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การพัฒนาแอปพลิเคชันความจริงเสริม (AR) สำหรับการนำเสนอผลิตภัณฑ์ชุมชนไทดำ บ้านนาป่าหนาด อำเภอเชียงคาน จังหวัดเลย

The Development of Augmented Reality Application (AR app) for Product Presentation in Tai Dam Community, Ban Na Pa Nhad, Chiang Khan District, Loei Province.

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Abstract

Purpose: This study aimed at developing augmented reality application (AR app), measuring its users' attitude, and comparing the promotion of Tai Damam's tribal products using a traditional approach with that using augmented reality application.

Methodology: This applied research employed hardware and software technologies to develop augmented reality (AR) application for promoting tribal products in Tai Dam Community using the System Life Cycle (SDLC) theory. Data collection was conducted through 3 different forms: the augmented reality application quality assessment forms for 5 experts, its users' attitude measurement forms, and comparison forms for comparing traditional media and augmented reality media. A total number of this study was 138 and the collected data were analyzed using basic statistics and T-test.

Findings: The study findings indicated as follows. First, the augmented reality application enabled sellers to present product details with modern technology, making the product presentation more interesting and motivating consumers to make easier decision to buy the products of Tai Dam tribal community. Second, the quality of the augmented reality application was found to be of the highest level since it was the interactive media. Third, the users' attitude towards the application was also found to be at the highest level as its users

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were interested in its contents, stories and historical background of Tai Dam tribal community. Fourth, with regard to the comparison of Tai Dam tribal products through traditional media and augmented reality application media, it was found that the latter was more interesting than the former one at statistical significance .05.

Applications of this study: This study contributes to the formulation of guidelines for developing a new information format which can be used as the economic, educational and social driving force. Furthermore, this information format stimulates people's awareness, learning and information seeking.

Keywords: Augmented reality, Application, Tai Dam, Community product

บทคัดย่อ:

วัตถุประสงค์: การวิจัยนี้มีวัตถุประสงค์เพื่อพัฒนาแอปพลิเคชันความจริงเสริม ประเมินคุณภาพ ประเมินทัศนคติของผู้ใช้งาน และเปรียบเทียบระหว่างการนำเสนอผลิตภัณฑ์รูปแบบดั้งเดิมและการนำเสนอในรูปแบบแอปพลิเคชันความจริงเสริม

วิธีการศึกษา: การวิจัยในครั้งนี้เป็นการวิจัยเชิงประยุกต์ที่นำเทคโนโลยีทางด้านฮาร์ดแวร์และซอฟต์แวร์มาพัฒนาเป็นแอปพลิเคชันความจริงเสริม (AR) สำหรับการนำเสนอผลิตภัณฑ์ชุมชนไทดำ โดยใช้ทฤษฎีวัฏจักรการพัฒนาระบบ (System Development Life Cycle : SDLC) เครื่องมือที่ใช้ในการเก็บรวมรวมข้อมูล ได้แก่ แบบประเมินคุณภาพจากผู้เชี่ยวชาญ จำนวน 5 คน แบบประเมินทัศนคติและแบบประเมินเพื่อเปรียบเทียบสื่อแบบดั้งเดิมและสื่อในรูปแบบความจริงเสริม โดยใช้กลุ่มตัวอย่าง จำนวน 138 คน การวิเคราะห์ข้อมูลวิเคราะห์ด้วยสถิติพื้นฐานและการวิเคราะห์ความแตกต่างด้วยสถิติ T-test

