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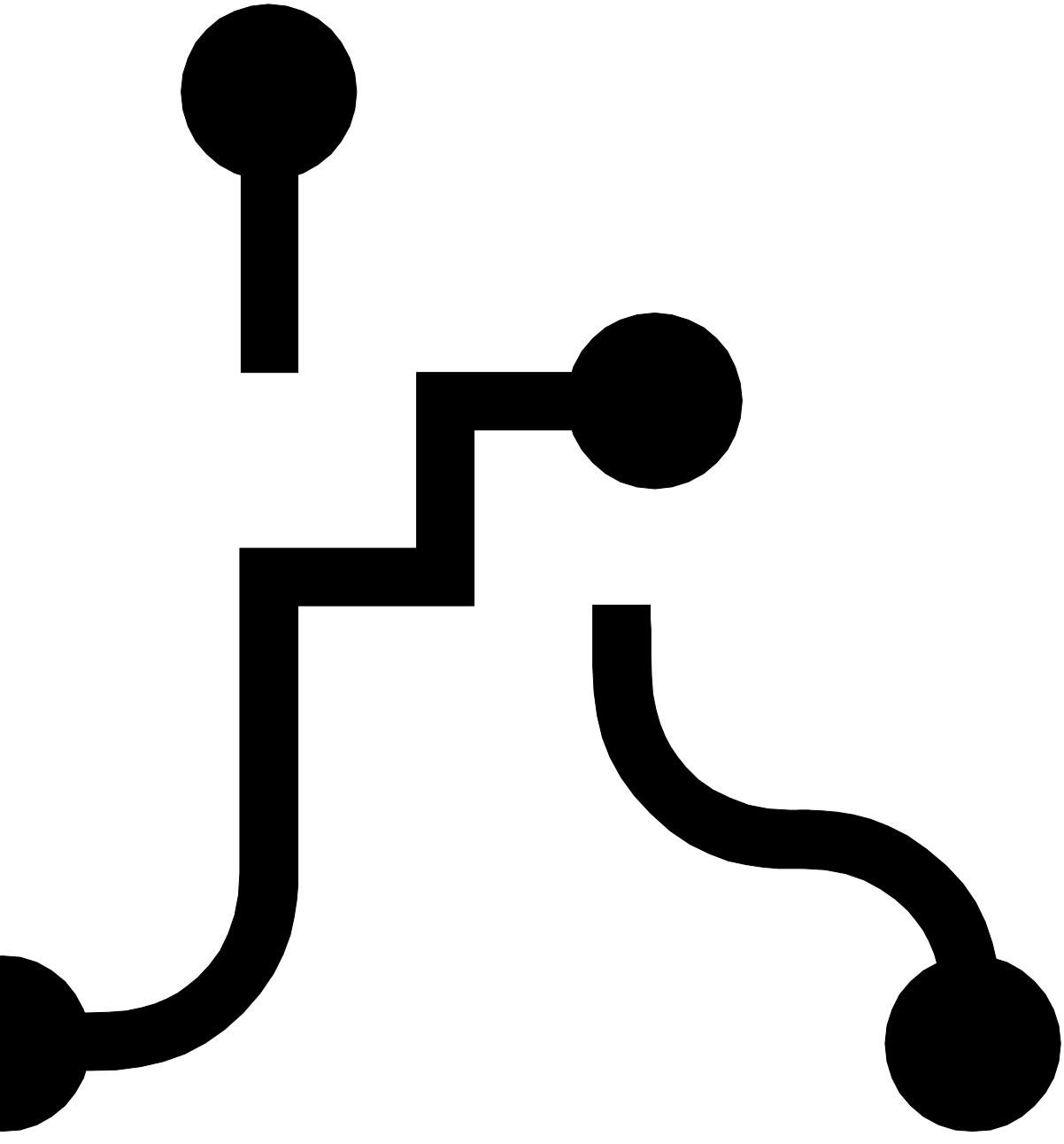

Immersion in print and pixel: communicating brand aesthetics through phygital packaging

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Abstract

As packaging design evolves from static physical formats to dynamic interfaces, the convergence of visual communication and digital technology is giving rise to what is now termed phygital packaging, a hybrid design language that merges print-based aesthetics with interactive, screen-mediated content. This paper investigates how phygital packaging functions as a site of visual communication, shaping consumer-brand relationships through immersive, multimodal experiences. Drawing on the Experience Economy framework, the study evaluates the communicative potential of phygital packaging, with a particular focus on how aesthetic elements, both tactile and digital, convey brand identity, emotional value, and consumer narratives. Using a mixed-method approach that combines literature review, theoretical analysis, and a consumer survey (N=122), the research identifies how visual and interactive elements in packaging influence consumer engagement, emotional resonance, and purchase behavior. Although results indicate that phygital packaging increases visual engagement and brand memorability, familiarity with this format remains limited, while consumers remain hesitant to pay a premium. Nonetheless, the study positions phygital packaging as a transformative communication tool, where design extends beyond form and function to participate in symbolic and experiential storytelling. This paper contributes to research on packaging as a visual medium by reframing it as a communicative interface that bridges the material and the digital, the commercial and the cultural.

