

Acceptance and effectiveness of the Healthier Choice Logo (HCL) among food industries in Malaysia

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ABSTRACT

Introduction: The Healthier Choice Logo (HCL) was introduced in 2017 by the Ministry of Health Malaysia. This paper analysed acceptance of HCL, effectiveness of HCL in encouraging healthier product reformulation, and factors affecting reformulation among food industries. **Methods:** An online self-administered questionnaire consisting of four sections utilising multiple choice and 5-point Likert scale questions was distributed to food industries in Malaysia. Sample size calculation yielded 100 respondents. **Results:** Food industries had a higher acceptance of the processes and requirements involved in HCL implementation. HCL was highly effective in encouraging product reformulation among food industries in Malaysia. Meeting consumer demand, improving brand image, public health, more awareness around nutrition labelling, logo and national nutrition target, more technical knowledge and budget were found to motivate healthier product reformulation. However, product suitability, consumer acceptability, difficulties maintaining taste and shelf life, and limited budget were the challenges faced in product reformulation. There was no correlation between HCL acceptance and factors encouraging or inhibiting reformulation. **Conclusion:** These findings are expected to help relevant authorities or stakeholders make changes, if necessary, towards processes and requirements involved in HCL application to ensure wider HCL implementation. Future research should identify the relationship between HCL implementation and public health improvement among the Malaysian population.

Keywords: consumer, food industries, food label, healthier choice logo

INTRODUCTION

Unhealthy diet is a risk factor for non-communicable diseases (NCDs), including diabetes, hypertension, and hypercholesterolaemia (Kaldor, 2018). As many as 1.7 million Malaysians have all three NCDs, and 3.4 million have at least two NCDs (IPH, 2019). Since most packaged foods and beverages contribute

to high sugar, salt, and fat consumption, logo implementation could encourage industries to reformulate healthier products (Ministry of Health Malaysia, 2017).

The Healthier Choice Logo (HCL) is a voluntary scheme introduced by the Malaysian government to promote healthier food choices and to reduce

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the prevalence of non-communicable diseases (NCDs) among the population. The HCL is awarded to food products that meet certain nutrient content and composition criteria, such as lower levels of sugar, salt and fat, and higher levels of fibre and whole grains. The logo is intended to provide consumers with an easy way to identify healthier food options and encourage manufacturers to reformulate their products to meet the criteria.

Despite the potential benefits of the HCL scheme, there needs to be more research on its acceptance and effectiveness among food industries in Malaysia. While some studies have examined the awareness and perception of the HCL among consumers (Kamaruddin, Ismail & Aziz, 2015; Fathelrahman, Ibrahim & Osman, 2020), there is a gap in the literature on the perspectives and experiences of food manufacturers in implementing the HCL criteria and applying the logo to their products. This research gap is important to address, as the success of the HCL scheme depends on the food industry's cooperation and support.

The acceptance and effectiveness of HCL among food industries in Malaysia is significant for several reasons. Firstly, understanding the factors that influence food manufacturers' decisions to participate in the scheme and their experiences in implementing the criteria can provide insights into the challenges and opportunities for promoting healthier food options in the country. This information can be used to refine the HCL criteria and to develop strategies to encourage more companies to participate in the scheme.

Secondly, investigating the effectiveness of the HCL in promoting healthier food choices and reducing the prevalence of NCDs is important for evaluating the scheme's impact on public health. While the HCL has

been in place for several years, there needs to be more evidence of its impact on consumer behaviour and health outcomes. Evaluating the effectiveness of the HCL can provide valuable information for policy makers and public health advocates on the potential benefits of the scheme and the areas where improvements are needed.

Finally, the research gap in the acceptance and effectiveness of HCL among food industries in Malaysia is important for addressing global concerns about the rising prevalence of NCDs and the role of food manufacturers in promoting healthier diets. Like many other countries, Malaysia faces a growing burden of NCDs, such as diabetes, hypertension, and obesity, which are linked to unhealthy diets. Encouraging food manufacturers to reformulate their products to meet the HCL criteria and to apply the logo to their healthier options can reduce the prevalence of these diseases and improve the population's overall health. This study aimed to determine the acceptance of HCL, the effectiveness of HCL in encouraging healthier product reformulation, and factors affecting reformulation among food industries.

