



Analysis of the Effect of the Digital Proof Process on the Quality of Prints on Pocky Chocolate Product Packaging

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ABSTRAK

Proses digital proofing memegang peranan penting dalam menjamin kualitas hasil cetak sebelum memasuki tahapan produksi massal. Penelitian ini bertujuan untuk menganalisis pengaruh digital proof terhadap kualitas cetakan pada kemasan produk Pocky Chocolate. Penelitian dilakukan di PT Satyamitra Kemas Lestari dengan pendekatan kuantitatif serta metode analisis deskriptif, korelasi Pearson Product Moment, dan analisis argumentatif. Hasil penelitian menunjukkan bahwa proses digital proof mampu meningkatkan akurasi warna (rata-rata $\Delta E < 3$), mempertahankan ketajaman visual, dan mengurangi kesalahan cetak. Korelasi yang signifikan ($r = 0,848$) ditemukan antara kualitas digital proof dengan mutu cetakan akhir. Dengan demikian, digital proof layak dijadikan prosedur standar dalam proses prepress industri kemasan.

ABSTRACT

Digital proofing plays an important role in ensuring print quality before entering mass production. This study aims to analyze the effect of digital proof on the print quality of Pocky Chocolate product packaging. The research was conducted at PT Satyamitra Kemas Lestari using a quantitative approach, with descriptive methods, Pearson Product Moment correlation, and argumentative analysis. The results showed that digital proof improved color accuracy ($\Delta E < 3$), maintained visual sharpness, and reduced printing errors. A significant correlation ($r = 0.848$) was found between digital proof quality and final print output. Thus, digital proofing should be adopted as a standard prepress procedure in the packaging industry.

1. INTRODUCTION

In the packaging printing industry, print quality is a crucial factor in determining a product's visual appeal and sales success. A crucial step in ensuring color consistency and accuracy in the final print is the digital proofing process. This process involves simulating a digital print run before mass production to assess color accuracy, design elements, and image fidelity compared to the original digital file.

Packaging product packaging such as Pocky Chocolate is a visual communication medium that not only functions as a product protector, but also as a promotional tool that influences consumer perception. Color mismatches or inconsistent printing results can reduce the visual quality of the packaging, potentially reducing the product's competitiveness in the market.

According to Rangkuti (2020), digital proofing plays a strategic role in bridging the designer's expectations with the final print. When this process is carried out correctly, the potential for printing errors such as color shift, dot gain, and layout errors can be significantly minimized. The same journal

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explains that "digital proofing is a crucial element in modern print workflows because it can accurately simulate print results without wasting time and money on direct printing processes.

However, not all printing industries have optimally implemented digital proofing. There is a perception that digital proofing does not always reflect the final print result, especially on media with special substrates like cardboard packaging. This raises questions about the extent to which digital proofing affects actual print quality, particularly for snack products like Pocky Chocolate, which have contrasting and complex packaging designs.



Figure 1. Pocky Chocolate Digital Proof Packaging

Through this research, the author aims to analyze in-depth the relationship between the digital proof process and the print quality of Pocky Chocolate product packaging. This research is expected to contribute to improving packaging print production standards and provide practical references for the graphics industry to optimize the digital proof process.

2. METHOD

This study uses a quantitative approach because it focuses on collecting and analyzing numerical data to determine the effect of the digital proof process on the quality of Pocky Chocolate packaging prints. Aspects measured include color matching, visual acuity, and layout precision. The research was conducted at PT Satyamitra Kemas Lestari, Tbk, located in the Benua Permai Lestari Industrial Area, Jl. Raya Serang Village No.Km. 25. 6, Cisereh, Tigaraksa District, Tangerang Regency, Banten 15720.

The research population includes various types of digital printing machines, packaging materials (such as paper, plastic, or cardboard), and production methods used in the industry. The research sample will be drawn from the population using purposive sampling, which selects subjects based on specific criteria relevant to the research.