Keywords: Interactive packaging, consumer engagement, experience economy, digital integration, brand identity.

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0. Introduction

Packaging has long played a crucial role in marketing, often considered the fifth 'P' in the traditional marketing mix alongside product, price, promotion, and place (Shekhar & Raveendran, 2016). Beyond its functional role of protecting and preserving products, packaging acts as a silent salesman, influencing consumer perceptions, brand recall, and purchase decisions. However, in the rapidly evolving marketplace, traditional packaging is no longer sufficient to meet the dynamic needs of modern consumers.

Historically, packaging was designed with a primary focus on functionality and aesthetics, with brands using materials, colors, and typography to create differentiation. Although these elements remain relevant, today's consumers demand more than just visually appealing and protective packaging—they seek interactivity, personalization, and digital integration. The shift from static, one-way communication to interactive and engaging experiences has rendered conventional packaging inadequate in delivering holistic brand experiences.

The limitations of traditional packaging stem from its inability to adapt to changing consumer behaviors and technological advancements. The modern consumer, particularly Gen Z and Millennials, expects a seamless omnichannel experience, where digital and physical interactions merge effortlessly (Baykal, 2020). Traditional packaging often lacks real-time adaptability, customization, and engagement-driven features, which are becoming essential in influencing purchasing decisions (Lydekaityte & Tambo, 2018).

Additionally, traditional packaging presents challenges in sustainability and information delivery. In an era of elevated environmental consciousness, consumers expect eco-friendly solutions that go beyond single-use packaging (Sunita, 2023). Static packaging also struggles to convey detailed product information, often limited by space constraints, leading consumers to seek additional insights online. The absence of digital touchpoints makes it harder for brands to provide real-time updates, track product lifecycles, and foster long-term engagement with consumers.

The rise of e-commerce and the digital revolution have drastically transformed consumer expectations and purchasing behaviors. Unlike traditional retail, where consumers physically interact with products before purchase, e-commerce relies on digital-first experiences, making packaging a key touchpoint in influencing brand perceptions. The post-pandemic era has further accelerated digital adoption, compelling brands to rethink their packaging strategies to cater to a digitally connected, convenience-driven audience. Smart technologies such as QR codes, Artificial Intelligence (AI), Augmented Reality (AR), and Near Field Communication (NFC) have become essential tools for enhancing engagement. By integrating these technologies, packaging can provide immersive brand storytelling, instructional content, gamification elements, and even virtual try-ons—all of which cater to the growing preference for experiential shopping. Designers strategically incorporate interactive elements at various stages— before, during, and after the product is opened— to strengthen this relationship. The experience economy states that the primary goal of economic activities is to generate pleasurable experiences rather than mere material gains (Pine & Gilmore, 1998). The rise of the experience economy has rendered traditional packaging design inadequate, as it no longer aligns with the evolving needs of consumers. In this context, packaging must transcend its practical functions, integrating interactivity and playfulness to enhance emotional experiences and influence consumer behavior, ultimately contributing to new consumer lifestyles. Moreover, it extends consumer engagement and entertainment beyond the point of purchase, creating memorable experiences that strengthen consumer-brand relationships (Lydekaityte & Tambo, 2018).

1. Scope and objectives

The purpose of this study is to provide a comprehensive analysis of the concept of phygital packaging, and particularly:

- to analyze the concept of phygital packaging, including its essential components and approaches.
- to explore current market trends in phygital packaging, industry innovations, and competitive strategies.
- to examine how phygital packaging can impact brand image.

A literature review was conducted to establish a theoretical foundation of physical, digital and phygital packaging, examining current trends and developments. Academic journal papers, books and online resources were reviewed. To ensure practical relevance, examples of brands implementing these concepts have been integrated, providing real-world illustrations of their applications.

This study is anchored on the Experience Economy Framework to evaluate the multifaceted impact of phygital packaging on consumer-brand interaction. Each dimension of the framework—Entertainment, Education, Esthetics, and Escapism—is examined and supported with relevant brand examples.

The study employs a mixed-methods approach, integrating qualitative and quantitative research, to comprehensively analyze the role of phygital packaging in shaping brand identity. A structured survey was created and shared with 120 participants through Google Forms. It aimed to explore consumer awareness and their willingness to adopt phygital packaging, among other aspects. The survey also featured questions designed to align with the four dimensions of the Experience Economy Framework.

