DIGITAL LABELLING

The Future of Smarter Food Labelling in Asia

082022

FIA FOOD INDUSTRY ASIA

Executive Summary

The pace of digital transformation has accelerated significantly across the food and beverage (F&B) industry during the COVID-19 pandemic.

Online presence has transitioned from a good-to-have to a must-have feature for brands to market, reach and engage consumers.

The fast-moving consumer goods (FMCG) sector is at the forefront of the digitalisation wave where digital transformation is vital in enhancing consumers' engagement.

Digital labels – the use of QR codes or barcodes, on pre-packaged goods represents a cost-effective way to communicate a vast range of product information. It helps producers to not only fulfil various product labelling requirements by different authorities, but also satisfy the increasingly conscious and inquisitive consumers of today. In both business-to-business (B2B) and business-to-consumer (B2C) settings, digital labelling can solve the challenges in product traceability across increasingly integrated supply chain networks and global trading systems.

The business case for digital labelling in the F&B industry is compelling in Asia, where the growth of the middle-class, purchasing power, and smartphone penetration are among the highest, globally. Consumer demand for more in-depth food information has also driven the adoption of digital labelling within the FMCG sector.

With the increasing prevalence of digital labelling, FIA conducted a pulse assessment across ten markets in Asia (China, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand, and Vietnam) to understand consumers' view towards digital labelling.

The findings show that majority of the consumers across the region would like to use digital labelling to receive up-to-date information on food products. In addition, consumers think that physical labels are lacking in terms of providing easy-to-read and simplified information on food products.

In tandem, FIA had also commissioned AlphaBeta, part of Access Partnership, to understand the trends driving the adoption of digital labelling, as well as the readiness of implementing digital labelling systems across the ten markets. The study shows that most of the key markets are still in the preliminary stages of digital labelling implementation, with Japan, Korea, Malaysia, and Singapore in the lead. These could be the priority markets to advocate for wide-scale digital labelling initiatives and development of relevant regulations and/or voluntary standards to help harmonise the approaches.

In light of our analysis, we see a promising future for Asia in broad-based adoption of digital labelling as an alternative way of presenting and storing product information to enhance the engagement with consumers, facilitate supply chain management, and provide solutions for the public and private sectors on some of the environmental and regulatory compliance issues.

Contents

Key Highlights

80% of consumers from 21 to 50 years old think that food product information is important

Top Three Food Product Information Consumers Look Out For

DD.MM.YYYY
Date of manufacturing/ Expiry date

INGREDIENT
Ingredient information list

DDR %
Nutrition and health information

Challenges Faced by Consumers with Printed Labels

40% of consumers across the 10 key markets studied encountered issues with **physical labels**

50% of consumers in Malaysia and Singapore mentioned that the **information printed is in a foreign language**

60% consumers in Malaysia and Singapore think that the **font size of food product information printed are too small**

Consumer Perceptions on Digital Labelling

82% of consumers find digital labelling concept appealing, with the **31 to 40 years old** age group being the most willing to use digital labelling

80% of consumers in Malaysia and Singapore are **willing/extremely willing to use an app to scan the digital labels** on food packaging products to obtain product information

Top Trends Driving the Adoption of Digital Labelling

1. Demand for greater transparency from the consumers
2. Greater complexity in supply chain management and traceability
3. Growing food safety concerns, particularly around counterfeit products
4. Increasing focus on making sustainable food choices
5. Lack of harmonisation for food labelling requirements globally
6. Growing number of food retailers transitioning to QR codes

Recommended Action Items for Stakeholders to Boost the Adoption of Digital Labelling

- Launch pilot programs
- Promote multi-stakeholder collaborations
- Launch consumers awareness programs
- Develop enabling digital labelling regulations
- Facilitate regional/ international harmonisation

The Need for Digital Labelling

While many consumers are demanding for more transparency of the products they consume, alongside growing regulatory requirements, the physical limitations on the product packaging might serve as a primary challenge for the FMCG sector.

Digital labelling has hence been introduced as an alternative method to communicate product information, providing clarity, greater flexibility, and control, in terms of space and the type of information shared in formats that might be best understood by the consumer.

The use of digital labelling can be traced back to the late 1970s when retail, pharmaceutical, and automobile industries began to assign their products with unique Universal Product Codes (UPC) for easier inventory management. By the 1990s, barcodes have been assigned to almost every single type of product.

One-dimensional (1D) barcode, despite its widespread adoption, has low data storage capacity and is vulnerable to physical damage. These limitations drove the development of two-dimensional (2D) barcodes, such as PDF416, Data Matrix and QR code, among others.

History of Digital Labelling Development

1948 – Norman Joseph Woodland and Bernard Silver from Drexel Institute of Technology, Philadelphia invented a 'bullseye' barcode, taking inspiration from the Morse Code.

1970 – George Lauer at IBM modified the bullseye barcode into a rectangular shape with thick and thin parallel lines and dubbed it the Universal Product Code (UPC).