MATERIALS AND METHODS

Respondents from manufacturing companies ranging from micro-enterprises to large industries in Malaysia were recruited using a convenient sampling method. Individuals working in the food and beverage (F&B) industry with access to internet connection and mobile devices were included as respondents of this study. In contrast, individuals from food chains and restaurants in the food service sector were excluded. However, a specific procedure for recruiting subjects to avoid biases and represent the Malaysian manufacturing industry could not be implemented due to poor

industry cooperation and the COVID-19 pandemic.

Sample size calculation

Based on a desired confidence level of 95%, a margin of error of 5%, and a conservative expected response rate of 50%, we calculated the initial sample size required based on Cochran (1977) as follows:

$$n = (1.96^2 * 0.5 * 0.5) / 0.05^2$$

$$n = 384.16 = 385$$

$$\text{Sample size} = \frac{\text{desired final sample size}}{(1 - \text{dropout rate})}$$

$$\text{Sample size} = 100 / (1 - 0.2)$$

$$\text{Final sample size} = 125 \text{ industries}$$

The questionnaire was designed to be self-administered and distributed through online platforms and social media such as emails, Facebook, WhatsApp, and Instagram. This research utilised a quantitative method through primary data collection via Google Forms. To establish content validity, fourteen (14) chosen experts in nutrition labelling and front-of-pack nutrition labelling (FOP-NL) evaluated the questionnaires considering the difficulty of phrases, inappropriateness, and ambiguity. Each expert rated the relevance of each item in the questionnaire using a 4-point Likert scale (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=highly relevant). The internal consistency was estimated, and its reliability was determined by the test-retest method using Cronbach's alpha coefficient. The questionnaire was piloted among 23 subjects from micro-enterprises to large industries and improved for its intended purpose and usefulness. The average time taken to complete the questionnaire was about 15 minutes.

The questionnaire consisted of four sections utilising multiple choice and 5-point Likert scale (1=strongly

disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree) questions. Section A collected data on the respondents' general characteristics on the type of industry, products manufactured, location, and position in the company. Section B contained sixteen (16) questions about the food industry's acceptance of the processes and requirements involved in implementing HCL. In Section C, six (6) questions were asked related to the effectiveness of HCL in producing healthier food products, category of products, and revenue of HCL products. In Section D, there were ten (10) questions to gather information related to product reformulation, factors that influenced the industry to apply for HCL, and challenging factors to reformulate products. The concept used in the given questionnaire was the survey research methodology (Sulong, Salleh & Ali 2019; Gressier, Sassi & Frost 2020; Young & Swinburn, 2002).

Ethical approval

The questionnaire was self-administered and participants provided digital consent via Google Form to ensure privacy. The study was approved by the Universiti Teknologi MARA Research Ethics Committee ref. no: REC/06/2021 (MR/396). The project was registered with the National Medical Research Register (NMRR) ref.no: NMRR-21-1062-60203. All information from the questionnaire, including the respondents' personal information, were kept confidential.

Data analysis

Data were analysed using IBM SPSS Statistics for Windows version 26.0 (IBM Corp, Armonk, New York, USA). Descriptive statistics, such as frequency and percentages, described answers for multiple choice and Likert scale questions. Mean and standard deviation were reported for ordinal data. Mean and

standard deviation score interpretation were obtained from Zambrano *et al.* (2019).

RESULTS

Demographic characteristics of the survey respondents are shown in Table 1. The survey had 100 respondents, 24% from micro-enterprises, 25%, 24%, and 27% from small, medium, and large industries, respectively. Most respondents were from manufacturing companies (64.4%), followed by importers, distributors, exporters, and traders. Most respondents were from the Central Region (46.0%). The greatest number of respondents held positions in regulatory affairs (21.0%), followed by technical or quality assurance (20.0%), general management (15.0%), marketing, communication, public relations (14.0%), research and development (12.0%), and nutrition (9.0%). Most respondents were from companies manufacturing cereals, dairy products, soups, sauces, and recipe mixes.

