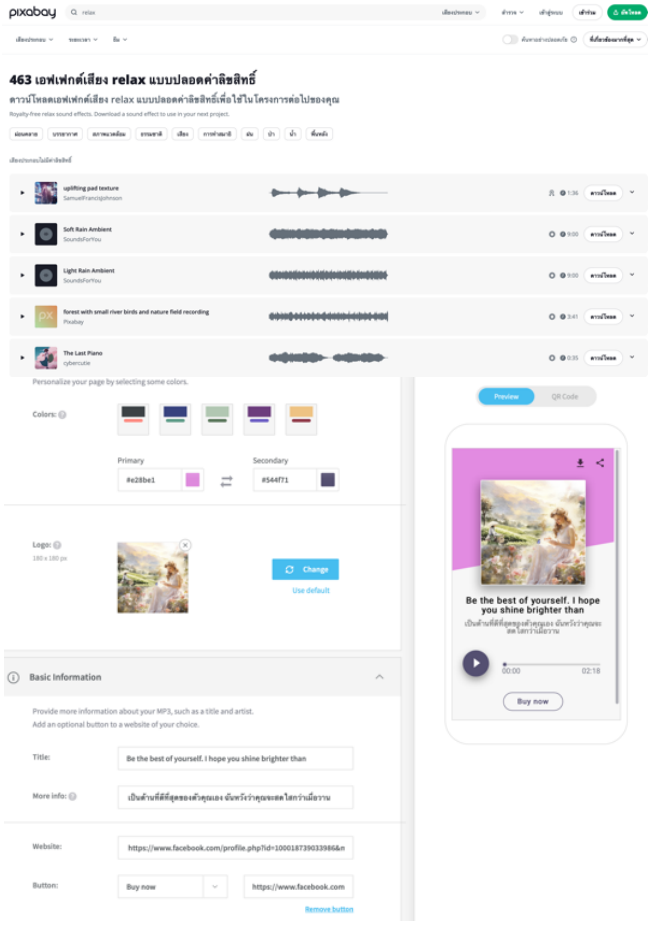

Fig 5. how to search for a song and use it to create a QR code.

6). Prepare three prototypes of herbal tea packaging and have them evaluated by the elderly for their effectiveness. Entrepreneur and graphic design expert

Fig 6. Graphic image on box-style herbal tea packaging. Kraft paper cans and foil bags

7). Scan the QR code on the tea label, and a musical sound will appear. Can be forwarded to other people via social media.

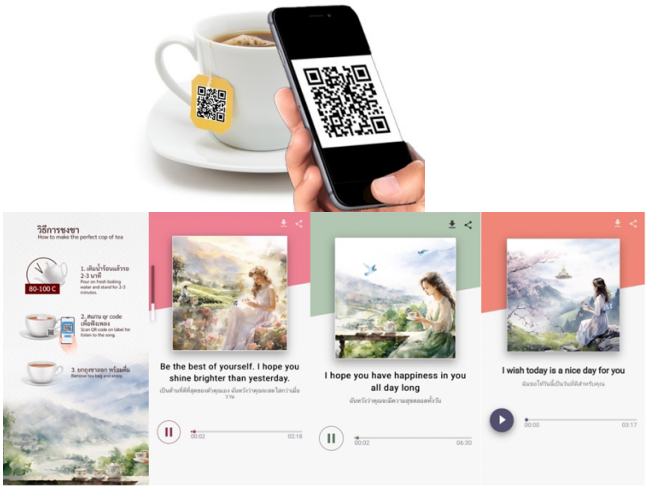

Fig 7. the results of scanning the QR code attached to the herbal tea label. The sound of music playing along with blessings.

8). Use herbal tea packaging as a target image to create augmented reality (AR) packaging using Zapworks Designer.

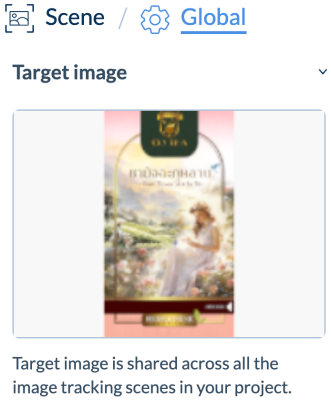

Fig 8. Using packaging to make Target images for augmented reality (AR)

9). Add various information to the Augmented Reality (AR) packaging, such as the Facebook Fanpage details of the herbal tea product, a location map of the herbal tea product, the insertion of 3D models, background music, different effects, and integrating hyperlinks with various buttons while using the Augmented Reality (AR) packaging.