ข้อค้นพบ: ผลการวิจัยได้ 1) แอปพลิเคชันความจริงเสริมสำหรับการนำเสนอผลิตภัณฑ์ชุมชนไทดำ เป็นเครื่องมือช่วยผู้ขายในการให้รายละเอียดสินค้าในรูปแบบที่ทันสมัย น่าสนใจและกระตุ้นผู้บริโภคให้เกิดการตัดสินใจซื้อสินค้าได้ง่ายขึ้น 2) ผลการประเมินคุณภาพของแอปพลิเคชันความจริงเสริมสำหรับการนำเสนอผลิตภัณฑ์ชุมชนไทดำ อยู่ในระดับมากที่สุด เนื่องจาก แอปพลิเคชันมีปฏิสัมพันธ์กับผู้ชม 3) ผลการประเมินทัศนคติของผู้ใช้งาน อยู่ในระดับมากที่สุด เนื่องจาก ผู้ชมมีความสนใจเนื้อหา เรื่องราวและความเป็นมาของชุมชนไทดำ 4) ผลการเปรียบเทียบระหว่างการนำเสนอผลิตภัณฑ์รูปแบบดั้งเดิมและการนำเสนอผลิตภัณฑ์ในรูปแบบแอปพลิเคชันความจริงเสริม พบว่า การนำเสนอผลิตภัณฑ์ในรูปแบบแอปพลิเคชันความจริงเสริม มีความน่าสนใจมากกว่ารูปแบบดั้งเดิม อย่างมีนัยสำคัญทางสถิติที่ระดับ .05

การประยุกต์ใช้จากการศึกษานี้: งานวิจัยนี้เป็นแนวทางในการพัฒนาสารสนเทศในรูปแบบสมัยใหม่ที่แตกต่างจากสารสนเทศแบบเดิม เพื่อขับเคลื่อนในด้านต่าง ๆ ทั้งด้านเศรษฐกิจ การศึกษา สังคม อีกทั้งยังกระตุ้นให้ประชาชนเกิดความสนใจในการรับรู้ เรียนรู้ข้อมูลข่าวสารที่เป็นประโยชน์และพัฒนาคุณภาพชีวิตได้

คำสำคัญ: ความจริงเสริม แอปพลิเคชัน ไทดำ ผลิตภัณฑ์ชุมชน

1. Introduction

Tai Dam community is located in Chiang Khan District, Loei Province.The villagers of Na Pa Nhad are of Tai Dam or Tai Song Dam or Tai Song descent. Tai Dam people are another ethnic group who have come to make colors for Chiang Khan District, Loei Province. In the Tai Dam community, Ban Na Pa Nhad can still preserve many things, for example, Sae Pang is a fun folk game of Tai Dam that in Thailand exists only in this area, Tai Dam language and unique products such as Piao or Sabai cloth made from weaving beautiful fabrics in various characteristics used for a variety of activities, Ghom shirt, Sarong, shawl, loincloth, scarf, ornaments are used for rituals and used as products for sale in the community and tourists who visit the Tai Dam village. (Maloei.com, 2017) Distinctive point and value of Tai Dam community products is history of the story and interesting background of the product. Telling a story about a product's history can make it easier for customers to make a purchase because it tells a story about the benefits, ancient beliefs and natural production methods. But most of the vendors who are in the shops in the Tai Dam community are elderly people. Sometimes the seller is tired of sharing information to the customer. If tourists visit in the afternoon or evening, the seller may be able to describe only part of the product description or not at all. This makes tourists are unaware of the history, value and usefulness of the products and the products are not attracted to the point of being overlooked.

Business today is a business in the digital age because business organizations are more competitive in online marketing channels by using media and information with both image and sound to present information that reaches consumers can also move which Augmented Reality or popularly known as AR is a media that has a greater role. It comes from the development of computer graphics technology by integrating the reality and virtual reality through applications and connected devices such as mobile phones, webcams, computers, or other devices. Virtual images are displayed on the screen in 3D image format. (Boonkerd, R., 2014). AR is increasingly exploited for cost reduction in business in the 4.0 era. In terms of sales and marketing, creating a mockup of products in a digital world where customers can add styles or decorate the product's colors to be realistic and match their own tastes through the online system. It makes it fun and engaging and it also has a psychological effect on making

purchasing decisions easier and faster. At the same time, it also helps the organization to reduce the number of sample production. Product development by virtual reality technology with AR. It will help to prevent errors in the design process of the product as well as determine the correct production materials. Complete before starting the actual production process, etc. (Sai-lert, 2018) Therefore, when Tai Dam community uses this type of media as a labor-saving tool for presenting product information, it will reduce the fatigue of elderly sellers in providing product details to customers and customers receive complete product information and causing a stimulus to make a purchase decision because AR is a modern media with interesting features that can present product information in 3D formats, including animations, music and sound for helping attract customers to be interested as well.

