THE IMPACT OF FRONT OF PACKAGE (FOP) FOOD NUTRITIONAL LABELLING STANDARDS ON CONSUMER SATISFACTION

By

Haiqa Javed

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Supervisor

Dr. Muhammad Moazzam

Department of Operations and Supply Chain

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Signature of Supervisor with stamp: _____

DR. MUHAMMAD MOAZZAM
Assistant Professor
NUST Business School (NBS)
Sector H-12, Islamabad.

Date: _____

Programme Head Signature with stamp: _____

DR. FARAN AHMED
Assistant Professor
NUST Business School (NBS)
H-12, Sector Islamabad

Date: _____

Signature of HoD with stamp: _____

DR. WAQAS AHMED
Associate Professor
HoD (Operations & Supply Chain)
NUST Business School, H-12, Islamabad

Date: _____

Countersign by

Signature (Dean/Principal): _____

Principal & Dean
Dr. Naukhez Sarwar
NUST Business School

Date: _____

Declaration

This dissertation affirms that none of the included content has been previously submitted in support of any academic qualification or degree. Careful acknowledgment and citation of all sources and references have been carried out in strict accordance with the prescribed academic guidelines and standards. The work presented here is the result of new contributions made to the discipline.

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Abstract

This thesis explores the significant role of food packaging, particularly Front of Package (FOP) food nutritional labeling, in influencing consumer behavior, satisfaction, and preferences. The research adopts a cross-sectional study design and employs purposive sampling, specifically targeting participants based on age, to ensure a representative sample of the Pakistani population. Data were collected through an online survey method, leveraging the convenience and accessibility of the internet to reach a wide and diverse audience. The study's framework encompasses multiple variables, including FOP labeling standards, consumer satisfaction, perceived food quality (PFQ), brand loyalty (BL), and consumer consciousness of nutritional value (CCNV). An innovative aspect of this research is the introduction of CCNV as a moderator, influencing the relationships between FOP labeling and PFQ and FOP labeling and BL. The findings underscore the positive influence of FOP labeling on both PFQ and BL, with PFQ identified as a significant factor affecting consumer satisfaction. This study contributes to our understanding of consumer behavior within the context of FOP food nutritional labeling in Pakistan. The innovative introduction of CCNV as a moderator offers insights into how consumer awareness of nutritional value shapes perceptions and loyalty, with potential implications for marketing and labeling practices aimed at promoting informed consumer choices and healthier eating habits. In conclusion, this research highlights the essential role of food packaging and FOP labeling in shaping consumer behavior and satisfaction, emphasizing the need for alignment between labeling standards and consumer expectations. The insights gained from this study have the potential to inform industry practices and public policy, promoting healthier dietary habits and overall well-being.

Key words: Front-of-package, Food Labeling, Brand Loyalty, Perceived Food Quality, Nutritional Knowledge, Consumer satisfaction.

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Abbreviation

Acronyms	Abbreviations
BL	Brand loyalty
CS	Consumer satisfaction
CCNV	Consumer consciousness of nutrient value
FOP	Front of Package
NFL	Nutrient Fact Label
PFQ	Perceived Food quality

1 Introduction

In the creation or development of any product, packaging is the first unit that is prioritized to maintain and convey product quality especially during transportation, delivery, and usage of the product. In the earlier days, the packaging was designed in a manner that ensures its safety during transportation and that keeps it intact for a longer period. Later, with emerging changes in the demands of manufacturers and customers, other uses of packaging also emerged such as product quality, copyright information from manufacturer and supplying details about products and market tactics (Verma et al., 2021). Furthermore, pertinent product information regarding nutrition and storage began to be included in this detailed process of packaging (Müller & Schmid, 2019). Overall, it can be said that the packaging process is carried out to accomplish numerous tangible and non-tangible goals that are linked to protective measures, communication, handling, and distribution of the product. Multiple packaging materials and techniques have been and continue to be used for packaging of products. These include paper, paperboard, glass, metal, synthetic plastic, biodegradable materials, and edible packaging techniques (Verma et al., 2021). The techniques and materials are supplied according to the commercial demand as required in accordance with ethical manufacturing practices of different product items (Verma et al., 2021).

For packaging of food items, the nutritional information displayed on its product packaging emerged as the most important feature. According to a study, for food items like fruits, vegetables, dry fruits, bakery goods, sauces and dairy products and other food items available in the market, a great emphasis must be placed on its storage period and nutritional value (Dobrucka & Cierpiszewski, 2014). This information must be displayed on the packaging of these products in an easily understandable manner for consumers.

Traditionally, bamboo baskets, wooden containers, and jute sacks were some of the components that were used in earlier times for the packaging of fruits and vegetables. However, while this method was environmentally friendly it also frequently failed to adequately cover a variety of products (Knorr & Watzke, 2019). Even in modern times this manual packaging method is often used by people around the world for packaging of their fruits and vegetables. This lack of knowledge on what consumers are putting in their bodies in terms of food consumption can easily be remedied through modern packaging styles that provide ample nutritional value of food items per serving.

The variety of goods in the market and the manner in which they are utilized are the two factors that play a role in the growth of the packaging industry. New emerging packaging technologies not only produce elegant wrapping, but also guarantee product quality restoration, lengthened storage life, and simplified distribution of goods and storage (Theurich, 2020). It is notable that the packaging of food products and nutritional supplements differs greatly from that of other products, especially pharmaceutical and

biopharmaceutical products. This is because the size and volume of packed food items, their shelf life, usage, variety, and price greatly differ from other non-food products and items.

Food product packaging serves a variety of important purposes. Firstly, it serves to protect the food item from external and chemical damage by preventing contamination. Secondly, it preserves and extends the shelf life of the product by creating a sealed and vacuumed environment. The third function of food packaging is to convey crucial information like ingredients list and nutritional information, to the consumers about the product, along with its usage instructions and expiration date. Food products packaging is designed to be convenient so that it is easy to store, handle, and consume by the consumers. Graphics create brand identity that's why they play an important part in the visuals of food packaging. Consumers are then able to differentiate a product from its competitors and eventually develop brand loyalty. Eye-catching labels and graphics of food packaging items are specifically marketed to attract a larger audience and establish a unique brand appeal. Food products are packaged in a manner that makes them tamper resistant and ensures safe handling and transportation throughout the supply chain and distribution. Modern packaging has also begun including sustainable packaging solutions for food items to minimize environmental damage that comes along with plastic packaged items. Several legal and regulatory compliance bodies have also introduced strict labeling and packaging requirements for food items that range from barrier properties to shelf visibility to nutritional and allergen information along with packaging materials (Marsh & Bugusu, 2007).

Hence, it can be stated that the food packaging industry aims to meet industry standards and consumer preferences in a safe and cost-effective method (Marsh & Bugusu, 2007). According to studies, food packaging and labels are the main communication source between the food industry and consumers (Bryła, 2020; Lisińska-Kuśnierz, 2014; Sørensen, Clement, & Gabrielsen, 2012; W. Wu, Zhang, van Klinken, Schrobback, & Muller, 2021). Therefore, the food packaging industry is often under immense pressure to meet growing legal requirements while allowing consumers to select safe, nutritious, and ecologically responsible food items (Sørensen et al., 2012).

In the era of ramen noodles, carbonated drinks, and sugary treats, eating healthy is not always the priority of consumers. This has been made even more impossible by unique and attractive marketing techniques that are designed to improve sales and consumption of food products. Due to these labels, nutritional information and value of products has become all the more important so that consumers can make informed choices. Despite the charm and attraction of processed food items, consumers value their health which can become a crucial instigator of behavior change that enables them to consume food products in a mindful manner. And packaging serves as the biggest communication source that enables understanding among the consumers.

Nutrition labelling is an important tool to promote mindful eating habits that can lead to a healthy lifestyle for the consumers. Pakistan is home to a diverse and growing population with varying dietary needs and preferences. Understanding how Front of Package (FOP) food labeling standards impact consumer satisfaction is crucial to ensuring that consumers can make informed and healthier food choices. This study focuses on the impact of food nutritional labeling on literate Pakistani audience and how it influences their purchasing patterns. The findings of this study also delves into whether this impact and influence of nutritional labeling on food packaging meets consumers satisfaction levels. This study is important as the labeling standards differ from country to country. What is prevalent in developing countries like the USA and UK might differ from under-developed countries like Pakistan. There is limited knowledge on whether nutritional labeling on packaged food items effects consumers purchasing decisions in Pakistan. This study will not only answer this research question, but it will also identify the extent to which nutritional labels can and are affecting consumers purchasing behavior. Like many other countries, Pakistan, faces public health challenges related to diet-related diseases. This research can be part of the solution and can contribute to the well-being of the population by promoting healthier eating habits through effective food labeling. It can also provide policymakers with evidence to make informed decisions about food labeling regulations that protect public health.

The food industry in Pakistan is dynamic and evolving. Understanding how FOP labeling influences consumer behavior is essential for food producers to cater to changing consumer preferences effectively. This research can help businesses adapt their marketing and labeling strategies to meet consumer demands. Theoretically, there is limited research on this specific topic in Pakistan, and the research can address this knowledge gap. It can provide a foundation for further studies and contribute to the academic and scientific understanding of consumer behavior with regard to FOP labeling. Furthermore, the proposed framework utilized in this research explores an inter-mix relationship between different variables in a single study that collectively address a bigger research gap in the literature.

Food Labelling is a key component of food packaging that represents consumers buying intention and purchase behavior. This research can enable Pakistan to compare its food labeling practices and consumer behavior with international standards. This is especially valuable for aligning with global best practices and facilitating international trade. Different food labelling systems have been introduced internationally to provide scientific guidance to the food industry to uphold citizen health requirements. Currently, in Pakistan some major processed food brands are following the international labeling system known as Daily Intake Guide (DIG). This study will therefore also compare consumers preferences of four major international labeling systems to find whether the current prevalent nutritional labeling system in Pakistani food packaging is sufficient or it requires modifications.

To study this phenomenon, the focus of this study revolves around the following research inquiries:

- RQ1: How satisfied are consumers with current food labeling standards?
- RQ2: What are the influencing factors that contribute to consumer satisfaction with the prevailing food labeling standards?
- RQ3: Which international food labeling standard aligns more effectively with Pakistani consumers preferences and requirements?

The above-mentioned research questions aim to meet the following research objectives:

- RO1: To assess the level of consumer satisfaction with current food labeling standards in the context of packaged food products.
- RO2: To analyze the key influencing factors that contribute to consumer satisfaction with the prevailing food labeling standards for packaged food products.
- RO3: To determine which specific international food labeling standard better aligns with the preferences and requirements of Pakistani consumers, and to quantify the extent of this alignment.

In summary, this research is needed in Pakistan to benefit consumers, inform policy decisions, adapt to market dynamics, make international comparisons, and bridge existing knowledge gaps within the realm of food labeling and consumer behavior. The study is categorized into different chapters. Chapter 1 presents the introduction to the Front of Package (FOP) food labelling standards. Along with the introduction, this chapter identifies the problem statement, research questions and the research objectives. Followed by the introduction, Chapter 2 discusses the background of the packaging and labelling components used in the various countries and their impact on consumer buying behavior. In Chapter 3, an extensive literature review is provided highlighting the different labelling standards being adopted all over the globe and their impact on consumer choices. The research gap is being identified and in line with the research gap, the proposed theoretical framework of the study is presented. Moving on to Chapter 4, it outlines the study's methodology, encompassing research strategy, design, sampling methodology, and the tools employed for data collection and preliminary data analysis techniques. Chapter 5 is dedicated to the discussion and analysis of the results. Finally, Chapter 6 offers the study's conclusion, discussing its theoretical and practical contributions, acknowledging limitations, and providing recommendations for future research.

2 Background

Viewed within the broader historical context of concerted efforts by producers, retailers, distributors, consumers, and government entities to establish mechanisms aimed at ensuring product quality and fostering trust between sellers and buyers, the increasing prevalence of informative food labeling can be comprehended (Blaszczyk, 2000). The process of industrializing food production and the consequential shift in dietary practices, commonly referred to as the "nutrition transition," constituted pivotal factors in the emergence of nutritional labeling during the latter half of the 20th century. This transition marked a shift from addressing concerns related to malnutrition and inadequate dietary intake to confronting the surge in health issues stemming from excessive dietary consumption (Caballero, 2002). The nutritional transition had far-reaching repercussions on food consumption patterns, industry dynamics, and legislative frameworks, in addition to representing a pivotal milestone in the fields of medicine and epidemiology. Noteworthy among these transformations were the adjustments in the regulatory methodologies employed by the Food and Drug Administration (FDA) to ensure marketplace fairness, as well as the fundamental changes in its organizational structure and underlying philosophies (Carpenter, 2014). The burgeoning acceptance of health-conscious food choices and applying scientific principles to the realm of nutrition are focal themes within a cultural narrative and vary from culture to culture (Cohen 2004). In accordance with the commercial history, the restructuring of processed foods production involved integrating innovative health-related elements and catering to emerging niche markets, eventually expanding into broader market segments (Deutsch, 2010).

It is imperative to contemplate two intertwined trends when delving into the subject of nutritional labeling. Firstly, the introduction of nutritional labels marked the emergence of a new category of diners, residents, and consumers. This transpired concurrently with the ascent of a distinct health-oriented ideology termed "healthism." Healthism signifies a profound emphasis on personal health as the primary determinant of happiness, with or without therapeutic interventions (Fischler, 1990). Beyond scientific research, medical counsel, or public health initiatives, this knowledge about food was widely embraced, thanks to evolving consumption patterns. As early as the 1920s, the market witnessed the emergence of a new class of dietary products that epitomized this "modern conception of nutrition." This transformation is evident in the replacement of traditional "food additives" with "vitamins," "non-caloric sweeteners," and "low-saturated fats," driven by the continuous chemical evolution within the food industry due to industrialization. This process, involving the mechanical and chemical alteration of agricultural, dairy, and horticultural products, ultimately transformed them into mass-market "food" (Galbraith, 1998).

Formerly, food market regulations were based on intuitive understandings of what constituted food. The concept of "food denaturing," which entails extracting food from its "natural" context and conventional

connotations and reconfiguring it into nutritional components, represented a paradigm shift from these conventional perceptions (Giddens, 1992). The evolution in industrial manufacturing was a consequence of the expanding markets for health-conscious dining. Advertising played a pivotal role in disseminating scientific insights about diet and health, concurrently serving as a tool for businesses to boost the demand for their products (Hadden, 1986).

Since the beginning of the 20th century food producers have voluntarily incorporated nutritional information on their product packaging. Towards the end of the 20th century, various front-of-package (FOP) nutrition labeling initiatives were being introduced by both governmental and non-governmental entities. FOP nutrition labels, known for their clear and easily comprehensible presentation, represent a distinct form of nutritional labeling designed to facilitate rapid decision-making regarding a product's relative healthfulness or nutritional value (Feunekes, Gortemaker, Willems, Lion, & Van Den Kommer, 2008; Pomeranz, 2011). Recent overviews have compiled the enactment of policies related to nutritional labeling.

The primary objectives of FOP nutrition labeling policies typically encompass two key aspects: firstly, to furnish consumers with additional information to aid them in making healthier food choices. Additionally, there is an aim to encourage the food industry to reformulate their products towards healthier alternatives (Hieke & Taylor, 2012). However, it is worth noting that there has been a substantial proliferation of FOP nutrition labeling policies in both the public and private sectors, warranting specific attention (Schermel, Emrich, Arcand, Wong, & L'abbé, 2013). Notably, FOP nutrition labeling has faced criticism for potentially serving as more of a marketing strategy rather than a genuine public health measure (Brownell & Koplan, 2011).

In the initial years of the twenty-first century, a global obesity epidemic emerged, closely linked to the proliferation of highly processed food choices (Kelly & Jacoby, 2018). The figure 2.1 illustrates a consistent increase in the number of Front-of-Package (FOP) nutrition labeling programs globally in both the public and private sectors over the years (A. H. L. E. A. Wartella & Boon, 2010). The introduction of FOP nutrition labeling as a policy tool can be traced back to the World Health Organization (WHO) in 2004, with the primary aim of improving dietary habits and overall health (A. H. L. E. A. Wartella & Boon, 2010). Subsequently, in accordance with the worldwide strategy for preventing and managing non-communicable diseases, the WHO has steadfastly advocated for FOP nutrition labeling as an integral component of a comprehensive strategy designed to combat the worldwide obesity epidemic and non-communicable diseases associated with dietary factors (Kanter, Vanderlee, & Vandevijvere, 2018).

FOP nutrition labeling systems exhibit diverse visual attributes concerning their size, color, and shape. Furthermore, the public health nutrition messages they convey may take various forms, including proscriptive, prescriptive, or a combination of both. These systems can also place emphasis on different nutritional components. For instance, while some prioritize "critical nutrients," others encompass a broader spectrum of nutritional elements, both positive and negative. Presently, the most commonly identified "critical nutrients" featured on FOP product nutrition labels are sodium, trans and saturated fats, and total sugars, in accordance with the recommendations of the Institute of Medicine (Nathan, Yaktine, Lichtenstein, & Wartella, 2012).

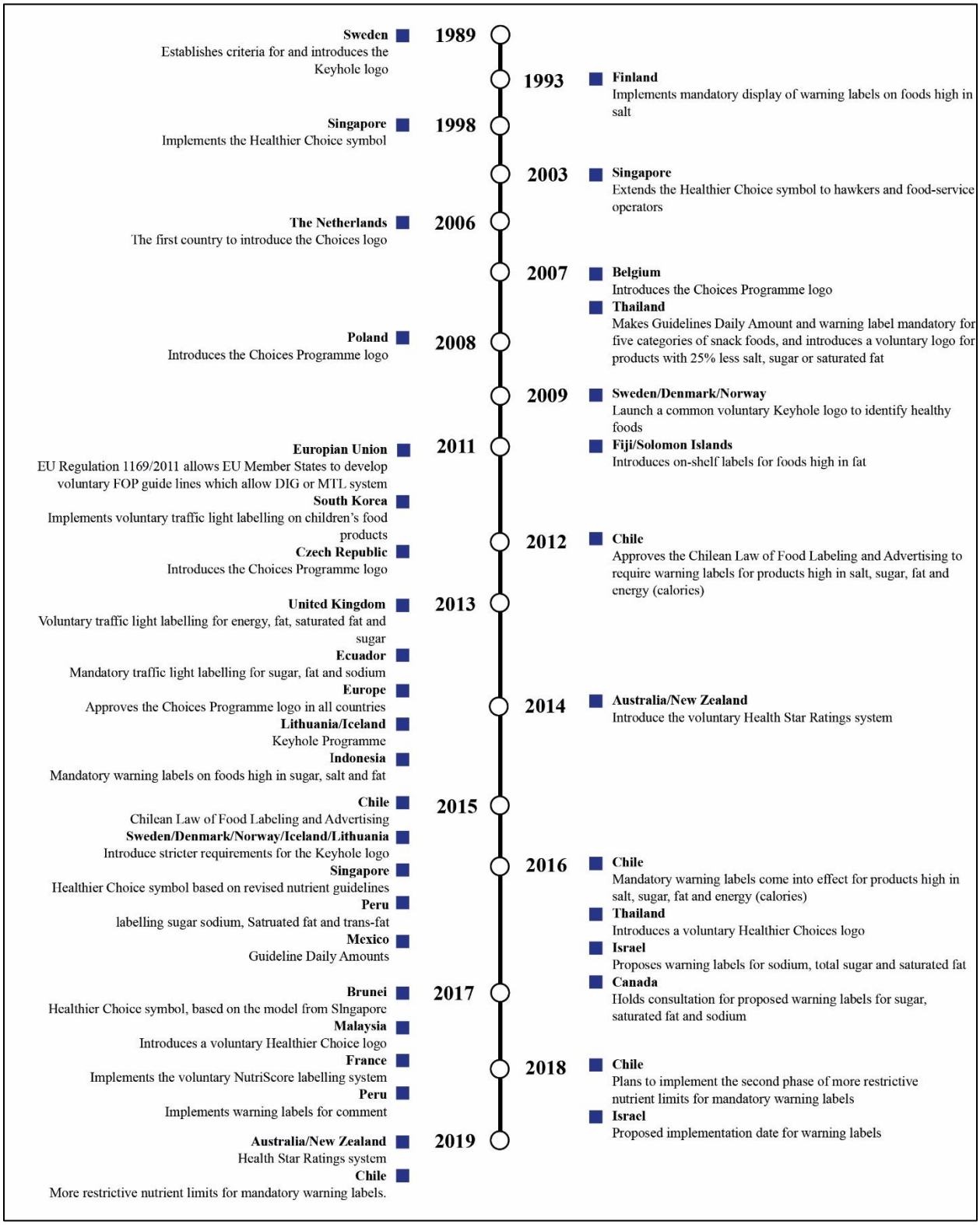


Figure 2.1 Timeline of front-of-package (FOP) nutritional labeling globally

Nutritional labeling has therefore emerged as a pivotal tool in the endeavor to promote healthier dietary habits. The primary objective of nutritional labeling is to provide consumers with pertinent information regarding the nutritional characteristics of specific food items at the point of purchase, allowing them to make informed and healthy food choices. The utilization of nutritional labeling is particularly desirable for several compelling reasons. It serves to encourage healthier eating habits while simultaneously upholding consumer autonomy, and it reduces the costs associated with information retrieval, thereby enhancing the likelihood that the provided nutritional information will be utilized (K. G. Grunert & J. M. Wills, 2007).

Consumer perspectives on the nutritional value of food and healthy dietary practices are changing quickly. People are increasingly prioritizing a balanced and healthier lifestyle. Moreover, there is a growing emphasis on food safety, hygiene, and nutritional content. In this context, food product labels assume a critical role as they contain comprehensive information concerning nutritional content, food safety, and product quality. In essence, labels provide insights into various aspects of food products, including ingredients, nutrient composition, preparation methods, and sourcing, among others. The manner in which consumers perceive a product significantly influences their purchasing decisions, and food labeling stands out as one of the most pivotal factors impacting consumers' purchase intentions.

Labels located on the front of food products, known as front-of-pack labels (FoPLs), are prominently displayed, offer a convenient means of accessing nutritional information swiftly. The primary objective of FoPLs is to offer individuals clear and efficient information about the composition of food items, encouraging them to choose and consume nutritious options (Talati et al., 2016).

The labeling of packaged food should provide an accurate description of its morphological properties, while refraining from misleading the end user, as emphasized by (Bandara, De Silva, Maduwanthi, & Warunasinghe, 2016). According to the U.S. Food and Drug Administration, pre-packaged meals are mandated to include Nutrition Facts Labels (NFL) to aid consumers in making informed choices and maintaining healthy dietary habits. Several nations, such as Australia, Canada, the European Union, Hong Kong, India, Malaysia, and New Zealand, have enacted legislation requiring similar nutritional label panels. NFLs are typically positioned on the side of food packaging, possibly contributing to the limited attention they receive from consumers, despite the global imperative of informed food purchasing (Graham, Lucas-Thompson, Mueller, Jaeb, & Harnack, 2017).

