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Factors Affecting the Design of Process Architecture for the Development of Applied Graphic Letter Set Based on the Wisdom and Identity of Thai Alphabet Art in 4 Regions

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Abstract

The research aims to study factors affecting the design of process architecture for the development of a series of applied graphic letters based on the wisdom and identity of Thai alphabet art in 4 regions and to analyze structural equation models of factors affecting the design of process architecture by using both qualitative research and quantitative research methods. The researcher studied related research papers and documents thoroughly and, on the qualitative approach, conducted the intensive interview with the ten subject matter experts. In contrast, on the quantitative aspect, the researcher collected the data from the questionnaires of 357 samples.

From the intensive interview, the study found that the Northeastern experts pay attention to handicrafts and architecture. The Northern experts pay attention to the "Tham Lanna" script, and the Central Region experts pay attention to "Royal Letters" and architecture. Besides, the Southern experts focus on the local shadow play or "Nhang Taloong". In addition, from the results of the affirmative component analysis and the structural equation modeling analysis, the study found that the factor affecting the process architecture design consists of 12 variables. The research found that the developed model is consistent with the empirical data and the results of the analysis of the aforementioned variables can be used to further design the process architecture.

Keywords: Factors, Process Architecture, Thai Alphabet Art

1. Introduction

Presently, digital technology plays an essential role in the turnaround for improving and developing the efficiency of many transactions. Especially, the use of new forms of publicity materials, digital advertising media, plays a considerable role. The rapid and continuous pace of media development has made a difference and diversity, which will attract consumers to be interested and have a quick and easy understanding of products and services.

Indeed, the traditions and lifestyles of Thai people in each region often have a unique identity. Therefore, the application of modern digital technology should also consider the context of people and the basis of their well-being to reach the needs of users or customers. It is essential to focus on the culture and lifestyle of people in society or local communities in each region. However, creating quality, differences and value added to goods and services relies on digital technology and proper art design and

marketing. Using new digital media will make communication with users more efficient. Significantly, advertising media graphic designs and publicity that include the identity of each sector through images, colors, or text letters that can be read and easily understood will enhance interest and understanding and will reach out to the senses and educate more about the organization's products and services. In this way, it will make consumers in the local community feel proud and is bound in the identity of Thai identity in each region. Hence this research aims to 1) study factors affecting process architecture design for developing a series of applied graphic letters based on the wisdom and identity of Thai alphabet art in four regions and 2) Analyze the Structural Equation Model of factors affecting process architecture design (14-26).

The research of Prachid Tinnabutr on "Standard Identity Graphic Design for Chandrakasem Rajabhat University" has designed a set of letters and developed standard identity graphics for Chandrakasem Rajabhat University to use both inside and outside the university. The findings include 1) a collection of three standard identity graphics: the Chandra Seal, the Chandra Logotype, and the Chandra Mark, which can indicate the characteristics of the emblem with certainty and connects to the original symbol of Rajabhat which, has a unique personality that stands out and is different and easy to remember which can lead to the adoption of unity of the organization, 2) Standard identity letter and typeface of Chandrakasem Rajabhat University with structural proportions according to the standards of the Thai alphabet which uses the typed family names CRU, including letters and typographers CRU-Chandrakasem, CRU-LanChand. and CRU-Rajabhat can be installed practically in both PC and Macintosh computer systems, and 3) A set of general print graphic design file masters, souvenir products and apparel used as role models to represent the adoption of standard identity graphics of Chandrakasem Rajabhat University (1, 6-13).