1987 – David Allais developed the first 2D barcode – Code 49, to overcome limitations of 1D barcodes.

1991 – Dr. Ynjiun P. Wang at Symbol Technologies developed the PDF417 symbology.

1994 – Denso Wave engineer Masahiro Hara developed the Quick Response Code or QR code and the US company International Data Matrix, Inc. invented Data Matrix.

Since the invention of barcodes, digital labelling has been widely used in the business-to-business (B2B) setting, assisting with supply chain management, and wholesale distribution.

In the early 2010s, leading packaged goods brands started launching digital labels as an additional channel for product information, marketing campaigns and other consumer engagement activities, introducing digital labelling into the business-to-consumer (B2C) setting. By scanning the barcode or QR code using smartphones or a scanning device, consumers will be brought to a cloud-based webpage that contains all the information published by the brand.

Moreover, following the COVID-19 pandemic, many people are still reluctant to touch common surfaces/touchpoints. Hence, digital labelling presents consumers with a unique way of interacting, having minimum contact with signages and packaging.

Information stored in Digital Labelling

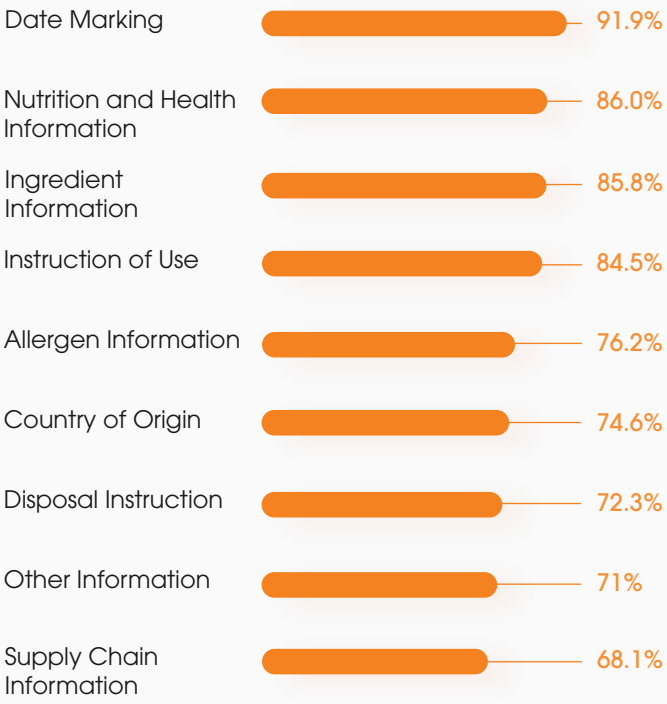
- Product identification/ authenticity
- Product origin
- Supply chain information
- Date of production, packaging and expiry
- List of ingredients
- Nutrition information
- Allergen declaration
- GM ingredient declaration
- Instruction for use
- Manufacturers' information
- Sustainability information (e.g., environmental footprint, recycling information)
- Packaging material
- Marketing campaigns
- and many more

Consumer Perceptions on Digital Labelling

More than three-quarters (79 per cent) of consumers across the ten Asian markets state the information on food and beverage labels are important or extremely important, with those aged between 31 to 40 agreeing most with the statement.

Majority of the consumers in Vietnam (89 per cent) and Philippines (87 per cent) indicate that the access to food product information is important or extremely important to them. However, only six in ten consumers in Korea and Japan agree to the statement, with other information such as halal certification, vegan declaration and sustainable sourcing being deemed important by one-third (45 per cent in Korea and 38 per cent in Japan) of the consumers.

Food product information



60% of Japanese consumers took ingredient labels into consideration when purchasing food products

44% of Indian consumers expect a brand selling healthy food and beverages to be fully transparent about the ingredients used

96% of Indonesian consumers prefer to purchase products with nutrition labels

90% of Singaporean consumers refer to nutrition labels to inform their purchases

88% of Vietnamese consumers read food labels to avoid unhealthy foods

Over 80% of Chinese consumers read packaging labels for nutritional content

Limitations with physical labels

the text is too small to read

there is too much information being provided

the information provided is in a foreign language

consumer is unable to find the information they need

the information provided is too difficult to understand

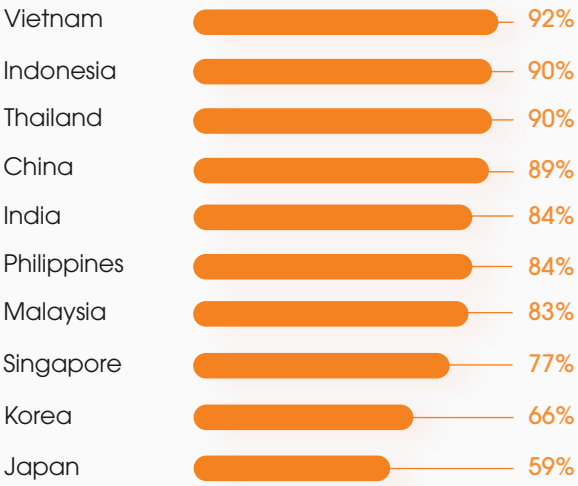
When making an informed decision on their purchase, physical food labels are the primary source of information for consumers. Nevertheless, more than four in ten (44 per cent) respondents encounter at least one problem when referring to physical labels at the point of sales.