One plausible government policy to address this issue involves the introduction of more visually appealing and easily comprehensible front-of-pack (FOP) nutrition labels. This approach aims to enable users to swiftly identify unhealthy food products and make more informed choices, as suggested by (Machín, Aschemann-Witzel, Curutchet, Giménez, & Ares, 2018). The enactment of Regulation (EU) No.

1169/2011, addressing the provision of food information to consumers, has notably strengthened consumer rights in terms of accessing accurate food details and making informed decisions that align with their dietary requirements. This legislation has also standardized details presented on food labels across Europe. Despite the overarching aim of this legislation to enhance consumer confidence, transparency, and safeguard public health, these efforts can be rendered ineffectual if consumers do not habitually peruse these labels. Factors such as lifestyle, literacy, and consumer confidence often hinder individuals from reading food labels. Consequently, it is imperative to evaluate consumer perspectives regarding the recently required information on food labels, considering that these attitudes are influenced by factors like literacy and lifestyle (Moreira, García-Díez, De Almeida, & Saraiva, 2019). Therefore, it is of utmost importance to raise awareness among consumers concerning the nutritional value of the products they consume daily.

Nutritional labeling has been crucial in influencing dietary habits and consumer choices. It has evolved in response to historical shifts from addressing malnutrition to addressing health issues arising from excessive dietary intake. The World Health Organization (WHO) has advocated for Front-of-Pack (FOP) nutrition labeling as a global strategy to combat obesity and non-communicable diseases. FOP labels offer a swift means of accessing nutritional information, but consumer perceptions and habits in reading labels can be influenced by factors like lifestyle and literacy. These labels, along with Nutrition Facts Labels (NFL), strive to help consumers make well-informed, healthier dietary selections. However, the positioning of NFLs on the side of packages has led to them being overlooked. To enhance their impact, incorporating more visually appealing and easily comprehensible front-of-pack (FOP) nutrition labels have been suggested as a government policy. The ultimate aim is to empower consumers to make better informed decisions about their food choices, considering the morphological properties, nutritional value, and healthfulness of the products they consume.

3 Literature Review

Acquiring a comprehensive grasp of the existing research in the field is imperative to establish a strong foundation for understanding the subject matter thoroughly. This process not only aids in cultivating a critical comprehension of the subject but also facilitates the application of previous research findings in novel contexts. In this literature review section, each pertinent aspect related to the study is meticulously examined. The chapter delves into the current state of the literature regarding the interrelationships among various factors associated with food labeling standards. Moreover, it expounds upon the research investigating the impact of Front-of-Package (FOP) labels on consumer satisfaction. Drawing insights from the literature review, the chapter also explores the role of food service quality and how these variables correlate with food service standards in influencing customer satisfaction. Furthermore, it elucidates the mediating function of brand skepticism between FOP labeling standards and customer satisfaction. The literature regarding consumers' awareness of nutritional values and its mediating effect on FOP labels and customer satisfaction is also addressed. This chapter delineates the existing gaps in the literature, leading to the outline of the proposed analytical approach.

3.1 Food Packaging and Labeling Standards

Food labeling is an integral component of marketing, serving as a crucial source of information for buyers (Blake, Mellor, & Crane, 2010). Consumers utilize labels both as a direct shopping aid and as a potent indicator of product quality (Annunziata, Pomarici, Vecchio, & Mariani, 2016). Economic theory identifies two scenarios where labeling offers significant advantages. The first scenario involves addressing asymmetric information in the market, with labels reducing consumer uncertainty and transforming credence attributes into search attributes (Kiesel & Villas-Boas, 2013). The second scenario considers the impact of externalities, where individual consumer decisions can have varying effects on society compared to their personal consequences (Golan, Kuchler, Mitchell, Greene, & Jessup, 2001).

In accordance with economic theory, the utilization of labeled information entails an active process involving the acquisition of information, its evaluation, and strategic planning (Gracia, Loureiro, & Nayga Jr, 2009). (Brunsø, Grunert, & Fjord, 2002) have underscored that in traditional economic demand research, price exerts a significant influence on consumers' food choices. However, in industrialized nations, consumers are increasingly considering various factors such as quality, health benefits, and convenience when making food purchasing decisions. This shift is a means to ensure fair treatment and consumer safety, essentially serving as the regulatory framework for the food supply chain. A generation or two ago, most individuals purchased their food from local shops or market stalls, where direct interactions with proprietors and their assistants were common. Prepackaged foods were relatively limited in variety. In the present era, with the transformation of shopping habits to encompass supermarkets, self-service, and an extensive array

of prepackaged food products, the role of food labels has become considerably more significant (Blake et al., 2010).

Food labels are becoming increasingly prevalent not only in grocery stores but also in fast food establishments, eateries, school and workplace cafeterias, and various other settings. Additionally, information pertaining to food labeling and product claims can often be found on the websites of food manufacturers (Rayner & Vandevijvere, 2017). The primary objective of nutritional labeling is to dissuade food producers from making false or misleading statements and to educate consumers regarding the nutritional characteristics of foods, thereby safeguarding them against unhealthy choices and offering insights into the nutritional value of food products. Nutrition information, whether displayed on the front or back of the packaging, typically includes details such as energy content (in kJ or kcal), fat, saturated fat, carbohydrates, sugars, protein, and salt (all in grams). Notably, in 2014, the Back of Package format emerged as the most widespread and obligatory label format on a global scale (Smed, Edenbrandt, & Jansen, 2019).

Table 3.1 provides an inventory of various Front-of-Pack (FOP) nutrition labeling systems officially endorsed by government authorities, as documented by (Kanter et al., 2018). One such system is the FOP traffic-light (TL) scheme, which was initially proposed by the UK government to facilitate informed food choices. This system categorizes main nutrients in foods along with energy levels as "low," "medium," or "high," designating each category with a distinct color—green, amber, or red (Carruba et al., 2021).

Furthermore, the Reference Intake (RI), alternatively known as Guideline Daily Amounts (GDA) or Daily Intake Guide (DIG), outlines the daily recommended intake of calories, for an average person to maintain their health (Deliza, de Alcantara, Pereira, & Ares, 2020). The Food Standards Agency in the United Kingdom established regulations for food classification based on nutrient content per 100 grams or 100 milliliters, which were integrated into the TL system. The motivation behind these criteria stemmed from the increasing incidence of non-communicable diseases (NCDs) related to diet and nutrition was instituted as a standard endorsed by government agencies in England, Scotland, Wales, and Northern Ireland (Ogundijo, Tas, & Onarinde, 2021).

Table 3.1 Terminologies of International Food Labels

Terminology	Definition	Examples
Interpretive nutrition rating system (INRS)	Presents nutritional details in the form of general guidance rather than measurable facts (McGuire, 2012).	▪ Star-based Systems ▪ Nutriscore ▪ Traffic light symbols ▪ Health logos
Reductive System	Gives facts without giving opinions and recommendations (Hamlin & McNeill, 2016).	▪ Guideline Daily Amount (GDA) system
Summary Indicator System	Evaluates a product's health using a variety of criteria and provides recommendations or opinions without going into specifics (Hamlin & McNeill, 2016).	▪ Star-based systems ▪ Health Logos
Nutrient Specific System	Provides nutritional information for a set of nutrients (Hamlin & McNeill, 2016).	▪ Traffic light symbols ▪ Warnings or "High in" symbols

The Ministry for Primary Industries (MPI) in New Zealand enforces the Australia New Zealand Food Standards Code (FSC), which regulates nutrition and health claims in both countries. As per the FSC, it is mandatory in Australia and New Zealand to display a Nutrition Information Panel (NIP) on most packaged foods. This panel provides information on energy, protein, total fat, saturated fat, carbohydrate, sugars, and sodium content per serving, as well as per 100 grams or 100 milliliters. If nutrition claims are made on a product, the NIP must also include the nutritional information for that specific nutrient (Rayner & Vandevijvere, 2017).

An encompassing nutrition strategy, as per the Australian Government's 2011 Labelling Logic Study of Food Labelling Law and Policy, should incorporate a front-of-pack food nutrition labeling program. Both the governments of Australia and New Zealand have endorsed this recommendation, emphasizing the need for a front-of-pack labeling system that provides consumers with clear and consistent nutrition information (Pettigrew et al., 2017).

Under the Health Star Rating System, a front-of-pack food labeling system, a 5-star-rated product represents the healthiest option, offering an at-a-glance ranking of the nutritional value of packaged foods. This rating system can be presented on food packaging in two formats. The first format displays only the product's star rating, while the second format shows both the star rating and the number of various nutrients per 100 grams, 100 milliliters, package, or serving, as applicable. Additionally, the label may highlight a positive nutrient, such as protein, dietary fiber, specific vitamins, or minerals, in addition to information on risk nutrients, including energy (kilojoules), saturated fat, sodium (salt), and carbohydrates. This method aims to aid consumers in conveniently comparing the comprehensive nutritional profiles of food products within the same category of packaged and processed products (Dickie, Woods, & Lawrence, 2018).

The adoption of New Zealand's Health Star Rating system has instigated food producers to reformulate their products for improved healthfulness, as indicated by a study. Survey results revealed that most products displaying Health Star Ratings had undergone some degree of modification, with these ratings being commonly featured on items such as cereals, breakfast beverages, convenience foods, and sauces and spreads (Mhurchu, Eyles, Jiang, & Blakely, 2018).

Moreover, a comparative analysis found that the average energy density of food products with Health Star Ratings in Australia was lower post-implementation of the labeling system than it was prior to its introduction (Mantilla Herrera et al., 2018). This suggests that the Health Star Rating system has influenced food product reformulation towards healthier options, aligning with the broader goal of promoting improved nutrition and health among consumers.

In the realm of food labeling, governmental regulations and initiatives play a crucial role in providing consumers with essential nutritional information and fostering healthier food choices. Australia and New Zealand enforce the Australia New Zealand Food Standards Code (FSC), which necessitates the inclusion of a Nutrition Information Panel (NIP) on most packaged foods. Both governments have acknowledged the significance of implementing a front-of-pack food nutrition labeling program to provide consumers with easily comprehensible and consistent nutrition details, thus enhancing informed food decision-making. Underpinning these efforts, the Health Star Rating System serves as a front-of-pack labeling initiative that assigns star ratings to packaged foods, aiding consumers in evaluating the nutritional excellence of products at a glance. Recent research indicates that the adoption of this system has spurred encouraging food producers to reformulate their products, aligning them with healthier nutritional profiles, particularly in categories like cereals, breakfast beverages, convenience foods, and sauces and spreads. This transformative impact extends across borders, with a lower average energy density observed in food products with Health Star Ratings in Australia post-implementation of the labeling system, emphasizing the

positive influence of such labeling schemes on food product reformulation and, ultimately, on promoting better nutrition and health among consumers.

3.2 Effectiveness of Front of Package (FOP) Nutritional Labelling

Various Front-of-Pack (FOP) nutrition labeling systems have been developed worldwide, each differing in its efficacy in aiding consumers in gauging the healthfulness of a product (Hodgkins et al., 2012).

The assessment of a product's healthfulness within these schemes can be either directive or interpretative, with judgments based on specific nutrients or the overall composition of the product (Kleef & Dagevos, 2015). Comparative studies have indicated that directive or interpretative systems tend to outperform other well-known labeling approaches, such as the Guideline Daily Amounts (GDA) or the traffic-light system, in facilitating consumers' accurate evaluations of product healthfulness and promoting healthier food choices (Arrúa et al., 2017).

Many nations have recently embraced different labeling schemes, each featuring notable distinctions in the data they encompass, their graphical presentation, and the nutritional profiling methods employed to assess assessing the healthiness of products by considering their nutritional composition. Debates persist regarding the effectiveness of various interpretive Front-of-Pack (FOP) label schemes. Notably, three interpretative schemes, representing diverse rationales and designs, have been introduced in nations across various regions. These schemes serve as illustrative models: the French Nutri-score (Ares et al., 2018), the Australian Health Star Rating system (Lawrence, Dickie, & Woods, 2018), and the Chilean warning system (de Salud & Social, 2011). This diversity underscores the ongoing efforts to develop effective FOP labeling strategies that best serve the interests of consumers and promote informed, healthier food choices.

The voluntary Front-of-Pack (FOP) nutrition labeling programs, such as Nutri-score and the Australian Health Star Rating system, offer a global perspective on product healthfulness. Nutri-score employs a color and letter-based system that categorizes items into five nutritional quality groups, with green signifying the highest nutritional quality (A) and red indicating the lowest nutritional quality (E) (Lawrence et al., 2018). Conversely, the Australian Health Star Rating system classifies products into ten nutritional quality categories solely using a star rating, ranging from 0.5 stars (least healthy) to 5 stars (most healthy) (Shahid, Neal, & Jones, 2020).

In contrast, the Chilean warning system is a nutrient-focused approach that highlights foods rich in nutrients linked to non-communicable diseases, specifically, calories, carbohydrates, saturated fat, and sodium (Corvalán, Reyes, Garmendia, & Uauy, 2013). Under the legislation, each nutrient exceeding predefined thresholds is required to display a distinctive black octagonal warning label on products (de Salud & Social, 2011).

There is a widespread consensus on the importance of providing consumers with clear and accessible nutritional information to enable them to make better-informed purchasing decisions (Perez & Edge, 2014). These diverse labeling schemes reflect global efforts to enhance consumer awareness and promote healthier food choices while accommodating a range of approaches to nutritional profiling.

The efficacy of Front-of-Pack (FOP) nutrition labeling initiatives in fostering healthier dietary choices holds a pivotal role in their overall success (K.-N. Kim, 2017). To fulfill this objective, the FOP label must effectively influence multiple stages, necessitating specific attributes for its effectiveness. First and foremost, FOP nutrition labeling programs must capture consumers' attention, recognizing that most purchasing decisions occur while shopping in stores (van't Riet, Sijtsema, Dagevos, & De Bruijn, 2011). Consequently, FOP solutions must promptly engage consumers to break their established buying patterns (Bialkova & van Trijp, 2011). The visibility of FOP labels significantly impacts their likelihood of being noticed, and subsequently, considered during the decision-making process (K. Grunert & J. Wills, 2007). Furthermore, the information conveyed by FOP labels must be swiftly processed, recognizing that consumers often allocate minimal cognitive effort to food selection in stores (Frewer & Van Trijp, 2006). Therefore, FOP labels serve to expedite and simplify the evaluation of products and the interpretation of nutritional information, facilitating more informed choices (Ares et al., 2018). This emphasis on consumer attention and the cognitive ease of processing nutritional data underscores the essential role of FOP labeling in encouraging healthier eating behaviors, linking these attributes to the potential success of such initiatives, as discussed in the previous paragraph.

The global landscape of Front-of-Pack (FOP) nutrition labeling systems exhibits significant diversity in their ability to assist consumers in evaluating product healthfulness, with some systems being more directive or interpretative in their approach. Comparative research highlights the effectiveness of interpretative systems, such as the French Nutri-score and the Australian Health Star Rating approach, in empowering consumers to make healthier food selections through transparent categorizations of nutritional quality. Meanwhile, the Chilean warning system offers a nutrient-centric approach by identifying products high in specific unhealthy nutrients. The importance of providing clear and accessible nutritional information to consumers is widely acknowledged. FOP labeling initiatives must focus on capturing consumers' attention, streamlining information processing, and simplifying product evaluation to promote healthier dietary choices effectively. These attributes are integral to the success of FOP labeling programs.

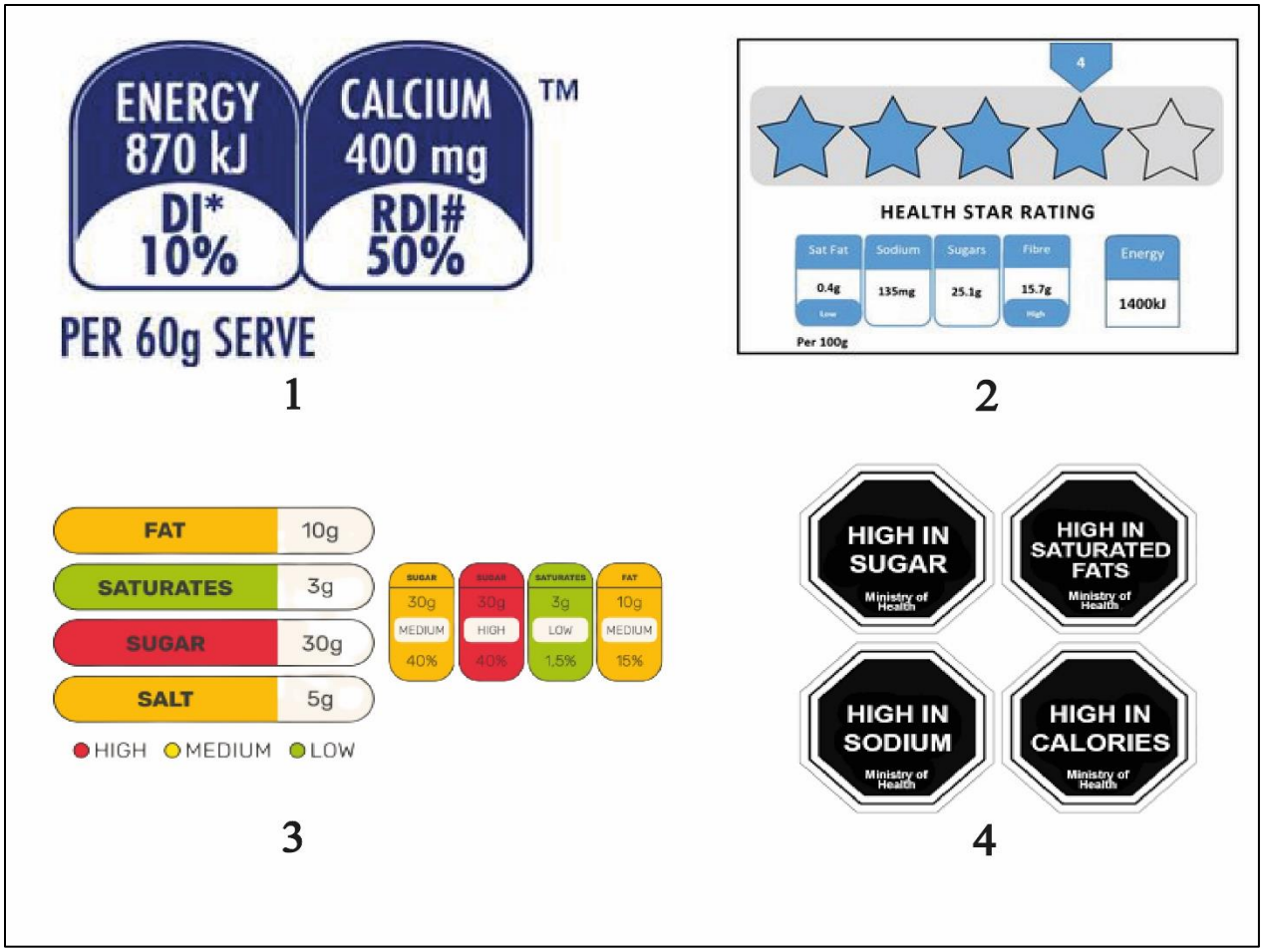


Figure 3.1 International Food labelling Standards

This study takes into consideration four specific food labels, which correspond to those depicted in Figure 3.1. In a survey, respondents will be queried about their preferences among these food labels. The options under consideration include the Daily Intake Guide, Health Star Rating System, Multi-Traffic Light, and Chile Warning Label. Participants will be required to make their selection based on their comprehension and perception of each label, identifying the one they deem to be the most effective or favorable.

3.3 Food Labeling Standards and Consumer Satisfaction

The nutrition facts label found on food products serves as an indispensable resource for consumers seeking information on nutrition and health (Miller & Cassady, 2015). A primary objective of this label is to aid consumers in identifying and selecting healthier food items characterized by nutrient-rich profiles and low energy density (Roberto & Khandpur, 2014). Existing research on food labeling primarily focuses on assessing how consumers perceive various elements of food labels, including aspects related to nutritional

content, design, label layout, and indicators of premium or regional products, among others (Feldmann & Hamm, 2015).

These food product labels assume a crucial role, encompassing essential information related to nutrition, safety, and the quality of food items. In essence, they provide comprehensive details concerning ingredients, nutritional value, processing methods, and storage considerations. The consumer's perception of a product plays a pivotal role in their purchasing decisions, with food labeling emerging as one of the most influential factors shaping this perception (Bandara et al., 2016). Consequently, food labeling holds substantial significance in influencing consumer choices and fostering informed decisions, underscoring its pivotal role in the consumer decision-making process.

Furthermore, these insights affirm the critical role that food labels play by educating consumers about nutrition and assisting them in making healthier food selections. As a major source of nutrition information (Cowburn & Stockley, 2005), food labels have been linked to the adoption of enhanced dietary quality and health-conscious eating patterns (Campos, Doxey, & Hammond, 2011; Cha et al., 2014). Notably, specific consumer groups, such as athletes, individuals with specific health concerns, and those committed to a health-oriented lifestyle, tend to benefit even more from food labeling practices (Moreira et al., 2019). These findings highlight the tangible impact of food labels on customer satisfaction and purchasing behavior. With the overarching objective of facilitating informed consumer choices, Front-of-Pack Labels (FoPLs) are instrumental in the choosing, buying, and consumption of health-conscious products (Khandpur et al., 2019). As consumers explore various sources of information, including food labels, during their quest for food products (Sajdakowska, Gębski, Wardaszka, & Wieczorek, 2022), the literature underscores the pivotal role of food labeling in shaping consumer preferences, promoting healthier dietary habits, and guiding purchasing decisions.

Building upon the extensive literature, which underscores the essential function of food labels in influencing consumer preferences, promoting healthier dietary habits, and guiding purchasing decisions, this study posits the first hypothesis as:

***H_1*:** FOP Food Labelling standards have a positive impact on consumer satisfaction.

3.4 Brand Loyalty

Expanding upon existing literature related to nutritional labeling and food packaging labeling systems, the influence of sound symbolism and brand symbolism in consumer perceptions and expectations holds a significant place in the intricate landscape of consumer behavior. In the current global market, the influx of new brands and products with unfamiliar names is a common occurrence. A critical aspect of consumers' initial interaction with these products is the auditory perception of their names. Interestingly, unfamiliar

names can inadvertently establish associations with a product's attributes, as the sound of a word, irrespective of its semantic meaning, has the potential to convey significance – a phenomenon referred to as sound symbolism (Athaide & Klink, 2012). This auditory influence on consumer expectations extends to the realm of unpronounceable brand names. Just as the auditory attributes of product and brand names can shape consumer expectations, the visual elements of food packaging labeling systems, such as colors and design components, are known to influence consumer choices (Becker, van Rompay, Schifferstein, & Galetzka, 2011) Additionally, various design elements, including colors, shapes, and materials, contribute to shaping consumer expectations regarding a product (Becker et al., 2011). Moreover, consumers leverage the social symbolic attributes of a brand to enhance their self-esteem and gain social acceptance (Dalal & Aljarah, 2021). Embracing a social constructivist perspective, consumers are regarded as active participants in the interpretation of information, implying that certain consumer perspectives and attributes influence the practical implications of hypothesized effects (Morhart, Malär, Guèvremont, Girardin, & Grohmann, 2015). Consequently, the role of brand symbolism in influencing consumer behavior has gained increasing importance. Brand symbolism arises from the brand's vitality, fueling both societal symbolism and self-symbolism (Dalal & Aljarah, 2021). Furthermore, the socio-psychological aspects of consumer behavior play a crucial role in interpreting and reacting to various labeling systems. In this context, the discussion on how brand symbolism and sound symbolism impact consumer perceptions not only adds depth to our understanding of consumer behavior but also underscores the multifaceted nature of consumer interactions with product information. This multidimensional perspective contributes to a comprehensive view of the factors at play in consumer decision-making and product evaluation, including the realm of nutritional labeling and food packaging.

