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Article

Optimizing the Content Generation Mechanism of Cross-Cultural Brand Communication Using Web Algorithms in Converged Media Environment

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Abstract: In order to enhance the effectiveness of cross-cultural brand communication, this paper proposes the Transformer model using Self-Attention mechanism and Multi-Head Attention mechanism for content generation. Combined with the pointer network, the TP model based on the optimized Transformer model is designed. Conduct ROUGE score comparison experiments between the TP model and five mainstream copywriting generation models to evaluate their performance effects. To further validate the usability of the content generated by the TP model, this paper uses a questionnaire to analyze the audience's agreement. The results show that the performance comparison between the TP model and the AAT model, which has the best performance among the five comparison models, increases the scores in the ROUGE-1, ROUGE-2, and ROUGE-L evaluation functions by 0.00982, 0.00143, and 0.00953 in that order. The average emotional resonance identity, average value confirmation identity, and average sharing and Diffusion recognition were 3.9304, 3.9806, and 4.0202, respectively, indicating that the use of the TP model to generate marketing copy can trigger audience resonance and brand recognition, providing new ideas and methods for brand cross-cultural communication.

Keywords: cross-cultural communication; ROUGE; pointer generator network; Transformer model

1. Introduction

A hundred years ago, silk, ceramics and tea were the shining business cards representing China, and a hundred years later, Chinese brands in energy, infrastructure, communications, home appliances, the Internet and many other fields have become the world standard. Since the reform and opening up of China's open door to the outside world, Chinese enterprises began to "go out" [1-3]. After the negative impact of OEM and OEM on the overall image of Chinese enterprises and Chinese brands in the early days, the construction of a strong brand with global influence has become an inevitable trend of China's economic development as the status of brand soft power in global competition continues to rise [4-6]. On the other hand, in the current era of information explosion, in the face of ever-changing integrated media technology and endless integrated media applications, how to choose integrated media strategy to effectively communicate the brand and reach the users is a problem that many enterprises need to think about and solve [7-9]. As a mainstream media, through the effective integration of traditional and emerging media resources, a comprehensive integrated media matrix can provide a broader stage for brand display. This requires enterprises to flexibly adjust their strategies to adapt to the new market environment [10-12]. For enterprises, brand communication done well can greatly enhance brand awareness. And the mainstream media has the construction of a comprehensive integrated media matrix,



which provides enterprises with a large number of opportunities to contact with the target audience, and if the content of the communication is very creative, the communication effect is immeasurable [13-15].

In the context of increasingly obvious globalization, the expansion of capital between different countries in the world has become a trend, and the infiltration of branding and consumer culture is particularly obvious in this general environment [16-17]. Multinational enterprises realize the cross-cultural communication of brand through brand strategy. And with the development of information technology, the strategy of brand communication is also constantly undergoing renewal and modernization, and in the context of globalization, cross-media communication, in which information flows between different media markets, has become an effective means of corporate brand expansion [18-20].

As China plays an increasing role in the process of world globalization, the depth and breadth of contact between Chinese enterprises and products and the world are also expanding, but Chinese product brands are generally characterized by low brand value, short life cycle and backward communication methods [21-22]. Some local enterprises in China should be fully aware of the positive role of cross-media communication technology in the context of globalization in promoting the cross-cultural communication of brands, and combine the new cross-media communication related technology. On the one hand, they should actively accept the essence of cultural communication from other countries in the world, and on the other hand, they should also combine the corresponding cultural brand communication strategy to realize the expansion of local cultural brands from the cultural roots [23-24].

This paper firstly elaborates the connection between cultural identity and brand cross-cultural communication, and proposes the significance and ways of cross-cultural brand communication. Second, the Transformer model, which relies on the self-attention mechanism, is optimized by adding a pointer network. Using the optimized TP model, a cross-cultural brand marketing copy generation model is constructed. ROUGE indicators are introduced to determine the optimal experimental parameters. Comparison experiments are conducted between the TP model and five mainstream copywriting models at cluster size 3 to explore the optimal cross-cultural brand marketing copywriting model. Finally, the questionnaire survey method is used to analyze the identity of the generated marketing copy and study the application effect of the generated cross-cultural brand marketing content.