Many respondents (53 per cent) among all age groups think that physical labels are printed in a font size too small to read. This problem has been flagged out by more than six in ten (63 per cent) consumers aged 51 and above, and five in ten (48 per cent) aged 18 to 30.

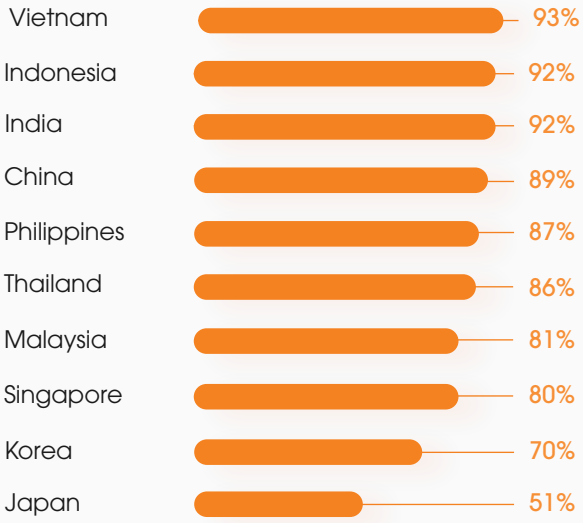
To overcome the limitations of physical labels, digital labelling can hence be an alternative platform for consumers to access accurate and up-to-date food product information, in their respective native languages.

Appeal of Digital Labelling Towards Consumers

Four-fifth (81%) of the consumers find the digital labelling concept appealing or extremely appealing, with those in Vietnam, Thailand, and India finding it the most appealing. However, only six in ten respondents in Japan and Korea have the same opinion. The decrease in appeal levels in Japan and Korea could be attributed to lesser consumers deeming food product information as important.



Consumers' Willingness to Use Digital Labelling



Many respondents (82%) are willing or extremely willing to use digital labels to access food product information. Almost half of the consumers living in Vietnam (49%) and Thailand (48%) claim that they are extremely willing to use digital labelling. One-third (32%) of the respondents residing in Japan, however, are on the fence regarding the use of digital labels.

Most (86%) young respondents aged between 21 and 40 are willing or extremely willing to adopt digital labels. However, the percentage of respondents open to digital labels decline with the increase in age group, with only half (53%) of the respondents aged 71 and above willing to adopt digital labelling.

About three-quarters (76%) of those who find the digital labelling concept appealing, are willing to use digital labelling to access food product information, indicating a strong uptake from consumers. To further drive the adoption of digital labelling, a study has also found that 34% of the global QR users are found within the Asia-Pacific region, and the growth of QR code usage is expected to be 22% annually from 2022 to 2025[1].

[1] Based on a Statista study on the market size of QR code transactions in various regions worldwide in 2020 with forecasts from 2021 to 2025.

Case Studies

In this section, we have presented several business case-studies that use digital labelling as an innovative solution to different challenges faced by the F&B industry.

Case Study 01

For Comprehensive Product Information

To provide consumers with access to more detailed product information beyond details that could ever fit a package, the SmartLabel programme was launched by the Trading Partner Alliance (TPA) in 2015[2].

Consumers can scan the Smart-Label QR code found on product packages using a phone's camera or any QR code reader to access the web-based product page.

Accurate and up-to-date information on ingredients, nutrition, and allergens and beyond the package label such as the instructions of use, disposal instructions, and recipes provided from brands can be found on the webpage link.

Coca-Cola believes that the adoption of SmartLabel programme helps to improve consumers' access to information and allows the firm to gain consumer insights. **Reily Foods** aims to improve product transparency and raise consumer awareness of its sustainability initiatives through the adoption of SmartLabel programme.

Case Study 02

To Assist Regulatory Compliance

United States of America (US), India, and Indonesia have introduced digital labelling systems in some of the food regulations, although the extent of information to be provided differs. In the US, digital labels are being approved as a mode of presentation for genetically-modified food ingredients. India and Indonesia, in contrast, allow digital labelling systems to present information about the manufacturers, for instance, registration number and address. Standards around digital labelling for general products was also developed by the International Organisation for Standardisation (ISO).

The Codex Alimentarius Commission is also in the midst of developing relevant guidelines to address the use of technology as an alternative means to provide food labelling information for both retail and non-retail prepackaged food products.

Australia is also collaborating with **GS1** to potentially develop regulations for digital food labelling.