The current food market offers consumers a vast array of choices, each product distinguished by a plethora of characteristics and promises communicated through labels, encompassing categories like natural products, organic foods, and processed items, among others (K. G. Grunert & J. M. Wills, 2007). The proliferation of food labels has seen endorsement from a variety of sources, including manufacturers' associations, retailers' associations, regional and national agencies, EU authorities, and more (Bonsmann, Celemín, & Grunert, 2010). These labels serve as a means for consumers to evaluate products before making their purchase decisions. Addressing the consumer demand for product differentiation and quality, food and grocery retailers have recognized the preference for premium private labels (Pilar Martinez-Ruiz, Ruiz-Palomino, Martinez-Canas, & José Blázquez-Resino, 2014). This growing preference for private labels has been facilitated by raising brand quality, expanding product variety, and embracing innovation, which has undoubtedly improved consumer perceptions of food labels (Akbay & Jones, 2005). In light of these considerations, it becomes evident that the connection between food labels and brand quality and reputation holds substantial importance, resulting in the development of the subsequent hypothesis:

***H_4*:** FOP Food labelling standards positively impact brand loyalty.

Brand loyalty has evolved into a pivotal strategic element for long-term success in today's business landscape. Devoted customers exhibit a proclivity for recurrent purchases, driving companies to innovate and introduce new goods and services in an effort to attract fresh clientele and bolster the organization's standing within the community (Tu & Chang, 2012). Notably, consumer expectations can be significantly influenced by both product and brand names (Spence, 2012). A positive perception of a brand has been consistently linked to elevated brand loyalty and a heightened intention to purchase, both in general (B. Yoo, Donthu, & Lee, 2000) and specifically in the context of label products (P. C. Wu, Yeh, & Hsiao, 2011). As theorized by (Fenko, Kersten, & Bialkova, 2016), food labels and packaging play a pivotal role in shaping the product experience, consumer judgments, and purchase intentions. It is an established fact that people are more prone to remember and interact with a brand that enjoys a strong reputation, with this reputation exerting a substantial impact on consumer purchasing decisions (Batt & Liu, 2012). However, there have been studies which indicate that brand loyalty doesn't consistently correlate with customer satisfaction (Silayoi & Speece, 2004; Usunier, Van Herk, & Lee, 2017). This tendency is often attributed to the relatively low level of risk associated with these products, as noted by (Chaudhuri, 2000) resulting in their perceived lower significance. It's also been observed that customers are more likely to experience satisfaction when engaging with a brand that meets their expectations, but this isn't always the case.

According to studies on consumer behavior by (Kaur, Mustika, & Sjabadhyni, 2018), brand association and customer satisfaction have an impact on brand loyalty (BL (Kaur et al., 2018). (Zollo, Filieri, Rialti, & Yoon, 2020) emphasized that brand loyalty measurement include cognitive, social integrative, and personal integrative benefits. (Park, 2009) underscored the significance of customer satisfaction and trust in the context of brand loyalty. According to (Delgado-Ballester & Munuera-Alemán, 2001) brand loyalty has a big positive influence on consumers' purchasing decisions and keeps them from switching to a competitor's brand. Additionally (S. H. Han, Nguyen, & Lee, 2015), provided evidence of the positive effects of brand association on a company's overall reputation. The level of a customer's attachment to a specific product brand is represented by brand loyalty. Strongly loyal customers frequently choose brands linked to good experiences, even in cases where other brands offer better items (HANAFI, 2016).

In conclusion, brand loyalty shapes consumers' purchasing decisions. Therefore, based on this pre-existing literature this study formulates the following hypothesis:

***H_5*:** Brand Loyalty positively influences consumer satisfaction.

3.5 Perceived Food Quality

The researchers underscore that a consumer's perception of a product or service's overall excellence and quality is predominantly influenced by subjective impressions rather than the intrinsic, objective quality of the item itself. Perceived quality, as distinguished from a product's inherent quality, primarily encompasses a customer's personal evaluation of the product's excellence. Perceived quality forms the crux of a consumer's appraisal of a product, shaped by both intrinsic and extrinsic attributes of the product. Conversely, objective quality adheres to a product's predefined design standards (Aaker, 2009). A consumer's holistic judgment of a product's overall quality, derived from their subjective sentiments and cumulative experiences with the product, is known as perceived quality (Zeithaml, 1988). Food labeling facilitates the transmission of information between producers and consumers, significantly simplifying the assessment of food quality, safety, and nutritional value (Donini et al., 2022). This is particularly crucial for pre-packaged foods that have undergone various degrees of processing, from mild to extensive (Van Boxstael, Devlieghere, Berkvens, Vermeulen, & Uyttendaele, 2014). In the European Union, food labels provide comprehensive information about ingredients, quantity, nutritional content, origin, processing, allergens, packaging, storage recommendations, and shelf life (Commission, 2000). Nutrition labels serve to educate consumers about the nutritional composition of packaged foods and how they integrate into a balanced diet, thus serving as a tool for promoting healthy dietary habits and preventing diet-related non-communicable diseases, all while influencing consumers' perceptions of packaged food quality (Ikonen, Sotgiu, Aydinli, & Verlegh, 2020; Kanter et al., 2018). An ongoing debate surrounds the effectiveness of food labels, particularly front-of-pack nutrition labels, in mitigating health risks. Furthermore, the growing awareness of the interplay between dietary packaged products and healthfulness has elevated the issue of food sustainability. Nutritional messages that emphasize positivity rather than negativity have the potential to promote a balanced diet (Willett et al., 2019). Therefore, it is imperative to recognize the affirmative impact of proper food labels on consumers' perceived food quality.

***H_2*:** FOP Food labelling standards positively impact the perceived food quality.

Over the past few decades, there has been a concerning increase in unhealthy eating patterns (Afshin et al., 2019). In response to this epidemiological trend, legislators have introduced Front-of-Pack Nutrition Labels (FOPNLs) as a potential solution (Abarca-Gómez et al., 2017). These labels serve as a means for consumers to gain a better understanding of the food supply and encourage them to make dietary choices that align with both health and sustainability goals (Orquin & Scholderer, 2015). FOPNLs primarily concentrate on "critical" nutrients, which can have adverse effects when consumed in excess, including key nutritional information like fats, sodium, and sugars (Roberto et al., 2012). Several studies have explored the efficacy of FOPNLs in shaping consumer behavior and influencing the purchase of packaged foods labeled as

"healthy" or "unhealthy." Some research suggests a noticeable decrease in the purchase of packaged goods that carry health warnings due to excessive nutrient content, and these warnings impact consumers' purchase intentions (Clarke et al., 2021).

In light of the ongoing discussion and the relevant literature, it becomes evident that Front-of-Pack Nutrition Labels (FOPNLs) play a crucial role in shaping consumer perceptions of food quality and influencing their overall satisfaction. The aim of introducing FOPNLs is to address the concerning trend of unhealthy eating (Afshin, Sur et al. 2019) by providing consumers with essential nutritional information that helps them make informed and healthier food choices. FOPNLs primarily focus on critical nutrients like fats, sodium, and sugars (Roberto, Shivaram et al. 2012), thereby enabling consumers to assess the quality and healthfulness of food products. As studies have indicated, these labels can influence consumers' purchase decisions, particularly in terms of choosing foods labeled as "healthy" or "unhealthy" (Clarke, Pechey et al. 2021). Therefore, it is plausible to propose that the perceived food quality, as influenced by FOPNLs, has a positive impact on consumer satisfaction.

***H_3*:** Perceived food quality has a positive effect on consumer satisfaction.

Consumer evaluations and decision-making processes are profoundly shaped by various product attributes, encompassing factors such as ingredients, fat content, nutritional information displayed on the label, packaging, and even the product's distinctive shape (Abdul Latiff, Rezai, Mohamed, & Amizi Ayob, 2016). These attributes significantly impact consumers' perceptions of product quality and its overall value, consequently influencing their purchase decisions, happiness, intention to buy, and preference (Dörnyei, Krystallis, & Chrysochou, 2017). In the realm of consumer brand engagement, perceived quality holds a pivotal role. It not only influences evaluation of a product or service's dependability by consumers and trustworthiness but also plays a key part in shaping brand loyalty (Andik & fitri Rachma, 2022). Brand engagement among consumers is significantly shaped by the idea of perceived quality. It is closely related to customer preferences, satisfaction, and purchase intent and plays a significant role in shaping a consumer's opinion of how dependable and trustworthy a product or service is (Nikhashemi, Valaei, & Tarofder, 2017). In addition, the increase in brand loyalty is influenced by perceived quality. The perception of quality plays a crucial role in establishing brand loyalty, particularly for recently launched brands. Consumers are more likely to place their trust in a brand known for its high quality (Andik & fitri Rachma, 2022). Therefore, it is reasonable to assert that perceived food quality positively impacts brand loyalty.

H_6: Perceived food quality positively influences brand loyalty.

3.6 Consumer Consciousness of Nutritional Value

Nutrition labelling serves as a valuable tool in empowering consumers to make informed choices about the nutritional content of food products, thereby contributing to the promotion of healthier dietary habits. (S. Y. Kim, Nayga Jr, & Capps Jr, 2001). In addition to fostering informed choices, the concept of transparency, an integral aspect of food labelling, plays a crucial role in safeguarding consumer interests. It not only ensures consumers' rights to access essential information about a food product's nutritional composition, but also provides details concerning its origin and expiration date (Cowburn & Stockley, 2005).

While some may question the significant impact of concerns related to food packaging, it is essential to recognize that subjective influences can have a considerable effect on consumer perceptions and behaviors, even in the presence of logical, evidence-based factors (Nardi, Teixeira, Ladeira, & de Oliveira Santini, 2020). In the realm of risk perception and consumer behavior, subjective factors often overshadow objective knowledge and attitudes (Kitz, Walker, Charlebois, & Music, 2022). Consumers frequently encounter situations where they must make decisions with limited information, especially during times of crisis. These decisions are then further shaped by a multitude of contextual, demographic, and attitudinal factors (Schroeder, Tonsor, Pennings, & Mintert, 2007).

Furthermore, it is noteworthy that an individual's subjective attitudes and risk perceptions, coupled with their subjective assessments of current risks, can significantly influence the difference between those who exhibit indifference and those who respond strongly to food-related crises (Rieger, Weible, & Anders, 2017).

Encouraging healthier food choices, an effective food labeling system has the potential to combat the increasing prevalence of obesity, making it a crucial tool in public health initiatives (Stein, 2010). However, this potential is challenged by the fact that individuals with limited literacy and numeracy skills often struggle to comprehend food labels, creating a health barrier for this population (Rothman et al., 2006). Even among individuals who possess functional literacy and numeracy skills, not everyone has the ability to fully engage in healthy behaviors with the aid of dietary information (Easton, Entwistle, & Williams, 2010).

To promote a healthier environment and empower individuals to make informed dietary choices, it is imperative that food labelling systems are designed to be easily comprehensible for all consumers (Carbone & Zoellner, 2012). An underlying principle of promoting public health is to create conditions that facilitate informed decision-making and healthier choices. Nutrition labelling, exemplified by components such as nutrient declaration and supplemental nutrition information, is a population-based approach aimed at

equipping consumers with fundamental knowledge of nutrition concepts and the confidence to make well-informed food purchasing decisions (Cowburn & Stockley, 2005).

Nutrition labelling systems serve two main purposes: nutrient declaration, which provides enhancing consumers' understanding, detailed qualitative information about nutrient content (e.g., nutrition facts panels) and supplementary nutrition information are provided. understanding of food's nutritional value (Ares et al., 2018). Previous research has indicated that young adults may be more likely to use Nutrition Facts labels if they possess a greater awareness of nutrition (Misra, 2007). Label users, compared to non-users, tend to opting for diets with reduced fat and cholesterol intake and increased consumption of fruits and vegetables (Kessler & Wunderlich, 1999). Furthermore, label users demonstrate a more positive outlook and possess greater nutritional knowledge regarding the link between food and health (Misra, 2007)). Consequently, literature reviews suggest that Front-of-Pack Labels (FoPLs) are generally well-received by consumers and can enhance their comprehension of the nutritional value of various food products (Cowburn & Stockley, 2005).

This context of consumer awareness of nutritional value being significantly impacted by food labelling is critical in the light of the following hypothesis:

***H_7*:** Consumer consciousness of nutritional value plays a moderating role in FOP (Front of Packaging) and PFQ (Perceived Food Quality).

Numerous studies have presented robust evidence regarding consumer behavior, particularly among individuals in their 20s and 30s and those who prioritize healthier eating habits. They have consistently reported elevated levels of self-declared awareness and utilization of nutrition labeling (Andrews, Lin, Levy, & Lo, 2014; Hawley et al., 2013). The reliance on nutrition labels as a trusted source of information to facilitate informed food purchasing decisions is a common practice among individuals who view these labels as highly credible (Campos et al., 2011). A significant body of research has underpinned the notion that label use and nutrition knowledge are intricately intertwined, especially among individuals pursuing dietary goals and those inclined to choose healthier food options (Giró-Candanedo, Claret, Fulladosa, & Guerrero, 2022)

A salient area of interest pertains to the combined impact of Front-of-Pack (FOP) conditions and objective nutrition knowledge on consumer decision-making. Trust plays an integral influence on consumer decision-making, denoting the faith or belief that a brand, its name, and reputation will consistently meet consumers' needs and expectations with each purchase (P. Liu, Tse, & He, 2022). The concept of trust is pivotal in determining whether consumers will remain loyal to a particular product or service. Additionally, a brand's reputation as an indicator of product quality is closely intertwined with consumers' trust levels. This

relationship between trust and brand awareness was underscored by a study on customers' online purchase intentions, revealing a significant and positive correlation between these two variables (P. Liu et al., 2022).

In light of these findings, the following hypothesis is proposed:

***H_8*:** Consumers with consciousness of nutrient values play a moderating role in the relationship between Front-of-Pack (FOP) labelling and Brand Loyalty (BL).

3.7 Research Gap

Substantial research efforts have been dedicated to the evolving landscape of food packaging labelling standards. Notably, consumer priorities have undergone a transformation, placing heightened emphasis on nutrition and health-conscious dietary practices. This shift has led to an increased demand for information related to nutrition, food safety, and the overall quality of food products. The burgeoning awareness of the importance of balanced and healthful eating habits has elevated consumer expectations concerning food labels, making them pivotal tools in facilitating informed purchasing decisions and ensuring the consumption of safe, high-quality foods. It is imperative to recognize that a food label represents more than a mere piece of paper; it serves as a vital resource for assisting consumers in making prudent and health-oriented buying choices.

This research avenue is gaining prominence in South Asia, despite the limited exploration conducted to date, reflecting its growing significance. The bulk of research on "Food Labeling, its Relevance, and Impacts" has emanated from countries such as South Korea, the United States, the United Kingdom, and various European nations. In response to the research findings, several countries have adopted and periodically updated their legislation governing food packaging and labelling. Each nation has customized its food packaging labelling regulations to align with its unique demographic composition, consumer preferences, normative legal frameworks, and design philosophies. For instance, while one country may opt for the Multiple Traffic Light system, another might select the Health Star Rating system, the Daily Intake Guide, or the Nutrition Information Panel, customizing these choices to suit their specific needs. Diverse nations exhibit variations in their regulations governing label components and label appearance.

The primary objective of this research is to scrutinize the disparities between international Front-of-Pack (FOP) labelling standards and the standards adhered to in Pakistan. Additionally, this investigation seeks to determine whether the standards currently practiced in Pakistan align with consumer satisfaction requirements or exert an impact on consumer purchasing behavior.

Table 3.2 presents a compilation of studies that have delved into the realm of Front-of-Pack (FOP) food labelling standards, examining their interactions with perceived food quality, brand loyalty, nutritional consciousness, and consumer satisfaction. These investigations have harnessed various methodologies to explore the intricate relationships within this multifaceted domain.

Firstly, (R. Liu, Hoefkens, & Verbeke, 2015) undertook a quantitative study to scrutinize the influence and use of nutritional labelling standards in conjunction with objective knowledge of nutrient value on consumers' purchase behavior. Their approach aimed to explore the factors influencing the utilization of nutritional labeling. Next, (Bialkova, Sasse, & Fenko, 2016) embarked on an inquiry into the impact of nutritional labeling and how it helped consumers to make well-informed health choices and to investigates the ways in which customers' decisions are influenced by the trade-off between health and satisfaction. (Khandpur et al., 2019) conducted an experimental study, focusing on the impact of FOP food labelling standards and which label helped customers to make more informed buying decision, by comparing three different nutritional label design and their approach involved randomized controlled experiments to discern the effects of FOP nutritional claims and their understanding among adults.

(Manivannan, 2020) conducted quantitative research with the aim to study the impact of nutritional food labels on consumer satisfaction and how lifestyle and brand preferences shapes the consumer buying decisions. Franco-Arellano, Vanderlee et al. (Franco-Arellano, Vanderlee, Ahmed, Oh, & L'Abbé, 2020) pursued a quantitative analysis, primarily examining the impact of FOP labeling and nutritional claim on consumers' perceptions of product quality and purchase intention. (Deliza et al., 2020) conducted the experimental study to compare the nutritional warning labels. To find out which nutritional label is more effecting in helping consumers to identify the products high in nutrients.

(Ogundijo et al., 2021) conducted a quantitative research study to examine how different socio-demographic factors influencing the consumers' buying behaviors and perceptions regarding quality of food. (Andrews, Netemeyer, Burton, & Kees, 2021) also conducted quantitative analysis on the association between FOP food labels and the role of understanding and knowledge of nutritional claim. (Aguenaou et al., 2021) pursued the quantitative research study to evaluate the consumers knowledge and views about different nutritional claims and their understanding to make informed buying decisions. (Sansone, Musso, Colamatteo, & Pagnanelli, 2021) undertook a quantitative research study to investigate the factors that affect the consumers choices and satisfaction regarding the food products and to study the influence of product healthfulness on consumers satisfaction. (Andik & fitri Rachma, 2022) conducted a quantitative research to study the perceived quality and brand loyalty. (Shahiduzzaman & Naskar) studied the relationship between FOP food labels and consumer satisfaction by using quantitative research approach.

The proposed framework of this research augments the existing literature by encompassing a holistic examination of FOP food labelling standards, perceived food quality, brand loyalty, consumer awareness of nutrition values, and their collective impact on consumer satisfaction, thereby providing a more in-depth comprehension of this complex field.

Table 3.2 Summary of past studies and contribution of this study

Paper	FOP Food Labelling	Perceived Food Quality	Brand Loyalty	Consumer Consciousness of Nutrients Value	Consumer Satisfaction	Methodology
(R. Liu et al., 2015)	✓			✓		Quantitative Research
(Bialkova et al., 2016)	✓	✓				Quantitative Research
(Khandpur et al., 2019)	✓			✓		Experimental Study
(Manivannan, 2020)			✓	✓	✓	Quantitative Research
(Franco-Arellano et al., 2020)	✓			✓		Quantitative Research
(Deliza et al., 2020)	✓					Experimental Study
(Ogundijo et al., 2021)	✓	✓				Quantitative Research
(Andrews et al., 2021)	✓			✓		Quantitative Research
(Aguenaou et al., 2021)	✓			✓		Quantitative Research
(Sansone et al., 2021)		✓			✓	Quantitative Research
(Andik & fitri Rachma, 2022)		✓	✓			Quantitative Research
(Shahiduzzaman & Naskar)	✓				✓	Quantitative Research
Proposed Framework	✓	✓	✓	✓	✓	Quantitative Research

3.8 Proposed Framework

The research landscape has indeed seen numerous investigations into the influence of Front-of-Pack (FOP) food labelling standards on consumer satisfaction. Similarly, the pivotal role of brand loyalty in shaping customer purchasing patterns and behaviors has been thoroughly examined. However, there exists a noticeable dearth of research when it comes to comprehensively understanding the connections between FOP labelling standards and their impact on brand reputation and loyalty. Additionally, the relationships between FOP labelling standards, perceived food quality of packaged products, and their collective influence on consumer satisfaction have been explored, but there remains an opportunity for further exploration in this domain.

Furthermore, while some studies have underscored the significance of customer consciousness of Nutrition Value (NV), the specific moderating impact of NV on the relationship between FOP Food labelling standards and customer satisfaction remains an underexplored area. To elevate customer satisfaction levels more effectively within the context of FOP food labelling requirements, it is important to construct a complete framework with these various components into account and elucidates their roles in shaping consumer perceptions and behaviors. Addressing these research gaps aims to offer a more holistic understanding of the multifaceted dynamics in play, this study proposes the framework depicted in Figure 3.2. This framework serves as a strategic tool to guide future research endeavors, shedding light on the intricate interplay between FOP labelling standards, brand reputation, loyalty, perceived food quality, and the mediating role of customer consciousness of Nutrition Value, all within the context of enhancing customer satisfaction.

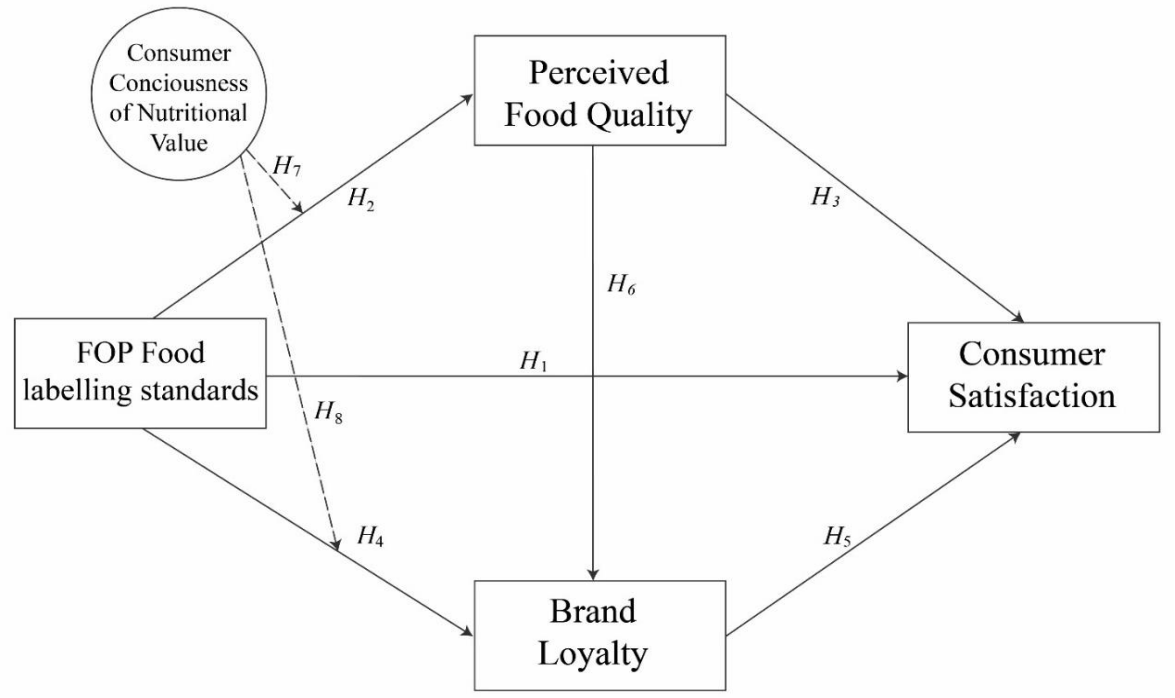


Figure 3.2 Proposed Framework of the Study

This study employs a structured framework that systematically explores the relationships between key variables in the context of food labelling. The independent variable under investigation is FOP (Front-of-Pack) food labelling standards, while the dependent variable is consumer satisfaction. The research hypotheses are organized as follows:

Hypothesis 1 (H1): FOP food labelling standards have a direct and positive influence on consumer satisfaction.