Meanwhile in (2), research titled "Artificial Intelligence, Artists, and Art: Attitudes Toward Artwork Produced by Humans vs. Artificial Intelligence" studied and tested how people can recognize art created by artificial intelligence and indicated how knowledge of artists' identity (Human vs AI). affects an individual's assessment of art. Drawing on the principles of data structure and computer theory in this research which are the Six artworks created by AI and human artists, and a sample of 288 participants including art experts were evaluated in conclusion, the findings are that man-made art has a higher score on the "Songwriting", "Level of Expression" and "Aesthetic Values". These variables can be seen as a strength of human artists, while art creators who are artificial intelligence (AI), (17). AI has been suggested for art products rather than to create art works. In the "Next Generation Typeface Representations: Parametric Fonts" research study, the font types have been developed with different font size designs in order to fit in modern printing styles. Using a design style based on the structure of letters of different proportion sizes and thicknesses of letters affecting the printing patterns in various concrete dimensions in a standard way of being the master of the letterform. The research results showed that the developed letters were of good quality and used to create professional printing applications. It also gives you an idea of the process of creating a design method with computer graphics programs to create the appropriate fonts (3). The research titled "Fonts Style Transfer using Conditional GAN" presents critical elements in the design of digital font styles by using a computer network to transfer differently designed and stylish characters such as Japanese-style letters and European-style letters, to create new font styles. This study identifies the pix2pix process of the developed program, which the researchers could rapidly incorporate the architectural design of the process of developing a series of applied graphic letters with artificial intelligence technology based on the big data of the wisdom and identity of Thai alphabet art in four regions rapidly (4). The research titled "Aesthetic Affordances of Buto's Shape and Texture Characters in Wayang Kulit Through Digital Sculpting" describes the creative process and digital engraving techniques focused on the character's design on shapes and textures, specifically, a form of protecting traditions as cultural property by adopting digital technological techniques of the game design to support the operation. The results showed a way to design characters that emphasized shapes and textures from the concept of creating inspired aesthetic images which bring together the creations of cultural art and technology as this has led to the preservation and transfer of traditions and valuable cultures in digital form to the younger generation with quick and easy access (5).

2. Methodology

The study combines qualitative and quantitative research. Qualitative research uses an in-depth interview method with ten experts, dividing experts by geographical zone into four regions: Northern, Northeast, Central, and Southern Regions.

For quantitative research, the researchers used a questionnaire to collect data from samples, including 1. Community Digital Learning Center, 2. Cultural Center in four regions, 3. Expert Group, and 4. 357 representatives from the 4 regions to determine the quality of the instrument starting with the validity of the content by determining the consistency between the question and the objective which is the Index of Item-objective Congruence (IOC). Then the confirmatory factor analysis (CFA) and the analysis of the structural equation model (SEM) were conducted to find factors that affected the design of the process architecture for developing a series of applied graphical letters based on the wisdom and identity of the Thai alphabet art in the four regions.

3. Results

The qualitative research on the in-depth interviews with ten experts was conducted to find the factors affecting the design of process architecture for the development of a series of applied graphic letters based on the wisdom and identity of Thai alphabet art in the four regions.

When analyzing content analysis under four groups of experts was conducted, the research found that Group 1, two northeastern experts focused on the identity of art in the dimensions of the most prominent crafts in the Northeast and followed by architecture (local temples). Group 2 consisting of two northern experts focused on a series of wisdom-based letters that will be uniquely clear in the arts: dharma or astrological figures considered the most important, and the appearance of spherical shape. Group 3 consisting of 3 specialists from the central region focused on a series of wisdom-based letters that will be uniquely clear in the identity of the arts, namely Thai-style house architecture, Ban Krung Kao which can be considered to be visible in its beautiful appearance in a structure which is strong and stable. There is an elegance in the way of combining art-centric works and variations of placement, and carvings of various kinds of food. Lastly Group 4 consists of three experts from the southern region featured in a series of letters based on the wisdom and identity of arts such as Taloong (Shadow Play) and Menorah which are the local performing arts and are apparent in the most shaped manner. The patterned lines of Gor-Lae Boat and Baté Fabrics are also uniquely focused on the beautiful local art. As details are shown in Table 1.

Table 1 In-depth interview results from experts.

Group	Region	Number of Experts	Based on wisdom/ Unique
1	Northeast	2	Arts & Crafts
2	North	2	Dhamma
3	Central	3	Alphabet architecture
4	South	3	shadow play

With the analysis of the in-depth interview results from experts in all four regions, the study found that there were seven issues or factors affecting the design of process architecture which are 1. Crafts 2. Architecture 3. Performing Arts 4. Dhamma 5. Shapes, 6. Designs and 7. Elements, and in respect of factors affecting the process of developing a set of applied graphic characters with artificial intelligence technology, there were 5 factors such as 1. Artificial Intelligence Knowledge 2. Application side 3. Application 4. Relay and 5. Format.

