
Declaration of Authorship Correction: Addition of Missing Author

Periodicals : Research in Management of Technology and Business (RMTB)

Article Title: Preserving Malacca Cultural Heritage Sites through Cendol Cup Packaging Design

Volume: Vol. 7 No. 1

DOI: <https://doi.org/10.30880/rmtb.2026.07.01.001>

Upon notification and agreement from all co-authors, it has been brought to our attention that one author was unintentionally omitted from the original publication. The following author has now been officially added to the author list:

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Contribution: Contributed to execution of experiments and data collection.

This correction has been made with the consent of all authors and verified by the editorial office. The amendment does not affect the scientific integrity, results, or conclusions of the published article.

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Sincerely,

Editorial Board of Research in Management of Technology and Business (RMTB)

Preserving Malacca Cultural Heritage Sites through Cendol Cup Packaging Design

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DOI: <https://doi.org/10.30880/rmtb.2026.07.01.001>

Article Info

Received: 31 March 2026

Accepted: 31 May 2026

Available online: 30 June 2026

Keywords

Malacca, building, heritage, cendol, packaging

Abstract

Malacca, a UNESCO World Heritage Site, is rich in cultural heritage, but modernization threatens its visibility. This study explores integrating Malacca's building heritage into cendol cup packaging to enhance cultural appreciation. Cendol, a popular dessert in Baba Nyonya culture in Malacca, serves as an ideal medium to bridge tradition with daily life. Aligning with Sustainable Development Goal 11 (SDG 11), the research examines how Malacca's heritage buildings can inspire packaging design and assesses consumer perceptions. A mixed-methods approach is applied, combining qualitative analysis of heritage elements and expert insights with quantitative consumer feedback through surveys. The study hypothesizes that heritage-themed packaging enhances cultural engagement. By embedding cultural elements into everyday products, this research offers an innovative strategy for heritage preservation, fostering public awareness and appreciation while ensuring Malaysia's cultural legacy remains relevant for future generations.

1. Introduction

Malacca, was known for its diversity of cultural tapestry and historical building under UNESCO, particularly on the shophouses, that reflect a mixture of Malay, Chinese, and other colonizer influences. According to Ezzy and Rahman (2022), due to the fast changing with modernization, these heritage elements were being overshadowed and faded for the next future generation. The aim of this research is to emphasize the fading visibility of Malacca's cultural heritage by adapting the Malacca heritage building elements into cendol cup packaging. Cendol is a refreshing local dessert that bridging between the cultural heritage with Malaysian people daily, fostering an appreciation among the public. This research also essential as it was aligned with the Sustainable Development Goal 11 (SDG11) with massive effort to sustain Malaysia's intangible and tangible cultural heritage (Fauzi & Ghani, 2022). The reason why cendol packaging was chosen as a medium is because it has a wide demographic and blend the tradition well within modern Melaka consumer behavior (Zahari *et al.*, 2019). By creating a packaging design influenced by Malacca's heritage sites, the study highlights the importance of legacy conservation in modern contexts.

Key issues addressed include identifying the specific architectural elements of Malacca's heritage building that resonate with cultural significance and translating these into compelling visual designs. Another issue was exploring the cendol consumer perceptions of culturally inspired packaging and assessing its effectiveness in promoting heritage awareness towards them. The independent variable of this research is the design of cendol cup packaging, while the dependent variable is the cendol customer feedback which will be measured through perception and appreciation of cultural heritage. The study operates under the hypothesis that culturally themed packaging enhances consumer engagement with heritage preservation. Delimitation focuses on Malacca's historic buildings and excludes other architectural forms. The packaging design will be tested primarily within the local Malaysian market. Key concepts include heritage preservation, visual communication, and consumer engagement, all integral to addressing the pressing issue of maintaining cultural relevance in a rapidly modernizing world.