To delve deeper into the causal mechanisms behind this relationship, the framework incorporates two mediating variables:

Hypothesis 2 (H_2): FOP food labelling standards positively impact perceived food quality.

Hypothesis 3 (H_3): Perceived food quality has a direct, positive effect on consumer satisfaction.

The framework also explores the role of brand loyalty as both an outcome and mediator:

Hypothesis 4 (H_4): FOP food labelling standards have a direct, positive impact on brand loyalty.

Hypothesis 5 (H_5): Brand loyalty significantly influences consumer satisfaction.

Hypothesis 6 (H_6): Perceived food quality positively influences brand loyalty.

Recognizing the potential moderating effects of consumer consciousness of nutritional value, two additional hypotheses are introduced:

Hypothesis 7 (H_7): Consumer consciousness of nutritional value plays a moderating role in the relationship between FOP food labelling standards and perceived food quality.

Hypothesis 8 (H_8): Consumer consciousness of nutritional value plays a moderating role in the relationship between FOP food labelling standards and brand loyalty.

This structured framework offers a systematic approach to examining the complex interplay between FOP food labelling standards, perceived food quality, brand loyalty, consumer satisfaction, and the moderating effects of nutritional value awareness. The hypotheses guide the investigation of these relationships and provide a structured foundation for the study.

4 Methodology

The research methodology is pivotal in molding the research process and directing the investigation towards valid and reliable conclusions. In this study, a quantitative research methodology is employed, aligning with a positivist perspective. This approach is grounded in the belief that reliable and valid knowledge is derived from factual information, obtained through systematic measurement and observation. Quantitative research is characterized by its emphasis on objective truth (Smith, 1983), which is achieved through verifiable and replicable data findings, utilizing a systematic scientific sampling method (Davies & Fisher, 2018).

Quantitative research methods adhere to a structured and formal research procedure in which data are linked to specific variables, and standardized data collection methods are applied (Callaghan Doyle, 2022). The resulting data are expressed in numerical form, often presented graphically in formats such as graphs and tables. To analyze the data collected through quantitative research, various statistical software applications, including SPSS, STATA, MATLAB, Excel, PLS, SAS, and others, can be employed.

This chapter further elaborates on the research design within the quantitative methodology, outlining the steps taken to gather and analyze data within this research. It also delves into the sampling methodology adopted to ensure that the data collected are representative and suitable for the study. Lastly, in this chapter, an exploration is undertaken to elucidate the data analysis techniques that will be employed to examine the research hypotheses based on the collected data. These systematic methods and procedures are essential for producing valid and reliable research outcomes.

4.1 Research Design

This study utilizes a research design that is quantitative and cross-sectional. This is a commonly used approach for investigating and observing a population of interest at a single point in time without manipulating research variables (Mabe & Bwalya, 2022). Cross-sectional studies, such as this one, aim to provide a snapshot of the target population, offering descriptive results without the need for follow-up data collection. This research design is akin to a Census study, where the entire target sample is surveyed simultaneously to gather information about the variables for each participant individually (Bruinsma, 2021). These studies are cost-effective and do not entail prolonged engagement with participants or follow-up assessments. “The subjects in a cross-sectional study are simply chosen from an available population of potential relevance to the study question” (X. Wang & Cheng, 2020). Therefore, in this research, subjects are chosen from a relevant and available population aligning with the study's objectives., enabling the testing of the proposed hypotheses.

4.2 Sampling Method

Data for this study will be collected using the purposive sampling method, which falls within the category of non-probability sampling techniques designed for the targeted acquisition of data from specific population subsets. Non-probability sampling methods are particularly valuable in situations where the precise calculation of selection probabilities is infeasible, or when certain population units inherently lack the possibility of being selected (Obilor, 2023).

Researchers resort to non-probability sampling techniques to exercise control over who participates in their study and to tailor their audience selection. It is essential to note that in non-probability sampling, not all members of a larger group possess an equal likelihood of being chosen (Pace, 2021). In the case of purposive sampling, the researcher exercises discretion in determining which individuals to include in the sample based on a range of factors, including their expertise in the subject matter or their willingness and ability to participate in the study (Oliver, 2015). As articulated by Adolph Jenson, "purposive sampling" is defined as "the technique of selecting sets of components in such a way that the resulting estimation or percentage closely approximates the population's corresponding characteristics currently under investigation" (Toleti, Bobbillapati, Kollipaka, & Myneni, 2015).

Purposive sampling, also referred to as judgmental, selective, or subjective sampling, relies on the researcher's discretion in selecting the study's units, whether they are participants, cases, organizations, events, or data points (Rai & Thapa, 2015). This method serves to streamline the selection of potential participants in the research (B. Thomas, 2022). It is commonly employed in market research, organizational research, and brand research to gain insights into potential customers, address issues, evaluate forthcoming product launches, assess brand image, and measure customer satisfaction, among other objectives.

Among the various forms of purposive sampling techniques, this study opts for "Maximum Variation Sampling," also known as "vast and varied sampling." This method is purposeful in its aim to capture a diverse array of perspectives on the subject matter of interest. Essentially, maximum variation sampling seeks to identify viewpoints that deviate significantly from the norm to the extraordinary (Berndt, 2020). This sampling approach is preferred for its cost-effectiveness, simplicity, and efficiency, largely attributable to the enthusiasm and keen interest of the research participants. In this study, this method is selected because the entire population cannot feasibly participate (Stratton, 2021).

To qualify for participation in this study, individuals must meet a minimum age criterion of 18 years or older, with age being determined at the commencement of the survey. In the realm of research, it is a common practice to apply structural equation modeling to datasets obtained through purposive sampling (Doustmohammadian et al., 2022; Van der Merwe, Bosman, & Ellis, 2014; J. Wang, Tao, & Chu, 2020).

4.3 Data Collection

In this study, data was gathered through an online questionnaire survey from individuals aged 18 years and older. The survey encompassed a well-constructed set of questions designed to assess and quantify the various components central to the study. Surveys serve as a highly advantageous means of data collection for several reasons.

Surveys are a cost-effective tool for data collection that yield expeditious results. This makes them a crucial factor in ensuring efficient data collection and processing. Additionally, surveys offer scalability, enabling the collection of data from a substantial and diverse population, rendering them well-suited for research with a broad scope.

For this study, the adoption of survey as a data collection tool is valuable due to its quantitative nature. The survey responses can easily be quantified or expressed in numerical terms which further facilitates subsequent analysis. Before the main survey, a preliminary study was conducted. This phase of pilot-study employed a questionnaire to assess the efficiency of the survey instrument and gain a deeper understanding of the study's core principles.

Following a meticulous examination of the feedback received from the pilot study of 25 samples, certain survey questions were refined. The objective of these adjustments was to enhance the clarity and comprehensibility of the questionnaire for respondents participating in the main survey.

Participants were requested to assess the questions in the primary survey using a 5-point Likert scale. In this scale, a rating of 1 signified "Strongly Disagree," while a rating of 5 denoted "Strongly Agree." The implementation of this Likert scale allowed participants to indicate their degree of agreement or disagreement with the survey questions systematically, offering a structured and uniform approach for articulating their thoughts and opinions.

4.3.1 Questionnaire

The questionnaire comprises a total of 55 items, encompassing variables, indicators, and demographic sections. It is structured into nine sections, meticulously designed to comprehensively investigate various facets of front-of-package (FOP) food labeling requirements and customer preferences.

The initial section begins with a qualifying question, ensuring that respondents are at least 18 years of age. Those who do not meet this age requirement are instructed to discontinue the survey. The second section is dedicated to collecting demographic data related to age and gender.

In the third section, respondents are provided with detailed information on four international FOP food labeling standards: the Daily Intake Guide, the Health Star rating system, the multi-traffic light Label System, and the Chilean warning label System. They are then prompted to express their preferences based on their knowledge and understanding of these standards.

The questionnaire employs Likert scale questions in Sections 4, 5, 6, 7, and 8 to gauge various factors, encompassing the perceived quality of food, consumer awareness of nutritional value, brand loyalty, the independent variable of FOP food labeling requirements, and the dependent variable of consumer satisfaction. These sections feature multiple indicators sourced from existing literature.

In Section 4, the focus is on evaluating the independent variable of front-of-package food labeling standards, with 11 indicators under consideration. The assessment employs a 5-point Likert scale and draws from a range of academic sources (Cannoosamy, Pugo-Gunsam, & Jeewon, 2014; Giró-Candanedo et al., 2022; Julia et al., 2017; Wakui et al., 2023).

Section 5 utilizes a 5-point Likert scale for assessment respondents' opinions on perceived food quality, featuring six indicators (Zhang et al., 2022). Section 6, which assesses the variable of consumer awareness of nutritional value, utilizes a 5-point Likert scale and includes ten indicators measuring the influence of consumers' awareness and utilization of nutritional labeling (Ashraf S, Lamia M, & Essam H, 2007; Cowburn & Stockley, 2005; Donga & Patel, 2018; Wakui et al., 2023).

Section 7 delves into brand loyalty, examining ten specific indicators adapted from various research studies (Kee et al., 2021; Lassoued & Hobbs, 2015). In Section 8, the dependent variable of customer satisfaction is explored using five indicators to measure respondents' satisfaction with food products and labeling requirements. The final section, Section 9, aims to collect demographic data concerning participants' education, occupation, household composition, weight range (BMI), exercise habits, and medical issues, in line with previous studies (J. S. Yoo, Han, Chung, & Park, 2019).

5 Results & Discussion

This chapter explores the findings of this research gathered through a comprehensiv statistical analysis conducted using the SmartPLS programme, SPSS Software and Microsoft Excel. It is subdivided into three distinct sections, each serving a unique purpose to enhance the clarity of the data. A detailed examination of the findings is presented in the section titled "Data." This sub-section commences with an exploration of demographic information, establishing the foundation for subsequent discussions. Subsequently, a meticulous Missing Value Analysis is employed to assess data integrity, followed by other crucial tests including normality and linearity, to see how well the data aligns with fundamental assumptions. These anchor the groundwork for subsequent investigations. Furthermore, this section also addresses the data validity and reliability, reinforcing the dataset's robustness.

The second sub-section delves deeper into the results of the conditional process analysis. Within this critical phase of the analysis, dependencies and relationships are unveiled, with meticulous explanations of their implications.

The concluding part of the chapter presents a comprehensive discourse on the findings, accompanied by a thorough examination of the analysis's outcomes. To impart a meaningful context for understanding their significance and applicability, these findings are defined through an exploration of pertinent research within the field.

5.1 Data

A total of 807 responses were collected through an online survey. An essential prerequisite for participation was that respondents must be 18 years of age or older and possess the ability to comprehend English. Out of the accumulated responses, 32 samples, equivalent to 4%, did not satisfy these criteria and were consequently excluded from the analysis. The remaining 775 responses, constituting 96% of the total, were retained for further examination.

To carry out the Missing Value Analysis, conditional formatting in MS Excel was employed, typically involving the identification of blank or incomplete survey questions. However, in this specific dataset, no missing values were detected. This absence of missing values can be attributed to the mandatory nature of every survey question, leaving no room for unanswered queries. This not only ensures the dataset's completeness but also confirms the absence of any missing data points.

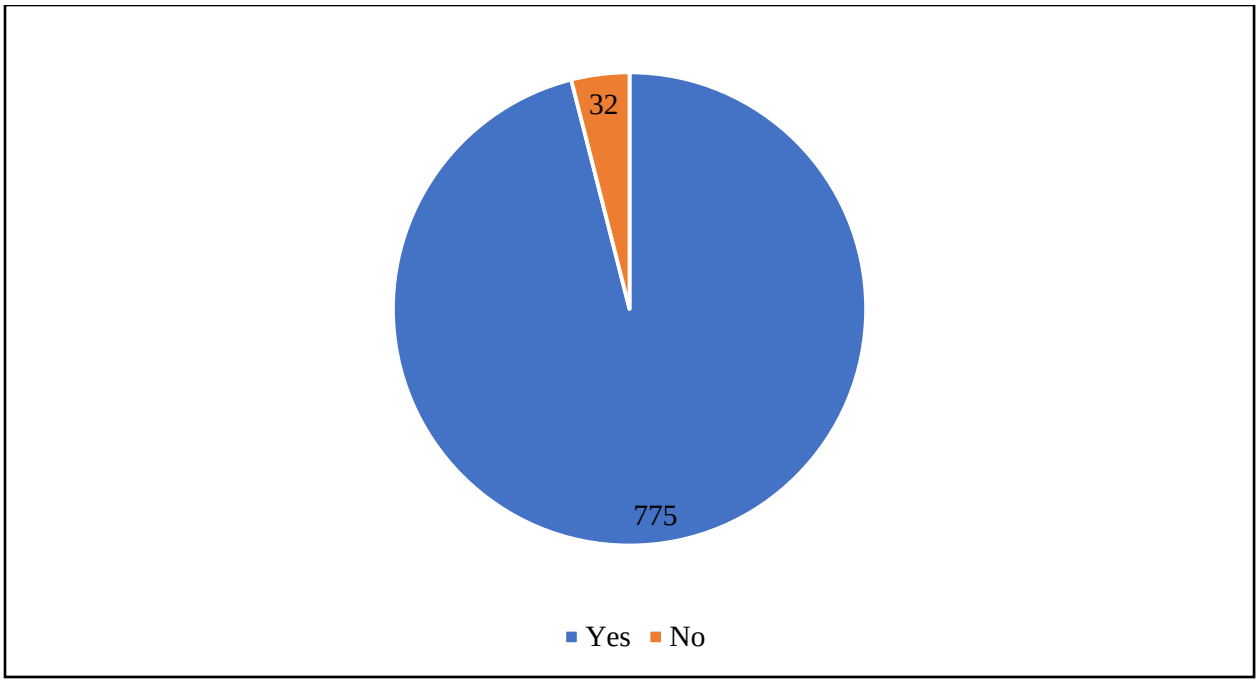


Figure 5.1 Survey Respondent Statistics

5.1.1 Demographics

A total of 775 participants, ranging in age from 18 to 65, were included in the study. In terms of gender distribution, 53.3% of participants identified as female, while 46.7% were male.

The process of data collection involved a widespread dissemination of the online survey link. This dissemination encompassed the distribution of personalized and corporate emails, as well as outreach efforts on various social media platforms, including Facebook, Instagram, and LinkedIn. This extensive outreach initiative spanned four weeks, with three weeks in September and one week in October 2023.

To participate in the study, individuals were required to initiate the survey by clicking on the hyperlink provided in the emails and messages they received. Participants were provided with concise instructions tailored to align with the study's objectives.

The survey gathered a range of demographic information from participants, including details related to age, gender, educational background, socio-economic status, occupation, household composition, exercise routines, health conditions, and the extent of their responsibility for grocery shopping. These demographic factors play a pivotal role in facilitating a comprehensive analysis of the study's findings and their subsequent implications.

Table 5.1 Socio-demographics Characteristics

Demographics features of participants in the online study (n = 775)		
Age	Frequency	Percentage (%)
18-24 Years	491	63.4
25-34 Years	251	32.4
35-44 Years	20	2.6
45-54 Years	10	1.3
55-64 Years	3	0.4
≥ 65 Years	0	0
Gender		
Female	413	53.3
Male	362	46.7
Education level		
Upto Primary	3	0.4
Upto Secondary	6	0.8
Upto Higher Secondary	60	7.7
Undergraduate	394	50.8
Postgraduate	284	36.6
Doctorate	28	3.6
Occupation		
Student	268	34.6
Supervisor	7	0.9
Engineer/Architect	101	13
Designer	22	2.8
Teacher/Professor	49	6.3
Doctor	27	3.5
Nutritionists	3	0.4
Manager	15	1.9
Other	283	36.5

Family Income (PKR Per Month)		
≤50000	120	15.5
50000-100,000	249	32.1
100,001-200,000	164	21.1
200,001-300,000	109	14
≥300,000	134	17.3
Household Composition		
Adults Only	373	48.1
Adults and Children	402	51.9
Health (Body Mass Index)		
≤18.5 Underweight	52	6.7
18.5-24.9 Normal	510	65.8
25.0-39.9 Overweight	117	15.1
≥40 Obese	96	12.5
Workout Routine		
Once a week	147	19
Twice a week	175	22.6
4-5 times per week	197	25.4
None of these	256	33
Any Food borne disease		
Yes	86	11.1
No	622	80.3
Don't Know	67	8.6
Responsible for grocery shopping		
Solely responsible	171	22.1
Co-responsible	604	77.9

5.1.2 Nutritional Label Test

In Section 3 of the survey, data related to four global nutritional labeling systems was presented, and respondents were asked to express their preferences based on their knowledge. The four available choices were as follows:

1. Daily Intake Guide: A daily intake recommendation implemented since 2006 by specific manufacturers in several countries.
2. Health Star Rating System: A system of health star ratings utilized by Australia and New Zealand since 2014.
3. Multi Traffic Light Label System: Implemented in the UK since 2005, using multiple traffic lights.
4. Chile Warning Label: Mandatory in Chile as of 2016 (Aguenaou et al., 2021).

Analysis of the responses pertaining to food labels revealed the distribution of respondents' preferences as follows:

- ✓ 22% of participants favored the Reference Intakes (DIG).
- ✓ An equivalent 22% showed preference for the Chilean Warning Label System (WRN).
- ✓ The Health Star Rating Method (HSR) was the choice of 23% of respondents.
- ✓ The Multiple Traffic Light Label method (MTL) garnered the highest preference, with 33% of respondents choosing it as their preferred nutritional labeling method.

The results suggest that the Multiple Traffic Light Label method received the highest level of preference among the respondents.

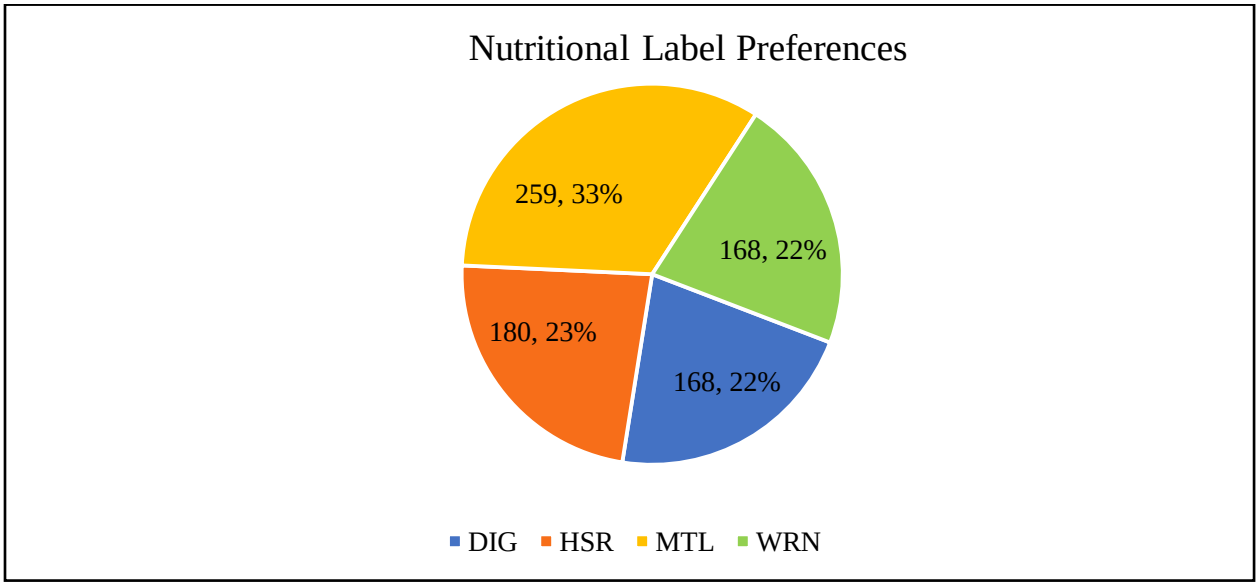


Figure 5.2 Respondents' Nutritional Label Preferences

5.1.3 Normality

In the context of normally distributed data, the majority of values tend to cluster around the mean, with only a small fraction of extreme values falling on the tails of the distribution (Talib, 2013). To assess whether data follows a normal distribution, researchers often employ skewness and kurtosis values in statistical software like SPSS. These metrics provide insights into the distribution's shape and characteristics. Skewness and kurtosis are considered descriptive statistics, distinguishing them from theory-based tests such as the Shapiro-Wilk (SW) and Kolmogorov-Smirnov (KS) tests (Razali & Wah, 2011).

Skewness, a measure of the symmetry or lack thereof in a distribution, helps determine whether the data exhibits asymmetry. On the other hand, kurtosis influences the shape and height of the distribution. The initial value associated with kurtosis is sometimes referred to as "kurtosis" (Mishra et al., 2019). Typically, kurtosis values fall within the range of -10 to +10, while skewness values tend to vary between -3 and +3.

Upon analyzing the data in Table 5.2, it appears that the variables align reasonably closely with a normal distribution based on their skewness and kurtosis characteristics.

Table 5.2 Summary of Normality Test

Indicators	**Skewness**	**Kurtosis**
BL	-0.175	0.314
CCNV	-2.01	0.32
CS	-0.139	-0.211
F0P	-0.93	0.49
PFQ	0.192	-0.25

The skewness values for the variables in the range from -0.93 to 0.192 suggest that there is minimal data skew. When skewness values approach zero, it suggests that the data exhibits a degree of symmetry.

Furthermore, the kurtosis values for these variables, falling between -0.25 and 0.490, are also in proximity to the kurtosis value of 3, which is characteristic of a normal distribution. This suggests that the data's tails and peaks do not significantly deviate from those of a normal distribution, as demonstrated in the table.

According to these skewness and kurtosis values, it seems that the data is fairly close to a normal distribution, also mentioned in Appendix B, which enhances the confidence in the data's conformity to the normal distribution assumption.