Acceptance of HCL

Table 2 revealed several important findings related to the food industry's acceptance towards the processes and requirements involved in HCL implementation. The respondents agreed that HCL nutrient criteria should be developed by independent experts who are non-industry related, but still consider opinions from the industry. Half of the respondents agreed that HCL had covered most of the market's major food and beverage categories. However, there was a need to expand a new product category under HCL, which includes several products such as extruded snacks, health and wellness products, meat essence, herbal products, confectionaries, convenience frozen meals, fats and oil, soup, sauces, plant-based products, and processed meat. A

quarter of the respondents agreed that HCL should be made compulsory for certain food categories, including sugar-sweetened beverages, widely consumed staple foods like cereal and dairy products, baked goods, processed foods, canned foods, convenience foods such as instant noodles, and fats and oil. The survey found that half of the respondents agreed that the online application was helpful and user-friendly, while the duration for the application to get approved and the payment needed to do food analysis before the application were acceptable.

Table 3 shows factors motivating companies to reformulate products and apply for the HCL. Findings from the study suggested that there was a consensus among the respondents that HCL should make positive nutrients a mandatory criterion. This indicated a growing interest in promoting healthier food choices and a move away from simply focusing on reducing negative nutrients. Additionally, the study found that respondents believed that related government policies, such as sugar-sweetened beverage taxation and marketing policy should make the HCL programme their main reference. This suggested greater coordination between policy interventions to promote healthier diets. The study also highlighted varying opinions on the revision period for HCL nutrient criteria. While a third of the respondents believed the revision period should be fixed at two years, nearly another one-third believed it should be extended to three years. A quarter of the respondents suggested a revision period of five years. These findings suggested a need for careful consideration and dialogue around the optimal revision period for HCL nutrient criteria. Other countries that are also implementing the FOP labels, for example Singapore, performs a continuous review of their

Table 1. Demographic data of respondents (N=100)

| <i>Demographic category</i> | <i>Frequency</i> | <i>Percentage (%)</i> |
|--|------------------|-----------------------|
| Type of industry | | |
| Large industry | 27 | 27.0 |
| Small industry | 25 | 25.0 |
| Medium industry | 24 | 24.0 |
| Micro-enterprise | 24 | 24.0 |
| Type of company | | |
| Manufacturer | 85 | 64.4 |
| Distributor | 25 | 18.9 |
| Importer | 17 | 12.9 |
| Trading | 4 | 3.0 |
| Exporter | 1 | 0.8 |
| Category of product sold by the company | | |
| Beverages | 49 | 32.0 |
| Cereals | 28 | 18.3 |
| Dairy products | 17 | 11.1 |
| Soup, sauces, seasonings, flavouring, colouring and recipe mixes | 14 | 9.2 |
| Meat, poultry, and eggs | 9 | 5.9 |
| Confectionary and desserts | 9 | 5.9 |
| Fruits and vegetables | 7 | 4.6 |
| Fish and fish products | 7 | 4.6 |
| Fats and oil | 6 | 3.9 |
| Snacks and convenience foods | 3 | 2.0 |
| Legumes, nuts, and seeds | 3 | 2.0 |
| Supplementary foods | 1 | 0.7 |
| Location of company | | |
| Central region | 46 | 46.0 |
| North region | 23 | 23.0 |
| Federal territory | 13 | 13.0 |
| Southern region | 11 | 11.0 |
| Sabah and Sarawak | 4 | 4.0 |
| East coast region | 3 | 3.0 |
| Position/ expertise in the company | | |
| Regulatory affairs | 21 | 21.0 |
| Technical/Quality Assurance | 20 | 20.0 |
| General management | 15 | 15.0 |
| Marketing/Communication/Public relation | 14 | 14.0 |
| Research and development | 12 | 12.0 |
| Nutrition | 9 | 9.0 |
| Production/Manufacturing | 7 | 7.0 |
| Procurement | 2 | 2.0 |