2. The significance and ways of cross-cultural brand communication

The current global economy has entered the era of brand competition, and after several stages of product output, technology output and capital output, today's brand competition has turned to cultural output. Identity, which is closely linked to culture, constitutes another important trend: culture is the core of brand value, identity is the brand's communication demand, and the realization of cultural identity in brand communication practice is the ultimate significance pursued by contemporary brand cross-cultural communication.

2.1. The link between cultural identity and brand communication

2.1.1. Culture is the core of brand value

A series of unique beliefs and values formed during the growth process of a brand are the core of its cross-cultural communication. In addition to the consistent opinion on the importance of culture formed within the brand, the external cultural environment has also become an important reference factor for all brands in establishing their brand values. Only by determining the cultural orientation in brand value can we reduce cultural conflict, establish cultural connection and realize cultural identity in cross-cultural communication. The core of brand value must be culture, and the theme of brand cross-cultural communication must also be culture. Instead of saying that today is the era of brand competition, it is better to say that the era of brand culture competition has arrived.

2.1.2. Identity as a brand communication claim

The issue of cultural identity has become a worldwide topic and has permeated the business world, becoming the ultimate goal of all brands when implementing intercultural communication activities. The combination with commercial behavior has become an important trend in the development of contemporary brand cross-cultural communication, so that consumers can thoroughly identify with the brand from the surface to the inside of the various levels of culture is the communication demand that

every brand wants to realize. For brands, identification is the most essential demand of cross-cultural communication. The core of a brand is culture, which is related to the product and enterprise at a shallow level, and related to the nation and country at a deeper level. The output of brand is bound to realize the output of both shallow and deep cultural values, and the loyalty of overseas consumers in cross-cultural communication is bound to be realized on the basis of product identity and cultural identity. Taking cross-cultural communication as the idea and means to disseminate brand culture, shape brand image and tell brand stories, and ultimately realizing the brand's cultural identity in the three dimensions of invisibility, visibility and technicality, this is an irreversible trend for the development of cross-cultural communication of brands in the future.

2.2. Merchandise marketing literature

Commodity marketing copy is a paragraph describing the characteristics of the product itself and used for marketing text, can enhance consumer awareness of the product itself, thereby stimulating consumer desire to buy, so also known as commodity description of commodity marketing copy. Commodity marketing copy does not need to use very gorgeous or lofty words to modify, otherwise it will produce a sense of distance with consumers to reduce the desire to buy. Therefore, in the description of the goods, the appropriate addition of some colloquial vocabulary buzzwords, hot words, hot words, etc., can be closer to the distance between the consumer, causing consumer resonance, and bring great pleasure to the consumer, greatly enhancing the consumer's sense of shopping experience and desire to consume.

With the rapid popularization of the Internet and the rapid development of e-commerce, there are more and more commodities on e-commerce platforms, and it is unrealistic to rely only on manual commodity marketing copy generation. Therefore, it is necessary to study the automatic generation of commodity marketing copy. Commodity marketing copy generation aims to convert commodity information into brief text containing key information. In this paper, we study automatic merchandising copywriting by generating a paragraph describing the characteristics of the merchandise based on the input characteristics of the merchandise.

Merchandising copy generation is a task involving natural language processing technology, which can help organizations quickly generate various types of merchandising copy, including advertising merchandising copy, product introductions, press releases, promotional campaigns, and so on. Common methods for generating merchandising copy include rule-based methods, statistical machine translation methods, and neural network generation methods. Among them, the neural network-based merchandising copy generation method has been widely applied and studied in recent years, because it can generate more natural and fluent text, and at the same time, it can also solve some semantic ambiguities and syntactic errors to a certain extent.