5.1.4 Collinearity

Collinearity, also referred to as multicollinearity, describes the scenario in which two or more independent variables within a statistical model exhibit a linear relationship (Alin, 2010). In the realm of statistical analysis, collinearity is a critical consideration, as it can significantly influence on the dependability and interpretive clarity of the data (Dormann et al., 2013). The statistical literature offers various measures to quantify collinearity, with one of them being the Variance Inflation Factor (VIF) (Fox & Monette, 1992).

VIF values were calculated for each indicator in the analysis to assess the extent of collinearity within the dataset. A VIF value equal to 1 indicates the absence of collinearity, while values between 3 and 5 suggest the presence of moderate multicollinearity, and VIF values exceeding 5 indicate high multicollinearity. The VIF serves as a metric to gauge the extent to which collinearity inflates the variance of estimated regression coefficient (Daoud, 2017). This assessment is crucial in determining the impact of collinearity on the results and conclusions drawn from the statistical analysis.

In Table 5.3, a summary is provided for the Variance Inflation Factor (VIF) values computed for each indicator:

Table 5.3 Summary of VIF values

Items	**VIF**	**Items**	**VIF**	**Items**	**VIF**	**Items**	**VIF**	**Items**	**VIF**
BL1	2.292	CCNV1	1.539	CS1	1.968	FOP1	2.059	PFQ1	1.485
BL2	2.402	CCNV10	2.225	CS2	2.396	FOP2	2.569	PFQ2	1.309
BL3	1.665	CCNV2	1.792	CS3	1.895	FOP3	2.029	PFQ3	1.564
BL4	1.783	CCNV3	2.4	CS4	2.602	FOP4	1.959	PFQ4	2.748
BL5	1.752	CCNV4	2.69	CS5	2.568	FOP5	-	PFQ5	2.69
BL6	2.041	CCNV5	2.504			FOP6	2.032	PFQ6	1.437
BL7	1.756	CCNV6	2.407			FOP7	1.698		
BL8	1.756	CCNV7	2.074			FOP8	1.466		
BL9	-	CCNV8	1.982			FOP9	1.404		
BL10	1.7	CCNV9	2.169			FOP10	-		
						FOP11	1.722		

Consequently, the obtained VIF values enhance the reliability of the results and facilitate a clearer understanding of the individual contributions of each indicator to the model. These VIF values collectively indicate that there is no substantial evidence of high correlations among the analyzed indicators. This finding underscores the robustness of the statistical analysis and the independence of the included variables.

5.1.5 Pearson Correlation Test

Many authors have used Pearson's correlations to assess the correlations/strength between variables (Chuenban, Sornsaruht, & Pimdee, 2021; Jacob et al., 2020).

A p-value below 0.05, signifying a 95% confidence interval, indicates that the Pearson Correlation for all variables is statistically significant, as Table 5.4 shows. As a result, the assumption of linearity remains valid.

Table 5.4 Pearson Correlation Test

Correlations						
		BL	**CS**	**FOP**	**PFQ**	**CCNV**
BL	Pearson Correlation	1	.404**	.459**	.500**	.559**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000
CS	Pearson Correlation	.404**	1	.803**	.809**	.503**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000
FOP	Pearson Correlation	.459**	.803**	1	.612**	.528**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000
PFQ	Pearson Correlation	.500**	.809**	.612**	1	.558**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000
CCNV	Pearson Correlation	.559**	.503**	.528**	.558**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
**. Correlation is significant at the 0.01 level (2-tailed).						

5.2 Measurement Model

Structural Equation Modeling (SEM) requires the establishment of a measurement model to link the measurement items with their respective latent variables (Munim & Noor, 2020). This section outlines the application of the PLS (Partial Least Squares) technique to generate outcomes for the measurement model through Confirmatory Factor Analysis (CFA).

Confirmatory Factor Analysis (CFA) is a statistical method used to confirm the underlying factor structure of a set of observed variables. With CFA, researchers can explore the hypothesis that a relationship exists between the observed variables and the latent constructs that underlie them (Suhr, 2006). In addition to assessing the quality and reliability of the measurement instruments used in the study, the measurement model is essential for validating the relationships between latent variables and their observable indicators. (Brown, 2015).

The primary discoveries and their implications for the study are highlighted in the subsequent discussion of the CFA-PLS analysis results. This analysis contributes to enhancing the study's robustness and confirming the validity of its measuring instruments by gaining a more profound insight into the connections between observed and latent variables.

5.2.1 Initial Measurement Model

Upon importing the data into the SmartPLS program, the analysis was conducted using the Partial Least Squares (PLS) technique to compute the values for Cronbach's alpha and the Average Variance Extracted (AVE). This crucial step is integral to evaluate the reliability and quality of the measurement instruments utilized in the study.

Cronbach's alpha offers insights into the internal consistency and reliability of the items within each construct, while the AVE score quantifies the ratio of variance accounted for by the latent construct in comparison to measurement error. These findings are instrumental in affirming the accuracy and robustness of the measurement model and provide a solid foundation for subsequent investigations.

The initial Confirmatory Factor Analysis (CFA) measurement model is presented in Figure 5.1. This model serves as the starting point for a deeper exploration of the connection between latent constructs and the measurable indicators associated with them.

Cronbach's alpha and composite reliability serves as key metrics for assessing the internal consistency, focusing on the relationships among observed item variables. These values are essential within the context of Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess the reliability of each indicator. They are expressed on a scale from 0 to 1, where higher values indicate greater reliability. Composite reliability and alpha values ranging from 0.60 and 0.70 in Cronbach's alpha are considered appropriate for exploratory research, but more advanced stages require higher values (Hair Jr, Hair Jr, Hult, Ringle, & Sarstedt, 2021). Extremely high values exceeding 0.90 are not preferred, and values surpassing 0.95 are strongly discouraged (Nunnally & Bernstein, 1994). .

In the realm of Structural Equation Modeling (SEM), the Average Variance Extracted (AVE) serves as a statistical measure to assess convergent validity effectively. Ideally, the AVE value should exceed 0.50 (Ab Hamid, Sami, & Sidek, 2017).

The following table 5.5 provides a summary of the AVE and Cronbach's alpha values calculated for each variable:

Table 5.5 Values of Cronbach's alpha and AVE

Indicators	Cronbach's alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
BL	0.869	0.896	0.467
CCNV	0.917	0.931	0.574
CS	0.833	0.882	0.6
FOP	0.859	0.889	0.442
PFQ	0.798	0.858	0.509

The CCNV and CS indicators exhibit strong internal consistency, supported by high Composite Reliability and Cronbach's alpha values, as well as reasonably high AVE values. These indicators showcase robust and reliable measurement.

Conversely, the BL and FOP indicators display considerable internal consistency and reliability, although their AVE values are relatively lower, indicating that some of the variance may be attributed to measurement error.

The PFQ indicator demonstrates good reliability and reasonable internal consistency with a moderate AVE value. This suggests that the PFQ indicator offers dependable measurement qualities while maintaining an acceptable level of consistency.

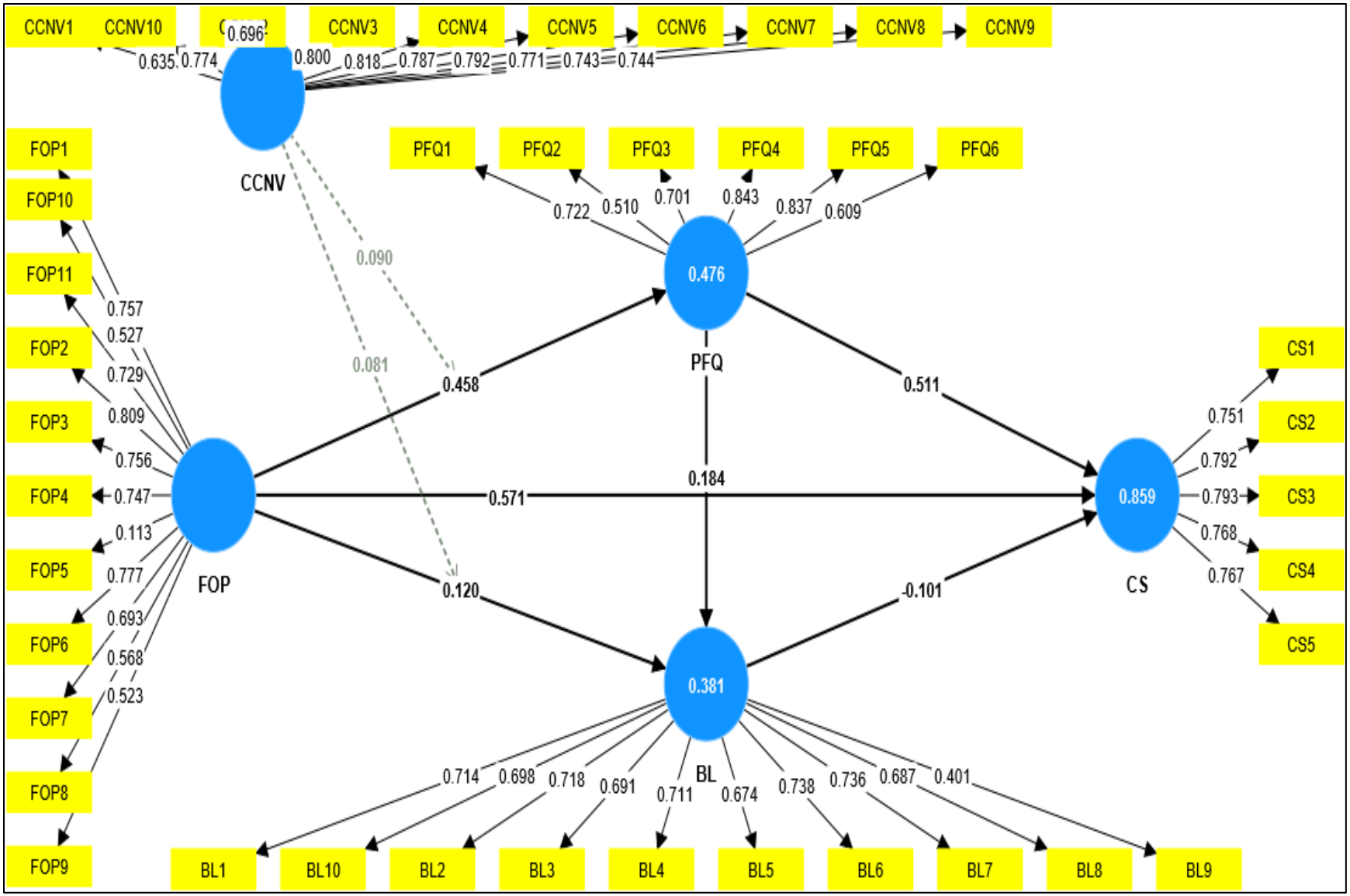


Figure 5.3 Values of Initial Confirmatory Factor Analysis

5.2.1 Calibrated Measurement Model

A calibrated measurement model, integral to measurement theory and structural equation modeling (SEM), serves the purpose of establishing and validating associations between latent (unobservable) constructs and their observed (measured) indicators.

Within this study, the initial values for FOP5 and FOP10 were 0.113 and 0.527, respectively, both falling below the designated threshold and thereby impacting the overall Average Variance Extracted (AVE) for the FOP construct. Similarly, the outer loading value for BL9 was 0.401, below the required threshold and influencing the overall AVE for the Brand Loyalty (BL) construct.

To enhance the calibration of the measurement model, it was imperative to eliminate the FOP5, FOP10, and BL9 indicators, as depicted in Figure 5.2. This adjustment was necessary to ensure that the AVE values for the FOP and BL constructs exceeded the minimum cutoff point of 0.5, thus indicating robust convergent validity. These three items had outer loadings below the recommended level, signifying their limited contribution to the measurement model, necessitating their removal.

Subsequent to the removal of these three items, the AVE for FOP improved from 0.442 to 0.508, and the AVE for BL improved from 0.467 to 0.513, both meeting the acceptable threshold. The model's validity and reliability are further assessed in the following sections, which involve a comprehensive analysis of the AVE values and a rigorous evaluation of the model's fit.

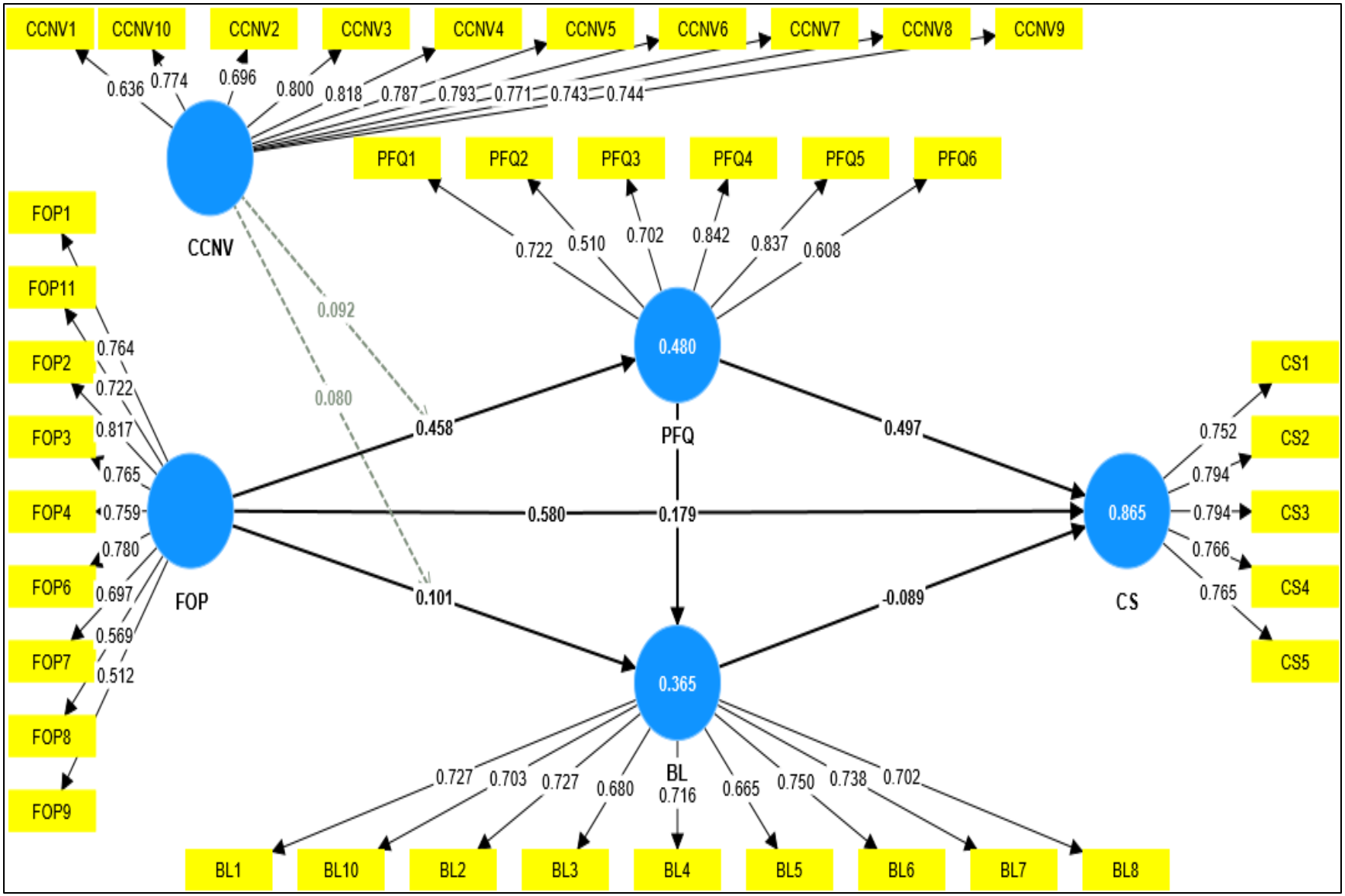


Figure 5.4 Calibrated Confirmatory Factor Analysis

5.2.1.1 Reliability and Validity

The evaluation of measurements or constructs' consistency and stability is a crucial element in this study, an activity commonly conducted to evaluate reliability (Chetwynd, 2022). Internal consistency within each construct under investigation is revealed through the examination of Cronbach's alpha values. When Cronbach's alpha values exceed the threshold of 0.7, which is considered standard (Amirrudin, Nasution, & Supahar, 2021), it indicates that a construct's elements consistently and reliably measure the same underlying concept.

Within the parameter of this research, various constructs are considered (BL, CCNV, CS, F0P, and PFQ) exhibit exceptional internal consistency as shown in table 5.6. Notably, the CCNV construct stands out with a remarkably high Cronbach's alpha of 0.917, signifying outstanding internal consistency among its indicators. It suggests that the CCNV indicator items consistently assess the same construct reliably.

Furthermore, both the BL and F0P constructs demonstrate strong internal consistency, with Cronbach's alpha reflecting a value of 0.879. The CS construct, with a Cronbach's alpha of 0.833, implies good internal consistency, although it slightly lags behind CCNV, BL, and F0P.

Conversely, the PFQ indicator exhibits a Cronbach's alpha of 0.798, which, while reasonably high, is the lowest among the indicators presented. Nevertheless, the range of all the reported Cronbach's alpha values spans from 0.798 to 0.917, surpass the recommended threshold, reinforcing the investigation's validity. These findings underscore the precision with which the measurements capture the intended conceptions, further enhancing the study's credibility and reliability.

Table 5.6 Summary of Cronbach's alpha

Indicators	**Cronbach's alpha**
BL	0.879
CCNV	0.917
CS	0.833
F0P	0.879
PFQ	0.798

5.2.1.2 Average Variance Extracted - AVE

In the field of psychometrics and structural equation modeling (SEM), the Average Variance Extracted (AVE) concept is considered a statistical term commonly applied in the context of Confirmatory Factor Analysis (CFA) and latent variable modeling (dos Santos & Cirillo, 2023). AVE is used to assess the validity

of indicators employed in a CFA or SEM model to measure a latent construct. It quantifies the extent to which the latent concept contributes to the variance observed in the variables. Higher AVE values suggest greater reliability, indicating a more substantial impact of the latent concept on the variation in the indicators. Ideally, AVE values should exceed 0.5 to demonstrate strong reliability and convergent validity (Shrestha, 2021).

The AVE values for CCNV (0.574) and CS (0.6) signify robust convergent validity, while BL (0.508), F0P (0.513), and PFQ (0.509) exhibit moderate convergent validity. Notably, all AVE values fall within the acceptable range as shown in table 5.7, emphasizing the validity of the latent constructs and the extent to which they influence the observed variables. This reinforces the model's overall reliability and validity.

Table 5.7 Summary of AVE values

Indicators	**Average variance extracted (AVE)**
BL	0.508
CCNV	0.574
CS	0.6
F0P	0.513
PFQ	0.509

5.2.1.4 Model Fit Assessment

The analysis of model testing and verification is a critical component of statistical assessment (Anderson & Darling, 1952). To evaluate the congruence between the cumulative distribution function of a model's predictions and the actual distribution of observed data, a statistical method known as the Cramér-von Mises test is employed (Chen, Döring, & Jensen, 2018). The Cramér-von Mises test statistic quantifies the level of discrepancy or mismatch between these distributions (Durbin & Knott, 1972).

The degree of statistical significance concerning the observed mismatch is established through the p-value associated with the Cramér-von Mises test statistic (Spinelli, Lockhart, & Stephens, 2002). In this context, a p-value of 0 signifies a highly significant conformity of the model with the dataset, indicating that the model aligns exceptionally well with the observed data, which is a desirable outcome in statistical modeling and hypothesis testing.

Table 5.8 Summary of Model Fit Assessment

Indicators	Number of observations used	Cramér-von Mises test statistic	Cramér-von Mises p value
BL	775	0.162	0.017
CCNV	775	0.317	0
CS	775	0.406	0
FOP	775	0.19	0.007
PFQ	775	0.233	0.002

The Cramér-von Mises test statistics for all five indices are consistently low as shown in table 5.8, indicating a strong fit of our structural model to the observed data. Specifically, these values, ranging from 0.162 to 0.406, are all below 0.5, which is a commonly accepted threshold point for assessing model fit (Ashkar, Aucoin, Choulakian, & Vautour, 2013). The lower values in the table suggest a tight correspondence between the model and the observed data, emphasizing the model's robustness and suitability for clarifying relationships within the dataset.

5.3 Structural Equational Model-SEM

Following the establishment of the measurement model in the preceding phase, the analysis proceeds with the utilization of SmartPLS for Structural Equation Modeling (SEM) to explore the relationships between latent variables, as illustrated in Figure 5.3. The PLS-SEM research model comprises both a structural model and a measurement model.

The outer model outlines the connection between a latent variable and its observed variables, whereas the inner model defines the associations among unobserved or latent variables. In the structural model, the statistical significance of path coefficients is evaluated for both independent and dependent variables (Hair, Ringle, & Sarstedt, 2011).

PLS-SEM enables the evaluation of how effectively the model accounts for the target construct of interest and computes the strength of the correlations among latent variables (Akpamah, Matkó, & Hussain). By employing path coefficients and t-values, the PLS-SEM technique, in conjunction with bootstrapping, is employed to assess the importance of structural correlations (Hair et al., 2011). This comprehensive analysis aids in understanding the relationships and their importance within the research model.