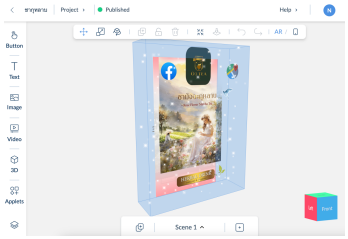

Fig 9. Entering various data on augmented reality (AR) packaging

10). Use by scanning the QR code attached to the herbal tea package. To display augmented reality (AR) media, which can be displayed with 3D models, sound tracks, and various effects, and connect to the Facebook fan page and Google Maps

Fig 10. Using herbal tea packaging with augmented reality

11). Evaluate the effectiveness of herbal tea packaging and augmented reality (AR) technology used as a visual medium for presenting information. Music and video clips were recorded by 100 elderly people. The data were then analyzed by means and standard deviations.

V. Conclusions

Designing interactive packaging and using Augmented Reality (AR) technology on packaging for the elderly: a case study of herbal tea products from Doi Mae Salong, Mae Fah Luang District, Chiang Rai Province. The effectiveness of the packaging is evaluated by 100 male and female tourists aged 60–69 years. The analysis results are as follows:

TABLE I. Results of the effectiveness evaluation of herbal tea packaging and augmented reality (AR) technology.

the principles of universal design packaging that are suitable for the elderly	**Mean**	S.D.	**Satisfaction Level**
Beautiful pattern consistent with the product.	4.35	0.49	High
Illustrations are easy to understand and communicate effectively.	4.55	0.51	Highest
The text is easy to read, and the meaning is clear.	4.45	0.51	High
Opening and closing do not require much effort.	4.70	0.47	Highest
Easy to hold and handle.	4.50	0.51	Highest
The packaging is in line with the usage behavior of the elderly.	4.60	0.50	Highest
The symbolic images showing how to use them are easy to understand.	4.50	0.51	High
The font size on the packaging is clearly visible.	4.50	0.61	Highest
The opening and closing mechanism allows for convenient and quick access.	4.65	0.49	Highest
The packaging helps to preserve the quality of the product better than the original packaging style.	4.75	0.44	Highest
Total	**4.56**	**0.50**	Highest

TABLE II. Mean and standard deviation of satisfaction toward presentation convenience of use

Convenience of use	**Mean**	S.D.	**Satisfaction Level**
The packaging is convenient for storage.	4.30	0.47	High
Consumers can conveniently carry the product to various places.	4.35	0.49	High
It offers greater convenience in use compared to the original packaging style.	4.75	0.44	Highest
Total	**4.47**	**0.47**	**High**

TABLE III. Mean and standard deviation of satisfaction toward presentation promoting sales

Promoting sales	**Mean**	S.D.	**Satisfaction Level**
Adds value to the product and stimulates purchasing decisions.	4.50	0.51	Highest
Can communicate information and details about products	4.30	0.47	High
Reflecting the distinct and clear identity of the production source, differentiating it from competitors.	4.55	0.60	Highest
The packaging reflects an image that makes one want to travel and visit the production site.	4.75	0.44	Highest
The music on the label is a feature that helps create an aesthetic experience when drinking tea.	4.70	0.66	Highest
Total	**4.53**	**0.54**	Highest

TABLE IV. MEAN AND STANDARD DEVIATION OF SATISFACTION TOWARD PRESENTATION AUGMENTED REALITY TECHNOLOGY

Augmented reality (AR) technology	Mean	S.D.	Satisfaction Level
Augmented reality technology helps make products look more valuable.	4.60	0.51	Highest
The usage is simple and convenient, even for those who have never used it before.	4.33	0.62	High
Provides additional information in an interesting way, suitable for the product.	4.47	0.52	High
Augmented reality technology can significantly increase the attractiveness of the product.	4.67	0.62	Highest
Total	**4.52**	**0.56**	**Highest**
Overview of all aspects	**4.53**	**0.57**	**Highest**

TABLE V. UNIVERSAL DESIGN RULES IN PACKAGE OPENING DESIGN BASED ON UNIVERSAL DESIGN PRINCIPLES

Packaging Design structure	
1) Art card paper box type, containing 25 packets, 2 grams per packet, total net weight 50 grams.	
2) Round kraft paper cylinder type for packing powdered tea, pack size 150 grams	
3) Foil packet type Label stickers, pack size 30 packets, net weight 60 grams,	

Results of the study and analysis of the general condition of herbal tea products of the Doi Mae Salong Avocado Fruit Tree Community Enterprise Group, Mae Salong Nok Subdistrict, Mae Fah Luang District, Chiang Rai Province Suitable packaging structures include the following: 1) Art card paper box type, containing 25 packets, 2 grams per packet, total net weight 50 grams. 2) Round kraft paper cylinder type for packing powdered tea, pack size 150 grams 3) Foil packet type Label stickers, pack size 30 packets, net weight 60 grams, are an appropriate and commonly used packaging format. Because they are easily available from online stores. In addition, manufacturers can set quantities and control production costs. In terms of environmental protection, kraft paper is made from recycled paper and is therefore 100% biodegradable. It has the ability to preserve the quality of the internal product and is durable, convenient to use, and easy to distribute. The three packaging structures are diverse for consumers to purchase according to their needs.