For this reason, the researcher has applied graphics technology to help represent the communication of product information to consumers for the Tai Dam community, Ban Na Pa Nhad Chiang Khan District, Loei Province by using Augmented Reality technology with smartphones that can display the preview image in three-dimensional format. There is audio and product details. In addition, consumers prefer to receive news with modern technology media that can influence consumer behavior to be accepted. arouse interest sales and make purchasing decisions easier and as a media to help present the product on behalf of the seller which is a combination of technology and innovation to benefit the community.

2. Objectives

The objectives of this research were:

1) To develop augmented reality (AR) applications for product presentations in Tai Dam community, Ban Na Pa Nhad, Chiang Khan District, Loei Province.

2) To evaluate the quality of augmented reality (AR) applications for product presentations in Tai Dam community, Ban Na Pa Nhad, Chiang Khan District, Loei Province.

3) To evaluate users' attitudes towards augmented reality (AR) applications for product presentations in Tai Dam community, Ban Na Pa Nhad, Chiang Khan District, Loei Province.

4) To compare the traditional product presentation and the augmented reality (AR) application for product presentation in Tai Dam community, Ban Na Pa Nhad, Chiang Khan District, Loei Province.

3. Methodology

This research was conducted by drawing on the System Development Life Cycle (SDLC). There are seven key steps as follows:

3.1 Problem recognition

The interview data with the leader of the Tai Dam community and vendors in the community revealed that the distinctive point of products in Tai Dam community is how they have the story behind—their history or origin— that can capture attention of customers. However, most vendors in many shops are elderly people. They, sometimes, do not have time to present the products, especially during the busy time. They are tired and may not want to talk much. When customers visit the shop, the elderly sellers may not be able to tell stories or provide the customers with product descriptions. This lack of storytelling decreases the potential for the products to capture customers' attention and influence buying decisions.

3.2 Feasibility study

The feasibility study of this research involved taking important factors into account including tools, cost, time, readiness of people and value. It was found that every seller has their own smartphone with free application download. In addition, they also wanted some tools that could help them present the products to save their time. Due to the simplicity of the application, the sellers were able to use new technology by just simply downloading the application which was ready for use. This created value in terms of how the application influenced consumers' purchasing decisions and reduced sellers' fatigue from providing information.

3.3 Analysis

An analysis of traditional product presentation suggested that product brochures with still texts and images did not arouse customers' attention. Moreover, the elderly sellers were often too tired to provide information of the products. Therefore, Tai Dam community was in need of an application that helped them with product presentation. The researcher, then, met with a group of sellers in the community to make decisions about selection criteria of the products. The group agreed on the aspects of community identity, interesting stories behind and details of the products. The result showed that the group selected ten types of products namely Piao fabric (headdress), shawl, Tai Dam shirt for male, female, boy and girl, sarong, scarf, Tai Dam polo shirt for male and female.

3.4 Design process

In this stage, the researcher first drafted the layout of screens and buttons on the paper. Then, they determined devices and software as explained below.

3.4.1 Devices that are compatible with the application

1) Mobile phone, smartphone, tablet, or electronic device with digital camera.

2) Markers are sheets of paper with QR-Code of Tai Dam products.

3.4.2 Software Augmented Reality application for Product Presentation in Tai Dam Community, Ban Na Pa Nhad, Chiang Khan District, Loei Province.