However, The results of quantitative research, which asked for feedback from the specific 357 samples in the 4 regions, showed that factors that significantly affected the design of the process architecture were the shape factors at the highest level while the compositional factor and the design factor are at the high level using compositional and design factors as shown in Tables 2, 3 and 4, respectively.

Table 2 Results of comments from a purposive sample in four regions on shape factors.

Contour Factors	$\bar{X}$	S.D.	Interpretation
1. Appropriate in the shape of the letter	4.08	0.77	High
2. Appropriate in the font size	4.08	0.77	High
3. Appropriate in the overall of the alphabet set	4.16	0.76	High

Contour Factors	$\bar{X}$	S.D.	Interpretation
4. The design of the graphic character set shape that appears the beauty	4.08	0.87	High
5. Application of character set shapes commercially	4.26	0.86	Highest
Overall Average	**4.13**	**0.81**	**High**

Table 3 Results of comments from a purposive sample in four regions on compositional factors.

Compositional Factors	$\bar{X}$	S.D.	Interpretation
1. Appropriate for placement presentation	4.26	0.80	Highest
2. Appropriate in the direction of the moving line	4.16	0.76	High
3. Appropriate in presentation, style, and highlights	4.18	0.80	High
4. Differences in different textures	4.24	0.74	Highest
5. Appropriate in space distance	4.24	0.74	Highest
Overall Average	**4.22**	**0.77**	**Highest**

Table 4 Results of comments from a purposive sample in four regions on design factors.

Design factors	$\bar{X}$	S.D.	Interpretation
1. Content that meets the purpose of design	4.30	0.76	Highest
2. Appropriate for use	4.28	0.78	Highest
3. Appropriate in the design of a set of letters with clarity	4.26	0.77	Highest
4. Appropriate in proportion to the graphic character set	4.24	0.79	Highest
5. It is consistent with local wisdom and identity	4.14	0.83	High
Overall Average	**4.24**	**0.79**	**Highest**

Table 5 Results of the data suitability check with Pearson correlation analysis between variables observed.

Factors	*LAC*	*ACH*	*PFA*	*LAA*	*SHA*	*DES*	*COM*	*KNO*	*APP*	*ACC*	*SHR*	*TEM*
LAC	1											
ACH	.163**	1										
PEA	.141**	.801**	1									
LAA	.129*	.773**	.773**	1								
SHA	.117*	.750**	.757**	.843**	1							
DES	.114*	.765**	.750**	.775**	.790**	1						
COM	.113*	.739**	.750**	.797**	.797**	.822**	1					
KNO	.121*	.714**	.708**	.777**	.788**	.779**	.846**	1				
APP	.122*	.757**	.775**	.727**	.758**	.793**	.819**	.829**	1			
ACC	0.065	.628**	.602**	.675**	.712**	.587**	.678**	.725**	.666**	1		
SHA	0.099	.546**	.510**	.613**	.657**	.523**	.621**	.646**	.562**	.742**	1	
TEM	0.095	.595**	.594**	.701**	.712**	.626**	.685**	.713**	.632**	.737**	.826**	1
Mean	4.248	4.276	4.328	4.230	4.201	4.329	4.29	4.264	4.339	4.248	4.119	4.206
S.D.	0.56	0.58	0.62	0.63	0.64	0.62	0.62	0.63	0.62	0.64	0.72	0.65

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 6 Analysis of coefficients of variables, factors affecting process architecture.

Cause Factors	**Factors affecting the design of process architecture**		
Effect Factor	TE	DE	IE
Development Process…(ADA)	0.968	0.968	-
Chi-Square = 41.740, df = 30, p-value = 0.075, GFI = 0.997, AGFI = 0.987, RMR = 0.003, RMSEA = 0.014			
Cause Factors	X (IDA)		
Precision	0.964		
Effect Factor	Y (ADA)		
Precision	0.965		
Structural Equations of Variables		ADA	
R-Square		0.937	
correlation matrix between latent variables			
Latent Variable		ADA	IDA
ADA		1.000	
IDA		0.968	1.000

Note p < 0.01 DE = Direct Effect IE = Direct Effect TE = Total Effect X1 = IDA Y1 = ADA.