[2] Winsight Grocery Business. (June 14, 2022). Demand for Transparency Drives SmartLabel's Growth. Retrieved 27 June 2022 from https://www.winsightgrocerybusiness.com/technology/demand-transparency-drives-smartlabels-growth

Case Study 03

For Product Origin and Authentication

Since the 2008 melamine crisis[3], it has been difficult for dairy companies to regain the trust of Chinese consumers and repair its collective reputation. **Danone**, being an established brand of premium quality, high safety level, and a mark of affluence in China, wants to continuously reinforce its brand value and image.

ABC934EF990DF0

The Track and Connect service on infant formula products, involves a dual-QR code system printed on the outer and inner packaging.

The outer QR code provides origin, time of production, manufacturing and supply chain information, after-sales support and services, while the inner QR code is printed behind a tamper-resistant seal – which upon scanning would trigger a message verifying the product authenticity[4].

Danone believes that the Track and Connect service provides additional assurance to the consumers in terms of product authenticity.

Case Study 04

For Sustainability and Changing Behaviours

To satisfy the thirst for knowledge from consumers to recycle packaging and highlight the company's differentiated approach to ESG (Environmental, Social, and Governance), **Mondelēz International** has developed a 'Snacking Right' platform that is accessible by scanning the QR code.

A global-first, on-pack QR code project was piloted by Mondelēz International for its 2022 UK summer promotion across a range of Cadbury, Oreo, and Barny products. Consumers can access the new online platform 'Snacking Right' by scanning the QR code found on the outer packaging[5]. The platform provides information about the company's environmental sustainability initiatives and well-being programs without the addition of multiple labels on the physical packs.

A Recycle Now locator is also included for consumers to check the local recycling facilities, promoting a more circular economy for packaging. Moreover, Mondelēz International also has plans to expand the 'Snacking Right' platform to include more brands, products, and geographies in the future.

With the pilot project, the company hopes to engage more consumers in recycling initiatives and uphold its corporate image on topics such as sustainability.

[3] Quartz. (2018). Ten years after China's infant milk tragedy, parents still won't trust their babies to local formula. Retrieved 21 July 202 from https://qz.com/1323471/ten-years-after-chinas-melamine-laced-infant-milk-tragedy-deep-distrust-remains/

[4] Danone. (13 February 2020). Danone launches Baby Formula Track & Connect – an innovative, data-driven service for consumers & retailers. Retrieved 27 June 2022 from https://www.danone.com/content/dam/danone-corp/danone-com/medias/medias-en/2020/brandnews/Danone_Track_and_Connect_20200213_EN.pdf

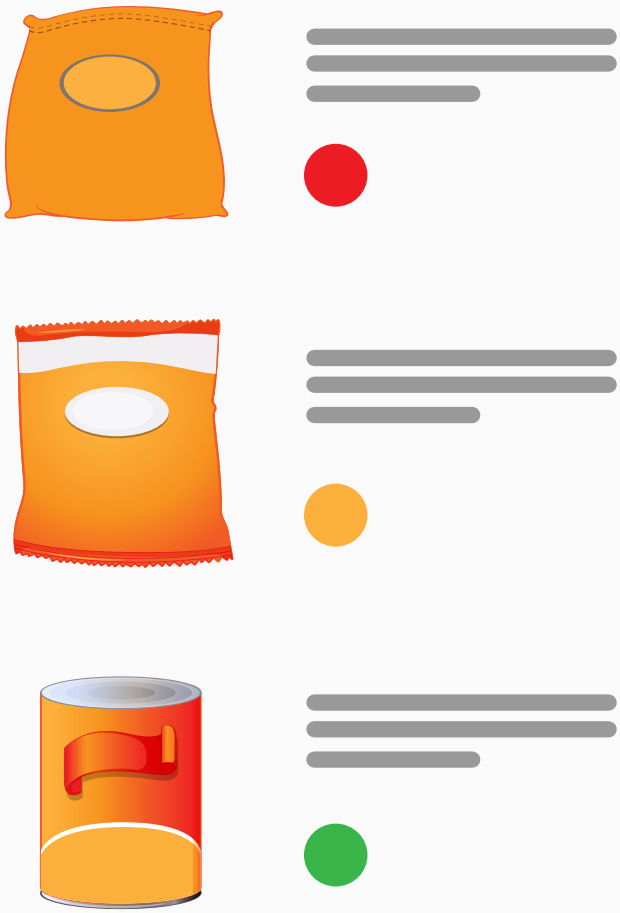
[5] Packaging Europe. (14 June 2022). Mondelez offers global first with QR pack codes to access sustainability and wellbeing initiatives. Retrieved 27 June 2022 from https://packagingeurope.com/news/mondelez-offers-global-first-with-qr-pack-codes-to-access-sustainability-and-wellbeing-initiatives/8347.article

Case Study **05**

For Nutrition Evaluation

Due to the limitations of physical labels, such as small font sizes and cluttered/complicated nutrition information, many consumers have found it hard to read and comprehend food product information.

Yuka provides an overall evaluation of the food and cosmetics products. Each food product is evaluated according to three key areas: nutritional quality, presence of additives, and its organic aspect, which is then scored out of a 100 points; accompanied by a colour-coded indicator.



