

EXPLORATION OF BATIK QR CODE USING ATUMICS METHOD TO INCREASE THE FUNCTIONAL VALUE OF BATIK

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Abstract: Batik is an Indonesian ancestral heritage in the form of oral and intangible culture that has long been recognized by UNESCO. As time progresses, batik usage has diminished, particularly among the youth who prioritize practical, efficient technology such as QR Codes through the adoption of digitalization and QRIS. On the other side, the limitations of fashion MSMEs in providing information regarding alternative products brought to exhibitions have resulted in buyers not finding products that match their desires, so MSMEs need a product catalog to represent products that cannot be brought to exhibitions. This research attempts to combine batik and QR Codes using the atumics method to create a new product that is relevant to the times. By combining culture and technology, the batik QR Code can be filled with digital information links, one of which can be a digital catalog of fashion MSME products fostered by Rumah BUMN Pekalongan. It is hoped that with this research, batik will have a functional value that is harmonious with its aesthetic value and can provide an additional product alternative for buyers at exhibitions

Keywords: batik; QR code; atumics; fashion; technology

Introduction

The research was conducted at Rumah BUMN Telkom Pekalongan, also known as the center of Nusantara batik and the Pekalongan Batik Museum. The data collection process took place from December 2024 to February 2025. The results

of direct observations revealed several challenges faced by MSMEs in the batik industry. One of the problems faced by fashion MSMEs at exhibitions is the limited number of products that can be brought. To overcome this, MSMEs need a product catalog to add alternative products that can be offered at exhibitions.

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In addition, the use of batik has started to decline, especially among young people (Sono 2023). Many efforts have been made, such as the Indonesia Berkain campaign, the Nusantara batik week, and inacraft, which aim to foster an interest in wearing batik. Efforts to increase the interest in wearing batik among teenagers can also be done through innovation in batik itself.

Younger generations find it difficult to be separated from gadgets because they have become a part of their daily lives. One of the practical and frequently used technologies on gadgets is the QR Code, especially through the adoption of QRIS. According to data from the Indonesian Payment Systems Association (ASPI), the number of QRIS users increased by 191.59% in 2023-2024 (data.goodstats.id 2025).

In the Pekalongan Batik Museum, there is a unique batik combined with Hijayah letters called besurek batik. From this observation, the idea arose that batik and QR codes could be combined into a new motif. One way is by designing batik that can be read like besurek batik, but made with a digital language in the form of a QR Code so that it can be scanned by a smartphone. The QR Code on this batik can be used as a medium for storing product catalogs. Therefore, the problem statement for this design is how to design a batik QR Code that is applied to a bag product, which contains a product catalog for MSMEs fostered by Rumah BUMN Telkom Pekalongan and can be accessed via a mobile device to be attractive to the younger generation, especially teenagers aged 12 plus.

Methodology

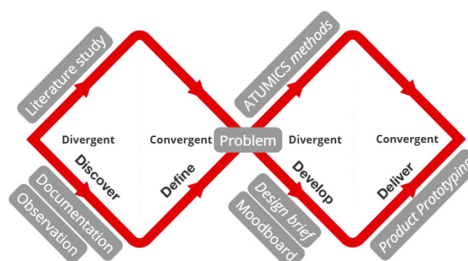


Figure 1. Research Method
(Source: Personal research documentation)

This research uses a qualitative research method, which was chosen because it allows for a more in-depth exploration of design to find unique and novel product design innovations. The product design process uses the double diamond method, which consists of two thinking approaches: divergent and convergent. It also has four stages: discover, define, develop, and deliver (Jedraszcyk, 2023). In the discovery stage, data is collected through a literature review, observation, and documentation. After obtaining data such as problems, parts and functions of QR Codes, and batik motifs, the next step is the define stage using the Atumics method. In the development stage, the analysis results are developed into motif exploration. The results of this exploration are presented in the delivery stage with product prototyping into a bag product.