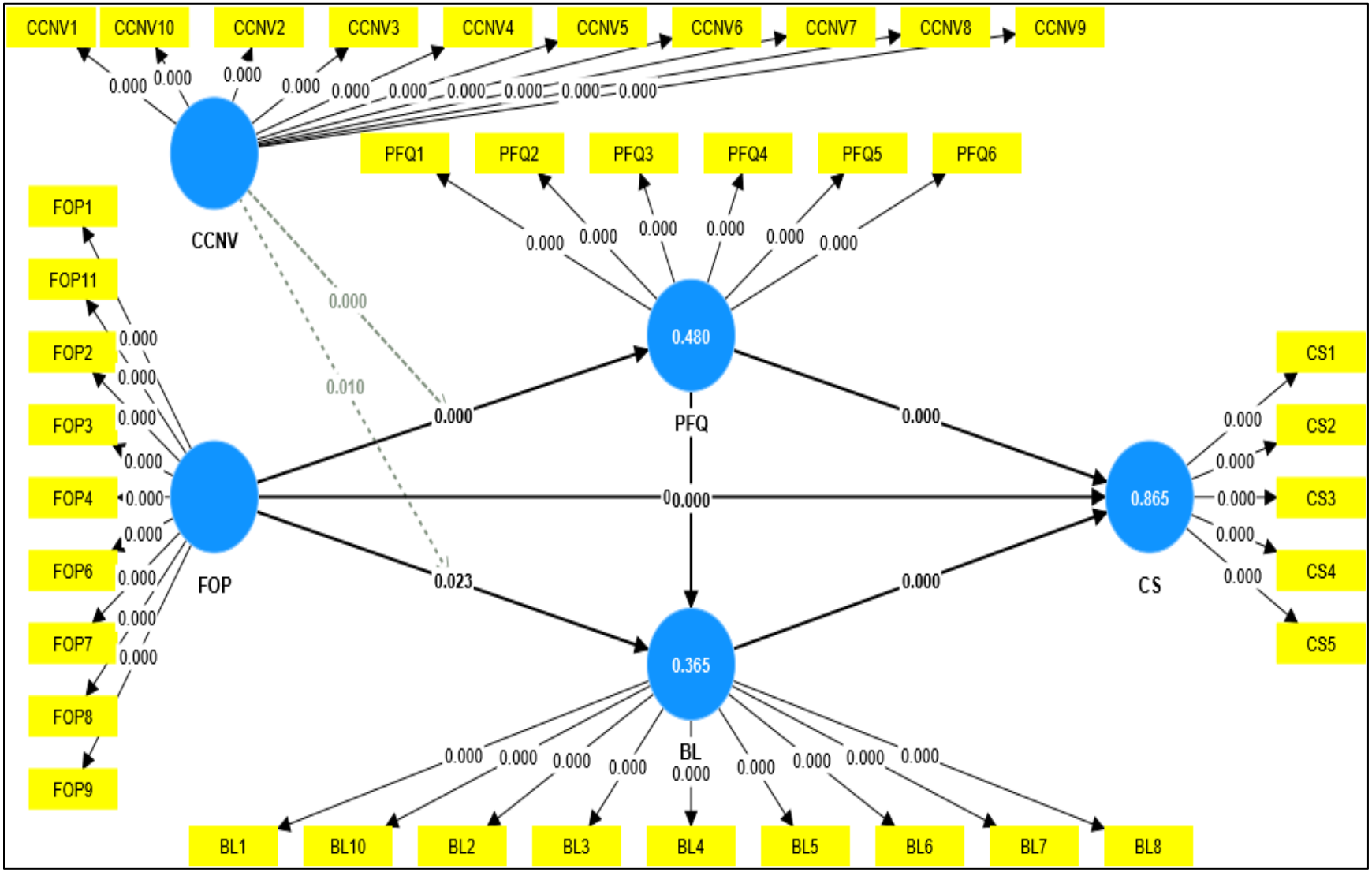


Figure 5.5 SmartPLS-Structural Equational Model

5.4.1 Hypothesis Testing results

Examining the hypotheses generated from the Structural Equation Model (SEM) presented in figure 5.5, is summarized in Table 5.9. The following hypotheses were examined:

Hypothesis H1: FOP food labeling standards have a positive impact on Consumer Satisfaction (CS). The results indicated a significant and positive relationship with a p-value less than 0.05, supporting H1.

Hypothesis H2: FOP food labeling positively influences Perceived Food Quality (PFQ). The analysis also supported this hypothesis with a p-value less than 0.05.

Hypothesis H3: PFQ positively affects Consumer Satisfaction (CS). This hypothesis was confirmed by the results, which showed a p-value less than 0.05.

Hypothesis H4: FOP labeling positively impacts Brand Loyalty (BL). The analysis supported this relationship with a significant p-value of 0.023, which is less than 0.05.

Hypothesis H5: Brand Loyalty positively influences Consumer Satisfaction. The analysis supported that there is a significant relationship between brand loyalty and consumer satisfaction, (p-value < 0.05), but this relation is slightly negative. So, this hypothesis is not accepted in terms of positive influence.

Hypothesis H6: Perceived Food Quality positively influences Brand Loyalty. This hypothesis was also supported by the analysis, with a significant p-value less than 0.05.

Hypothesis H7: Consumer consciousness of nutrient value plays a moderating role between FOP food labeling and perceived food quality. The obtained P-value is 0, which indicates that, in terms of perceived food quality (PFQ), there is a strong and statistically significant interaction impact between CCNV and FOP.

Hypothesis H8: Consumer consciousness of nutrient value plays a moderating role between FOP food labeling and brand loyalty. The obtained P-value is 0.01; this indicates statistical significance below the threshold of 0.05. This suggests that CCNV and FOP have a statistically significant effect on brand loyalty (BL).

These findings contribute to understanding the connection between the variables and highlight the complex dynamics that exist within the research model.

Table 5.9 Hypothesis Results

Hypothesis	Conclusion
H1	Accepted
H2	Accepted
H3	Accepted
H4	Accepted
H5	Not accepted
H6	Accepted
H7	Accepted
H8	Accepted

5.4.2 Direct Path Coefficients

In the Structural Equation Model (SEM), the table provides a comprehensive overview of the correlations between various variables, categorized under "Direct Path Coefficients." These coefficients represent the direct influence of one variable on another, quantifying the size and significance of these effects.

The path from FOP Food labeling to Consumer Satisfaction (FOP->CS) shows a highly significant positive impact, with a path coefficient of 0.581 and an exceptionally high T-statistic of 29.769. This suggests a noteworthy positive effect of FOP labeling on consumer satisfaction.

Similarly, the path from FOP to Perceived Food Quality (FOP->PFQ) indicates a significant positive impact (T-statistic = 12.982) with a path coefficient of 0.459. The path from PFQ to CS also demonstrates a strong and significant impact, indicating a positive influence between these variables, with a path coefficient of 0.496.

The path from FOP to Brand Loyalty (BL) is somewhat weaker but still significant, indicating a positive effect, although less influential. Unexpectedly, the path from Brand Loyalty (BL) to Consumer Satisfaction (CS) reveals a negative mean, suggesting a predominance of negative values in this relationship.

However, the path from the combination of CCNV and FOP to Brand Loyalty (CCNV x FOP -> BL) exhibits a significant positive impact (T-statistic = 2.565) with a p-value of 0.01, indicating that the brand loyalty is positively and statistically significantly influenced by CCNV and FOP.

The path from the combination of CCNV and FOP to Perceived Food Quality (CCNV x FOP -> PFQ) also indicates a significant positive impact (T-statistic = 3.918) with a p-value of 0. These values reveal that the paths related to the interactions between CCNV and FOP have positive and statistically significant effects

on both Brand Loyalty (BL) and Perceived Food Quality (PFQ). These findings expand complete understanding of the intricate relationships within the SEM, as depicted in Table 5.10.

Table 5.10 Summary of Path Coefficients

Paths	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
FOP -> CS	0.581	0.019	29.769	0
FOP -> PFQ	0.459	0.035	12.982	0
PFQ -> CS	0.496	0.02	24.685	0
FOP -> BL	0.102	0.045	2.266	0.023
BL -> CS	-0.089	0.016	5.478	0
PFQ -> BL	0.178	0.047	3.815	0
CCNV x FOP -> BL	0.081	0.031	2.565	0.01
CCNV x FOP -> PFQ	0.094	0.024	3.918	0

5.4.3 Indirect Path Coefficients

The table 5.11 labeled "Indirect Path Coefficients" functions as a valuable reference for comprehending the intricate relationships among variables in the Structural Equation Model (SEM). These coefficients shed light on the nuanced mechanisms through which intermediate variables influence outcomes. The initial path, marked by a negative coefficient, suggests that FOP indirectly affects CS through BL, with statistical significance at the 0.05 level. The second path reveals a substantial negative impact of CCNV on CS, partially mediated by BL, and this relationship is highly significant. The third path signifies a strong positive indirect effect of CCNV on CS through PFQ, also highly significant. The fourth path, while statistically significant, indicates a relatively weak negative influence of the interaction between CCNV and FOP on CS, passing through PFQ and BL. The fifth path indicates that FOP positively affects BL through PFQ, with significance, highlighting PFQ's mediating role. The sixth path suggests that the interaction between CCNV and FOP positively impacts BL through PFQ. The seventh path unveils that PFQ negatively affects CS through BL, with BL's influence being significant. The subsequent path demonstrates that FOP negatively affects CS through the entire chain: FOP -> PFQ -> BL, with statistical significance, signifying the mediating roles of PFQ and BL. Another indirect path of CCNV through PFQ and BL on CS shows a negative effect of CCNV on CS through the complete chain, with PFQ and BL's influence being statistically significant. The indirect path of CCNV on CS through FOP and PFQ suggests that the interaction between CCNV and FOP positively impacts CS through PFQ, a highly significant effect. Lastly, a path implies that

CCNV has a positive effect on BL through PFQ, representing a meaningful relationship, although not extremely strong.

Table 5.11 Summary of Indirect Paths

Paths	Sample mean (M)	Standard deviation	T statistics	P values
FOP -> BL -> CS	-0.009	0.005	1.998	0.046
CCNV -> BL -> CS	-0.036	0.007	4.792	0
CCNV -> PFQ -> CS	0.161	0.02	8.017	0
CCNV x FOP -> PFQ -> BL -> CS	-0.001	0.001	2.493	0.013
FOP -> PFQ -> BL	0.082	0.022	3.736	0
CCNV x FOP -> PFQ -> BL	0.016	0.006	2.952	0.003
PFQ -> BL -> CS	-0.016	0.005	3.112	0.002
FOP -> PFQ -> BL -> CS	-0.007	0.002	3.045	0.002
CCNV -> PFQ -> BL -> CS	-0.005	0.002	2.833	0.005
CCNV x FOP -> PFQ -> CS	0.046	0.012	3.907	0
CCNV -> PFQ -> BL	0.058	0.018	3.297	0.001
FOP -> PFQ -> CS	0.228	0.019	11.759	0
CCNV x FOP -> BL -> CS	-0.007	0.003	2.419	0.016

The SEM's indirect path coefficients illuminate the complex correlations that exist between the variables, highlighting the function of intermediary factors in moderating the associations between FOP labelling, perceived food quality, brand loyalty, and consumer satisfaction.

5.5 Discussion

This chapter provides a comprehensive insight into the research findings by incorporating the values of pertinent tests, path coefficients, and statistical significance in addition to a detailed analysis of the data. It adds depth to the study's findings and advances theoretical comprehension of the intricate linkages that exist between factors and surprising results when it comes to the effects of Front of Package (FOP) food labelling on consumer behavior and satisfaction.

A comprehensive explanation of the statistical analysis conducted using SmartPLS software are provided. The online survey data generated a total of 807 responses, but 32 responses (4%) were excluded due to non-

conformance with the sample criteria. Hence, 775 responses (96%) were retained for subsequent analysis, guaranteeing a complete dataset free of missing values.

A thorough examination of the measurement model was then conducted, assessing both validity and reliability. The internal consistency and reliability of the measurement instruments are supported by the reported Cronbach's alpha values, which are presented in Table 5.6. These values, ranging from 0.798 to 0.917, all exceed the recommended threshold, confirming strong internal consistency across all constructs.

To further validate the measurement model, Table 5.7 presents Average Variance Extracted (AVE) values for each construct. The majority of these values fall within an acceptable range, demonstrating sufficient convergent validity.

In Section 5.3, the preferences of respondents regarding four international nutritional labeling systems were discussed. According to this study findings, the Health Star Rating approach came in second with 23% support from the surveyed respondents, and both the daily intake guide and the Chilean warning label system received 22% support. The Multiple Traffic Light Label approach was the most preferred, with 33% of respondents favoring it. This phenomenon was also observed in another study in which the researcher compared consumers' preferences between the DIG and MTL labeling systems, with the majority of votes favoring MTL (Maubach, Hoek, & Mather, 2014). This data forms the basis for this research, providing insights into the participants' preferences regarding nutritional labeling standards.

Using the acquired data, this study utilizes the Structural Equation Modeling (SEM) framework, and detailed results of hypothesis testing are presented in Section 5.4.1. These tests examine the theories of how Front of Package (FOP) food labeling affects consumer satisfaction (CS), perceived food quality (PFQ), and brand loyalty (BL). The path coefficient values and results from statistical significance tests are provided. Notably, p-values less than 0.05 confirm that FOP labeling significantly improves PFQ and CS, supporting hypotheses H1 and H2 (Feldmann & Hamm, 2015; Kanter et al., 2018; Miller & Cassady, 2015; Willett et al., 2019).

One of the important findings of this research contrary to expectations, brand loyalty does not contribute positively to consumer satisfaction. This hypothesis is determined through pre-existing literature of (Kaur et al., 2018; Spence, 2012; Tu & Chang, 2012). Although the effect is slightly negative which could be attributed to several different factors, like price point of the products and the cultural context of this research, as mentioned in the researches of (Y. J. Han, Nunes, & Drèze, 2010; Usunier et al., 2017). This is particularly true for product categories like fast-moving consumer goods (FMCG), where brand loyalty tends to be weak. According to (Kotlet, Ang, Leong, & Tan, 1999) FMCG predominantly comprises low-involvement products, characterized by their frequent and routine consumption. In low-involvement

scenarios, consumers typically avoid extensive information searches, the evaluation of brand attributes, or making significant purchase decisions. According to (Y. J. Han et al., 2010) price sensitivity can have an impact on customer loyalty, especially if customers believe they are not receiving a fair return on their investment. Cultural norms and values can also have an impact on consumer satisfaction. Some cultures have specific expectations about how items should function, and they value excellent customer service and a well-known brand. Customers may become less satisfied with a brand if it fails to meet certain cultural norms or acts contrary to their values. Due to these reasons consumers don't always show a strong sense of brand loyalty and are more likely to quickly move to alternatives when their favorite brand isn't accessible (Silayoi & Speece, 2004). Moreover, According to a study by (Usunier et al., 2017), there is a risk of dissatisfaction by customers when firms fail to adapt their marketing methods to meet the cultural environment. All these studies indicate the possibility that there can be a negative relationship between brand loyalty and consumer satisfaction.

Section 5.4.2 of the results delves into the direct path coefficients in the SEM and provide the associated T-statistics. The strength of the relationship between FOP labeling and consumer satisfaction (CS) is robust, as demonstrated by a highly significant influence with a path coefficient of 0.581 and a T-statistic of 29.769, as presented in Table 5.10.

Further supporting the connection between FOP labeling and perceived food quality (PFQ) is the path from FOP to PFQ, which indicates a substantial positive impact (T-statistic = 12.982).

To gain comprehensive insights into the correlations between these variables, the values of T-statistics and path coefficients can be analyzed. Table 5.11 offers a significant understanding of the intricate relationships revealed by the indirect path coefficients within the SEM. A strong and positive indirect impact can be observed along the path from FOP labeling to PFQ to CS, emphasizing the role of perceived food quality as an intermediary variable. A minor but statistically significant negative influence is noticeable in the path from FOP labeling to BL to CS.

In summary, this chapter has provided a deep and thorough exploration of the research findings, illuminating the intricate relationships between various factors and unveiling unexpected results concerning the impact of Front of Package (FOP) food labeling on consumer behavior and satisfaction.

6. Conclusion

This study had the primary objective of examining the influence of Front of Package (FOP) food nutritional labeling on consumer satisfaction. It specifically focused on assessing disparities among four globally recognized FOP labeling standards and their implementation within the context of Pakistan. The overarching aim of this research was to determine the degree of satisfaction among consumers with existing food labeling standards, thus ascertaining whether these standards align with consumer expectations and impact purchasing behavior.

To comprehensively address this objective, the study considered several crucial participant demographics, which served as important variables. These demographics encompassed age, gender, level of education, socioeconomic status, occupation, physical activity habits, health conditions, and roles in grocery shopping. Additionally, the study sought to evaluate consumer preferences in relation to the four distinct nutritional food labeling systems: the Chilean Warning Label, the Health Star Rating System, the Daily Intake Guide, and the Multi-Traffic Light. In essence, the primary purpose of this study was to gain a deeper understanding of consumer preferences regarding Front of Package (FOP) food labeling.

Through a five-variable analysis, encompassing Front of Package (FOP) food labeling standards, consumer satisfaction, perceived food quality (PFQ), brand loyalty (BL), and consumer consciousness of nutritional value (CCNV), this study has yielded valuable insights. The results have revealed that CCNV acts as a moderator, influencing the relationships between FOP and PFQ, as well as FOP and BL.

Furthermore, the findings have illuminated the positive impact of FOP on both PFQ and BL. Notably, PFQ has been recognized as a significant factor influencing consumer satisfaction and displaying a robust positive correlation with brand loyalty.

The study's outcomes provide valuable information regarding how consumers' perceptions of food quality, brand loyalty, and satisfaction are shaped by Front of Package (FOP) labels. This research highlights the importance of aligning food labeling standards with the preferences and expectations of consumers in Pakistan. It sheds light on the intricate interactions and connections among these various elements. Ultimately, the results underscore the potential of FOP labeling to enhance consumer satisfaction with their choices.

6.1 Theoretical Contribution

This research offers valuable insights into consumer behavior within the context of Front of Package (FOP) food nutritional labeling. It significantly contributes to our theoretical understanding of how FOP labels impact consumers' perceptions of food quality, brand loyalty, and overall satisfaction. These findings hold relevance not only in the specific context of Pakistan but also contribute to a broader comprehension of global FOP labeling guidelines and consumer preferences. Additionally, the study introduces the concept of Consumer Consciousness of Nutritional Value (CCNV) as a moderator in the relationship between FOP labeling, perceived food quality (PFQ), and brand loyalty (BL). This innovative approach expands the existing literature by exploring how consumer knowledge of nutritional value influences their perceptions and loyalty, with potential implications for marketing and labeling practices.

6.2 Practical Contribution

Policymakers and the food industry, particularly in Pakistan, should pay close attention to the practical implications of this research. It underscores the importance of aligning food labeling requirements with consumer expectations. Food manufacturers have the opportunity to adjust their labeling practices to better cater to consumer preferences, while policymakers can use this knowledge to make informed decisions regarding labeling regulations.

The results of this research can also benefit food producers and marketers. Gaining insights into the impact of Front of Package (FOP) labeling on perceptions of food quality and brand loyalty can contribute to the development of more effective marketing and branding strategies. By optimizing their labels to have a positive impact on these factors, companies can enhance consumer satisfaction.

Additionally, the study highlights the moderating role of consumer awareness of nutritional value (CCNV) in the relationship between consumer satisfaction and FOP food labeling. This suggests that consumer education and awareness campaigns hold the capacity to positively impact customer attitudes. Therefore, developing educational programs to enhance consumers' understanding of nutritional value and labeling can make a meaningful contribution.

Lastly, the findings of this study can serve as guidance for food producers in creating products that align with consumer preferences. Understanding how FOP labeling influences consumer satisfaction can inform product development plans and assist organizations in creating products that better meet the expectations of their customers.

6.3 Limitations and Future Recommendations

The current study was carried out among individuals aged 18 and above, targeting the general public in Pakistan. However, it's important to acknowledge that this approach might constrain the applicability of the findings to a more extensive demographic. Future research could address this limitation by focusing on specific age groups, such as Generation Z and millennials, or by studying particular segments of the population, such as retailers, wholesalers, shopkeepers, gym and fitness enthusiasts, or individuals with specific dietary preferences. This tailored approach would provide a more comprehensive understanding of food preferences among various consumer groups.

The current study employed a brief three-week, cross-sectional design and collected 775 responses. To enhance the reliability of results, future research may consider a long-term approach to capture changes in consumer preferences over time. Additionally, increasing the sample size could yield a more representative sample, resulting in more applicable and robust results.

Furthermore, this study did not specifically focus on any particular brand or packaged item. Future studies could explore how Front of Package (FOP) labeling influences specific food groups or well-known brands, offering more specialized insights into consumer preferences and behaviors.

By implementing these recommendations in future research, we can advance our understanding of how FOP food nutritional labeling affects consumer satisfaction and contribute to the development of more informed marketing and strategic approaches.

References

Aaker, D. A. (2009). *Managing brand equity*: simon and schuster.

Ab Hamid, M., Sami, W., & Sidek, M. M. (2017). *Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion.* Paper presented at the Journal of Physics: Conference Series.

Abarca-Gómez, L., Abdeen, Z. A., Hamid, Z. A., Abu-Rmeileh, N. M., Acosta-Cazares, B., Acuin, C., . . . Aguilar-Salinas, C. A. (2017). Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128· 9 million children, adolescents, and adults. *The lancet, 390*(10113), 2627-2642. doi:https://doi.org/10.1016/S0140-6736(17)32129-3

Abdul Latiff, Z. A. B., Rezai, G., Mohamed, Z., & Amizi Ayob, M. (2016). Food labels' impact assessment on consumer purchasing behavior in Malaysia. *Journal of food products marketing, 22*(2), 137-146. doi:https://doi.org/10.1080/10454446.2013.856053

Adesina, E., Ajayi, B., Amoo, E. O., Adeyeye, B., Ajayi, M. P., Olawande, T., . . . Udume, M. E. (2022). Consumers' Knowledge and Use of Nutritional Labelling Information in Lagos, Nigeria. *Sustainability, 14*(1), 578.

Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S., . . . Abebe, Z. (2019). Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The lancet, 393*(10184), 1958-1972. doi:https://doi.org/10.1016/S0140-6736(19)30041-8

Aguenaou, H., El Ammari, L., Bigdeli, M., El Hajjab, A., Lahmam, H., Labzizi, S., . . . El Kari, K. (2021). Comparison of appropriateness of Nutri-Score and other front-of-pack nutrition labels across a group of Moroccan consumers: Awareness, understanding and food choices. *Archives of Public Health, 79*(1), 1-13.

Akbay, C., & Jones, E. (2005). Food consumption behavior of socioeconomic groups for private labels and national brands. *Food Quality and Preference, 16*(7), 621-631. doi:https://doi.org/10.1016/j.foodqual.2005.01.005

Akpamah, P., Matkó, A., & Hussain, R. " Meeting the Skills and Competencies Demands of Contemporary Business Operations.

Alin, A. (2010). Multicollinearity. *Wiley interdisciplinary reviews: computational statistics, 2*(3), 370-374. doi:https://doi.org/10.1002/wics.84

Amirrudin, M., Nasution, K., & Supahar, S. (2021). Effect of variability on Cronbach alpha reliability in research practice. *Jurnal Matematika, Statistika dan Komputasi, 17*(2), 223-230. doi:https://doi.org/10.20956/jmsk.v17i2.11655

Anderson, T. W., & Darling, D. A. (1952). Asymptotic theory of certain" goodness of fit" criteria based on stochastic processes. *The annals of mathematical statistics*, 193-212.

Andik, S. D. S., & fitri Rachma, A. (2022). *The Impact of Brand Awareness, Brand Association, and Perceived Quality towards Brand Loyalty (A case study of New Product).* Paper presented at the E3S Web of Conferences.

Andrews, J. C., Lin, C.-T. J., Levy, A. S., & Lo, S. (2014). Consumer research needs from the food and drug administration on front-of-package nutritional labeling. *Journal of Public Policy & Marketing, 33*(1), 10-16. doi:https://doi.org/10.1509/jppm.33.1.10

Andrews, J. C., Netemeyer, R., Burton, S., & Kees, J. (2021). What consumers actually know: The role of objective nutrition knowledge in processing stop sign and traffic light front-of-pack nutrition labels. *Journal of Business Research, 128*, 140-155.

Annunziata, A., Pomarici, E., Vecchio, R., & Mariani, A. (2016). Nutritional information and health warnings on wine labels: Exploring consumer interest and preferences. *Appetite, 106*, 58-69.