When a product is deemed to have a negative impact on health, Yuka will recommend healthier alternatives. An 'eco-score' was also added in March 2021, which analyses the impact of products on the environment.

92 per cent of its 20 million users put products graded red back onto the shelf. 21 food and cosmetic companies also stated that Yuka has impacted their product formulation, which includes Nestle France.

[6] Foodnavigator.com. (20 August 2019). Evaluating the Yuka 'phenomenon': How effective is the scanning app in practice? Retrieved 27 June 2022 from https://www.foodnavigator.com/Article/2019/08/20/Evaluating-the-Yuka-phenomenon-How-effective-is-the-scanning-app-in-practice

Market Readiness to Adopt Digital Labelling

Key Trends Driving the Adoption of Digital Labelling in the F&B Industry[7]

01 Demand for greater transparency

The increase in demand from consumers for visibility into provenance of produce and information about it could stimulate greater demand for labels containing information that might not fit into traditional print labels.

02 Greater complexity in traceability

Tracking of the supply chain issues has become more challenging due to longer and more complex supply chains that could extend across multiple countries.

03 Growing food safety concerns

The rise in counterfeit food products can be addressed by introducing labels containing immutable digital records of each product's unique attributes (e.g., certificates of origin) that enable consumers to validate its authenticity.

04 Increasing focus on food sustainability

Consumers are becoming more wary of their individual carbon footprint and seeking products that are socially and environmentally responsible, by accessing information on the environmental footprint of food via digital labels.

05 Differing food labelling requirements

Due to the growing range of food regulation regimes globally, firms find it challenging to comply with increasing labelling requirements through traditional means, due to limited labelling space and ever evolving labelling regulations.

06 More retailers adopting QR codes

Larger players in the food industry are anticipated to drive this transition into digital labelling, rather than regulators.

The assessment shows that two overarching factors that boost the adoption of digital labelling in the F&B industry – inquisitive consumers and food safety concerns.

[7] SOURCE: Desktop research; AlphaBeta analysis

Consumers are constantly calling for more in-depth food product information from brands, including information on supply chain and environmental impact. Apart from that, the increasing number of food product recalls due to contamination and the presence of counterfeit food products have also placed food safety concerns in the spotlight in recent years.

As a result, more food retailers are planning to provide consumers with the requested information through the means of digital labelling.

SWOT Analysis of Digital Labelling[8]

S Strengths of Digital Labelling

- Enable faster response to readily accessed information
- Greater flexibility and cost-efficiency in changing labels
- Reduce packaging waste
- Ability to include more information
- Improved supply chain management with better traceability

O Opportunities of Digital Labelling

- Demand for labels that are adaptable to evolving labelling requirements
- Avenue to collect customer insights
- Provide an option for harmonisation of labelling requirements
- New way of engaging consumers

W Weakness of Digital Labelling

- Excludes digitally disconnected consumers
- Smaller businesses might fail to catch-up
- Hassle in accessing product information compared to physical labels
- Risk of imitation

T Threats of Digital Labelling

- Greater exposure to cybersecurity threats
- Potential violation of consumer data privacy (e.g., via web cookies) or infringing cross-border data restrictions
- Potential misinformation and enforcement difficulties
- Resistance of regulators/consumers towards digital adoption

[8] SOURCE: Desktop research; AlphaBeta analysis

Enabling Factors Driving the Implementation of Digital Labelling[9]

Amidst potential obstacles, digital labelling has shown promise in the engagement with consumers. Labelling material usage or waste from label obsolescence can be reduced, leading to environmental gains. While supplementary information is consolidated into digital labels and only essential information remaining on physical labels, results in less visual clutter, improving the aesthetics and clarity of the food product.

Furthermore, digital labels can also provide consumers with a personalised experience, improving the brand's image and driving sales.

Error correction capabilities in digital labelling systems allows data to be read even if the codes are partially removed or damaged. This results in the accurate and comprehensive presentation of food product information.

The enabling factors driving the implementation of digital labelling systems are grouped into three broad categories– Digital awareness & public demand, Regulations and regulatory capacity, and Partnerships & collaboration.

Digital awareness and public demand focuses on the consumer preference for information and accessibility to technology. Regulations and regulatory capacity stresses on the existence of relevant laws and guidelines permitting the use of digital labels for food products, setting minimum requirements on which information should be included on physical product labels and which can be digitised, together with the prevention of consumers' data misuse.

Partnerships and collaboration target multistakeholder action across the supply chain, with national food authorities and regional/ international bodies to align on the understanding of digital labelling, resolving implementation challenges, and maximise the benefits of digital labelling systems by adopting harmonised food labelling standards.