Table 2. Food industry's acceptance towards Healthier Choice Logo (HCL) (N=100)

| Question | Strongly disagree (%) | Disagree (%) | Neutral (%) | Agree (%) | Strongly agree (%) | Mean±SD |
|---|-----------------------|--------------|-------------|-----------|--------------------|-----------|
| HCL has covered most of the major food and beverages categories in the market | 4.0 | 20.0 | 19.0 | 51.0 | 6.0 | 3.35±0.99 |
| There is a need to expand a new product category under HCL | 3.0 | 0.0 | 25.0 | 50.0 | 22.0 | 3.88±0.85 |
| There are still a few food categories in the market not yet covered under HCL | 0.0 | 7.0 | 59.0 | 26.0 | 8.0 | 3.35±0.73 |
| HCL should be made compulsory for certain food categories | 3.0 | 26.0 | 38.0 | 26.0 | 7.0 | 3.08±0.96 |
| The online application of HCL is helpful and user-friendly | 1.0 | 1.0 | 24.0 | 54.0 | 20.0 | 3.91±0.75 |
| The duration of the HCL application being processed and approved is approximately 2-4 weeks. This duration is acceptable | 1.0 | 18.0 | 20.0 | 58.0 | 3.0 | 3.44±0.85 |
| The food analysis process may necessitate payment or a charge to the laboratory that performs the analysis. It is acceptable for your organisation to pay the cost of analysis before the HCL application | 6.0 | 12.0 | 24.0 | 52.0 | 6.0 | 3.40±0.98 |
| Government should impose a fee for applicants to get HCL | 31.0 | 32.0 | 18.0 | 15.0 | 4.0 | 2.29±1.17 |
| HCL nutrient criteria should be developed by independent experts (non-industry related) but still take into account the opinions and comments from the industry at the consultation stage | 1.0 | 12.0 | 20.0 | 57.0 | 10.0 | 3.63±0.86 |
| HCL should include positive nutrients as mandatory nutrient criteria | 4.0 | 2.0 | 16.0 | 55.0 | 23.0 | 3.91±0.91 |
| HCL should be the main reference for other related government policies (e.g., sugar-sweetened beverage taxation, marketing policy, etc.) | 2.0 | 4.0 | 15.0 | 57.0 | 22.0 | 3.93±0.84 |
| There is a need to harmonise HCL nutrient criteria and logo among ASEAN countries (label sharing) | 1.0 | 1.0 | 17.0 | 56.0 | 25.0 | 4.03±0.74 |
| Healthy eating reduces the risk of getting non-communicable diseases (NCDs) such as diabetes, hypertension, and hypercholesterolaemia. HCL can help tackle the rising prevalence of NCDs in Malaysia | 1.0 | 2.0 | 14.0 | 52.0 | 31.0 | 4.10±0.78 |

Table 3. Factors motivating companies to reformulate products and apply for Healthier Choice Logo (HCL) (N=100)

| <i>Factors motivating companies to apply for HCL</i> | <i>Strongly disagree</i> <i>n (%)</i> | <i>Disagree</i> <i>n (%)</i> | <i>Neither agree nor disagree</i> <i>n (%)</i> | <i>Agree</i> <i>n (%)</i> | <i>Strongly agree</i> <i>n (%)</i> | <i>Mean±SD</i> |
|--|--|---------------------------------|---|------------------------------|---------------------------------------|----------------|
| Meet consumer demand | 0 (0.0) | 2 (4.3) | 13 (27.7) | 26 (55.3) | 6 (12.8) | 3.77±0.72 |
| Responding to government's call | 0 (0.0) | 1 (2.1) | 11 (23.4) | 25 (53.2) | 10 (21.3) | 3.94±0.73 |
| Improve brand/business image | 0 (0.0) | 0 (0.0) | 5 (10.6) | 28 (59.6) | 14 (29.8) | 4.19±0.61 |
| Application of HCL by other brands | 0 (0.0) | 4 (8.5) | 12 (25.5) | 26 (55.3) | 5 (10.6) | 3.68±0.78 |
| Improve public health | 0 (0.0) | 1 (2.1) | 7 (14.9) | 27 (57.4) | 12 (25.5) | 4.06±0.70 |
| Prediction of increase in sales | 0 (0.0) | 0 (0.0) | 13 (27.7) | 27 (57.4) | 7 (14.9) | 3.87±0.64 |
| Producing healthier products is a part of company's vision | 0 (0.0) | 2 (4.3) | 3 (6.4) | 28 (59.6) | 14 (29.8) | 4.15±0.72 |
| Cost saving | 4 (8.5) | 7 (14.9) | 22 (46.8) | 11 (23.4) | 3 (6.4) | 3.04±0.99 |
| Company feels that it is the right thing to do | 0 (0.0) | 0 (0.0) | 6 (12.8) | 28 (59.6) | 13 (27.7) | 4.15±0.62 |