3. TP model for adding pointer networks

3.1. Self-Attention Mechanism

The Self-Attention mechanism is an attention mechanism in deep learning that is able to connect different parts of the input information to other parts without having to map that input to a low-dimensional space.

The Self-Attention mechanism represents the input to the model as a set of vectors, where each vector corresponds to a part of the input (Query, Key, Value). The model then computes its relevance to the other parts, so that each part, including itself, is "attended". These relationships can be semantic, positional, or sentence-structural. Such relevance enables the model to understand the input more accurately and helps it to make more accurate predictions. In short, in Self-Attention operation, the similarity between Query and Key is measured by the inner product of the Query and Key vectors, and this result is multiplied by the Value vector to get the relevance weight representation. Where the Query vector, Key vector and Value vector are obtained by multiplying the word vector matrix with its corresponding three matrices (W^Q, W^K, W^V) respectively, which are computed as:

$$Attention(Q, K, V) = \text{soft max} \left(\frac{QK^T}{\sqrt{d_k}} \right) V \quad (1)$$

Where d_k is the dimension of the K -vector, dividing by $\sqrt{d_k}$ is intended to prevent the gradient from becoming unstable during back propagation due to too large a computational result.

softmax function is a normalized activation function that serves to represent it as a probability distribution.

3.2. Transformer model

Transformer model is a deep learning model for natural language processing, which is essentially an Encoder-Decoder model that solves the problem of variable sequence lengths of inputs and outputs by using Self-Attention mechanism and Multi-Head Attention mechanism, and realizes parallel computing. The model is widely used in language modeling, machine translation, word embedding and other tasks with good results. It utilizes a set of Multi-Head Attention mechanism and Positional Encoding encoding mechanism that contain both semantic information, adopts a matrix consisting of a series of vector representations as input, and then computes the relations between the vectors and transforms the matrix according to these relations to generate the output.

Among them, Multi-Head Attention is a commonly used attention mechanism in the Transformer architecture, which is based on Self-Attention and can capture interrelationships between words, sentences and larger granular structures. Multi-Head Attention consists of multiple Head's Self-Attention, each Head can independently perform attention operations and stitch the results of the attention operations together as the final output, and this multi-layer structure allows the model to capture richer associative information. Its formula is:

$$MultiHead(Q, K, V) = \text{concat}(head_1, \dots, head_h)W^O \quad (2)$$

$$head_i = \text{Atteneion}(QW_i^Q, KW_i^K, VW_i^V) \quad (3)$$

Positional Encoding is designed to ensure that the model utilizes the sequences in order, this is because the Transformer architecture does not have a looping or convolutional structure. Positional Encoding is added to the token embedding as a stack of inputs at the bottom of the encoder and decoder, this input is not captured by the attention mechanism. Positional Encoding is defined using sine and cosine functions of different frequencies. Its calculation formula is:

$$PE(pos, 2i) = \sin\left(\frac{pos}{10000^{2i/d_{model}}}\right) \quad (4)$$

$$PE(pos, 2i+1) = \cos\left(\frac{pos}{10000^{2i/d_{model}}}\right) \quad (5)$$

Where pos indicates the position where the current character is located and d_{model} indicates the word embedding length. When i is an even number use formula (4) to calculate, when i is an odd number use formula (5) to calculate.

It can be seen that the Transformer model not only breaks through the limitation that the RNN model cannot be parallelized, but also can directly calculate the relevance of each word without passing through the hidden layer.

3.3. Transformer Improvement Model

Although the pointer generation network plus overlay mechanism solves the problem of unregistered words and the problem of repetitive generation, which is very suitable for the study of merchandising copy generation. However, due to the sequential computing characteristics of the RNN structure, on the one hand, it cannot solve the problem of long-term dependence of information, and on the other hand, it restricts the parallel ability of the model, which makes the model computationally inefficient and consumes more time for training. Compared with the pointer generation network, the traditional Transformer does not solve the problem of unregistered words, although it uses the Attention mechanism, which reduces the distance between any two positions in the sequence is to a constant with better parallelism, thus greatly reducing the training time.