Digital awareness and public demand

- High level of digital awareness and sophistication by companies, consumers, and regulators
- Strong consumer demand for information about food products
- High smartphone adoption rates

Regulations and regulatory capacity

- Presence of enabling regulations on food
- Presence of digital labelling regulations
- Strength of data protection laws and enforcement mechanisms
- Presence of strong supervisory mechanisms

Partnerships and collaboration

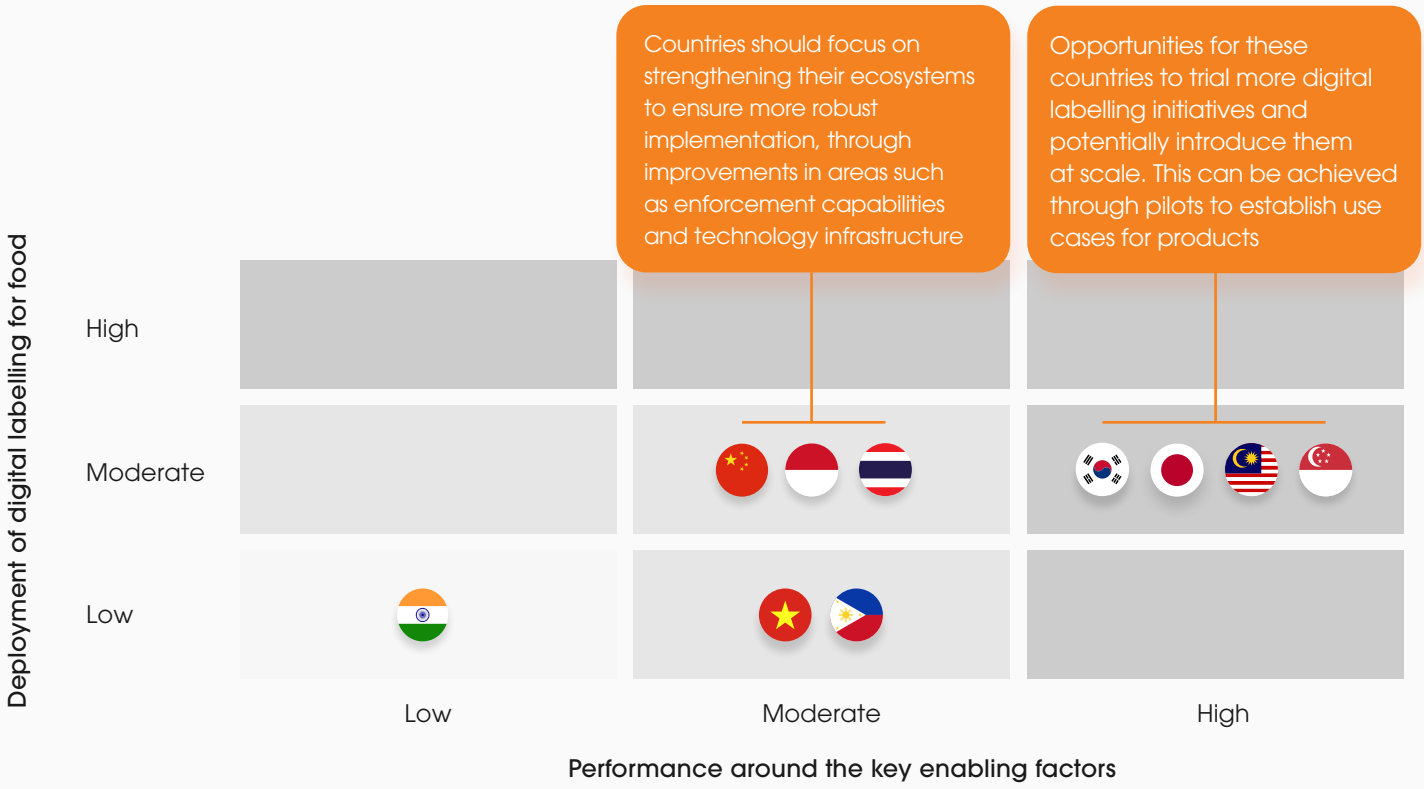
- Strong partnership between supply chain partners and regulators
- Strong collaboration across relevant government units
- Participation in international and/or regional forums on harmonisation of food labelling standards

[9] SOURCE: AlphaBeta analysis

Countries' Readiness on Digital Labelling[10]

Countries are scored across the ten enabling factors based on the following criteria: if the country has widespread use of digital labelling for food (e.g., used in almost all food categories), they were scored 'high'. 'Moderate' score given if there were some pilots for digital labelling in place or if digital labelling was used for one or more major food product(s) (e.g., halal meat, fresh produce). They were scored 'low' if there was limited evidence of use of digital labels currently. 'Performance around the enabling factors' was scored based on the total performance of countries around the key enabling factors.

The scoring of the vertical axis was based on the presence of use cases of digital labelling for food while the scoring of the horizontal axis was on the total performance around the 10 key enabling factors identified.



In most countries, food labelling regulations have already been well-established. Digital labelling regulations are, however, either absent or still being considered in most countries.