2. Physical packaging

Physical packaging refers to the technology and design strategies employed to protect products during storage, shipping, and sale. It is a fundamental aspect of product presentation, protection, and touch-points. Elements like materials, colors, typefaces, forms, textures, and images are crucial in physical packaging. To remain competitive, brands must continually adapt their packaging to meet evolving consumer expectations (Nie, 2020).

2.1 Current trends in physical packaging

For leading brands, packaging goes beyond mere protection; it serves as a reflection of their commitment to inclusivity, sustainability through regenerative practices, practicality, and engaging sensory design. Below we discuss some current trends in physical packaging that can be integrated with digital technologies to create phygital packaging designs.

2.1.1 Gamification

By leveraging principles from psychology and game design, gamification enhances the user's experience across various media, including video, board games, and card games. When applied to packaging, gamification can foster deeper consumer engagement, offering educational and enjoyable experiences. This approach often leads to increased brand loyalty, word-of-mouth

promotion, viral social sharing, and other dynamics that drive sales. For example, Kazoom Kids, a children's shoes and accessories company, designed a package for their shoes that can be converted into a fun board game, resulting in increased consumer engagement (Lschwammy, 2023) (see Figure 1, Panel A). Kissan too designed a board game for kids as a part of their Kissan jam gift sets (McQuarrie, 2014) (see Figure 1, Panel B).

Figure 1(A). Kazoom's interactive shoe and sock packaging.

Figure 1(B). Packaging of Kissan Jam.

2.1.2 Sensory appeal

In this era of digitization, brand and product differentiation are difficult to achieve; this is where the five-sense packaging design experience comes in (Zhang & Park, 2023). Multisensory packaging is known as the practice of designing packaging that can appeal to multiple senses simultaneously, which involves visual elements (like colors and graphics), tactile features (such as texture), auditory cues (music or sounds when opening), olfactory elements (scents), and even taste in the context of edible packaging (Velasco & Spence, 2019). A paradigm shift has occurred in the last decade toward creating more interactive and sensorially engaging goods and services (Petit et al., 2022).

In multi-sensory packaging design, color plays a pivotal role, significantly influencing consumers' thoughts, emotions, and behaviors (Labrecque & Milne, 2013). Technological advances, such as thermochromics inks, provide visual and tactile feedback, allowing colors to change and reveal temperature-sensitive information. Additionally, touch-sensitive applications enable labels to alter or display information, with colors shifting in response to body heat. For example, Coca-Cola used thermochromics inks to create visual effects. The ice graphics on the can change colour when the bottle is chilled, indicating the ideal drinking temperature (Redot, 2014) (see Figure 2).

Figure 2. Coca-Cola's multi-sensory packaging using thermochromic inks.

Brands are increasingly incorporating texture and haptic interactive features into their packaging, recognizing that consumer purchase decisions are often influenced by tactile interactions with the packaging (Spence & Gallace, 2011). In 2021, Victorialand Beauty, an American skincare brand, exemplified advancements in tactile and auditory design with its inclusive packaging for the visually impaired. This packaging utilized the CyR.U.S tactile system, featuring raised symbols and an embossed QR code to provide auditory product information (Paris Packaging Week, 2022) (see Figure 3).

Auditory elements in packaging can improve consumers' experience of different products. Baileys created the Baileys Sound Scale to help users know how much Irish cream is left in dark bottles. Users can blow over the bottle to hear sound waves and find out the amount of the liquid remaining (Creative Salon, 2024).

Figure 3. Victorialand Beauty's packaging that makes products accessible to blind consumers.

2.1.3 Multifunctional packaging

Multifunctional packaging incorporates reusability to prolong its utility and offer substantial value to customers beyond product use. It can also transform the packaging into practical tools, interactive games or aesthetically pleasing objects for better user engagement. For instance, the UK-based personal care brand Kankan launched recyclable tinplate cans compatible with curbside recycling programs. The design includes a clip-on pump with a thumb screw, facilitating refills without spills.

Similarly, Samsung's CES 2020 Innovation Award-winning eco-packaging, designed for its Lifestyle TV product, featured corrugated cardboard with a dot matrix pattern. This design allowed users to repurpose the box into various home objects, such as a kitten house and a paper stand, making the packaging physically interactive (Team THC, 2020) (see Figure 4).

Figure 4. Samsung's out-of-the box packaging.

2.1.4 Regenerative packaging

Regenerative packaging is a solution that restores and enhances natural resources and environmental conditions. It involves materials that improve biodiversity, purify water, and boost soil fertility through carbon and nitrogen-fixing. This approach goes beyond traditional sustainability by a net positive environmental impact and 100% recyclability throughout the packaging lifecycle (Rhodes, 2015). Pangea, a beauty brand, was the first to use Sugarcane Bio-resin in their packaging, which lowers the need for raw materials and cuts down on carbon emissions (Berry, 2021).