TABLE VI. GUIDELINE FOR USE ELEMENTS ON PACKAGING DESIGN

Graphic design on packaging	
Illustrations on the packaging include attractive things, 1) including mountains and mist. Important historical sites include Phra Borommathat, Chedi, Srinagarindra Sathit, and Maha Santikhiri. Located on the highest peak at an altitude of 1,500 m, the road is steep and winding. This is considered beautiful scenery and can be easily remembered.	
2) Phaya Sua Krong flowers amidst the mountains. It is a beautiful scene with a cool atmosphere during the winter. It is another point that attracts tourists to come visit.	
3) The way of life of tea growing Showing the uniqueness of the tea-growing area that is fertile and produces quality products.	

logo design I Choose images that show the product, including tea leaves, tea cups, and flowers, using gold color. brown and green Make the product look valuable and have a price, adding luxury to the packaging. The lettering is formal but modern.

Fig 10. Summary of packaging design guidelines for the elderly.

V. Conclusions

3) The effectiveness of herbal tea packaging and augmented reality (AR) technology in designing packaging suitable for the elderly. At the highest level ($\overline{x}$, = 4.56), (S.D. = 0.50) box style with a die cut on the front of the box that can be torn off. It is a hole that has been cut out and uses an eye-catching red strip to indicate the location so that you can easily take out the tea bag without having to hold the box. Reduce the use of physical force to open and close. A font size of not less than 18 pt is clearly visible. The dark color of the text is clearly visible against the white background. Augmented reality technology provides visual and audio instructions to make it easier to understand. (Understanding) Packaging size is reduced (space) according to the needs of each consumption. It is an art card paper box, containing 25 packets, 2 grams per packet, and a total net weight of 50 grams. The round kraft paper cylinder is lighter than the aluminum can. Aluminum that is commonly used makes it convenient for elderly people to lift and handle, and the steps for use are not complicated. There are clear pictures of symbols to communicate usage and details related to the product for easy understanding (simplicity).

In terms of promoting sales, the level is very high (($\overline{x}$, = 4.53, S.D. = 0.54). When the target group scans the QR code on the tea label, music plays, adding to the sensory experience of tea drinking (($\overline{x}$, = 4.70, S.D. = 0.66), at the highest level. This encourages consumers to scan and listen to the music while drinking tea, along with meaningful and positive greeting messages. This feature is particularly appealing to the target group, aligning with the behavior of elderly people who enjoy sending morning greetings to friends, relatives, and loved ones and expressing good wishes. This interactive packaging can demonstrate the value of the product while also presenting it through packaging that conveys the story of its place of origin**.**

In terms of augmented reality (AR) technology, the level is very high ($\overline{x}$ = 4.52, S.D. = 0.56). Augmented reality transforms the icon images into 3D objects that appear to float above the real surface, helping elderly individuals with visual limitations to see larger information on the box. This AR technology enhances the perceived value of the product and makes it more interesting. This aligns with the research of Phunthipapha Homsoi, Khwanrat Suanpong, and Pongpan Ananvanich (2016), which corresponds with the concept of interactive packaging for consumers using virtual reality technology by [8] Butler states that consumer engagement with packaging through virtual reality technology affects attachment, starting from the intention to pause and look, to gaining interest, picking up for a closer look, and finally leading to the desire and decision to purchase.

In terms of convenience ($\overline{x}$ = 4.47, S.D. = 0.47), the overall level is high. The target group expressed a desire for additional packaging options, such as: 1) Trial size for consumers who want to try different flavors of tea, with smaller box sizes for convenience when buying to travel by plane. 2) A small box combining all three types of herbal tea products in a gift-box style 3) A set including all three types of herbal teas with brewing equipment. 4) A box combining three types of herbal teas with a handle. When considering the results of the newly designed herbal tea packaging in terms of ease of use compared to the original packaging style, the level is highest ($\overline{x}$ = 4.75, S.D. = 0.44). Therefore, it is suitable for commercial expansion.

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