When determining the suitability of the sample and the relationship between the 12 observable variable factors used to analyze the composition represented by the Kaiser-Mayer-Olkin statistics (KMO) and the statistical values of Bartlett's test, the statistics of The Kaiser-Mayer-Olkin and the statistical values of Bartlett's test were found to be equal to 4368.820, df = 66, p = 0.000, and the correlation coefficient matrix is not statistically significant identity matrix at the level of .01. The observed variables are sufficiently correlated to be able to analyze elements in line with the results of the Kaiser-Mayer-Olkin analysis which should be greater than 0.5, which is close to 1 (0.949), corresponding to the research model with empirical data which the index value is 0.80 or higher indicating that the data is well suitable for Factor Analysis which the results of the data suitability check details are shown in Table 5.

Table 5 on the Pearson Correlation Coefficient (Correlation Pearson Product Moment) in the analysis of correlation coefficients between 12 observed variables confirmed that all observable variables were studied and there are no Multicorrelality problems (none of the pairs of variables with a correlation value exceeding 0.9). The study results of the variables' causal structural relationships were observed. Factors affecting the design of process architecture by analyzing the influence of variables as shown in Table 6.

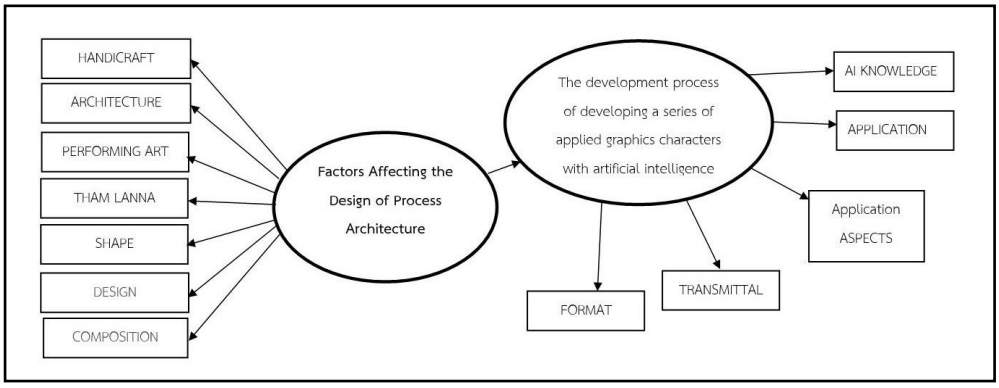
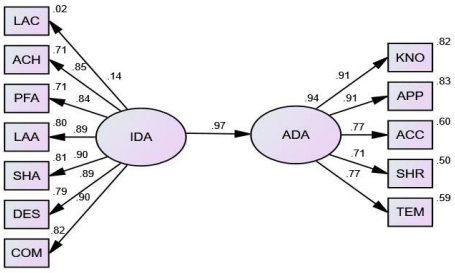


Figure 1 The factors affecting the design identity of Thai alphabet art in 4 regions.

Figure 1 identifies on primary variables and dependent variables which affect the factors that will contribute to developing a series of applied graphic characters with artificial intelligence technology as well as providing an idea of architectural design, the process of developing a series of applied graphic characters based on the wisdom and identity of Thai alphabet art in 4 regions which are both primary variables and dependent variables accordingly. For example, primary variables which are a factor affecting the design of process architecture have been observed in 7 variables: 1) Handicraft 2) Architecture, 3) Performing

Arts, 4) Tham Lanna 5) Shape, 6) Design, and 7) Composition while the dependent variables according to the process of developing a series of applied graphical letters with artificial intelligence technology consist of five observable variables: 1) AI knowledge, 2) Application, 3) Aspects Using, 4) Transmittal and 5) format.



Chi-square=65.296, Df=37, P-value=.003, Chi-Square/df=1.765, GFI=.971, AGFI=.939, NFI=.985, IFI=.994, CFI=.994, RMSEA=.046, RMR=.007, SRMR=0.0184, CN=285.000, PCLOSE=.605

Figure 2 Structural equation model analysis of factors affecting the design of process architecture for the development of applied graphic letter set based on the wisdom and identity of Thai alphabet art in 4 regions.