Table 4. Factors encouraging reformulation among food industries (N=100)

| <i>Factors encouraging your company to reformulate</i> | <i>Strongly disagree</i> <i>n (%)</i> | <i>Disagree</i> <i>n (%)</i> | <i>Neither agree nor disagree</i> <i>n (%)</i> | <i>Agree</i> <i>n (%)</i> | <i>Strongly agree</i> <i>n (%)</i> | <i>Mean±SD</i> |
|--|--|---------------------------------|---|------------------------------|---------------------------------------|----------------|
| More awareness on public health priorities | 1 (1.0) | 1 (1.0) | 11 (11.0) | 64 (64.0) | 23 (23.0) | 4.07±0.68 |
| More awareness regarding nutrition labelling and existing logo | 1 (1.0) | 1 (1.0) | 14 (14.0) | 58 (58.0) | 26 (26.0) | 4.07±0.72 |
| More awareness on national nutrition targets or standard in line with national health agenda | 0 (0.0) | 2 (2.0) | 9 (9.0) | 68 (68.0) | 21 (21.0) | 4.08±0.61 |
| More technical knowledge | 1 (1.0) | 2 (2.0) | 24 (24.0) | 56 (56.0) | 17 (17.0) | 3.86±0.75 |
| Supported by consumer testing | 0 (0.0) | 3 (3.0) | 13 (13.0) | 63 (63.0) | 21 (21.0) | 4.02±0.68 |
| Improving internal communication | 0 (0.0) | 2 (2.0) | 24 (24.0) | 59 (59.0) | 15 (15.0) | 3.87±0.67 |

Table 5. Reformulation challenges among food industries (N=100)

| Reformulation challenges | Strongly disagree n (%) | Disagree n (%) | Neither agree nor disagree n (%) | Agree n (%) | Strongly agree n (%) | Mean±SD |
|---|----------------------------|-------------------|--|----------------|----------------------------|-----------|
| Product suitability to be reformulated | 0 (0.0) | 14 (14.0) | 19 (19.0) | 58 (58.0) | 9 (9.0) | 3.62±0.83 |
| Consumer acceptability | 1 (1.0) | 6 (6.0) | 17 (17.0) | 56 (56.0) | 20 (20.0) | 3.88±0.83 |
| Companies should not interfere in consumers' choice to be healthier | 3 (3.0) | 19 (19.0) | 37 (37.0) | 34 (34.0) | 7 (7.0) | 3.23±0.94 |
| Budget limitation | 1 (1.0) | 8 (8.0) | 26 (26.0) | 51 (51.0) | 14 (14.0) | 3.69±0.84 |
| Limited technical resources or expertise | 0 (0.0) | 13 (13.0) | 29 (29.0) | 43 (43.0) | 15 (15.0) | 3.60±0.89 |
| Difficulties in sourcing ingredients | 1 (1.0) | 19 (19.0) | 31 (31.0) | 38 (38.0) | 11 (11.0) | 3.39±0.95 |
| Shelf life | 2 (2.0) | 15 (15.0) | 29 (29.0) | 44 (44.0) | 10 (10.0) | 3.45±0.93 |
| Difficulty maintaining texture or taste or colour | 1 (1.0) | 6 (6.0) | 19 (19.0) | 51 (51.0) | 23 (23.0) | 3.89±0.86 |
| Not company's priority to produce healthier product | 19 (19.0) | 30 (30.0) | 32 (32.0) | 17 (17.0) | 2 (2.0) | 2.53±1.04 |

Healthier Choice Symbol nutrient guideline to stay relevant and to fit current nutritional concerns (Health Promotion Board, 2020). van der Bend *et al.* (2020) reported that the Dutch Choices product criteria are revised every four years, while a study by Dötsch-Klerk & Jansen (2011) showed that the nutrient criteria of the Netherlands' Choices logo ("Ik Kies Bewust" logo) are reviewed every two years. The Finnish Heart Symbol's nutrient criteria are also updated regularly when needed (Sydänmerkki, 2012).