Korea has been observed leading the performance among the studied markets, together with Singapore, Japan, and Malaysia following closely behind. Hence, there are opportunities for these countries to trial more digital labelling initiatives and potentially introduce them at scale through pilot projects. India, Philippines and Vietnam, on the other hand, are found to have comparatively lower performance than the remaining studied markets. As a result, these countries should focus on strengthening their ecosystems to ensure more robust implementation of digital labelling, through improvements in areas such as enforcement capabilities and technology infrastructure.

[10] Sources: Desktop research; expert interviews; AlphaBeta analysis

Key Takeaways

The high level of willingness and awareness amongst consumers on digital labelling across the ten surveyed markets exhibit a solid foundation for deeper discussions on how the stakeholders – governments, F&B businesses, food retailers, and service providers can collectively build strong relationships and alliances, to seize opportunities from the shift of traditional physical labels into a more digitalised and smarter future for food labels.

A stronger nudge on consumer education by both the F&B industry and government is needed to build digital awareness and penetration. The government should also strengthen its development of related regulations/standards to mediate the move toward digital labels.

Additional efforts may be required as well to promote regional and/or international harmonisation on the approach towards digital labelling, seizing the advantages of digital labelling systems.

Furthermore, the launch of a pilot programs by F&D businesses for selected products can be done to optimise the use of digital labels and in turn ease the labelling transition.

However, balancing the engagement between digitally connected and disconnected consumers will be tricky for the industry players. To overcome it, collaborations can be done among the government, food retailers, and manufacturers, to provide further education and incentives to the consumers to promote digital labelling adoption.

By Food Industry

Launch pilot programs

Promote multi-stakeholder collaborations

Launch consumers awareness programs

By Regulators

Develop enabling digital labelling regulations

Facilitate regional/ international harmonisation

Survey Methodology

How the consumer survey was conducted

The survey was conducted via online panels with respondents from China, India, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam.

A **total of 2542 responses** were collected in December 2021

n=255 CHINA	n=254 INDIA
n=255 INDONESIA	n=255 JAPAN
n=254 KOREA	n=255 MALAYSIA
n=255 PHILIPPINES	n=252 SINGAPORE
n=252 THAILAND	n=255 VIETNAM

n=254 AVERAGE

Want to know more? Contact Jiang YiFan, Associate Director, Science & Regulatory Affairs, Food Industry Asia at **yifan.jiang@foodindustry.asia**.

Gender

Male	Female
52%	48%

Age Group

Male n=74	**18-20** 7.2%	Female n=103
Male n=293	**21-30** 27.7%	Female n=412
Male n=359	**31-40** 29.4%	Female n=388
Male n=238	**41-50** 17.7%	Female n=213
Male n=142	**51-60** 10.1%	Female n=116
Male n=90	**61-70** 6.1%	Female n=64
Male n=24	**+71** 1.8%	Female n=19

About Food Industry Asia

Food Industry Asia (FIA) was formed in 2010 to enable major food manufacturers and B2B ingredients suppliers to speak with one voice on complex issues such as health and nutrition, food safety, sustainability, and regulations and trade. From its base in Singapore, FIA seeks to enhance the industry's role as a trusted partner and collaborator in the development of science-based policy throughout Asia.

Find out more about us at **foodindustry.asia**.

Appendix – Current Digital Labelling Regulatory Status

Codex Alimentarius Commission

During the 44th Session of the Codex Committee on Food Labelling (CCFL46), the Committee had agreed to start new work on the use of technology in food labelling. The scope of the proposed work covers labelling information provided via technology, such as QR code, with respect to a prepackaged food that is present with the consumers or for catering purposes. Furthermore, the new work proposed to review the General Standard for the Labelling of Prepackaged food (GSLPF) and to develop a broad guidelines for the use of technology in food labelling.

International Organisation for Standardisation (ISO)

The ISO had established a multi-part standard, ISO/IEC 226603 [11,12], to establish the general requirements for electronic product labelling which can be applicable to all types of product regardless of industry. The term electronic product labelling is used to describe electronically stored and displayed compliance markings, statements and other product information using a website, a machine-readable code and/or e-Label.

Information contained in an electronic product label shall include manufacturer's identity, product identity, technical information of the food product, responsible party of the assurance of a working link between the product and the electronic product labelling, other product information and archive of compliance changes. Technical information of the food product comprises of list of ingredients, nutrition information and Halal certification. Furthermore. Instruction as to how to access the information within the electronic product label shall accompany the electronic product label.

The electronically stored and displayed information, and active links shall be maintained for at least the shelf-life of the product. In addition, updates on the information may be made during the shelf-life of the product to maintain continuity with changes to product certifications or other information. The update can be done either directly or be maintained separately as an archive. An indication that an update has been made and instructions as to how to access the update archive can be included should the manufacturer choose to update the electronic product labelling as an archive.

For website reference, the Web address of the electronic product label shall be provided by printing on the product packaging, along with a machine-readable code for the website address.