Regenerative biodegradable polymers, like PLA and PHA, derived from fermented plant starch and bacterial synthesis, are advantageous due to their renewability, biocompatibility, and ability to break down naturally (Zhao et al., 2023). Seaweed and mycelium are being used as sustainable alternatives to single-use plastics. Seaweed can absorb carbon and reduce ocean acidity. Mycelium, found in mushrooms, is moldable, fire-resistant, and antibacterial, making it a renewable substitute for plastics and Styrofoam (Pohan, 2023).

2.2 Consumer perceptions of physical packaging

Packaging is critical in influencing consumer perceptions by communicating unique value and setting items apart in a competitive market (Silayoi & Speece, 2007). It affects consumer purchasing decisions by its quality, color, design, and other attributes; this frequently results in impulsive purchases and increases market share and sales (Wells et al., 2007). Although

consumers often connect well-packaged products with higher quality, there is no clear correlation between product quality and packaging.

3. Integration of digital technologies in packaging

The global pandemic and the rise of e-commerce in today's omnichannel retail environment have exponentially increased the demand for adaptable and interactive packaging design. Thus, the integration of digital technology into physical packaging manifests itself as a transformative trend in a world where the user craves instant information and gratification.

Digital interactive packaging, sometimes referred to as smart packaging, is packaging that uses technologies like sensors, augmented reality (AR), QR codes, Internet of Things (IoT), and artificial intelligence (AI) to interact with and educate consumers on their own time and terms (Zhang et al., 2024). It aims to provide additional value beyond a protective layer. The mix of AI and IoT transforms each silent package into a chatty guide, an intelligent personal assistant and even a brilliant storyteller. While AI harnesses the power of machine-based learning, IoT seamlessly connects everyday packages to the vast Internet world. According to Precedence Research (2023), the global IoT packaging market valuation is predicted to rise to around USD 45.22 billion by 2032. The digital interactive packaging industry is still considerably fragmented as all businesses are focused on one-off, niche solutions instead of developing a cohesive approach that can be implemented on a large scale (Schaefer & Cheung, 2018).

3.1 Strands of digital interactive packaging

Smart packaging can be categorized into two main strands: connected packaging and intelligent packaging. Connected packaging uses quick response (QR) codes, near-field communication (NFC) tags, and AR to enable consumers to interact directly with the product through smartphones. NFC tags are small wireless devices that store and transmit vital data during manufacturing. They are embedded in packaging for short-range communication with NFC-enabled devices (Stollerman, 2023). For example, Clinique incorporates NFC technology into its Moisture Surge 100H product line, giving customers access to services, such as the Daily Dehydrator Index and the Clinical Reality Tool, for tailored skincare advice based on the geographic location. The main objective of connected packaging is to make the product use easier from delivery to disposal.

Intelligent packaging assists inventory management and ensures product integrity through advanced sensors, indicators, blockchain technology, and RFID that tracks freshness, temperature, and humidity. Radio Frequency Identification (RFID) packaging utilizes electromagnetic fields to create an RFID-based Inventory Control and Management System (RICMS) that provides detailed information about a product's location and status (Oliver Inc., 2023). As a decentralized digital ledger, blockchain-enabled packaging, with its immutable and transparent nature, protects against product theft or tampering (Linwood, 2022). The current trends in digital interactive packaging are outlined below-

3.1.1 AR interactive packaging

AR refers to the ability to superimpose 3D or 2D graphics over a real-world environment where the information can be dynamically updated. AR-enabled packaging gives access to additional product information and engaging brand content to decrease anxiety over a purchase decision. For example, Australian brand Body Science used web-based AR technology that, on scanning, reveals product information not typically provided on standard packaging labels such as brand

social media pages, weight management nutrition programs, articles and podcasts on nutrition knowledge and instructions on preparing the product (Koe, 2020).

The continuous evolution of AR technologies in recent years has led to the rise of endless possibilities in packaging design (Zhang, 2023). The immersive experience achieved with AR enhances consumer interactivity with the brand. There are two ways of integrating AR in packaging: Marker-Based AR initiates the augmented reality experience only when the digital marker in an object, animation, video, or text is detected and identified on the device (Rani & Ramlie, 2023). For example, Pizza Hut invited customers to scan their pizza box to play the PAC-MAN game (see Figure 5) (Tayeb, 2021). Most AR-enabled packaging in the market is marker-based.

Marker-less AR eliminates the need for physical markers; that is, the virtual objects no longer need to be anchored to an image or barcode in the real world to be visualized. Instead, it uses smartphones' global positioning system (GPS) to map virtual objects to a specific location or touch point outside (Rani & amlie, 2023).

Figure 5. Pizza Hut's AR PAC-MAN Campaign.