Therefore, in this paper, based on the Transformer model, the pointer network of pointer generation network is added so that the generated merchandising copy can take words from the source text with a certain probability, which is controlled by p_{gen} . In this paper, we refer to this model as Transformer model with Pointer, or TP model for short.

The function of the pointer network in the TP model is to realize the calculation of the source text attention weight distribution, context vector, P_{gen} parameters, and the final probability distribution based on the calculation results of the Transformer model.

During the decoding process, the decoder's attention distribution to the source text at the moment of time step t is calculated by the formula:

$$e^t = v^T \tanh(W_e E n_{out} + W_d D e_{out} + b_{attn}) \quad (6)$$

$$a^t = \text{softmax}(e^t) \quad (7)$$

Eqs:

W_e, W_d - learnable weight parameters;

$E n_{out}$ - the output of the N th encoder block of the encoder;

$D e_{out}$ - output of the N th decoder block of the decoder at time step t ;

b_{attn} - the bias term;

a^t - the attentional weight of the source text at time step t .

Based on the attentional weight of the source text, combined with the output of the N th encoder block of the encoder, the context vector h_c containing the source text and the target text is obtained.

$$h_c = d^t \times E n_{out} \quad (8)$$

The output of the N stdecoder block of the decoder needs to be computed through a linear layer and a softmax layer to obtain the glossary distribution P_{vocab} .

$$P_{vocab} = \text{softmax}(LN(D e_{out})) \quad (9)$$

Eq:

LN - linear transformation.

Similar to pointer generation networks, the TP model also introduces weights P_{gen} to weigh whether a word should be generated or copied, allowing the model to accurately copy information while retaining the ability to generate new words through the generator. Referring to the relevant formulas for pointer generative networks, the formula for the P_{gen} -parameter of the TP model is:

$$P_{gen} = \sigma(W_c h_c + W_s D e_{out} + W_x D e_{inp} + b_{por}) \quad (10)$$

Eq:

$\sigma(x)$ - sigmoid function:

$D e_{inp}$ - Input of the N rd decoder block of the decoder;

W_c, W_s, W_x - learnable weight parameters:

b_{por} - bias term.

After obtaining P_{gen} , the weight distribution of the extended vocabulary can be obtained according to the following equation.

$$P(w) = P_{gen} P_{vocab}(w) + (1 - P_{gen}) \sum_{D w_i = w} a_i^t \quad (11)$$

In the training phase, the loss at time step t and the overall loss of the original input sequence are specifically calculated as follows, respectively:

$$loss = -\log P(w_t^*) \quad (12)$$

$$loss = \frac{1}{T} \sum_{t=0}^T loss \quad (13)$$

To avoid the over-repeat problem, the TP model sums the attentional weights of time step t to obtain the coverage vector c^t , and then adds c^t to the attentional weights to compute e^t . At this point, the e^t counting surface formula in the TP model is:

$$e^t = v^T \tanh(W_e E n_{out} + W_d D e_{out} + W_c c^t + b_{atbs}) \quad (14)$$

At this point, the model ends up with a loss of:

$$loss_i = -\log P(w_i^*) + \lambda \sum \min(a_i^t, c_i^t) \quad (15)$$

4. Effectiveness of cross-cultural brand marketing content generation based on TP modeling

4.1. Performance evaluation

4.1.1. Contrasting models

In the previous chapter, the TP model used for merchandising copy generation was proposed. In order to investigate the performance of the TP model used for cross-cultural brand marketing copy generation and to select the optimal cross-cultural brand marketing copy generation model, this paper adopts the ROUGE metrics to compare the quality of cross-cultural brand marketing copy generated by each model, so as to determine the improvement effect of the TP model proposed in this paper. The comparison models involved are:

- (1) Seq2seq With Attention model. A base sequence-to-sequence cross-cultural brand marketing copy generation model with added attention mechanism.
- (2) Pointer Generator Networks model (PGN). A cross-cultural brand marketing copywriting generation model that adds pointer networks and a full attention layer to the Seg2Seg model that adds an attention mechanism.
- (3) BERT-based Pointer Generator Networks model (BERT-PGN). PGN optimization model using BERT pre-training layer.
- (4) Transformer model. A cross-cultural brand marketing copy generation model that relies solely on the self-attention mechanism to compute its inputs and outputs.
- (5) All attention Transformer model (AAT). This model is a simplified Transformer cross-cultural brand marketing copywriting generation model using the all attention mechanism.

4.1.2. Selection of experimental parameters

In this paper, we take ROUGE number as the evaluation index of model-generated copy, and the principle of the ROUGE scoring mechanism is to compare the model-generated copy with the corresponding copy that already exists, and calculate the number of overlaps between the two, so as to evaluate the goodness of the model. In the model for generating cross-cultural brand marketing copy, we use the three parameters of ROUGE-1, ROUGE-2 and ROUGE-L as the indicators for evaluating the effectiveness of copy generation. The L in ROUGE-L denotes the initial letter of the longest common subsequence (LCS), and ROUGE-L measures the fluency and readability of the generated cross-cultural brand marketing copy by calculating the longest common subsequence of the generated candidate copy and reference copy.

In the process of model decoding, the decoding algorithm is a must, after comparing the cluster search with greedy search this paper chooses the cluster search as the decoding algorithm of this model, and the hyper-parameter cluster size in the cluster search also affects the effect of the model to generate cross-cultural brand marketing copy in the end, so it is necessary to select different cluster sizes to generate the copy, and to compare and analyze the effect of the copy generation in order to Determine the most appropriate cluster size, this selection of the most appropriate cluster size experiments are carried out on the basis of the TP model, selecting the cluster size of 1, 2, 3, 4, 5 for experimental comparison and analysis, and the final results of the experiment are shown in Table 1.

Table 1. Comparison of ROUGE scores of different BeamSize

BeamSize	ROUGE-1	ROUGE-2	ROUGE-L
1	0.4037	0.2305	0.3297
2	0.4192	0.2376	0.3381
3	0.4311	0.2401	0.3573
4	0.4188	0.2318	0.3462
5	0.4274	0.2392	0.3480

From the table, it can be seen that the TP model has the highest ROUGE-1, ROUGE-2, and ROUGE-L scores when the cluster size is 3. Since the cluster size also affects the speed of the model when decoding, the combined ROUGR scores and the decoding time, the TP model selects a cluster size of 3 to be the experimental parameter for this experiment.

4.1.3. Analysis of experimental results

The results obtained by comparing the ROUGE scores of the TP model with the five models are shown in Table 2.

Table 2. Comparison of ROUGE scores of different models

Model	ROUGE-1	ROUGE-2	ROUGE-L
Seq2seqWithAttention	0.20863	0.02386	0.12864
PGN	0.20995	0.02574	0.12981
BERT-PGN	0.21086	0.02616	0.13454
Transformer	0.21289	0.02754	0.13864
AAT	0.21882	0.02799	0.14028
TP	0.22864	0.02942	0.14981

From the ROUGE scores of each model in the table, it can be seen that the TP model has the highest scores in the ROUGE-1, ROUGE-2, and ROUGE-L review functions, which are 0.22864, 0.02942, and 0.14981 in that order. The TP model, compared with the PGN model, has scores in the ROUGE-1, ROUGE-2, and ROUGE-L review functions increased by 0.01869, 0.00368, and 0.02 in turn, indicating that the Transformer model based on the attention mechanism is better than the RNN-based generative model.