For machine-readable code, the code shall be printed on the product packaging and be scannable using a smartphone, barcode scanner, webcam or other similarly functional device and supporting application(s). Moreover, the marking shall be clear, legible, and maintain aspect ratio. When the product carries more than one machine readable code, the one used for electronic product labelling shall be clearly identified. Lastly, access to the electronic product label shall be achieved in no more than three steps from the manufacturer's website or home menu. The access shall be made available without any special codes, accessories, registrations or permissions. The website should also be publicly available without fees, non-proprietary and usable by all operating system platforms.

United States of America (USA)

The U.S. Department of Agriculture (USDA) issued the Bioengineered (BE) Food Disclosure Standard[13]

[11] ISO. (2021). ISO/IEC 22603-1:2021(en) Information Technology – Digital representation of product information. Retrieved 20 July 2022 from https://www.iso.org/obp/ui/#iso:std:iso-iec:22603:-1:ed-1:v1:en
[12] ISO. (2021). ISO/IEC 22603-2(en) Information Technology – Digital representation of product information – Part 1: General requirements. Retrieved 20 July 2022 from https://www.iso.org/obp/ui/#iso:std:iso-iec:22603:-2:dis:ed-1:v1:en
[13]Federal Register. (21 December 2018). National Bioengineered food Disclosure Standard. Retrieved 27 June 2022 from https://www.federalregister.gov/documents/2018/12/21/2018-27283/national-bioengineered-food-disclosure-standard

to disclose information about BE food and ingredients on food labels, with electronic or digital link as one of the approved disclosure option. The accepted technologies include QR codes that are detectable by consumers and digital watermark technology that is imperceptible to consumers but can be scanned anywhere on a food package using a smart phone or other device. These technologies may or may not include an embedded Uniform Resource Locator (URL). Alternative statements can also appear above or below an electronic or digital link to direct consumers to the link to the BE food disclosure, such as `Scan here for more information' or equivalent words.

Furthermore, a telephone number that a consumer can call to access the disclosure information shall be located in close proximity to the electronic or digital link, along with the statement "Call xx for more food information". The telephone number must be available at all times of the day and provide BE food information to the caller clearly. Pre-recorded information is permitted.

Lastly, the product information page accessed through the electronic or digital link shall not contain any marketing or promotional information. The electronic or digital link disclosure may not collect, analyse, or sell any personally identifiable information about consumers or the devices of consumers. However, if this information must be collected to conduct the purposes of the BE disclosure, the information must be deleted immediately and not used for any other purpose.

Australia

The Australian authority has commissioned a study to investigate potential for digital food labelling in Australia[14]. The report found that Australia's food industry is already considering ways to collect and provide digital food product information, and this will be used to inform the future development of digital food labelling.

India

The Food Safety and Standards Authority (FSSAI) issued the Food Safety and Standards (Labelling and Display) Regulations, 2020[15], introducing barcode/Global Trade Identification Number (GTIN) as a method of presentation for the address of the brand owner and license number of the manufacturer, packer, or bottler for both retail and non-retail prepackaged food products. Nutrition information may also be provided in the GTIN as well.

Indonesia

The National Agency of Drug and Food Control (BPOM) issued a Regulation No. 33/2018 on Implementation of 2D Barcode in order to Improve Effectiveness of Medicines and Processed Food Supervision[16] and Regulation No. 26/2021 on Nutritional Value Information on Processed Food Labels[17]. The former requires processed food that has obtained a registration number after 7 December 2018 to apply 2D Barcode Identification issued by BPOM on the product label, containing information of registration number and expiry date of the product. Special nutrition processed food that has similarly obtained a registration number after 7 December 2018 will also be required to apply 2D Barcode Identification issued either by BPOM or business entity. More detailed information, batched number, production code and serial number of the product, is included in the barcode. The latter regulation allows nutrition value information to be presented in the form of 2D barcodes for food products with packaging surface area less than or equal to 30 cm2 and glass bottles that are reusable or returnable.

[14] Australian Government. (25 February 2022) Country of origin food labels - Digitising food product data for consumers. Retrieved 27 June 2022 from https://www.industry.gov.au/regulations-and-standards/country-of-origin-food-labels
[15] FSSAI. (18 November 2020). Food Safety and Standards (Labelling and Display) Regulations, 2020. Retrieved on 27 June 2022 from https://www.fssai.gov.in/upload/notifications/2020/12/5fd87c6a0f6adGazette_Notification_Labelling_Display_14_12_2020.pdf
[16] BPOM. (2018). Regulation No. 33/2018 on Implementation of 2D Barcode in order to Improve Effectiveness of Medicines and Processed Food Supervision. Retrieved on 27 June 2022 from https://jdih.pom.go.id/download/product/803/33/2018
[17] BPOM. (2021). Regulation No. 26/2021 on Nutritional Value Information on Processed Food Labels. Retrieved on 27 June 2022 from https://standarpangan.pom.go.id/dokumen/peraturan/202x/PERATURAN_BADAN_PENGAWAS_OBAT_DAN_MAKANAN_NOMOR_26_TAHUN_2021_TENTANG_INFORMASI_NILAI_GIZI_PADA_LABEL_PANGAN_OLAHAN.pdf