3.1.2 Generative AI

Generative artificial intelligence (generative AI) is the computational technique that can generate seemingly novel and organized content in the form of text, images, or audio from training data. Gen-AI platforms, such as GPT-4, Gemini by Google, and Dall-E 2, are currently revolutionizing traditional packaging design processes (Feuerriegel et al., 2023). In the packaging design industry, generative AI has emerged as a powerful ally by offering a wellspring of fresh perspectives to fuel innovation and creative exploration. Thus, artificial Intelligence has actively responded to the growing trend of personalization to facilitate the creation of meaningful packaging designs (Cengiarslan, 2024).

Johnnie Walker, a scotch brand, utilized Generative AI to allow customers to create personalized packaging. This was done in collaboration with Scottish artist Scott Naismith. Users could create personalized bottle labels inspired by Naismith's artworks using Gen AI (see Figure 6) (Reynolds, 2024).

Figure 6. Johnnie Walker Project Halo Initiative.

Similarly, Givaudan, a perfume brand, partnered with Tmall to launch 'Creatogether', an AI-powered co-creation tool that uses the Myrissi algorithm to translate scents into color patterns based on data collected from over 25,000 consumers. These colors are believed to evoke the same emotions as the perfume scent, helping consumers make better buying decisions on online platforms.

3.2 Impact of digital interactive packaging on consumer behavior

Digital interactive packaging captures consumer attention and delivers essential information, influencing perceptions, preference, and choice. Whether emotional or rational, the nature and quality of information are crucial in driving engagement and decision-making (Ankiel, 2020). By providing instant access to product information and sustainability credentials, such packaging supports informed purchasing decisions, particularly among tech-savvy and eco-conscious consumers.

4. Phygital packaging

The term phygital was coined in 2007 by Chris Weil, former chairman and CEO of Momentum Worldwide, an Australian design agency to characterize the solid ties between the real and digital worlds (Bartoli et al., 2023). The emergence of phygital resources stems from the widespread adoption of intelligent technologies (Mele et al., 2023). A phygital world comes into existence when digital technology enters a physical space to enrich its existing functions with computational intelligence and adapt its performance to the space (Zurlo et al., 2018). Despite its practical use, academic research on phygital is limited (Mele et al., 2024). The phygital phenomenon is here to overtake every part of our lives, from virtual fitting rooms and contactless payments in e-commerce to real-time engagement apps in concerts for immersive entertainment to physical marketing campaigns featuring AR billboards.

Phygital packaging is considered as an evolved version of smart packaging since it includes a higher integration of 4.0 digital technologies, such as sensor fusion, artificial intelligence (AI)

chips, mixed reality, and Internet of Things (IoT) in one connected ecosystem. The primary role of this digital integration is to offer the desired functionalities and endless value-added benefits, enhance supply chain traceability, and prevent counterfeiting (Janakiraman, 2021). The food and beverage (F&B), and personal care categorieshave been the first to recognize the vast application potential of phygital packaging to boost brand-consumer interactions and promote brand recall. Table 1 maps out the differences between physical and digital interactive packaging and the role of phygital designs in modern packaging.

4.1 Implementation of phygital packaging

The key to a cohesive phygital experience is achieving a sense of continuity and balance between the physical and the digital. To ensure that consumer immersion is constant, the transition from the physical to digital factors should be without sudden interruptions. In addition to that, technological transparency, inclusivity, and contextual personalization are fundamental principles for driving the phygital experience. When implementing the phygital approach, multiple challenges come into play, such as real-time data synchronization to avoid confusion, the interoperability of varied technologies such as AR, NFC, and QR codes across digital platforms, and the privacy concerns emerging from real-time data collection. To address these challenges, adopting a user-centered design approach grounded in an efficient data architecture and omnichannel strategies will build trust and deliver an intuitive experience (Prabhakar, 2023). The rising investments in hybrid consumer technologies by brands and companies in the last decade prove the relevance of the phygital phenomenon in the consumer markets. Brand-driven phygital packaging allows brands to express their core values and convey brand narratives to guide consumer buying behavior.

Table 1. Comparative analysis between physical, digital & phygital interactive packaging.

Aspect	**Physical Interactive Packaging**	**Digital Interactive Packaging**	**Phygital Packaging**
Engagement	Attract consumers through tactile experiences, physical design innovation and unique aesthetic appeal.	Engages consumers with immersive digital experiences and virtual gamification.	Merges tactile aesthetic experiences with immersive experiences
Information Delivery	Limited information through printed labels, which gets outdated after a period of time.	Real-time product details, usage tutorials, multi-media content through AR labels.	Opens opportunity for to provide detailed, interactive, and easily accessible product information

Technological Requirements	Zero technological dependence, making it universally accessible.	Always requires a smartphone, tablet or installing an app, limiting usability for several users.	Fulfills the role of providing physical information, ensuring its functionality even without the use of digital devices.
Personalization	Limited scope for personalization except through pre-printed designs.	Offers customization, tailored recommendation and experiences based on user preferences.	Enables endless possibilities for both tactile and digital explorations.
Data Collection	Relies on observational feedback and research with negligible data collection abilities.	Tracks real-time user actions and, providing valuable data to the brand.	Combines observational consumer responses with real-time data tracking, ensuring greater accuracy in understanding consumer behavior.
Cost	High initial cost due to software and technology integration.	Usually lower cost, but may increase with use of new, regenerative materials.	Allows to tailor the integration of materials and digital techniques as per budget

Table 2. SWOT analysis of phygital packaging.