3.5 Development process

The processes of developing software and application are as follows:

3.5.1 Create a model for all ten products with ZBrush, it is a program for designing and sculpting 3D models with high details of digital sculpting and painting tools that can create models close to reality.

3.5.2 Use 3DMax program to create the animation of product models.

3.5.3 Record narrations and edit audio tracks with Voice Recorder, a high-quality digital audio recording program.

3.5.4 Create a QR Code for each product from a free QR Code creation website called qrcodeth.com.

3.5.5 Design a sheet of marker paper using Photoshop program. Each sheet has a QR Code image for all ten products.

3.5.6 Import the marker images into Unity program to allow the program to capture QR Code and match them with the display of all ten product models.

3.5.7 Import ten animated product models, audio narrations, and music to create augmented reality media with Unity program and Vuforia. It is a cloud-based program used for storing data and application code.

3.5.8 Export applications with Unity program.

3.6 Implementation process

The next step involves testing a fully developed application by two evaluation groups.

3.6.1 Experts

Five experts assessed the quality of augmented reality (AR) applications. They are the experts from various fields, namely:

1) Public relations
2) Marketing and product
3) Experts and philosophers of Tai Dam villagers
4) Management and community product development
5) Computer and technology

Data collection tools include:

1) Augmented Reality (AR) application for product presentations of Tai Dam community. The experts would download and try out the application independently.
2) The Augmented Reality (AR) Application Quality Assessment. This evaluation form consists of 3 parts: Demographic information, Augmented Reality application quality assessment and suggestions about the application.

3.6.2 A sample group

Participants in this group were those who were interested in the Tai Dam community and were also users of the augmented reality (AR) application for product presentation of Tai Dam community. The researcher employed the formula (Silpcharu, 2012) to determine the number of sample group in case the population is unknown. The calculation showed that there was a sample of 138 people. The formular details are as follows

$$n = \frac{P(1-P)(Z)^2}{e^2}$$

n = sample size

P = The desired percentage value is randomized from the entire population.

e = Percentage Tolerance from Sampling

Z = The confidence level is set at the 95% confidence level. Z is equal to 1.96.

The researcher took a random sample of 10% or .10

$$n = \frac{(0.10)(1-0.10)(1.96)^2}{.05^2}$$

$$= \frac{.3457}{.0025^2}$$

= 138.30 or 138 people

The data collection methods and tools are as follows:

1) The research team were divided into groups to collect data at local products stores in Tai Dam community.

2) The research team presented the products of Tai Dam community by using the traditional media such as brochures, and personal media (i.e., the seller presented product information to the sample group).

3) The research team used an augmented reality (AR) application to present products in Tai Dam community. The application was installed on a smartphone and the sample group traveling in the Tai Dam community tried out the application.

4) The sample group completed an attitude assessment about augmented reality (AR) applications. The assessment form consisted of 3 parts: demographic information; attitudes towards Augmented Reality (AR) applications; and suggestions.

5) The sample group compared between the traditional and augmented reality media by responding to ten statements in the assessment form. The data was statistically analyzed using t-test.

3.7 System Maintenance

Prior to delivering the application to the community, the researcher had revised and improved the application according to suggestions and evaluation results from the sample group. Then, the representatives in the community were trained to use the application.

4. Research results

4.1 The development of augmented reality (AR) application for product presentations of Tai Dam community.

The AR application for product presentations in Tai Dam community is called “AR Tai Dam Products”. It has file size of 78 megabytes (MB.) and can be used via electronic devices such as mobile phones, smartphones, webcams, tablets with an Android operating

system. To use the AR Tai Dam Products application, user must download and open the application on the phone. By pointing the camera lens at the marker, the product preview will appear in a 3D format which can be rotated in 360 degrees. The application also has music which is a traditional song of the Tai Dam community including an audio description of the product details. The user can choose to turn on or turn off the audio as needed. There are ten types of products in the application as follows.