Ares, G., Varela, F., Machin, L., Antúnez, L., Giménez, A., Curutchet, M. R., & Aschemann-Witzel, J. (2018). Comparative performance of three interpretative front-of-pack nutrition labelling schemes:

Insights for policy making. *Food Quality and Preference, 68*, 215-225. doi:https://doi.org/10.1016/j.foodqual.2018.03.007

Arrúa, A., Curutchet, M. R., Rey, N., Barreto, P., Golovchenko, N., Sellanes, A., . . . Ares, G. (2017). Impact of front-of-pack nutrition information and label design on children's choice of two snack foods: Comparison of warnings and the traffic-light system. *Appetite, 116*, 139-146. doi:https://doi.org/10.1016/j.appet.2017.04.012

Ashkar, F., Aucoin, F., Choulakian, V., & Vautour, C. (2013). Cramér-von Mises and Anderson-Darling goodness-of-fit tests for the two-parameter kappa distribution. *Journal of Hydrologic Engineering, 18*(12), 1749-1757.

Ashraf S, E. S., Lamia M, H., & Essam H, G. (2007). Consumer behaviour towards food label in Alexandria city markets.

Athaide, G. A., & Klink, R. R. (2012). Creating global brand names: The use of sound symbolism. *Journal of Global Marketing, 25*(4), 202-212. doi:https://doi.org/10.1080/08911762.2012.744123

Bandara, B., De Silva, D., Maduwanthi, B., & Warunasinghe, W. (2016). Impact of food labeling information on consumer purchasing decision: with special reference to faculty of Agricultural Sciences. *Procedia Food Science, 6*, 309-313. doi:https://doi.org/10.1016/j.profoo.2016.02.061

Batt, P. J., & Liu, A. (2012). Consumer behaviour towards honey products in Western Australia. *British Food Journal, 114*(2), 285-297. doi:https://doi.org/10.1108/00070701211202449

Becker, L., van Rompay, T. J., Schifferstein, H. N., & Galetzka, M. (2011). Tough package, strong taste: The influence of packaging design on taste impressions and product evaluations. *Food Quality and Preference, 22*(1), 17-23. doi:https://doi.org/10.1016/j.foodqual.2010.06.007

Berndt, A. E. (2020). Sampling methods. *Journal of Human Lactation, 36*(2), 224-226.

Bialkova, S., Sasse, L., & Fenko, A. (2016). The role of nutrition labels and advertising claims in altering consumers' evaluation and choice. *Appetite, 96*, 38-46.

Bialkova, S., & van Trijp, H. C. (2011). An efficient methodology for assessing attention to and effect of nutrition information displayed front-of-pack. *Food Quality and Preference, 22*(6), 592-601. doi:https://doi.org/10.1016/j.foodqual.2011.03.010

Blake, M. K., Mellor, J., & Crane, L. (2010). Buying local food: Shopping practices, place, and consumption networks in defining food as "local". *Annals of the Association of American Geographers, 100*(2), 409-426. doi:https://doi.org/10.1080/00045601003595545

Blaszczyk, R. L. (2000). *Imagining consumers: design and innovation from Wedgwood to Corning* (Vol. 16): JHU Press.

Bonsmann, S., Celemín, L. F., & Grunert, K. (2010). Food labelling to advance better education for life. *European journal of clinical nutrition, 64*(3), S14-S19.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research*: Guilford publications.

Brownell, K. D., & Koplan, J. P. (2011). Front-of-package nutrition labeling—an abuse of trust by the food industry? *New England Journal of Medicine, 364*(25), 2373-2375. doi:https://doi.org/10.1056/nejmp1101033

Bruinsma, K. (2021). *A parent's perspective on neighbourhood safety: How the built environment influence parent's social safety perception.*

Brunsø, K., Grunert, K. G., & Fjord, T. A. (2002). *Consumers' food choice and quality perception* (Vol. 77): MAPP, Center for markedsovervågning,-vurdering og-bearbejdning til ….

Bryła, P. (2020). Who reads food labels? Selected predictors of consumer interest in front-of-package and back-of-package labels during and after the purchase. *Nutrients, 12*(9), 2605. doi:https://doi.org/10.3390/nu12092605

Caballero, B. (2002). *The nutrition transition: diet and disease in the developing world*: Elsevier.

Callaghan Doyle, L. (2022). *Is the Moneyball approach is a feasible approach for success in Football (Soccer)? An analysis of Brentford's adoption of a statistical approach.* Dublin, National College of Ireland.

Campos, S., Doxey, J., & Hammond, D. (2011). Nutrition labels on pre-packaged foods: a systematic review. *Public health nutrition, 14*(8), 1496-1506. doi:https://doi.org/10.1017/S1368980010003290

Cannoosamy, K., Pugo-Gunsam, P., & Jeewon, R. (2014). Consumer knowledge and attitudes toward nutritional labels. *Journal of nutrition education and behavior, 46*(5), 334-340.

Carbone, E. T., & Zoellner, J. M. (2012). Nutrition and health literacy: a systematic review to inform nutrition research and practice. *Journal of the Academy of Nutrition and Dietetics, 112*(2), 254-265. doi:https://doi.org/10.1016/j.jada.2011.08.042

Carpenter, D. (2014). Reputation and power: Organizational image and pharmaceutical regulation at the FDA *Reputation and Power*: Princeton University Press.

Carruba, M. O., Caretto, A., De Lorenzo, A., Fatati, G., Ghiselli, A., Lucchin, L., . . . Riva, E. (2021). Front-of-pack (FOP) labelling systems to improve the quality of nutrition information to prevent obesity: NutrInform Battery vs Nutri-Score. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 1-10. doi:https://doi.org/10.1007/s40519-021-01316-z

Carter, O., Mills, B., & Phan, T. (2011). An independent assessment of the Australian food industry's daily intake guide'Energy Alone'label. *Health Promotion Journal of Australia, 22*(1), 63-67.

Cha, E., Kim, K. H., Lerner, H. M., Dawkins, C. R., Bello, M. K., Umpierrez, G., & Dunbar, S. B. (2014). Health literacy, self-efficacy, food label use, and diet in young adults. *American journal of health behavior, 38*(3), 331-339.

Chaudhuri, A. (2000). A macro analysis of the relationship of product involvement and information search: the role of risk. *Journal of Marketing theory and Practice, 8*(1), 1-15.

Chen, H., Döring, M., & Jensen, U. (2018). Test for model selection using Cramér–von Mises distance in a fixed design regression setting. *AStA Advances in Statistical Analysis, 102*(4), 505-535.

Chetwynd, E. (2022). Critical analysis of reliability and validity in literature reviews. *Journal of Human Lactation, 38*(3), 392-396.

Chuenban, P., Sornsaruht, P., & Pimdee, P. (2021). How brand attitude, brand quality, and brand value affect Thai canned tuna consumer brand loyalty. *Heliyon, 7*(2). doi:https://doi.org/10.1016/j.heliyon.2021.e06301

Clarke, N., Pechey, E., Kosīte, D., König, L. M., Mantzari, E., Blackwell, A. K., . . . Hollands, G. J. (2021). Impact of health warning labels on selection and consumption of food and alcohol products: systematic review with meta-analysis. *Health Psychology Review, 15*(3), 430-453. doi:https://doi.org/10.1080/17437199.2020.1780147

Commission, E. (2000). Directive 2000/13/EC of the European Parliament and of the Council of 20 March 2000 on the approximation of the laws of the Member States relating to the labelling, presentation and advertising of foodstuffs. *Official Journal of the European Communities, 109*(6/5/2000), 29-42. doi:https://doi.org/10.1016/j.tifs.2003.12.006

Corvalán, C., Reyes, M., Garmendia, M. L., & Uauy, R. (2013). Structural responses to the obesity and non-communicable diseases epidemic: the C hilean L aw of F ood L abeling and A dvertising. *Obesity reviews, 14*, 79-87.

Cowburn, G., & Stockley, L. (2005). Consumer understanding and use of nutrition labelling: a systematic review. *Public health nutrition, 8*(1), 21-28.

Dalal, B., & Aljarah, A. (2021). How brand symbolism, perceived service quality, and CSR skepticism influence consumers to engage in citizenship behavior. *Sustainability, 13*(11), 6021. doi:https://doi.org/10.3390/su13116021

Daoud, J. I. (2017). *Multicollinearity and regression analysis.* Paper presented at the Journal of Physics: Conference Series.

Davies, C., & Fisher, M. (2018). Understanding research paradigms. *Journal of the Australasian Rehabilitation Nurses Association, 21*(3), 21-25.

de Salud, M., & Social, P. (2011). Decreto Número 1880 de 2011. *Por el cual se señalan los requisitos para la comercialización de leche cruda para consumo humano directo en el territorio nacional. Bogotá*.

Delgado-Ballester, E., & Munuera-Alemán, J. L. (2001). Brand trust in the context of consumer loyalty. *European Journal of Marketing, 35*(11/12), 1238-1258.
Deliza, R., de Alcantara, M., Pereira, R., & Ares, G. (2020). How do different warning signs compare with the guideline daily amount and traffic-light system? *Food Quality and Preference, 80*, 103821. doi:https://doi.org/10.1016/j.foodqual.2019.103821
Deutsch, T. (2010). *Building a housewife's paradise: Gender, politics, and American grocery stores in the twentieth century*: Univ of North Carolina Press.
Dickie, S., Woods, J. L., & Lawrence, M. (2018). Analysing the use of the Australian Health Star Rating system by level of food processing. *International Journal of Behavioral Nutrition and Physical Activity, 15*(1), 1-9. doi:https://doi.org/10.1186/s12966-018-0760-7
Dobrucka, R., & Cierpiszewski, R. (2014). Active and intelligent packaging food-Research and development-A Review. *Polish Journal of Food and Nutrition Sciences, 64*(1). doi:10.2478/v10222–012–0091–3

http://journal.pan.olsztyn.pl
Donga, G., & Patel, N. (2018). The Nutrition Label–Which Information is Important to the Consumer. *International Journal of New Technology and Research, 4*(11), 53-56.
Donini, L. M., Penzavecchia, C., Muzzioli, L., Poggiogalle, E., Giusti, A. M., Lenzi, A., & Pinto, A. (2022). Efficacy of front-of-pack nutrition labels in improving health status. *Nutrition, 102*, 111770. doi:https://doi.org/10.1016/j.nut.2022.111770
Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., . . . Leitão, P. J. (2013). Collinearity: a review of methods to deal with it and a simulation study evaluating their performance. *Ecography, 36*(1), 27-46. doi:https://doi.org/10.1111/j.1600-0587.2012.07348.x
Dörnyei, K. R., Krystallis, A., & Chrysochou, P. (2017). The impact of product assortment size and attribute quantity on information searches. *Journal of Consumer Marketing, 34*(3), 191-201. doi:https://doi.org/10.1108/JCM-10-2015-1594
dos Santos, P. M., & Cirillo, M. Â. (2023). Construction of the average variance extracted index for construct validation in structural equation models with adaptive regressions. *Communications in Statistics-Simulation and Computation, 52*(4), 1639-1650. doi:https://doi.org/10.1080/03610918.2021.1888122
Doustmohammadian, A., Omidvar, N., Keshavarz-Mohammadi, N., Eini-Zinab, H., Amini, M., & Abdollahi, M. (2022). The association and mediation role of Food and Nutrition Literacy (FNLIT) with eating behaviors, academic achievement and overweight in 10–12 years old students: a structural equation modeling. *Nutrition Journal, 21*(1), 1-16.
Dunford, E. K., Poti, J. M., Xavier, D., Webster, J. L., & Taillie, L. S. (2017). Color-Coded front-of-pack nutrition labels—an option for US packaged foods? *Nutrients, 9*(5), 480.
Durbin, J., & Knott, M. (1972). Components of Cramér–von Mises statistics. I. *Journal of the Royal Statistical Society: Series B (Methodological), 34*(2), 290-307.
Easton, P., Entwistle, V. A., & Williams, B. (2010). Health in the'hidden population'of people with low literacy. A systematic review of the literature. *BMC Public Health, 10*(1), 1-10.
Feldmann, C., & Hamm, U. (2015). Consumers' perceptions and preferences for local food: A review. *Food Quality and Preference, 40*, 152-164. doi:https://doi.org/10.1016/j.foodqual.2014.09.014
Fenko, A., Kersten, L., & Bialkova, S. (2016). Overcoming consumer scepticism toward food labels: The role of multisensory experience. *Food Quality and Preference, 48*, 81-92. doi:https://doi.org/10.1016/j.foodqual.2015.08.013
Feunekes, G. I., Gortemaker, I. A., Willems, A. A., Lion, R., & Van Den Kommer, M. (2008). Front-of-pack nutrition labelling: testing effectiveness of different nutrition labelling formats front-of-pack in four European countries. *Appetite, 50*(1), 57-70. doi:https://doi.org/10.1016/j.appet.2007.05.009
Fischler, C. (1990). L'homme omnivore. *Paris: Editions Odile Jacob*.
Fox, J., & Monette, G. (1992). Generalized collinearity diagnostics. *Journal of the American Statistical Association, 87*(417), 178-183. doi:https://doi.org/10.1080/01621459.1992.10475190

Franco-Arellano, B., Vanderlee, L., Ahmed, M., Oh, A., & L'Abbé, M. (2020). Influence of front-of-pack labelling and regulated nutrition claims on consumers' perceptions of product healthfulness and purchase intentions: A randomized controlled trial. *Appetite, 149*, 104629.
Frewer, L., & Van Trijp, H. (2006). *Understanding consumers of food products*: Woodhead Publishing.
Galbraith, J. K. (1998). *The affluent society*: Houghton Mifflin Harcourt.
Giddens, A. (1992). Modernity and Self-Identity: Self and Society in the Late Modem Age: HeinOnline.
Giró-Candanedo, M., Claret, A., Fulladosa, E., & Guerrero, L. (2022). Use and understanding of nutrition labels: impact of diet attachment. *Foods, 11*(13), 1918.
Golan, E., Kuchler, F., Mitchell, L., Greene, C., & Jessup, A. (2001). Economics of food labeling. *Journal of consumer policy, 24*(2), 117-184. doi:https://doi.org/10.1023/A:1012272504846
Gracia, A., Loureiro, M. L., & Nayga Jr, R. M. (2009). Consumers' valuation of nutritional information: A choice experiment study. *Food Quality and Preference, 20*(7), 463-471.
Graham, D. J., Lucas-Thompson, R. G., Mueller, M. P., Jaeb, M., & Harnack, L. (2017). Impact of explained v. unexplained front-of-package nutrition labels on parent and child food choices: a randomized trial. *Public Health Nutrition, 20*(5), 774-785.
Grunert, K., & Wills, J. (2007). A review of European research on consumer response to nutrition information on food labels. 385–399.
Grunert, K. G., & Wills, J. M. (2007). A review of European research on consumer response to nutrition information on food labels. *Journal of public health, 15*, 385-399. doi:https://doi.org/10.1007/s10389-007-0101-9
Hadden, S. G. (1986). Read the label: Reducing risk by providing information. doi:https://doi.org/10.2307/1962046
Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing theory and Practice, 19*(2), 139-152. doi:https://doi.org/10.2753/MTP1069-6679190202
Hair Jr, J., Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*: Sage publications.
Hall, M. G., & Grummon, A. H. (2020). Nutrient warnings on unhealthy foods. *JAMA, 324*(16), 1609-1610.
Hamlin, R., & McNeill, L. (2016). Does the Australasian "health star rating" front of pack nutritional label system work? *Nutrients, 8*(6), 327.
Han, S. H., Nguyen, B., & Lee, T. J. (2015). Consumer-based chain restaurant brand equity, brand reputation, and brand trust. *International Journal of Hospitality Management, 50*, 84-93.
Han, Y. J., Nunes, J. C., & Drèze, X. (2010). Signaling status with luxury goods: The role of brand prominence. *Journal of marketing, 74*(4), 15-30. doi:https://doi.org/10.1509/jmkg.74.4.015
HANAFI, A. F. (2016). *Pengaruh Brand Equity Mobil Toyota Yaris Terhadap Kepuasan Konsumen (Studi Pada Pengguna Mobil Toyota Yaris di Yogyakarta)*. Universitas Muhammadiyah Yogyakarta.
Hawley, K. L., Roberto, C. A., Bragg, M. A., Liu, P. J., Schwartz, M. B., & Brownell, K. D. (2013). The science on front-of-package food labels. *Public health nutrition, 16*(3), 430-439. doi:https://doi.org/10.1017/S1368980012000754
Hieke, S., & Taylor, C. R. (2012). A critical review of the literature on nutritional labeling. *Journal of Consumer Affairs, 46*(1), 120-156. doi:https://doi.org/10.1111/j.1745-6606.2011.01219.x
Hodgkins, C., Barnett, J., Wasowicz-Kirylo, G., Stysko-Kunkowska, M., Gulcan, Y., Kustepeli, Y., . . . genannt Bonsmann, S. S. (2012). Understanding how consumers categorise nutritional labels: a consumer derived typology for front-of-pack nutrition labelling. *Appetite, 59*(3), 806-817. doi:https://doi.org/10.1016/j.appet.2012.08.014
Ikonen, I., Sotgiu, F., Aydinli, A., & Verlegh, P. W. (2020). Consumer effects of front-of-package nutrition labeling: An interdisciplinary meta-analysis. *Journal of the Academy of Marketing Science, 48*, 360-383. doi:https://doi.org/10.1007/s11747-019-00663-9
Jacob, R., Drapeau, V., Lamarche, B., Doucet, É., Pomerleau, S., & Provencher, V. (2020). Associations among eating behaviour traits, diet quality and food labelling: a mediation model. *Public health nutrition, 23*(4), 631-641. doi:doi:10.1017/S1368980019003203

Julia, C., Péneau, S., Buscail, C., Gonzalez, R., Touvier, M., Hercberg, S., & Kesse-Guyot, E. (2017). Perception of different formats of front-of-pack nutrition labels according to sociodemographic, lifestyle and dietary factors in a French population: Cross-sectional study among the NutriNet-Santé cohort participants. *BMJ open, 7*(6), e016108.

Kanter, R., Vanderlee, L., & Vandevijvere, S. (2018). Front-of-package nutrition labelling policy: global progress and future directions. *Public health nutrition, 21*(8), 1399-1408.

Kaur, D., Mustika, M. D., & Sjabadhyni, B. (2018). Affect or cognition: which is more influencing older adult consumers' loyalty? *Heliyon, 4*(4). doi:10.1016/j.heliyon.2018.e00610

Kee, D. M. H., Gan, Z. W., Chan, Y. Q., Lee, H. T., Tan, X. Y., & Lee, S. W. (2021). Customer satisfaction and brand loyalty: A case study of Nestlé. *Advances in Global Economics and Business Journal, 2*(1), 13-26.

Kelly, B., & Jacoby, E. (2018). Public Health Nutrition special issue on ultra-processed foods. *Public health nutrition, 21*(1), 1-4. doi:https://doi.org/10.1017/S1368980017002853

Kessler, H., & Wunderlich, S. M. (1999). Relationship between use of food labels and nutrition knowledge of people with diabetes. *The Diabetes Educator, 25*(4), 549-559.

Khandpur, N., Mais, L. A., de Morais Sato, P., Martins, A. P. B., Spinillo, C. G., Rojas, C. F. U., . . . Jaime, P. C. (2019). Choosing a front-of-package warning label for Brazil: a randomized, controlled comparison of three different label designs. *Food Research International, 121*, 854-861. doi:https://doi.org/10.1016/j.foodres.2019.01.008

Kiesel, K., & Villas-Boas, S. B. (2013). Can information costs affect consumer choice? Nutritional labels in a supermarket experiment. *International Journal of Industrial Organization, 31*(2), 153-163. doi:https://doi.org/10.1016/j.ijindorg.2010.11.002

Kim, K.-N. (2017). Global Update on Nutrition Labeling. *가가가가가가가가가 학술대회발표가*, 191-191.

Kim, S. Y., Nayga Jr, R. M., & Capps Jr, O. (2001). Food label use, self-selectivity, and diet quality. *Journal of Consumer Affairs, 35*(2), 346-363. doi:https://doi.org/10.1111/j.1745-6606.2001.tb00118.x

Kitz, R., Walker, T., Charlebois, S., & Music, J. (2022). Food packaging during the COVID-19 pandemic: Consumer perceptions. *International Journal of Consumer Studies, 46*(2), 434-448. doi:https://doi.org/10.1111/ijcs.12691

Kleef, E. V., & Dagevos, H. (2015). The growing role of front-of-pack nutrition profile labeling: a consumer perspective on key issues and controversies. *Critical reviews in food science and nutrition, 55*(3), 291-303. doi:https://doi.org/10.1080/10408398.2011.653018

Knorr, D., & Watzke, H. (2019). Food processing at a crossroad. *Frontiers in Nutrition, 6*, 85.

Kotlet, P., Ang, S. H., Leong, S. M., & Tan, C. T. (1999). Marketing Management: an Asian Perspective: Prentice-Hall, Singapore.

Lassoued, R., & Hobbs, J. E. (2015). Consumer confidence in credence attributes: The role of brand trust. *Food policy, 52*, 99-107. doi:https://doi.org/10.1016/j.foodpol.2014.12.003

Lawrence, M. A., Dickie, S., & Woods, J. L. (2018). Do nutrient-based front-of-pack labelling schemes support or undermine food-based dietary guideline recommendations? Lessons from the Australian Health Star Rating System. *Nutrients, 10*(1), 32. doi:https://doi.org/10.3390/nu10010032

Lisińska-Kuśnierz, M. (2014). Food packaging as non-satisfactory communication instrument in opinion of consumers. *Commodity Science in Research and Practice–Innovations in Product Development and Packaging. Eds. A. Cholewa-Wójcik, A. Kawecka. Polish Society of Commodity Science, Kraków*, 141-155. doi:https://doi.org/10.2202/1935-1682.1848

Liu, P., Tse, E. C.-Y., & He, Z. (2022). Influence of Customer Satisfaction, Trust, and Brand Awareness in Health-related Corporate Social Responsibility Aspects of Customers Revisit Intention: A Comparison between US and China. *Journal of Quality Assurance in Hospitality & Tourism*, 1-27. doi:https://doi.org/10.1080/1528008X.2022.2135163

Liu, R., Hoefkens, C., & Verbeke, W. (2015). Chinese consumers' understanding and use of a food nutrition label and their determinants. *Food Quality and Preference, 41*, 103-111.

Mabe, K., & Bwalya, K. (2022). Key performance areas and indicators perceived to be critical for Information Science roles in the Fourth Industrial Revolution. *South African Journal of Libraries and Information Science, 88*(1), 1-13.

Machín, L., Aschemann-Witzel, J., Curutchet, M. R., Giménez, A., & Ares, G. (2018). Does front-of-pack nutrition information improve consumer ability to make healthful choices? Performance of warnings and the traffic light system in a simulated shopping experiment. *Appetite, 121*, 55-62.

Manivannan, A. S. (2020). Marketing Implications of Nutrition Food Labels on Consumer's Purchase Behaviour.