Strengths	***Weaknesses***
Enhanced Consumer Engagement: Phygital packaging results in a higher consumer engagement rate by merging physical and digital experiences. ● ***Traceability and Transparency:*** Technology such as IoT and smart sensors generate real-time data on product conditions to improve supply chain transparency and prevent counterfeiting. ● ***Sustainability:*** Most phygital packaging solutions integrate recyclable or biodegradable materials, to align with consumer demand for environmentally friendly products and reduce dependence on single-use plastics.	● ***Complexity in Design:*** Effective phygital packaging that seamlessly merges digital elements with existing physical aspects, can become technologically challenging to navigate for the average consumer. These complex designs often require designers with specialized expertise as well. ● ***High Carbon Footprint*****:** The energy intensive processes for making the digital components and maintaining the technology for the interactive features in the packaging can lead to a high carbon footprint. ● ***High Initial Costs:*** The significant monetary investment in technology and materials required to implement phygital packaging systems discourages small brands from adopting the same.
Opportunities	***Threats***
● ***Growing E-commerce Market:*** With the rise of online shopping, brands are looking to prioritize phygital packaging to provide additional product information and digitally elevate the complete packaging experience. ● ***Consumer Demand for Interactivity****:* As the demand for immersive experiences increase, the opportunity for phygital packaging to take center stages for greater brand differentiation becomes a reality.	● ***Technological Dependence:*** If the phygital packaging relies too much on technology, in case of system failure or lack of access to necessary digital devices, the packaging may lose all its usability. ● ***Regulatory Challenges:*** As the regulatory landscape evolves, becomes layered and filled with uncertainty, brands have to ensure that their phygital packaging complies with all the regulations, which would make the digital implementation slow.

5. The experience economy framework

Experience economy designates the sale of memorable experiences to customers. The term was coined in a 1998 article to describe the economy that follows the agrarian, industrial, and service economies (Pine and Gilmore 1998). The experience economy encompasses the experiential aspects of using and consuming goods and services (Sundbo & Sørensen, 2013).

Traditional packaging design must adapt to the changing consumer aesthetics influenced by cultural dynamics. Today's consumers have varied and complex product consumption desires. Therefore, to enhance consumers' emotional experiences, product packaging must fulfill functional and practical needs while incorporating interactive and playful design elements. In this context, studying interactive packaging design with a focus on customers' emotional experiences has gained importance.

Within the framework of the experience economy, an experience can be characterized as the psychological effect an individual experiences and remembers due to their unique perception of external stimuli. The idea is that experiences are memorable events; and for an occasion or indicator to remain in one's memory, it must be exceptional and unexpected. The experience economy includes four key components: Educational, Esthetic, Escapist, and Entertainment experiences. These four types of experiences vary based on the customer's active or passive participation and their level of absorption or immersion in the experience (Fiore et al. 2007).

5.1 Entertainment

There are multiple ways to describe an activity or event as entertainment, but most involve some element of fun and enjoyment. Phygital packaging increases the entertainment experience economy by turning ordinary packaging into a captivating universe. In this respect, it uses elements like augmented reality and game design to build an experience that is simultaneously engaging and aurally and visually stimulating. An example of such a brand is Chobani, a Greek yoghurt company that introduced a unique AR experience for its Halloween packaging. Users had to scan a QR code to play a digital trick-or-treat game, unveiling rewards. The goal was to engage customers in a fun way and utilize their growing use of QR codes.

The four elements in the entertainment industry that play a critical role in shaping the overall consumer experience are:

Engagement: phygital packaging captivates consumer attention since it entails using multiple digital impacts such as QR codes and augmented reality.
Enjoyment: through phygital packaging, the fun component is elevated because of touch sensitivity coupled with displays of digital components.
*Interactive features***:** consumers can receive a range of messaging and entertainment options through Near Field Communication (NFC) and augmented reality technology on the packaging itself.
Emotional impact: the perceived value of phygital packaging must be considered because it tells a story that is moving to consumers.

5.2 Education

In the educational experience economy, AR-enhanced phygital packaging offers consumers interactive learning opportunities by allowing them to scan packaging with a smartphone or AR

device to access virtual elements like 3D models and tutorials that explain product features and benefits.

Nestlé's AR-based Milkybar promotion exemplifies this by educating kids and teens about recycling and tree planting through augmented packaging. Similarly, Heinz's 2011 AR campaign turned ketchup containers into interactive experiences, providing consumers access to a hidden recipe book. Another brand, Perfection Fresh, launched an AR web experience through its packaging to educate consumers about its unique farming practices and fresh produce.