The TP model improved its score in the ROUGE-1, ROUGE-2, and ROUGE-L review functions compared to the Transformer model, increasing by 0.01575, 0.00188, and 0.01117, in that order. This indicates that the performance of the Transformer model with the introduction of the pointer network is improved, and it is more effective for the automatic generation of cross-cultural brand marketing copy.

By comparing the performance with the AAT model, which has the best performance among the five comparison models, the score of TP model in the ROUGE-1, ROUGE-2, and ROUGE-L evaluation functions increases by 0.00982, 0.00143, and 0.00953 in that order, and therefore, it is concluded that the TP model is the best in generating copy.

4.2. Analysis of application effects

In the process of cross-cultural brand communication, the degree of audience recognition of marketing copy content can be used to evaluate the effectiveness of marketing copy. In this study, a cross-cultural brand marketing copy generation model based on the TP model was used to generate marketing copy and place it in different social media. A questionnaire survey was conducted with the group of people who liked, commented, and retweeted the content of the copy on social media to analyze the respondents' recognition of the generated copy. In this study, a total of 482 questionnaires were distributed and 461 were recovered, of which the valid questionnaires were 450, with an effective rate of 97.6%.

The research dimensions of this study are divided into 3 dimensions: emotional resonance, value confirmation, sharing and diffusion, and the measurement items are as follows:

- (1) Emotional resonance
 - Q1: The content of the copy makes me feel emotionally touched.
 - Q2: I feel that the emotions expressed in the copy are highly similar to my personal experience.
 - Q3: When reading the copy, I can understand and identify with the emotions conveyed in the copy.
 - Q4: The language of the copy makes me feel the warmth and care of the brand.
 - Q5: The emotions conveyed in the copy make me interested in learning more about the brand.
- (2) Value Confirmation
 - Q6: The values conveyed in the copy are consistent with my personal values.
 - Q7: The copy makes me think that the brand has a good performance in terms of social responsibility and ethics.
 - Q8: The content of the copy convinces me that the brand brings me tangible benefits or value.
 - Q9: I think the copy reflects the core values that the brand promises.
 - Q10: The copy makes me feel that the brand's ideas have a positive impact on my life.
- (3) Sharing and Diffusion
 - Q11: I think the content of the copy is worth sharing with friends or family.
 - Q12: The content of the copywriting gives me the idea to comment on social platforms.
 - Q13: I think the message conveyed by the copywriting deserves to be seen by more people.
 - Q14: After reading it, I am interested in reposting the copywriting content on social media.
 - Q15: The content of the copywriting was able to spark discussion or interaction on social media for me.

4.2.1. Emotional resonance identity analysis

The results of emotional resonance identity are shown in Table 3. The average emotional resonance identity of the respondents for the generated copy was 3.9304. Specifically, “The language of the copy makes me feel the warmth and care of the brand” received the highest level of agreement among respondents, while “I feel that the emotional expression in the copy has a high degree of similarity to my personal experience” received a relatively low level of agreement. Overall, the mean value of agreement is more than 3, indicating that most of the respondents agree with the viewpoints in the questionnaire, i.e., they share a high level of emotional resonance with the marketing copy generated by the cross-cultural brand marketing copy generation model based on the TP model.

Table 3. Analysis of emotional resonance recognition

Item	Sample size	Minimum value	Maximum value	Mean value	Standard deviation	Median
Q1	450	1.00	5.00	3.953	1.028	4.000
Q2	450	1.00	5.00	3.811	1.043	4.000
Q3	450	1.00	5.00	3.918	1.098	4.000
Q4	450	1.00	5.00	4.108	1.032	4.000
Q5	450	1.00	5.00	3.862	1.087	4.000

4.2.2. Value Recognition Agreement Analysis

The results of value confirmation identity are shown in Table 4. The average level of agreement of the respondents in the value recognition dimension is 3.9806. “The content of the copy convinces me that the brand brings me tangible benefits or value” was the most highly agreed upon among respondents, while “The copy convinces me that the brand is socially and ethically responsible” was relatively low. Overall, the average agreement in this section was over 3, indicating that the vast majority of respondents agreed with these ideas, suggesting that the effectiveness of copywriting in the value confirmation dimension is recognized.