Result

One of the problems faced by fashion MSMEs at exhibitions is that the items sold are very diverse. Starting from head accessories such as hats, hijabs, and scarves; tops such as t-shirts, shirts, and outerwears; bottoms such as trousers, skirts, and sarongs; to various bags. However, the products that MSMEs can bring to exhibitions are limited. To overcome

this, a product catalog is needed to serve as a representation of the products that cannot be brought.

Meanwhile, the Pekalongan Batik Museum has three batik motifs that are interesting because they have a suitability to be combined with QR Codes. The following are images of the batik collections in the Pekalongan Batik Museum:

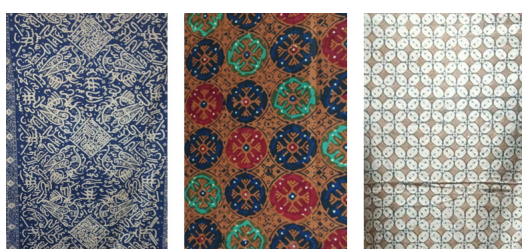


Figure 2.
Besurek
Batik

Figure 3.
Jlamprang
Batik

Figure 4.
Kawung
Batik

(Source: Personal research documentation)

The first motif is the besurek batik motif from Bengkulu. This batik motif is unique because it is a combination of batik techniques and the calligraphy of Hijaiyah letters, both readable and unreadable. The second motif is a typical Pekalongan batik motif, namely Jlamprang batik, which has a distinctive circular motif like a coin. If the circle is changed to an oval shape, it will form like the third motif, which is the typical Central Javanese Kawung motif. If observed, the three batik motifs have a similarity in the form of square gaps that are similar to QR Codes.

The next step after collecting data is analysis using the Atumics method, which divides an artifact into seven elements: Element, Technique, Utility, material, icon, concept, and shape. This aims to obtain a product concept that combines tradition and is relevant to the times (Nugraha, A. 2018). The blue part is the selected part, while the white part means the unselected part. After performing the analysis using

the Atumics method.

Table 1. Atumics Method
(Source: Personal research documentation)

MIXTURE IDEA		
Artefact	Batik QR Code	
Technique	Hand-drawn & stamped batik (using wax)	Digital Printing, Screen Printing
Utility	Specific events (exhibitions) and daily products	Product catalog, game, Digital products, website, payment methods
Material	Mori fabric, primissima cotton	Polymicro fabric
Icon	Besurek, Jlamprang, Kawung	Dot matrix, pixelated
Concept	Traditional, Philosophical, Artistic	Digital information Storage
Shape	Handbag and sling bag	Sticker, standee, banner

The results of the analysis will be packaged in a design brief. The design brief is presented as a crucial, well-informed starting point for designers that defines the core details of a project (Hanington, 2017).

Table 2. Design Brief
(Source: Personal research documentation)

Client	Rumah BUMN Telkom Pekalongan
Service Name	UMKM Batik QR Product Catalog
Objective	Design a pair of batik products combined with a QR Code

Target Consumer	Teenagers aged 12 and above and fostered UMKM of Rumah BUMN Telkom Pekalongan
Product List	Kawung-patterned batik QR sling bag for men and handbag for women
Material	Batik printing fabric with polymicro material, canvas fabric to add texture and thickness, and foam for bag structure reinforcement.

Based on the Design Brief Table, the products designed are a Batik QR sling bag and a handbag. These products are a combination of traditional elements (Kawung and Jlamprang batik motifs) and QR code elements. The client in this design project is Rumah BUMN Telkom Pekalongan. The target consumers are teenagers aged 12 and over and MSMEs fostered by Rumah BUMN Telkom Pekalongan. It can be used to store product catalogs and be worn at exhibitions. It uses a digital printing technique on polymicro fabric and canvas fabric to add texture and thickness, and foam to strengthen the bag's structure.

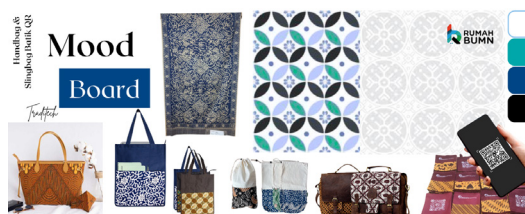


Figure 5. Batik QR Code Product Moodboard (Source: Personal research documentation)

Based on the design brief and moodboard for the batik QR product design, the products to be designed are one batik sling bag for men and one handbag for women.