The four elements in the education sector that play a critical role in shaping consumers' overall experience are:

Information: AR smart interactive labels on packaging provides additional digital information when scanned with a smartphone or AR device. Consumers can access in-depth details about a product's content, ingredients, manufacturing process, and sourcing methods from procurement to the final product.
Clarity: the experience economy in the context of product packaging focuses on creating immersive and educational experiences that provide clarity to consumers with relevant information about the product.
Relevance: transparency about the product not only builds consumer trust but also empowers them to make informed purchase decisions by providing clear and detailed information about the product's ingredients, sourcing, and environmental impact.
Accessibility: information is easily accessible through a QR code or AR label on packaging, obtaining real-time information directly from their devices.

5.3 Esthetic

An aesthetic experience in packaging occurs when an individual passively engages with an immersive design. The design and overall esthetics of packaging can influence consumer behavior.

For example, The Nescafé Alarm Cap combines technology and practicality by adding an Arduino-based digital alarm clock to the lid of a coffee jar. When the alarm sounds, an LED ring lights up, and users must twist and remove the cap to silence it. Removing the cap also releases the aroma of Nescafé coffee for a multi-sensory wake-up experience.

The four aesthetic elements that play a critical role in shaping consumers' overall experience are:

Visual appeal: dynamic AR elements in phygital packaging enhance visual appeal, capturing attention and reinforcing brand identity.
Sensory stimulation: integrating tactile materials and interactive sound features enriches the unboxing experience, engaging multiple senses.
Design innovation: by using projection mapping technology, animated graphics or changing visuals can be projected onto the packaging whereby brands can create immersive experiences.
Consistency: ensuring aesthetic elements align with brand messaging and product functionality maintains a cohesive, immersive experience.

5.4 Escapism

An escapist experience is a journey from and a voyage to a particular space or activity. Escapist experiences convey individuals' need to escape their overstimulating everyday environment. In

the context of phygital design, effective escapist packaging begins with active world-building that transforms ordinary interactions into adventures. Notable examples include the black-and-white Jack Daniels label that flaps open into an interactive cartoon diorama version of the brand's distillery in Lynchburg, Tennessee, along with a real-time virtual tour showing the whiskey distillation process. Famous almond milk brand Almond Breeze also leverages AR in their packaging to transport consumers to their almond farms, which reveal beehives, animated delivery trucks, and blossoming almond trees. Sensory elements like the sound of buzzing bees enhance the immersive experience, highlighting the brand's farm-to-table journey.

Malfy, a premium Italian gin brand, launched an AR experience "Escape to a Malfy World" to target travellers. By scanning a QR code on their gin bottles, the users get a 360° walkthrough of the Amalfi Coast. Users can explore scenic locations, matching them with different botanical gins like Con Arancia and Con Limone, creating a dreamlike sensory experience for consumers globally.

The four escapist elements that play a critical role in shaping consumers' overall experience are:

Immersion: using augmented reality, brands can fully immerse customers in innovative virtual worlds, creating a unique brand experience.
Narrative: the narrative in interactive packaging acts as a framework for guiding the consumer through the brand journey and fostering an emotional connection with consumers.
Technology: various types of AR technology like WebAR, Marker-based AR, and Information Overlay AR play a vital role in facilitating the escapist experiences in phygital packaging.
Sensory displacement: to enhance the escapist experience, phygital packaging seeks to engage more senses simultaneously by integrating sounds, haptic textures, or other visual aspects.

6. Survey of consumer perceptions of and experience with phygital packaging

A survey with 122 online participants, was conducted to understand consumer perceptions of phygital packaging and its potential impact on brand image. The survey was conducted with Gen-Z participants, considering that they are digital natives and early adopters of technology. The objectives of the survey included evaluating consumer familiarity with phygital packaging, its role in shaping brand loyalty, and how the four realms of the Experience Economy—entertainment, education, escapism, and esthetics—align with consumer experiences. The findings provide valuable insights into how interactive packaging influences purchasing decisions, emotional connections with brands, and willingness to spend more. The survey utilized a Likert scale to gather data, allowing for a nuanced understanding of consumer perceptions of phygital packaging. Here is the analysis of the key findings:

6.1 Familiarity and interaction with phygital packaging and its impact on purchasing decisions

The survey results revealed limited consumer familiarity with phygital packaging. Only 9% of the respondents were very familiar with the concept of interactive packaging while 32% of the respondents had never heard of interactive packaging (see Figure 7). The distribution suggests a significant portion of the sample is either unfamiliar or only somewhat familiar with phygital packaging, pointing to ample space for increasing awareness and education on the topic.