Table 4. Analysis of value recognition degree

Item	Sample size	Minimum value	Maximum value	Mean value	Standard deviation	Median
Q6	450	1.00	5.00	4.084	1.043	4.000
Q7	450	1.00	5.00	3.881	1.102	4.000
Q8	450	1.00	5.00	4.135	1.098	4.000
Q9	450	1.00	5.00	3.897	1.037	4.000
Q10	450	1.00	5.00	3.906	1.065	4.000

4.2.3. Sharing and Diffusion Identity Analysis

The results of sharing and proliferation identity are shown in Table 5. The average level of identification of the respondents on sharing and proliferation is 4.0202. In the specific analyses, “After reading it, I am interested in reposting the content on social media” had the highest acceptance level, while “The content makes me think about commenting on social media platforms” had a relatively low acceptance level. Overall, given that the mean value of agreement in this section is more than 3, it can be assumed that respondents generally agree with the questionnaire's view that copywriting possesses a high degree of effectiveness in the dimensions of sharing and diffusion.

Table 5. Analysis of sharing and diffusion recognition

Item	Sample size	Minimum value	Maximum value	Mean value	Standard deviation	Median
Q11	450	1.00	5.00	4.022	1.108	4.000
Q12	450	1.00	5.00	3.967	1.094	4.000
Q13	450	1.00	5.00	4.018	1.033	4.000
Q14	450	1.00	5.00	4.109	1.095	4.000
Q15	450	1.00	5.00	3.985	1.124	4.000

5. Conclusion

In this paper, we propose the TP model with added pointer network to explore the performance of

the cross-cultural brand marketing copy generation model based on the TP model and to verify the effectiveness of the generated copy.

Comparing the ROUGE scores of the TP model with five models, the TP model has the highest scores in the ROUGE-1, ROUGE-2, and ROUGE-L evaluation functions, which are 0.22864, 0.02942, and 0.14981, respectively, and are 0.01869/0.01575 higher than the scores of the PGN model and the Transformer model, 0.00368/0.00188, 0.02/0.01117. Compared with the performance of AAT model, which has the best performance among the five comparison models, the TP model scores in the ROUGE-1, ROUGE-2, and ROUGE-L evaluation functions increase by 0.00982, 0.00143, 0.00953 in that order, and the TP model is the best in generating the texts.

The survey on the recognition of generated copywriting was conducted in three dimensions: emotional resonance, value confirmation, and sharing and diffusion. The results show that the average emotional resonance recognition, average value confirmation recognition, and average sharing and diffusion recognition of the generated copy are 3.9304, 3.9806, and 4.0202, respectively, which proves that the respondents have a high degree of recognition of the marketing copy content generated by the cross-cultural brand marketing copy generation model based on the TP model.