This study aims to highlight this problem by exploring how Malacca heritage building elements can be translated into everyday products, such as cendol cup packaging which enhances cultural awareness and promote the value of heritage preservation. By integrating into packaging design, this study seeks to create an innovative solution that merges cultural awareness with consumer products, besides promoting the places. This method approaches a solution to engage the public with Malacca's rich cultural heritage in a present and accessible manner, as the outcome contributing to a greater appreciation and preservation of its cultural heritage. Through this research, the idea is to demonstrate how product design can play a role in cultural preservation and inspire a renewed commitment to maintaining the historical landmarks for future generations.

2. Literature Review

2.1 Malacca Heritage Sites and Its Preservation

Malacca is the heart of numerous of significant heritage sites which includes A Famosa, Masjid Selat Melaka, Muzium Istana Kesultanan Melaka, Stadthuys, and shop lots all the way on Jonker Walk Street. Enrich with cultural and historical value, it demand for a preservation for future generations. According to Hasbollah and Ali (2015), preserving these cultural treasures is an accountability owed to the next generations. The process of maintenance started before it was declared as heritage, where individuals and communities acknowledge its historical significance. An effort to retain this significance, by ensuring its historic value and extending physical longevity. Malaysia has seen an increasing number of restored and repurposed heritage buildings. Proper conservation practices, including maintenance, are key to sustaining these structures. This huge step will also have an economic implication. According to Mahirah *et al.* (2020), she studied the willingness to pay (WTP) of domestic tourists in preserving the Stadthuys using the Contingent Valuation Method (CVM). Through her research findings, the visitors are willing to pay RM 8.82 to show their support for conservation efforts. By having that, the fund could maintain sustainable tourism and community extension while progressing. Thus, preserving Malacca's heritage sites is fundamental to keeping our cultural identity, encouraging tourism, and ensuring historical continuity for future generations.

2.2 Cendol; Baba and Nyonya Identity

Cendol is a dessert that synonym within Malacca's Baba Nyonya convergence, exhibiting a mix of Chinese and Malay cultures. It emerged from the intermarriage between Chinese immigrants and local Malays, creating a unique culinary identity (Zahari *et al.*, 2019). All this while, food has played as a main highlight in this identity, whereas an example, cendol illustrates the cultural fusion through its ingredients and process. With the blend of pandan-flavored rice flour jelly, coconut milk, and palm sugar, cendol combines both Malay and Chinese culinary elements. The role of coconut milk and palm sugar are significance in Malay cuisine and the preparation of the jelly reflects Chinese techniques. Cendol is not just a local luxury but also a cultural symbol of Malacca's rich heritage. Traditional foods like cendol contribute to heritage tourism and cultural preservation. With the innovative recipe, such as cendol with durian, it shows adaptability and maintaining cultural significance. According to Zahari *et al.*, (2019), recognizing cendol as part of Malacca's identity helps sustain its heritage through tourism, education, and innovative promotion. Moreover, food socialization studies pinpoint on how the food identity evolves over time through intergenerational diffusion and adaptation to contemporary consumer preferences. When the traditional cendol hikes its popularity, the modern flavors merging supplementary ingredients like durian have been introduced, which demonstrate the dynamic nature of Baba Nyonya cuisine. Such modifications promise that traditional foods remain significant while preserving their cultural essence.

3. Methodology

This research applies to a mixed-methods approach, combining both qualitative and quantitative methods, aiming for a comprehensive perception of customers' engagement and the potential effect of culturally inspired cendol cup packaging design. For qualitative approach, it focuses on understanding the essence of the Malacca cultural heritage site and converting it into design as the outcome. On quantitative approach, measuring customers' perceptions of the cultural and aesthetic value of the cendol cup packaging designs. For qualitative data collection, field visits to Malacca were conducted to document key architectural elements of Malacca's heritage building through photographs. Additionally, interviews with design experts were carried out via Google Forms to validate the integration of cultural elements into the packaging design. This ensures that the cultural design on the packaging remains original while appealing to consumers. On the quantitative part, an online survey via Google Form regarding customers' likings, their perception on the cultural value, and expectation in the cendol cup packaging design.