1) AR Piao (headdress)

Figure 1 Piao fabric (headdress)

2) AR shawl

Figure 2 AR shawl

3) AR Tai Dam shirt for male

Figure 3 AR Tai Dam shirt for male

4) AR Tai Dam shirt for female

Figure 4 Tai Dam shirt for female

5) Tai Dam shirt for boy

Figure 5 Tai Dam shirt for boy

6) AR Tai Dam shirt for girl

Figure 6 AR Tai Dam shirt for girl

7) AR sarong

Figure 7 AR sarong

8) AR Scarf

Figure 8 AR Scarf

9) AR Tai Dam Polo shirt for male

Figure 9 AR Tai Dam Polo shirt for male

10) AR Tai Dam Polo Shirt for female

Figure 10 AR Tai Dam Polo shirt for female

4.2 Quality assessment of Augmented Reality (AR) applications for product presentations of Tai Dam community

The quality assessment of augmented reality (AR) applications for product presentations in Tai Dam community was conducted by five experts. Table 1 below presents the overall mean score of the assessment across four aspects.

Table 1 The overall results of quality assessment of Augmented Reality (AR) applications

Quality assessment items	$\bar{x}$	S.D.	Quality level
Suitability	4.36	0.57	Highest
Content	4.45	0.45	Highest
Design	4.28	0.67	Highest
The interaction and use of the application	4.44	0.55	Highest
Overall quality	**4.38**	**0.55**	**Highest**

As shown in Table 1, the overall score of quality assessment in four aspects is at the highest level ($\bar{x}$ = 4.38, S.D = 0.55). A closer observation reveals that among the four aspects, content is rated at the highest level ($\bar{x}$ = 4.45, S.D = 0.45), followed by the interaction and

use of the application ($\bar{x}$ = 4.44, S.D = 0.55), suitability ($\bar{x}$ = 4.36, S.D = 0.57), and design $\bar{x}$ = 4.28, S.D = 0.67), respectively.

4.3 The users' attitude towards Augmented Reality (AR) application for product presentation of Tai Dam community

Table 2 below shows the mean score, standard deviation in the assessment of the users' attitude towards Augmented Reality (AR) application for product presentation of Tai Dam community.

Table 2 The users' attitude towards Augmented Reality (AR) application

Quality assessment items	$\bar{x}$	S.D.	Satisfaction level
image	4.24	0.62	Highest
sound effects	4.17	0.70	High
content	4.46	0.62	Highest
application usage	4.40	0.58	Highest
overall attitude assessment	**4.32**	**0.55**	**Highest**

Overall, the mean score of the users' attitude towards the quality of the application is at the highest level ($\bar{x}$ = 4.32, S.D = 0.55). When considering each aspect, the mean score of content is at the highest level ($\bar{x}$ = 4.46, S.D = 0.62), followed by application usage ($\bar{x}$ = 4.40, S.D = 0.58), image ($\bar{x}$ = 4.24, S.D = 0.62) and sound effects ($\bar{x}$ = 4.17, S.D = 0.70), respectively.

4.4 The comparison between traditional and augmented reality (AR) application for product presentation of Tai Dam community

In a comparative evaluation between the traditional product presentation and augmented reality (AR) application, there are ten key topics and statements used in the assessment, namely (1) The media is interesting; (2) The media is accurate, clear, and easy to understand; (3) The media is responsive to the audiences; (4) Time spending on the media is appropriate; (5) The media motivates the audience to think analytically and make decisions; (6)The media has modern technological innovation; (7) The presentation format is consistent with the product; (8) The media has easy access; (9) The media creates enjoyment; and (10) overall satisfaction of the media. The results of the analysis between the presentation of traditional products and an augmented reality (AR) application are presented in Table 3 below.

Table 3 The comparison between traditional and augmented reality (AR) application for product presentation of Tai Dam community.