Figure 2 shows the results of analysis of the structural equation model of Factors Affecting the Design of Process Architecture for the Development of Applied Graphic Letter Set based on the Wisdom and Identity of Thai Alphabet Art in 4 Regions. The results show a Chi-square value of 65.296, a Degree of Freedom (df) of .37, a p-value of .003, a Relative Chi-square value of 1.765, and a Goodness of Fit Index (GFI) of .971, AGFI=.939, NFI=.98, IFI=.994, CFI=.994 which is greater than .90, and Root Mean Square Error of Approximation (RMSEA)=0.46 and RMR=.007 accordingly.

However, when considering the observational variable weight values of factors affecting the design of the process architecture for the development of a series of applied graphic letters based on the wisdom and identity of Thai alphabet art in the four regions, the study founds that 11 observable variables were significant for weight values with a positive value between 0.50 and 0.83 and one variable was found to have a positive weight value of the experimental variable which is 0.02 thus it is clear that, for this variable, if it will lead to the design and development process of the font set, then the craft variable (LAC) should not be used in the process.

In addition, considering the factors affecting the Design of Process Architecture for the Development of Applied Graphic Letter Set Based on the Wisdom and Identity of Thai Alphabet Art in 4 Regions (IDE) in the ascending weight values which are the Shape (SHA) (the coefficient of influence is 0.90), the Elements (COM) (the coefficient of influence is 0.90), the Design (DES) (the coefficient of influence is 0.89), the Dhamma (LAA) (the coefficient of influence is 0.89), the Architecture (ACH) (the coefficient of influence is 0.85, the Performing arts (PFA) (the coefficient of influence is 0.84), and the Part of the Handicraft Variable (LAC) (the coefficient of influence is 0.14), it can be considered that it does not affect the primary variables since the arts and crafts have combination with various features, such as patterns, colors, textures, and unclear materials as the respondents did not take much importance. The study also found that the dependent variables which are the process of developing a set of applied graphic characters with artificial intelligence technology could be shown in the weight in ascending order which are the Artificial Intelligence Knowledge (KNO) (the coefficient of influence is 0.91), the Application (APP) (the coefficient of influence is 0.91), the Application to Use (ACC) (the coefficient of influence is 0.77), the Format (TEM) (the coefficient of influence 0.77) and the Presentation (SHR) (the influence coefficient is 0.71) as shown in Figure 2.

4. Conclusions

The research has discovered 12 statistically significant observable variables of factors affecting the design of process architecture which these variables have direct positive influence on graphical character series design process architecture (IDA) (the coefficient of influence is 0.97) significantly which is the Shape (SHA) as it has its visual clear identity which could bring imagination on analytic thinking process to concrete dimension. It is considered an essential factor in the development of a set of letters in the future that will cause interest. The same applies to the Elements (COM) or the Harmonious Layout of

Specific Features and Designs (DES) that will clearly create the beauty and identity of each region.

5. Discussion and Recommendation

The research is qualitative and quantitative. In addition, it used an online questionnaire through google form as a research tool and was examined for the index of item objective congruence (IOC) and the reviewed reliability from experts in the examination of the research process and then was brought for survey with the samples of four regions of Thailand. The researchers collected questionnaires from a total sample of 357 sets and analyzed structural equation models (SEM) with the AMOS program and found out that 1) the latent variables are factors that affect the design of process architecture for the development of a series of wisdom-based applied graphic letters (IDE) consisting of seven observational variables which have observational variables of interesting importance: the shape (SHA) has an influence coefficient of 0.90 greater than 0.4, and the element (COM) has an influence coefficient of 0.90, which is greater than 0.4. 2) The latent variable is the process of developing a series of applied graphical letters with artificial intelligence technology (ADA) consisting of five observable variables which two of them are interesting observables which are the artificial intelligence knowledge side (KNO) (the coefficient of influence is 0.91) and the application (APP) (the coefficient of influence is 0.91) which is greater than 0.4 indicating that it is also statistically significant.

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The authors declared that they have no conflicts of interest in the research, authorship, and this article's publication.

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