The study implements an approachable sampling technique, allowing for the efficient collection of diverse perspectives. The target population for qualitative data includes heritage experts and design professionals who specialize in packaging design. For quantitative data, the participants are the cendol consumers aged 12-60 who have experienced purchasing and consuming the dessert and possess basic awareness of Malacca's cultural heritage. The sample size for qualitative data consists of 4 design experts feeding insights about the cultural and design significance of the packaging, while the quantitative survey including 50 cendol consumers gathered various feedback on the cultural appeal of the cendol cup packaging design. This method guarantees an evaluated approach, combining expert validation and consumer feedback to create a packaging design that effectively preserves and promotes Malacca's cultural heritage.

4. Data Collection

This study employs both qualitative and quantitative analysis to interpret findings from mixed-methods research. The qualitative analysis focuses on identifying and integrating Malacca's heritage elements into packaging design, while the quantitative analysis assesses consumer perceptions of these cultural design influences.

4.1 Quantitative Data Analysis

For quantitative data analysis, responses from the consumer perception survey will be analyzed using descriptive statistics. The survey results as shown in Fig.1 indicate that most respondents have at least some knowledge of Malacca's cultural and historical heritage. Out of 52 respondents, 48.1% reported being somewhat familiar, 32.7% indicated they were familiar, and 11.5% described themselves as very familiar with the heritage. Meanwhile, a smaller portion, 7.7%, stated they are not familiar with Malacca's cultural and historical significance. It's remarks that while general awareness is high, there is still room for deeper engagement and education.

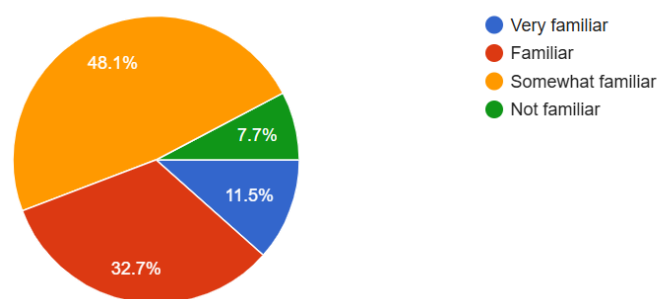


Fig. 1 Respondent feedback on Malacca's cultural and historical heritage

The feedback from respondents in Fig.2, shows a strong consensus on the significance of preserving Malacca's heritage buildings. Out of 52 respondents, 65.4% rated it as very significant, 23.1% considered it

somewhat significant, while 11.5% remained neutral, with no respondents deeming it insignificant. The majority of the respondents highly agreed on the importance of maintaining the cultural building for the next generation.

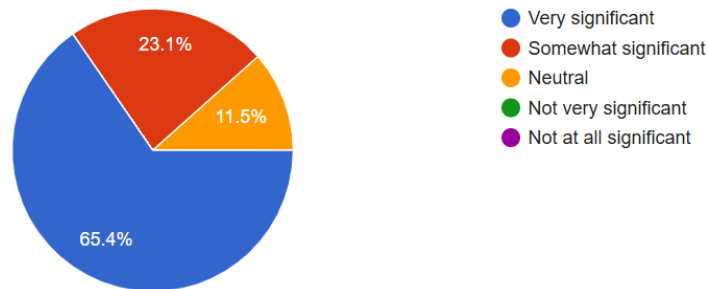


Fig. 2 Respondent feedback significant on preserving Malacca's heritage buildings for future generations

The feedback from respondents on cendol in Fig. 3 highlights its strong connection to the cultural identity of Malacca, with 46.2% somewhat agreeing and 40.4% strongly agreeing that it reflects the region's heritage. Meanwhile, 11.5% remained neutral, and a small percentage felt that it did not significantly represent Malacca's cultural identity. Most of the respondents agreed that cendol is one of the desserts that brings Malacca to the world level.