Study variables		n	$\bar{x}$	s.d.	t-test
Traditional and augmented reality (AR) product presentations	Traditional (Brochure, personal media)	138	1.60	0.55	.00*
	augmented reality (AR)	138	4.51	1.53	

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	before - After	-2.913	.768	.065	-3.04	-2.783	-44.51	137	.000

* P<0.05

* statistically significant at the .05 level.

As shown in Table 2, the comparison between traditional and augmented reality (AR) application reveals that presenting the product in a traditional style has the mean score of 1.60, the standard deviation is 0.55. The t value is −44.51 which is less than the critical t value (0.05) and the Sig (2-tailed) was 0. There is a statistically significant difference between the two means of traditional and AR applications at the .05 level. This indicates that the augmented reality application (AR) for product presentation is more interesting than the traditional style.

5. Discussion

This section discusses key findings as follows:

As mentioned earlier, the augmented reality (AR) application for product presentations of Tai Dam community has a file size of 78 megabytes. It can be used with any electronic devices that are installed with Android operating system. The application will show the preview of ten products in 3D format which can be rotated in 360 degrees. The application also has music that plays a traditional song of the Tai Dam community including an audio

description of the product details. These features can attract users' interest and create enjoyment because the application is a new and modern form of media. The result from this research is consistent with Phuthong (2021) study that investigated consumer engagement in online retail business through augmented reality applications. The importance of digital service experiences that are resulted from perception of emotional enjoyment, useful value of augmented reality technology, ease of use, social influence, and personal skill and innovation capability. These factors can potentially increase consumer engagement. The result of this research, therefore, confirms the point that online retail operators should pay more attention on creating digital service experiences in order to enhance customer engagement and interaction with the products.

Regarding the quality assessment of augmented reality (AR) applications for product presentations of Tai Dam community evaluated by five experts, it was found that the quality of this application was rated at the highest level due to its advantageous features such as the simplicity of the application. There are elements of augmented reality technology that are easy to understand and implement. This finding accords with the research of Siwapornwasarat, and Pleehachinda (2017) that developed food menu presentation system with augmented reality technology on smartphones to display food in three dimensions. Viewing images can be rotated in all directions via a smartphone running on an android operating system, adding another product view that makes the menu interesting. From the evaluation of the system using a satisfaction questionnaire with a group of ten experts, the satisfaction result was at a good level with an average of 4.00

The results of the users' attitude towards augmented reality (AR) application for product presentation of Tai Dam community were at the highest level because the application can effectively present useful product contents. As the sample group were provided with product information in a new and innovative way, they were more interested in the product. This result is consistent with the research of Jitkaseamphuree (2018) that studied Augmented Reality Technology for the display of Thai wares. The results showed that when using augmented reality technology to display Thai wares through the media through 3D books, it can create a novelty technique in presenting products. The implementation of augmented reality technology increased customers' satisfaction and their interest in Thai wares at the level of good to very good.

The comparison between traditional and augmented reality (AR) application for product presentation of Tai Dam community found that the analysis of t-test showed a statistically significant difference between the two means of traditional and AR applications at the .05 level. This indicates that the augmented reality application (AR) for product presentation is more attractive than the traditional style. Possibly, this is because the augmented reality (AR) application used computer graphics technology that included 3D images, audio narration, music and images of the actual environment. It can create excitement and new experiences for the audiences. Again, the result is consistent with the research of Phuangsiri (2016) that developed augmented reality manual on body fat measurement tools for first year university students in public health. The results showed that there was a statistically significant difference in t-test analysis between pre-test and post-test at the 0.05 level. Thus, it can be said that learning processes that integrate innovative technology can create positive learning environment and encourages learners' participation and engagement. Everyone takes part in learning activities, receives knowledge and enjoys learning in a fun way.

6. Suggestions

6.1 Suggestions from research

When the community has new products, product models and information should be added to the application for continuity and more variety of products.

6. 2 Suggestions for the next research

Future research should present augmented reality technology in other aspects such as culture, food, history of Tai Dam community. This including applying it with other communities and use the application as instructional materials.

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