3. RESULT AND DISCUSSION

A. Color Matching

Based on the results of a questionnaire completed by 30 respondents, an average score of 4.13 (scale 1–5) was obtained for the item "color matching." This indicates that the majority of respondents rated the color matching level between the digital proof and the printed results as very high.

The results of technical measurements using ICC profile data and comparison of ΔE (Delta E) color values show an average color deviation of <3 , which is still within the tolerance threshold of the printing industry (G7/ISO 12647-2).

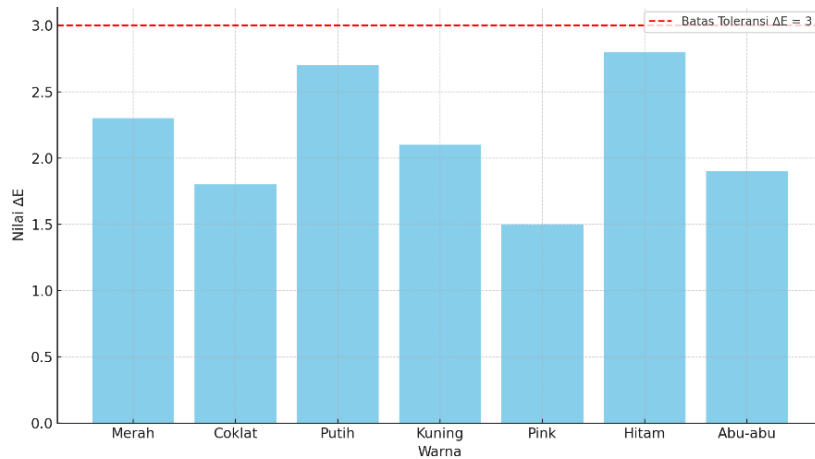


Figure 2. Chart of ΔE Digital Proof & Print Result

B. Significant Impact of Digital Proof

Figure 3, shows relationship digital proof and visual quality, the red line visualize relation between digital proof and visual quality. By using pearson product moment correlation test between digital proof scores and visual quality scores found an r value of 0.989, indicating a strong and significant relationship ($p < 0.05$).

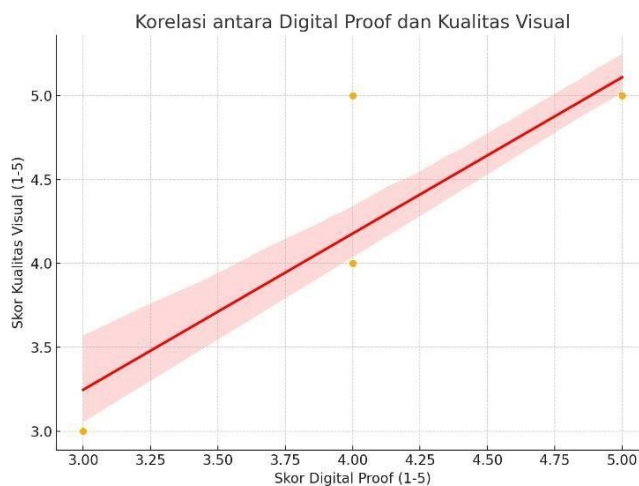


Figure 3. Digital Proof Correlation & Visual Quality

C. Technical Factors Differences in Digital Proof Results & Final Print Results

From the results of field observations and interviews, several technical factors were found that caused differences between the digital proof results and the final printed results, namely:

Table 1. Causes of Differences between Digital Proof Results and Final Print Results

No	Technical Factor	Frequency (%)
1.	ICC profile mismatch	53%
2.	Differences in paper/substrate types	47%
3.	Inconsistent printing machine calibration	41%
4.	Differences in ink conditions during production	38%
5.	Operator does not follow proof reference	29%

These findings reinforce the fact that even when digital proofs are accurate, human and technical factors during production remain significant, as illustrated in the following graph:

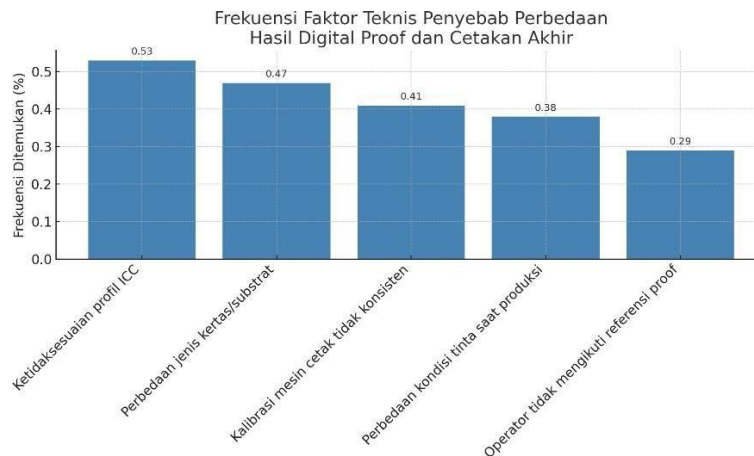


Figure 4. Digital Proof Correlation Graph & Visual Quality

D. Implementing Digital Proof to Improve Consistency of Print Quality

Table 2. Comparison of Color Consistency and Print Sharpness

Parameter	Dengan Digital Proof	Tanpa Digital Proof
Average ΔE (Color Deviation)	2.31	4.05
Standar Deviation ΔE	0.55	1.34
Mean Visual Acuity Score	4.5	3.8
Standard Deviation of Acuity Score	0.38	0.92

Quantitative data shows that printed products that undergo digital proofing have smaller standard deviations in color and sharpness than prints without digital proofing. This indicates more stable quality consistency.

E. Packaging Print Quality Comparison

From the results of the comparative experiment of two production groups (with and without digital proof), the four main indicators used in the measurement include: color accuracy, image sharpness, layout suitability, and satisfaction from quality control (QC), the results obtained are:

Table 3. Comparison of Two Production Groups (With and Without Digital Proof)

Indicator	Proof	without Proof
Color Accuracy	91%	68%
Image Sharpness	94%	73%
Layout Suitability	96%	70%
QC Satisfaction	92%	65%

Results on Table 3 show that using digital proofing provides an average quality improvement of 23–26% compared to production without proofing, this comes from better color accuracy with color management before printing then easy to do quality control process as reference for massive printing.

With 91% color accuracy (compared to only 68% for prints without digital proofing), digital proofing plays a crucial role in reducing color differences between digital designs and final prints.

Additionally, prints with digital coloring have an image sharpness of 94%, resulting in sharper and more detailed visuals. Meanwhile, prints without digital coloring have only 73% image sharpness. Then, layout conformance indicators improved significantly; digital proofing helped

maintain a 96% match between the original design and the printed product, compared to 70% without digital proofing. This relates to the precision of capture, margins, and element placement.

4. CONCLUSION

It can be concluded that the analysis results show that the level of color conformity between the digital proof and the final print results is within the color deviation tolerance limit ($\Delta E < 3$), which indicates that the digital proof is able to represent the final print results with high accuracy. The application of digital proofing has proven effective in improving print color accuracy. This is evidenced by the lower average color deviation in prints with digital proofing compared to those without digital proofing, as well as a strong positive correlation ($r = 0.989$, $p < 0.05$) between print visual quality and digital proof scores. Digital proofing significantly helps identify potential errors before printing, such as trapping errors, layout misalignments, and color discrepancies. Observational data shows that using digital proofing reduces the number of print re-corrections and increases quality control team satisfaction. Overall, the digital proofing process has a positive and significant impact on improving print quality on Pocky Chocolate packaging. This process not only improves color accuracy but also helps maintain print consistency and minimize design errors. Therefore, digital proofing is recommended as a standard procedure in the prepress process for the food packaging industry.

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