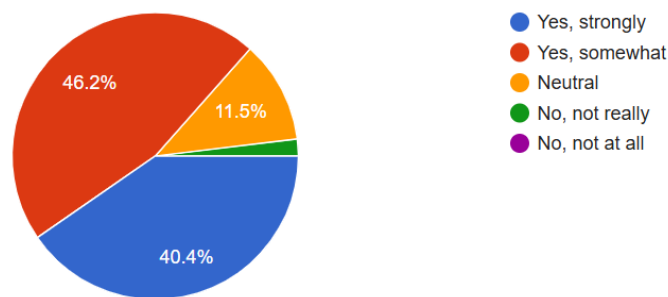


Fig. 3 Respondent feedback on cendol reflects the cultural identity of Malacca

The feedback from 52 respondents as shown in Fig.4 on incorporating elements of Malacca's cultural heritage buildings into the cendol cup packaging design was largely positive, with 55.8% expressing excitement and 26.9% feeling very excited about the idea. Meanwhile, 15.4% remained neutral, and the remaining respondents showed little to no interest. This indicates a strong overall enthusiasm for a design that reflects Malacca's rich cultural heritage, suggesting that such an approach could enhance the product's visual appeal and cultural connection.

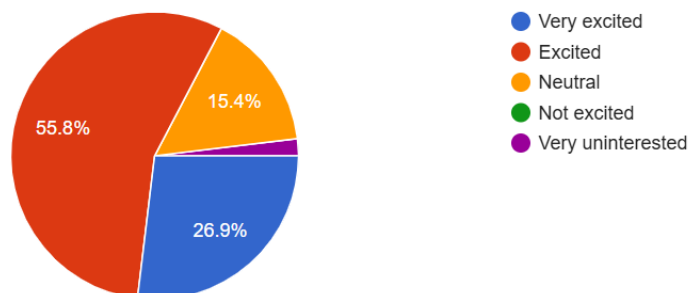


Fig. 4 Respondent feedback on the idea of incorporating elements of Malacca's cultural heritage buildings into the cendol cup packaging design

4.2 Thematic Analysis

For qualitative data analysis, the study will use thematic analysis to examine photographic documentation and expert interview responses. Photographs of Malacca's heritage buildings will be categorized into themes such as architectural motifs, color schemes, and ornamental details that can be adapted into the packaging design.



Fig 7 *Stadthuys
Kesultanan Melaka*



Fig 6 *A Famosa*



Fig 8 *Masjid Selat Melaka*



Fig 9 *St Francis Xavier
Church*



Fig 10 *Jonker Walk*

4.3 Quantitative Data Analysis

Expert interviews were transcribed as shown in Table 1, and recurring themes will be identified using question keywords to determine insights on the feasibility and effectiveness of the cultural adaptations.

Table 1 *The design experts view*

Question Keywords	Experts 1	Experts 2	Experts 3	Experts 4
Culture preservation through product packaging	Might work but needs to adapt with modernize concept	As a Visual Culture medium in Design Society	Serve as a reminder for locals and souvenir for tourist	Promoting awareness and creating a unique brand identity
Parts of the buildings to be highlighted	The whole building	The whole building	The whole building	Building colour
Role of culture storytelling in packaging design	Less is better	Makes the packaging interesting and compelling	Makes the packaging interesting and compelling	Drive emotional connections, interest and strengthening brand identity
Color schemes or patterns associate most with	Red, blue, white and earthy colors	Red	Malacca flag colour	Orange, brown-red, and earthy tones, reflecting Dutch

Question Keywords	Experts 1	Experts 2	Experts 3	Experts 4
Malacca's heritage building				and Peranakan influences
Incorporating interactive elements	Yes	Yes	Yes	Yes

By integrating statistical analysis for quantitative data and thematic analysis for qualitative data, this study provides a structured approach to understanding how heritage-inspired packaging enhances consumer engagement and cultural appreciation.

5. Design Process

5.1 Phase 1: Malacca Historical Building

Based on expert advice and respondent feedback, Muzium Istana Kesultanan Melaka, Masjid Selat Melaka, and Stadthuys were chosen as the main heritage buildings for cultural preservation at Malacca. Each building's distinct architectural features and colors are artistically replicated in the selected cendol flavors; deep gula melaka brown for the wooden elegance of Muzium Istana Kesultanan Melaka, rich pandan green and durian musang king for the grand Masjid Selat Melaka and its shining yellow dome, and red bean with dragon fruit for the iconic red Stadthuys. This fusion of heritage and flavor enhances cultural appreciation, allowing consumers to experience Malacca's history through both visual and sensory elements.