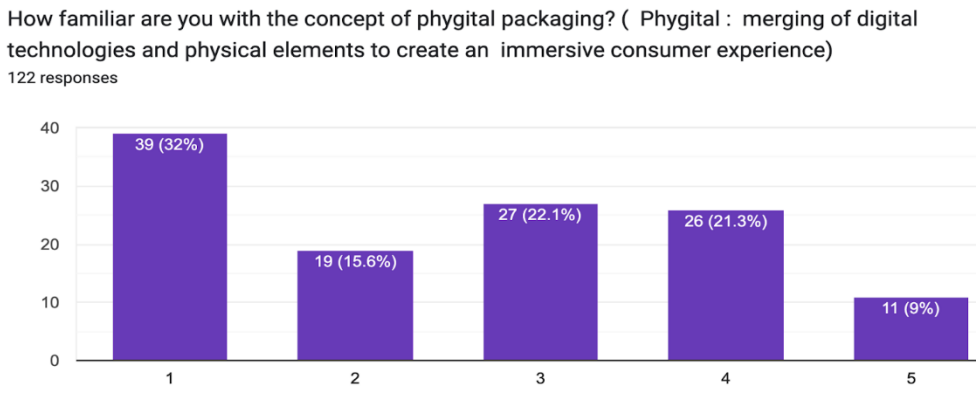

Figure 7. Consumers' familiarity with interactive packaging.

The majority of respondents (64%) had never interacted with phygital packaging. This indicates that despite growing interest in phygital packaging, actual consumer engagement with such innovations remains relatively low, suggesting potential opportunities for increased exposure and integration in the market. Packaging design plays a crucial role in purchasing decisions, with 57% of participants affirming its importance. This indicates that while phygital packaging may not yet be widely familiar, consumers value innovative and aesthetically appealing designs. While only a small minority (10%) viewed it as unimportant, 32% claimed that the actual product in itself is as important as the packaging innovations in generating sales.

6.2 Key insights based on the experience economy framework

Entertainment

Interactive features like AR games or storytelling elements can add enjoyment and a sense of novelty to a packaging design. The respondents confirmed this as 67% of the respondents found it very engaging. 20% of the respondents found it somewhat engaging and only 13% claimed that they did not enjoy the digital interactions in the physical packaging design.

Education

The survey showed that 47% of respondents found AR labels moderately informative, while 24% rated them as highly informative. These findings indicate that AR and other interactive features can enhance consumers' understanding of products, adding value to their purchasing experience.

Esthetics

54% of the respondents confirmed the importance of design in their purchasing decisions and rated that the visual elements of a design are very effective. Only 14% of the respondents felt it did not add any value to the product.

Escapism

Phygital packaging creates an immersive experience for the consumers as agreed by 81% respondents. It allows consumers to momentarily disconnect from reality.

The respondents were asked about the interactive feature they would most commonly like to see adapted in phygital packaging design. The respondents could choose multiple options. 57% of the respondents were keen on seeing more of AR labels with product information. 43% wished for packaging with QR codes linking to online content. 41% wanted NFC technology to be integrated and 40% wanted AR interactive games to accompany traditional packaging designs.

6.3 Implications for brand image and purchase decisions

Phygital packaging creates a sense of connection between consumers and brands. 69% agreed that interactive packaging enhances their emotional bond with a brand. This suggests that phygital packaging serves as a tool for fostering brand loyalty by making interactions more personalized and engaging. 71% agreed that interactive packaging creates a stronger brand identity. However, when it comes to purchase decisions, only 37% of the respondents were willing to purchase a product based on just interactive packaging usage. When asked consumers if they would be willing to spend more for products that use interactive packaging, 43% respondents said no, 39% said it largely depends of the product category and range and only 17% of the respondents were willing to spend more on brands that integrated phygital packaging. This analysis points to opportunities for brands to experiment with interactive packaging while maintaining competitive pricing.

7. Conclusion

Phygital packaging offers a unique value proposition, prompting stakeholders to explore multifunctional, integrated solutions that incorporate advanced functionalities and renewable materials, aligning with the growing circularity trend. The COVID-19 pandemic amplified the reliance on online platforms and elevated consumer demand for immersive experiences. By bridging physical and digital elements, phygital packaging enables brands to experiment with hybrid business models, combining both offline and online interactions. When implemented effectively, this approach allows brands and product developers to rethink marketing strategies and deliver impactful consumer experiences.

Despite its promising potential, the adoption of phygital packaging remains at a nascent stage. Challenges such as higher deployment costs compared to conventional and smart packaging, debates over the balance between cost and performance among industry stakeholders, and the lack of large-scale implementation efforts hinder its widespread adoption. To overcome these barriers, the industry can focus on designing user-friendly packaging, leveraging cost-effective sensors and digital technologies, scaling up production, and integrating digital printing solutions. These advancements can improve ROI for technology developers and position phygital packaging for mainstream acceptance.

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