They have a “Traditech” feel, a combination of traditional batik motifs and QR code technology, with a large capacity to carry MSME items to exhibitions. They have a blue and green color palette typical of Rumah BUMN and have a QR code combined with batik motifs inspired by besurek, kawung, and Jlamprang batik.

Before designing the Batik QR Code product, it is important to know the parts of a QR Code. The structure and components of a QR Code consist of black and white patterns in a square shape that store data in binary format. The colors white and light blue represent 0, and dark blue represents 1. The faded parts are the unhighlighted parts of the QR. The following are the components that make up a QR Code and their placement.



Figure 6. Parts of a QR Code (Source: www.qr-code-generator.com)

Finder Patterns: Tell the scanner the location and orientation of the QR Code.

Alignment Pattern: Helps adjust the scan if there is distortion or tilt.

Timing Patterns: Determine the coordinates of each data module in the QR Code.

Version Information: Contains information about the version of the QR Code used, which affects the size of the matrix.

Format Information: Contains details on the error correction level and data masking pattern for accurate scanning.

Data and Error Correction Keys: The core part that stores the actual information and backup data for damage recovery.

Quiet Zone: The empty area around the QR Code that helps the scanner cor-

rectly identify its boundaries.

After knowing the parts of the QR code and their locations, the Batik QR Code product design process begins with motif design & QR readability testing.

Discussion

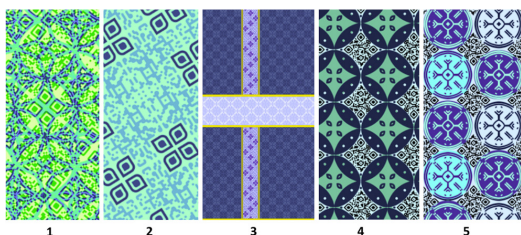


Figure 7. Motif Exploration
 (Source: Personal research documentation)

Motif exploration begins with four dark blue QR codes arranged in a circle with a turquoise green background, overlaid with a bright green kawung motif for a modern and unique impression (motif 1). Next, in motif 2, four QR codes with light blue data and a turquoise green background are simplified by changing the finding pattern to a dark blue kawung shape, giving a futuristic and modern impression. The third trial (motif 3) is a development of the previous motif, where the fabric is designed to be a QR batik sarong with a composition of 80% kawung batik motif and 20% QR Code. This sarong design was initially considered a suitable product to be executed because it was in line with the habits of the people of Pekalongan, but it was considered less comfortable to scan. Motifs 4 and 5 were chosen as the selected designs because of their success in combining modern and traditional elements in a balanced way and ensuring the readability of the QR Code. In motif 4, black QR codes are arranged in the gaps of the dark green kawung motif typical of Central Java, with a background combination of light blue, bright blue, and dark blue with green. In addition, black QR codes

are also inserted between the Jlamprang motif typical of Pekalongan with a background combination of bright blue, dark blue, and light blue.

There are QR readability testing results carried out in 10 trials.

Table 3. QR readability testing.
 (Source: Personal research documentation)

Motifs	Scan time
1	7-15 seconds
2	5-12 seconds
3	5-12 seconds
4	3-7 seconds
5	3-7 seconds

Designs motifs 4 and 5 will be used as material for making the batik QR bags. The following are the results of the batik QR bag products after the production process is complete.



Figure 8 & 9. Kawung & Jlamprang Batik QR Bag
 (Source: Personal research documentation)

Conclusion

This research successfully explored the Batik QR Code, which originated from the batik collection at the Pekalongan Batik Museum. It used the Atomics method as an innovative solution to increase the functional value of batik and overcome the challenges of fashion MSMEs in Pekalongan. Through motif exploration, it produced the selected designs (motifs 4 and 5). It successfully harmonized the traditional kawung and jlamprang motifs with the QR Code aesthetically and functionally, had good QR Code readability, and achieved a balanced combination of modern and traditional elements. This Batik QR Code bag is expected to provide a functional value that is in harmony with the aesthetic value of batik, while also becoming an additional product alternative for MSMEs at exhibitions.