5.2 Phase 2: Packaging Design - HeritaCup

HeritaCup a name created which define from the merging of words 'heritage' and 'cup' of cendol to celebrates Malacca's rich cultural heritage by integrating architectural elements from Muzium Istana Kesultanan Melaka, Masjid Selat Melaka, and Stadthuys into its packaging design. Encouraged from the interviews and survey conducted, the design incorporates structural motifs and the historical representation to reflect the essence of those iconic landmarks. The packaging highlights the unique blend of history and modernity, creating a visually immersive feel that connects consumers to the legacy. By merging heritage with daily life, HeritaCup advances appreciation for cultural preservation, ensuring Malacca's historical identity remains vibrant and relevant for future generations. Refer to Fig. 12, Fig. 13 and Fig. 14.



Fig. 12 HeritaCup Packaging Design : Muzium Istana Kesultanan Melaka



Fig. 13 HeritaCup Packaging Design : Masjid Selat Melaka



Fig. 14 HeritaCup Packaging Design : Stadthuys

5.3 Phase 3: QR Code

To connect consumers with the highly intricate heritage of Malacca, Heritacup has designed an interactive experience by placing a QR code on its packaging. Upon consuming the cendol, consumers can scan the QR code for information regarding the historical and cultural sites in Malacca. This certainly gives an added incentive for tourists to go explore these fantastic sites, learn about their history, and create their own memories with it. This marrying of the old with the new, going from tradition to technology, turns HeritaCup events with this simple dessert into a real cultural and heritage experience.



Fig. 15 QR Code: Masjid Selat



Fig. 16 QR Code: Muzium Istana Kesultanan Melaka



Fig. 17 QR Code: Stadthuys

5.4 Phase 4: The Final Product

The final HeritaCup design is interpreted as alive with Malacca's cultural heritage, embodied in ingenious packaging. The colors, architectural elements, and historical motifs of Muzium Istana Kesultanan Melaka, Masjid Selat Melaka, and Stadthuys inspired the very design. Each flavours design pays homage to those landmarks, creating a bond between the tradition and modernity. The packaging storytelling thereby serves to elevate consumer experience while enhancing their appreciation for Malacca's rich history. Such an innovative effort has introduced fun and simplicity into preservation - one that is incorporated into the everyday.



Fig. 18 HeritaCup Product:
*Original Cendol + Muzium
Istana Kesultanan Melaka*



Fig. 19 HeritaCup Product:
Musang King+ Masjid Selat



Fig. 20 HeritaCup Product: Red
*Bean and Dragon Fruit +
Stadthuys*

6. Conclusion

This study demonstrates how integrating Malacca's heritage elements into cendol cup packaging can enhance cultural appreciation and engagement. The findings support the hypothesis that heritage-inspired packaging fosters a stronger connection between consumers and cultural preservation. By embedding architectural motifs into everyday products, this approach offers a practical solution for sustaining Malacca's historical identity amid modernization. Aligning with SDG 11, it highlights the role of design in promoting heritage awareness. Ultimately, this research reinforces the importance of innovative preservation strategies, ensuring that Malacca's cultural legacy remains relevant and valued by future generations.

Acknowledgement

The authors are grateful to all supervisory committee members for their scholarly contributions and to all individual who are involved on this research paper. Additionally, they would like to express their gratitude to INTI International College Subang (IICS), Universiti Teknologi MARA (UiTM) and SEGi University for the support that encouraged them to keep up their research.

Conflict of Interest

The authors declared there is no conflict of interest concerning the paper's publication.

Author Contribution

The authors confirm contribution to the paper as follows: **study conception and design:** Muhammad Faizul Azhar, Norfadilah Kamaruddin and Fathin Nur 'Izzah Mohd Taslim; **data collection:** Muhammad Faizul Azhar and Fathin Nur 'Izzah Mohd Taslim; **analysis and interpretation of results:** Muhammad Faizul Azhar; **draft manuscript preparation:** Muhammad Faizul Azhar, Norfadilah Kamaruddin and Fathin Nur 'Izzah Mohd Taslim. All authors reviewed the results and approved the final version of the manuscript.

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