Effectiveness of HCL

Table 4 shows the factors encouraging reformulation among food industries. The survey results suggest that food industries are motivated to engage in reformulation by factors such as awareness of public health priorities (64.0% agree and 23.0% strongly agree), nutrition labelling (58.0% agree and 26.0% strongly agree), alignment with national health targets (68.0% agree and 21.0% strongly agree), technical knowledge (56.0% agree and 17.0% strongly agree), consumer testing support (63.0% agree and 21.0% strongly agree), and internal communication improvement (59.0% agree and 15.0% strongly agree). These findings highlight the multifaceted nature of influences driving reformulation efforts in the food industry.

Most respondents were from manufacturing companies, indicating that food industry is an important sector of the economy. The distribution of respondents across micro-enterprises and small, medium, and large industries suggested a diverse representation of the food industry. The Central Region had the highest number of respondents, which may indicate that the region has a more significant impact on the food industry. The positions held by respondents highlight the regulatory and quality control aspects of the food

industry, indicating that these areas are critical to the industry's success.

Product reformulation

Table 5 shows the reformulation challenges among food industries. One important finding from the survey was that a significant number of companies (47 out of 100) had either completed or started the reformulation process, with the majority citing HCL as the reason for doing so. Additionally, the companies reported high motivation for reformulation, including meeting consumer demand, responding to government calls, improving brand image, and improving public health. Another interesting finding was that the cost factor did not motivate companies to apply for HCL, with medium agreement among respondents. The survey results also suggested that the responses were reliable, with low dispersion and most answers clustered around the mean values.

DISCUSSION

Most respondents were from manufacturing companies, indicating that the food industry is an important sector of the economy. The distribution of respondents across micro-enterprises and small, medium, and large industries suggested a diverse representation of the food industry. The Central Region had the highest number of respondents, which may indicate that the region had a more significant impact on the food industry. The positions held by respondents highlighted the regulatory and quality control aspects of the food industry, indicating that these areas are critical to the industry's success.

Since the HCL was launched in Malaysia in 2017, about 53% of food industries surveyed have successfully obtained the logo for any of their products. Food groups with the highest uptake

rates of the HCL logo were beverages, followed by dairy and dairy products, as well as cereals. Approximately one in two products (51.3%) displaying the HCL logo has already complied with the HCL criteria. In contrast, one-fifth of the respondents have had their products reformulated to some extent, giving small but significant favourable changes in the nutrient contents compared with product composition before the adoption of HCL. The most reformulated nutrient content were total sugar, fat, and fibre. In contrast, protein, sodium, vitamin D, and calcium contents were only reformulated by a few companies.

A study by Mhurchu, Eyles & Choi (2017) showed that products with Health Star Rating (HSR) star graphic logos in New Zealand have reported a reduction in saturated fat, total sugar, and sodium with an increase in fibre content. Tick labelling in New Zealand has also produced positive changes where the energy, saturated fat, trans fat, and sodium of Tick products were reduced (Young & Swinburn, 2002). FOP labels in the Netherlands successfully reduced sodium, trans fat, and sugar, while fibre was increased in food products with the label. Meanwhile, the Canadian Health Check programme has also successfully encouraged food manufacturers to reduce the sodium content in their products (Dummer, 2012). A similar Canadian study surveyed 14 Health Check program licensees representing 371 products and found that 150 products had their sodium content reduced in order to meet the criteria, leading to a total reduction of over 322,000 kg of sodium 2004 (Dummer, 2012). These successful healthier product reformulations have shown that a healthy choice logo was highly accepted among food industries in these countries (van der Bend *et al.*, 2020). In Malaysia, the HCL has also succeeded in encouraging healthier product

reformulation among food industries; however, there is not enough evidence to suggest an association between HCL acceptance among food companies and food companies having products with HCL.