References

- Agustino, M. R. (2024). Pendampingan Pembuatan Katalog Produk pada UMKM Batik Sekar Rinambat sebagai Media Pemasaran: Assistance in Creating Product Catalogs for UMKM Batik Sekar Rinambat as a Marketing Tool. *PengabdianMu: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, 9(3), 502–509. <https://doi.org/10.33084/pengabdianmu.v9i3.6556>
- Hanington, B., & Martin, B. (2017). *The Pocket Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas and Design Effective Solutions*. Rockport Publishers.
- Ismail, M. (2021). APLIKASI QR CODE SEBAGAI SARANA PENYAMPAIAN INFORMASI POHON DIKEBUN RAYA JOMPIE. *JURNAL SINTAKS LOGIKA*, 1(1), 33-41. <https://doi.org/10.31850/jsilog.v1i1.694>
- Jedraszczyk, M. (2023, May 11). The Double Diamond design process — still fit for purpose? *Medium*.
- Kusrianto, A. (2024). *Batik Filosofi, Motif dan Kegunaan*. Penerbit Andi.
- Maulidia, H., Murty, D. A., & Sasongko, A. D. W. (2024). Pembuatan desain batik motif jlamprang menggunakan aplikasi ibis paint x sebagai dasar perencanaan produksi. *Canting: Jurnal Batik Indonesia*, 1(1), 14-19.
- Nathania, D., & Aryani, D. I. (2024). Rafflesia arnoldii Motif with Kaganga Letter in Besurek Batik for Women's Ready-to-Wear Fashion Collections. *TEKNOBUGA: Jurnal Teknologi Busana dan Boga*, 12(2), 151-164.
- Nizar, M., Jamhuri, M., & Rakhmawati, A. (2024). PENGUATAN KAPABILITAS DIGITAL UKM BATIK CANTING KHAS GEMPOL KABUPATEN PASURUAN MELALUI PEMBINAAN DAN PENDAMPINGAN TRANSFORMASI BISNIS DIGITAL. *Jurnal Abdi Insani*, 11(3), 755-763.
- Nugraha, A. (2018). Transforming tradition in Indonesia. *Design Roots: Culturally Significant Designs, Products, and Practices*, London, Bloomsbury Publication, 147-161.
- Siti, H. (2024). Eksplorasi sosiokultural berbasis etnomatematika pada motif Batik Jlamprang Pekalongan (Doctoral dissertation, UIN KH ABDURAHMAN WAHID).
- Sofliatin, U. K., Fiantika, F. R., & Rusminati, S. H. (2024). EXPLORING PEKALONGAN BATIK MOTIFS AS GEOMETRY LEARNING MATERIALS FOR ELEMENTARY SCHOOL STUDENTS. *JPSD (Jurnal Pendidikan Sekolah Dasar)*, 10(2), 42-52. <http://dx.doi.org/10.30870/jpsd.v10i2.28337>

Michelle Sutjiadi Sono, & Mary Philia Elisabeth. (2024). Upaya Meningkatkan Kecintaan Terhadap Batik Nusantara Pada Generasi Muda (Pendekatan Teori Determinasi Diri). Prosiding Seminar Nasional Industri Kerajinan Dan Batik, 5(1), D.02 1-9. Retrieved from <https://proceeding.batik.go.id/index.php/SNBK/article/view/249>

Tamara, O. S. (2024). AKULTURASI “BATIK PARANG DAN BATIK KAWUNG” DENGAN PAKAIAN TRADISIONAL KOREA “HANBOK” PADA BUSANA READY-TO-WEAR.

Widayanti, F. M., & Handayani, T. (2024). Nilai Spiritual Manunggaling Kawula Gusti dalam Motif Batik Kawung. HUMANIKA, 31(2), 200-209. <https://doi.org/10.14710/humanika.v31i2.66404>