References

1. Voyer, B. G., Kastanakis, M. N., & Rhode, A. K. (2017). Co-creating stakeholder and brand identities: A cross-cultural consumer perspective. *Journal of Business Research*, 70, 399-410.
2. Krautz, C. (2017). A cross-cultural study of collective brand perceptions within the brand equity framework. *Journal of Marketing Theory and Practice*, 25(3), 274-290.
3. Khajuria, M. I. (2017). Impact of social media brand communications on consumer-based brand equity. *Indian Journal of Commerce and Management Studies*, 8(3), 124-131.
4. Yunus, U., Wahyuningtyas, B. P., & Willyarto, M. N. (2020). Branding about Indonesia through cross-cultural communication. *Jurnal Studi Komunikasi*, 4(2), 374-388.
5. Xinman, D. (2022). Cross Cultural Communication Strategy of Enterprise Brand under the Background of New Media. *Academic Journal of Humanities & Social Sciences*, 5(13), 1-3.
6. Šerić, M., Gil Saura, I., & Mikulić, J. (2016). Exploring integrated marketing communications, brand awareness, and brand image in hospitality marketing: a cross-cultural approach. *Market-Tržište*, 28(2), 159-172.
7. McEwan, R. (2017). Renegotiating radio work in the era of media convergence: Uncertainty, individualisation and the centrality of brands. *The Political Economy of Communication*, 5(2).
8. Wu, D. D., & Li, C. (2018). Emotional branding on social media: A cross-cultural discourse analysis of global brands on Twitter and Weibo. *Intercultural communication in Asia: Education, language and values*, 225-240.
9. Mitra, A., & Das, S. (2024). Communication networks and media convergence in the age of intelligent systems. In *Intelligent Networks* (pp. 235-248). CRC Press.
10. Thanasi-Boçe, M., Ali, O., & Ersoy, A. B. (2023). Developing brand relationships through social media communication: a cross-cultural comparison. *International Journal of Electronic Marketing and Retailing*, 14(4), 351-370.
11. Mishra, P. (2024). Recognizing the Mechanisms of Media Convergence: An Empirical Investigation into the Combination of Traditional and Contemporary Media. *Global Media and Cultural Exchange*, 43.
12. Lu, F., & Zheng, X. (2022). Formation and Diffusion Analysis of Agricultural Product Brand Communication Influence Based on Big Data Fuzzy K - Means Clustering in Convergent Media Era. *Mobile Information Systems*, 2022(1), 5905769.
13. Meikle, G., & Young, S. (2017). *Media convergence: Networked digital media in everyday life*. Bloomsbury Publishing.
14. Hackley, C., & Hackley, R. A. (2017). Marketing and the cultural production of celebrity in the era of media convergence. In *Celebrity, Convergence and Transformation* (pp. 9-25). Routledge.

15. Long, T. J., Yi, L., Kee, C. P., Nor, N. H. M., & Nie, K. S. (2024). A Systematic Literature Review on the Ontology of Media Convergence. *Akademika*, 94(3), 161-180.
16. Li, C., Li, D., Chiu, C. Y., & Peng, S. (2019). Strong brand from consumers' perspective: A cross-cultural study. *Journal of Cross-Cultural Psychology*, 50(1), 116-129.
17. Voorveld, H. A. (2019). Brand communication in social media: A research agenda. *Journal of advertising*, 48(1), 14-26.
18. Shi, X., & Shan, X. (2019). Cross-cultural impact on financial companies' online brand personality. *Marketing Intelligence & Planning*, 37(5), 482-496.
19. Buzeta, C., De Keyzer, F., Dens, N., & De Pelsmacker, P. (2024). Branded content and motivations for social media use as drivers of brand outcomes on social media: a cross-cultural study. *International Journal of Advertising*, 43(4), 637-671.
20. Zhang, J. (2024). Cross-Cultural Communication Strategy Model for Chinese Brands. In *Cross-Cultural Communication of Chinese Brands* (pp. 147-165). Singapore: Springer Nature Singapore.
21. Sadek, H., Elwy, S., & Eldallal, M. (2018). The impact of social media brand communication on consumer-based brand equity dimensions through Facebook in fast moving consumer goods: The case of Egypt. *Journal of Business and Retail Management Research*, 12(2).
22. Kusumasondjaja, S. (2018). The roles of message appeals and orientation on social media brand communication effectiveness: An evidence from Indonesia. *Asia Pacific Journal of Marketing and Logistics*, 30(4), 1135-1158.
23. Dal Zotto, C., & Lugmayr, A. (2016). Media convergence as evolutionary process. *Media Convergence Handbook-Vol. 2: Firms and User Perspectives*, 3-16.
24. Tsai, W. H. S., & Men, L. R. (2017). Consumer engagement with brands on social network sites: A cross-cultural comparison of China and the USA. *Journal of Marketing Communications*, 23(1), 2-21.