Consistent with other findings, a few factors motivated the respondents to apply for HCL, including meeting consumer demand. This is because current rising health trends have positively influenced consumers to eat more healthily, eventually stimulating food industries to fulfil the consumers' wants and needs by reformulating their products towards healthier versions (van der Werf, 2018). Almost three-fourths of the respondents agreed that their HCL applications were meant to respond to the government's call. A study by Gressier *et al.* (2020) mentioned that manufacturers are constantly changing their product formulation to cater to consumers' demand, lower production costs, widen profit margins, or respond to the government's call, as many governments have developed a reformulation policy to tackle the increasing prevalence of NCDs. Findings showed that nine out of ten respondents who applied for HCL did that to improve their brand or business image, just like how Scrinis (2015) stated that food businesses use health concerns as a drive to innovate products, improve brand image, and develop new markets. Besides, the application of HCL by other brands encouraged more than half of the respondents to apply for HCL, which may be for competitive reasons, as mentioned by van der Werf (2018) and Scott & Nixon (2017). More than 80% of the respondents agreed that improving public health motivated them to apply for the HCL. Public health will have a positive impact with a higher number of manufacturers having the same purpose of pursuing HCL, given that manufactured foods and beverages contribute a lot to the

diet of their consumers (Scrinis, 2016). These previous findings indicate HCL's effectiveness towards encouraging healthier product reformulation among food industries in Malaysia.

The findings also showed that more than half of the respondents agreed that product suitability was one of the factors that hindered product reformulation. Collaboration between research institutions and ingredient suppliers is necessary to find the most suitable alternative ingredient that can drive reformulation (Van der Werf, 2018). However, the clean label trend needs to be considered because consumers are aware of the negative effects of some alternative ingredients; therefore, they demand natural alternative ingredients. This is consistent with the finding that reported high levels of agreement on the matter of HCL nutrient criteria that should be developed by non-industry related independent experts, while still considering opinions from the industry. A study by Mozaffarian *et al.* (2018) also showed that decisions in health-related policies are to be made by those without any commercial interest.

The strengths of this study lie in its comprehensive analysis, diverse industry representation, and timely research. Firstly, the study undertook a comprehensive analysis of the HCL programme, examining multiple aspects such as its acceptance, perceived effectiveness, and the challenges faced by food industries in adopting the programme. This thorough examination allowed for a comprehensive understanding of the programme's impact and identified areas for improvement. Secondly, the study included representatives from various food industry sectors, including manufacturers, retailers, and food service operators. This diverse industry representation provided a holistic view of the challenges and opportunities different

stakeholders faced in implementing the HCL programme. Considering multiple perspectives, the study's findings were more robust and reflected the overall industry landscape. Lastly, the research was conducted recently, ensuring the information gathered were up-to-date and relevant. With the dynamic nature of the food industry and evolving regulations, it is essential to have timely research that captures the current acceptance and effectiveness of the HCL programme in Malaysia. This aspect adds value to the study and enhances its applicability for policy makers and industry professionals seeking the most recent insights. One limitation of the study was the potential self-report bias, as the data relied solely on self-reported information from food industry representatives. This introduced the possibility of bias or social desirability effects, where participants may have exaggerated their adoption of the HCL programme to avoid negative judgment or downplayed their difficulties with it. Another area for improvement was the limited exploration of contextual factors that could influence the adoption and effectiveness of the HCL programme. The study did not delve into important factors, such as cultural norms, policy support, or industry competition, which could significantly impact the programme implementation and its overall success.

CONCLUSION

The findings suggested that the HCL programme was highly accepted among food industries as it positively influenced several food manufacturers for healthier product reformulation, leading to increased market share in HCL products. However, we found that financial constraints, limited technical resources, and lower consumer acceptability were among the factors that may hinder food industries from reformulating their

products. Nevertheless, more awareness should be raised around the HCL logo, public health priority, and national nutrition targets to encourage a higher rate of healthier product reformulation among the food and beverage industries. Any nutrition labelling systems, including the FOP (energy) icon, must be accompanied by awareness and education programmes for multi-stakeholders. The findings can inform policy and programme improvements to enhance the programme's effectiveness in promoting healthier food choices.

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Authors' contributions

Norazmir MN, principal investigator, conceptualised and designed the study, prepared the draft of the manuscript and reviewed the manuscript; Fatimah S & Nazli Suhardi I, advised on data analysis and interpretation, and reviewed the manuscript; Laila Hawariy AA, Nur Izzati Aina AZ & Nursyukrina MN, conducted the study, data analysis and interpretation, assisted in drafting of the manuscript, reviewed the manuscript.

Conflict of interest

The authors declare that there is no conflict of interest.

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