Mantilla Herrera, A. M., Crino, M., Erskine, H. E., Sacks, G., Ananthapavan, J., Mhurchu, C. N., & Lee, Y. Y. (2018). Cost-effectiveness of product reformulation in response to the health star rating food labelling system in Australia. *Nutrients, 10*(5), 614. doi:https://doi.org/10.3390/nu10050614

Marsh, K., & Bugusu, B. (2007). Food packaging—roles, materials, and environmental issues. *Journal of food science, 72*(3), R39-R55. doi:10.1111/j.1750-3841.2007.00301.x

Maubach, N., Hoek, J., & Mather, D. (2014). Interpretive front-of-pack nutrition labels. Comparing competing recommendations. *Appetite, 82*, 67-77. doi:https://doi.org/10.1016/j.appet.2014.07.006

McGuire, S. (2012). Institute of medicine. 2012. Front-of-package nutrition rating systems and symbols: promoting healthier choices. Washington, DC: the National Academies Press. *Advances in Nutrition, 3*(3), 332-333.

Mhurchu, C. N., Eyles, H., Jiang, Y., & Blakely, T. (2018). Do nutrition labels influence healthier food choices? Analysis of label viewing behaviour and subsequent food purchases in a labelling intervention trial. *Appetite, 121*, 360-365.

Miller, L. M. S., & Cassady, D. L. (2015). The effects of nutrition knowledge on food label use. A review of the literature. *Appetite, 92*, 207-216. doi:https://doi.org/10.1016/j.appet.2015.05.029

Mishra, P., Pandey, C. M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of cardiac anaesthesia, 22*(1), 67.

Misra, R. (2007). Knowledge, attitudes, and label use among college students. *Journal of the American Dietetic Association, 107*(12), 2130-2134.

Moreira, M., García-Díez, J., De Almeida, J., & Saraiva, C. (2019). Evaluation of food labelling usefulness for consumers. *International Journal of Consumer Studies, 43*(4), 327-334. doi:https://doi.org/10.1111/ijcs.12511

Morhart, F., Malär, L., Guèvremont, A., Girardin, F., & Grohmann, B. (2015). Brand authenticity: An integrative framework and measurement scale. *Journal of Consumer Psychology, 25*(2), 200-218.

Müller, P., & Schmid, M. (2019). Intelligent packaging in the food sector: A brief overview. *Foods, 8*(1), 16.

Munim, Z. H., & Noor, T. (2020). Young people's perceived service quality and environmental performance of hybrid electric bus service. *Travel Behaviour and Society, 20*, 133-143.

Nardi, V. A. M., Teixeira, R., Ladeira, W. J., & de Oliveira Santini, F. (2020). A meta-analytic review of food safety risk perception. *Food Control, 112*, 107089. doi:https://doi.org/10.1016/j.foodcont.2020.107089

Nathan, R., Yaktine, A., Lichtenstein, A. H., & Wartella, E. A. (2012). *Front-of-package nutrition rating systems and symbols: Promoting healthier choices*: National Academies Press.

Nikhashemi, S., Valaei, N., & Tarofder, A. K. (2017). Does brand personality and perceived product quality play a major role in mobile phone consumers' switching behaviour? *Global Business Review, 18*(3_suppl), S108-S127. doi:https://doi.org/10.1177/0972150917693155

Nunnally, J., & Bernstein, I. (1994). Psychological Theory, MacGraw-Hill, New York, NY. *Nyer, PU (1997),"A study of the relationships between cognitive appraisals and consumption*.

Obilor, E. I. (2023). Convenience and purposive sampling techniques: Are they the same. *International Journal of Innovative Social & Science Education Research, 11*(1), 1-7.

Ogundijo, D., Tas, A., & Onarinde, B. (2021). An assessment of nutrition information on front of pack labels and healthiness of foods in the United Kingdom retail market. *BMC Public Health, 21*, 1-10.

Oliver, P. (2015). *Sociology: A Complete Introduction: Teach Yourself*: Hachette UK.

Orquin, J. L., & Scholderer, J. (2015). Consumer judgments of explicit and implied health claims on foods: Misguided but not misled. *Food policy, 51*, 144-157. doi:https://doi.org/10.1016/j.foodpol.2015.01.001

Pace, D. S. (2021). Probability and non-probability sampling-an entry point for undergraduate researchers. *International Journal of Quantitative and Qualitative Research Methods, 9*(2), 1-15.

Park, S. H. (2009). *The antecedents and consequences of brand image: Based on Keller's customer-based brand equity.* The Ohio State University.

Perez, R., & Edge, M. S. (2014). Global nutrition labeling: moving toward standardization? *Nutrition Today, 49*(2), 77-82. doi:10.1097/NT.0b013e31829da17f

Pettigrew, S., Talati, Z., Miller, C., Dixon, H., Kelly, B., & Ball, K. (2017). The types and aspects of front-of-pack food labelling schemes preferred by adults and children. *Appetite, 109*, 115-123.

Pilar Martinez-Ruiz, M., Ruiz-Palomino, P., Martinez-Canas, R., & José Blázquez-Resino, J. (2014). Consumer satisfaction and loyalty in private-label food stores. *British Food Journal, 116*(5), 849-871. doi:https://doi.org/10.1108/BFJ-09-2012-0216

Pomeranz, J. L. (2011). Front-of-package food and beverage labeling: New directions for research and regulation. *American journal of preventive medicine, 40*(3), 382-385. doi:https://doi.org/10.1016/j.amepre.2010.11.009

Rai, N., & Thapa, B. (2015). A study on purposive sampling method in research. *Kathmandu: Kathmandu School of Law, 5*.

Rayner, M., & Vandevijvere, S. (2017). INFORMAS Protocol: Food Labelling Module. doi:https://doi.org/10.17608/k6.auckland.5673643.v1

Razali, N. M., & Wah, Y. B. (2011). Power comparisons of shapiro-wilk, kolmogorov-smirnov, lilliefors and anderson-darling tests. *Journal of statistical modeling and analytics, 2*(1), 21-33.

Rieger, J., Weible, D., & Anders, S. (2017). "Why some consumers don't care": Heterogeneity in household responses to a food scandal. *Appetite, 113*, 200-214.

Roberto, C. A., & Khandpur, N. (2014). Improving the design of nutrition labels to promote healthier food choices and reasonable portion sizes. *International Journal of Obesity, 38*(1), S25-S33.

Roberto, C. A., Shivaram, M., Martinez, O., Boles, C., Harris, J. L., & Brownell, K. D. (2012). The Smart Choices front-of-package nutrition label. Influence on perceptions and intake of cereal. *Appetite, 58*(2), 651-657. doi:https://doi.org/10.1016/j.appet.2012.01.003

Rothman, R. L., Housam, R., Weiss, H., Davis, D., Gregory, R., Gebretsadik, T., . . . Elasy, T. A. (2006). Patient understanding of food labels: the role of literacy and numeracy. *American journal of preventive medicine, 31*(5), 391-398. doi:https://doi.org/10.1016/j.amepre.2006.07.025

Sajdakowska, M., Gębski, J., Wardaszka, A., & Wieczorek, A. (2022). Evaluation of Food Labelling the Products with Information Regarding the Level of Sugar: A Preliminary Study. *Nutrients, 14*(13), 2697. doi:https://doi.org/10.3390/nu14132697

Sansone, M., Musso, F., Colamatteo, A., & Pagnanelli, M. A. (2021). Factors affecting the purchase of private label food products. *British Food Journal, 123*(3), 1207-1222.

Schermel, A., Emrich, T. E., Arcand, J., Wong, C. L., & L'abbé, M. R. (2013). Nutrition marketing on processed food packages in Canada: 2010 Food Label Information Program. *Applied Physiology, Nutrition, and Metabolism, 38*(6), 666-672.

Schroeder, T. C., Tonsor, G. T., Pennings, J. M., & Mintert, J. (2007). Consumer food safety risk perceptions and attitudes: impacts on beef consumption across countries. *The BE Journal of Economic Analysis & Policy, 7*(1). doi:https://doi.org/10.2202/1935-1682.1848

Shahid, M., Neal, B., & Jones, A. (2020). Uptake of Australia's health star rating system 2014–2019. *Nutrients, 12*(6), 1791.

Shahiduzzaman, A. S. M., & Naskar, M. CUSTOMER SATISFACTION ON THE LABELLING OF PACKAGED FOOD PRODUCTS IN BANGLADESH.

Shrestha, N. (2021). Factor analysis as a tool for survey analysis. *American Journal of Applied Mathematics and Statistics, 9*(1), 4-11. doi:10.12691/ajams-9-1-2

Silayoi, P., & Speece, M. (2004). Packaging and purchase decisions: An exploratory study on the impact of involvement level and time pressure. *British Food Journal, 106*(8), 607-628. doi:https://doi.org/10.1108/00070700410553602

Smed, S., Edenbrandt, A. K., & Jansen, L. (2019). The effects of voluntary front-of-pack nutrition labels on volume shares of products: The case of the Dutch Choices. *Public health nutrition, 22*(15), 2879-2890. doi:https://doi.org/10.1017/S1368980019001423

Smith, J. K. (1983). Quantitative versus qualitative research: An attempt to clarify the issue. *Educational researcher, 12*(3), 6-13.

Sørensen, H. S., Clement, J., & Gabrielsen, G. (2012). Food labels–an exploratory study into label information and what consumers see and understand. *The International Review of Retail, Distribution and Consumer Research, 22*(1), 101-114. doi:https://doi.org/10.1080/09593969.2011.634072

Spence, C. (2012). Managing sensory expectations concerning products and brands: Capitalizing on the potential of sound and shape symbolism. *Journal of Consumer Psychology, 22*(1), 37-54. doi:https://doi.org/10.1016/j.jcps.2011.09.004

Spinelli, J. J., Lockhart, R. A., & Stephens, M. A. (2002). Tests for the response distribution in a Poisson regression model. *Journal of statistical planning and inference, 108*(1-2), 137-154.

Stein, K. (2010). A national approach to restaurant menu labeling: the Patient Protection and Affordable Health Care Act, Section 4205. *Journal of the American Dietetic Association, 110*(9), 1280-1289. doi:10.1016/j.jada.2010.07.017

Stratton, S. J. (2021). Population research: convenience sampling strategies. *Prehospital and disaster Medicine, 36*(4), 373-374.

Suhr, D. D. (2006). Exploratory or confirmatory factor analysis?

Talati, Z., Pettigrew, S., Kelly, B., Ball, K., Dixon, H., & Shilton, T. (2016). Consumers' responses to front-of-pack labels that vary by interpretive content. *Appetite, 101*, 205-213.

Talib, O. (2013). Asas penulisan tesis penyelidikan dan statistik. *Serdang: Universiti Putra Malaysia*.

Theurich, M. A. (2020). Are modern complementary food packaging, devices and teats compatible with international guidance on complementary feeding? *Journal of Human Lactation, 36*(1), 29-33.

Thomas, B. (2022). The Role of Purposive Sampling Technique as a Tool for Informal Choices in a Social Sciences in Research Methods. Just Argiculture, 2 (5), 1–8.

Thomas, D., Seenivasan, S., & Wang, D. (2021). A nudge toward healthier food choices: the influence of health star ratings on consumers' choices of packaged foods. *European Journal of Marketing, 55*(10), 2735-2768.

Toleti, S., Bobbillapati, J. R., Kollipaka, S. R., & Myneni, R. B. (2015). Detection of inducible clindamycin resistance and susceptibilities to other antimicrobial agents in clinical isolates of Staphylococcus aureus. *International Journal of Research in Medical Sciences, 3*(3), 612.

Tu, Y.-T., & Chang, H.-C. (2012). Corporate brand image and customer satisfaction on loyalty: An empirical study of Starbucks coffee in Taiwan. *Journal of social and development sciences, 3*(1), 24-32. doi:https://doi.org/10.22610/jsds.v3i1.682

Usunier, J.-C., Van Herk, H., & Lee, J. A. (2017). *International and cross-cultural business research*: Sage.

Van Boxstael, S., Devlieghere, F., Berkvens, D., Vermeulen, A., & Uyttendaele, M. (2014). Understanding and attitude regarding the shelf life labels and dates on pre-packed food products by Belgian consumers. *Food Control, 37*, 85-92. doi:https://doi.org/10.1016/j.foodcont.2013.08.043

Van der Merwe, D., Bosman, M., & Ellis, S. (2014). Consumers' opinions and use of food labels: Results from an urban− rural hybrid area in South Africa. *Food Research International, 63*, 100-107.

van't Riet, J., Sijtsema, S. J., Dagevos, H., & De Bruijn, G.-J. (2011). The importance of habits in eating behaviour. An overview and recommendations for future research. *Appetite, 57*(3), 585-596. doi:https://doi.org/10.1016/j.appet.2011.07.010

Vareiro, D., Franchini, B., Oliveira, B. M., & Almeida, M. D. V. d. (2021). Nutrition labelling on prepacked foods: opinion and suggestions of Portuguese food and nutrition professionals.

Verma, M., Shakya, S., Kumar, P., Madhavi, J., Murugaiyan, J., & Rao, M. (2021). Trends in packaging material for food products: historical background, current scenario, and future prospects. *Journal of food science and technology*, 1-14. doi:https://doi.org/10.1007/s13197-021-04964-2

Wakui, N., Matsuoka, R., Togawa, C., Ichikawa, K., Kagi, H., Watanabe, M., . . . Machida, Y. (2023). Effectiveness of Displaying Traffic Light Food Labels on the Front of Food Packages in Japanese University Students: A Randomized Controlled Trial. *International Journal of Environmental Research and Public Health, 20*(3), 1806.

Wang, J., Tao, J., & Chu, M. (2020). Behind the label: Chinese consumers' trust in food certification and the effect of perceived quality on purchase intention. *Food Control, 108*, 106825.

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. *Chest, 158*(1), S65-S71.

Wartella, A. H. L. E. A., & Boon, C. S. (2010). *Examination of front-of-package nutrition rating systems and symbols: Phase I report*: National Academies Press Washington, DC, USA:.

Wartella, E. A., Lichtenstein, A. H., & Boon, C. S. (2010). Purpose and Merits of Front-of-Package Nutrition Rating Systems *Front-of-Package Nutrition Rating Systems and Symbols: Phase I Report*: National Academies Press (US).

Willett, W., Rockström, J., Loken, B., Springmann, M., Lang, T., Vermeulen, S., . . . Wood, A. (2019). Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. *The lancet, 393*(10170), 447-492. doi:http://dx.doi.org/10.1016/S0140-6736(18)31788-4

Wu, P. C., Yeh, G. Y.-Y., & Hsiao, C.-R. (2011). The effect of store image and service quality on brand image and purchase intention for private label brands. *Australasian Marketing Journal, 19*(1), 30-39. doi:https://doi.org/10.1016/j.ausmj.2010.11.001

Wu, W., Zhang, A., van Klinken, R. D., Schrobback, P., & Muller, J. M. (2021). Consumer trust in food and the food system: a critical review. *Foods, 10*(10), 2490. doi:https://doi.org/10.3390/foods10102490

Yoo, B., Donthu, N., & Lee, S. (2000). An Examination of Selected Marketing Mix Elements and Brand Equity. *Journal of the Academy of Marketing Science, 28*(2), 195-211. doi:https://doi.org/10.1177/0092070300282002

Yoo, J. S., Han, K.-T., Chung, S. H., & Park, E.-C. (2019). Association between awareness of nutrition labeling and high-density lipoprotein cholesterol concentration in cancer survivors and the general population: the Korean National Health and Nutrition Examination Survey (KNHANES) 2010–2016. *BMC cancer, 19*(1), 1-9. doi:https://doi.org/10.1186/s12885-018-5196-6

Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *Journal of marketing, 52*(3), 2-22.

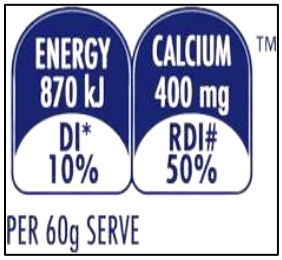
Zhang, Y., Zhang, Z., Xu, M., Aihemaitijiang, S., Ye, C., Zhu, W., & Ma, G. (2022). Development and validation of a food and nutrition literacy questionnaire for Chinese adults. *Nutrients, 14*(9), 1933.

Zollo, L., Filieri, R., Rialti, R., & Yoon, S. (2020). Unpacking the relationship between social media marketing and brand equity: The mediating role of consumers' benefits and experience. *Journal of Business Research, 117*, 256-267.

Appendix A

Questionnaire:

We are conducting a research survey to examine the impact of Packaged food Labeling standards on consumer behavior. According to the published research, there is a significant relationship between the nutritional information provided on Front of Package (FOP) food labels and consumers healthy food choices. Please read these standards carefully and answer the question at the end.



Daily Intake Guide-DIG
The Daily Intake Guide comprises nutritional details and recommendations derived from the Food Standards Code. DIG helps quickly find out how much energy (kilojoules) and important nutrients are in packaged food per serving, shown as a percentage of daily intake (%DI) (Carter, Mills, & Phan, 2011). **This standard is currently being used in Pakistan.**

Health Star Rating System-HSR
In this system, packaged items receive a rating determined by their nutritional composition. Ratings considered factors like total energy (kilojoules), saturated fat, sodium (salt) and sugar content, fiber, protein, fruit, vegetable, nut, and legume content. Products are given a rating of 0.5 to 5 stars. The more stars, the healthier the choice within that category (D. Thomas, Seenivasan, & Wang, 2021).

Multi-Traffic Light Label System-MTL
The multiple traffic-light indicates the content of target nutrients in products by displaying color-coding.
The traffic light label uses color to signify nutrient levels: green indicates low, amber denotes medium, and red signals high. For optimal health, consider reducing, consuming less frequently, or moderating your intake of products marked in red (Dunford, Poti, Xavier, Webster, & Taillie, 2017).

Chilean Warning Label System-WRN
This requires prominent warning labels on the front of product packaging to alert consumers when products contain high levels of unhealthy nutrients. Warnings related to specific nutrients can be communicated using various visual elements such as colors, shapes, and graphics.(Hall & Grummon, 2020).

	DIG	HSR	MTL	WRN
Which standard, according to your understanding and knowledge, is best.				

Please be informed that all the information provided by you is with your free consent and it must be treated with confidentiality as per the NUST Code of Research Ethics.

Instructions: Please read the given questions carefully and select the appropriate answer (✓) on a 5-point scale.

S. No	Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Front of Package Food Labeling Standards						
1.	FOP labeling standards in Pakistan are helpful to choose healthier products. (Julia et al., 2017)					
2.	FOP labeling standards in Pakistan provide adequate information to make healthy food choices. (Julia et al., 2017)					
3.	FOP labeling standards in Pakistan are trustworthy and provides reliable information. (Julia et al., 2017)					
4.	FOP labeling standards in Pakistan are quick to process and easy to understand. (Julia et al., 2017)					
5.	FOP labeling standards in Pakistan are too complex to understand the information. (Julia et al., 2017)					
6.	FOP labeling standards in Pakistan are helpful in determining optimal daily intake of calories. (Giró-Candanedo et al., 2022)					
7.	Pakistan's Front of Package Food label mentions the mandatory nutrition declaration per serving size of the foodstuff (i.e., energy, fat, carbohydrates, sugars, proteins, fiber, and sodium). (Vareiro, Franchini, Oliveira, & Almeida, 2021)					
8.	FOP food labels in Pakistan (particularly for imported products) are translated in a					

	language that is easily understandable for me.					
9.	FOP labeling standards in Pakistan mentions the mandatory symbols such as Halal food and Pakistan standards.					
10.	Pakistan's Front of Package Food labels' content Information of the Prepackaged Food Product affect my Purchasing Behavior. (Cannoosamy et al., 2014)					
11.	I believe that Pakistan's Front of Package Food label aim to provide nutrition information to improve health awareness. (Wakui, Matsuoka, & Watanabe, 2023)					
Perceived Food Quality						
1.	Pakistan's Packaged Food provides prominent calorie content information. (E. A. Wartella, Lichtenstein, & Boon, 2010)					
2.	Pakistan's Packaged Food provides prominent serving size information. (E. A. Wartella et al., 2010)					
3.	Pakistan's Packaged Food provides targeted nutrition information. (E. A. Wartella et al., 2010)					
4.	Pakistan's Packaged Food indicates whether product is high or low in specific nutrient(s). (E. A. Wartella et al., 2010)					
5.	I believe that Pakistan's Packaged Foods present transparent quality information. (E. A. Wartella et al., 2010)					
6.	Pakistan's Packaged Food made me able to judge food quality and to choose healthy food. (Zhang et al., 2022)					

Customer Consciousness of Nutritional Values						
1.	I understand the nutritional information displayed on packaged food labels. (Adesina et al., 2022)					
2.	I consciously search for nutritional details before I buy packaged food items. (Adesina et al., 2022)					
3.	I can read the nutritional information (i.e., Total fat, sodium, sugar etc.) presented on packaged food before I purchase a product. (Adesina et al., 2022)					
4.	I can interpret the nutritional information on Total fat content (saturated, unsaturated, and trans) in relation to my health. (Donga & Patel, 2018)					
5.	I can interpret the nutritional information on Salt/Sodium in relation to my health. (Donga & Patel, 2018)					
6.	I can interpret the nutritional information on Sugar content (natural and added) in relation to my health. (Donga & Patel, 2018)					
7.	I can interpret the nutritional information on Cholesterol (HDL, LDL) in relation to my health. (Donga & Patel, 2018)					
8.	I can interpret the nutritional information on calories given are for one serving of the food. (Donga & Patel, 2018)					
9.	I know how to calculate my daily intake (in grams) for different packaged foods according to given serving size. (Adesina et al., 2022)					
10.	Nutritional Information provided on packaged food products significantly shapes					

	my purchasing choices. (Adesina et al., 2022)					
11.	I can relate nutritional information with my health preferences. (Adesina et al., 2022)					
Brand Loyalty						
1.	I prefer a specific brand for packaged food products. (Kee et al., 2021)					
2.	I prefer a specific brand of packaged food products due to its superior quality standards. (Kee et al., 2021)					
3.	I prefer a specific brand of packaged food products because of its value for money. (Kee et al., 2021)					
4.	I prefer a specific brand because of its country of origin. (Kee et al., 2021)					
5.	Buying products of a specific packaged food brand would make a good impression on other people. (Kee et al., 2021)					
6.	I am willing to pay a higher price for packaged food products of a specific brand. (Kee et al., 2021)					
7.	I think that the brand I choose positively contributes to my overall my well-being in terms of nutrition and health. (Lassoued & Hobbs, 2015)					
8.	I will not buy another brand if my favorite brands' product is available at the same store. (Kee et al., 2021)					
9.	When another brand of packaged food is on sale, I tend to purchase it of my usual preferred brand. (Kee et al., 2021)					

10.	I switch to another store if my preferred packaged food brand is not available. (Kee et al., 2021)					
Consumer Satisfaction						
1	I am more satisfied with food products that display FOP food labeling as compared to those that do not.					
2	The presence of Front of Package (FOP) labelling positively influences my overall satisfaction.					
3	The presence of FOP labeling enhances my perception of food product quality, which, in turn, contributes to my satisfaction as a consumer.					
4	Front of Package (FOP) labeling positively influences my loyalty to specific food brands.					
5	Considering Front of Package (FOP) labeling in my purchasing decisions improves my overall consumer satisfaction.					

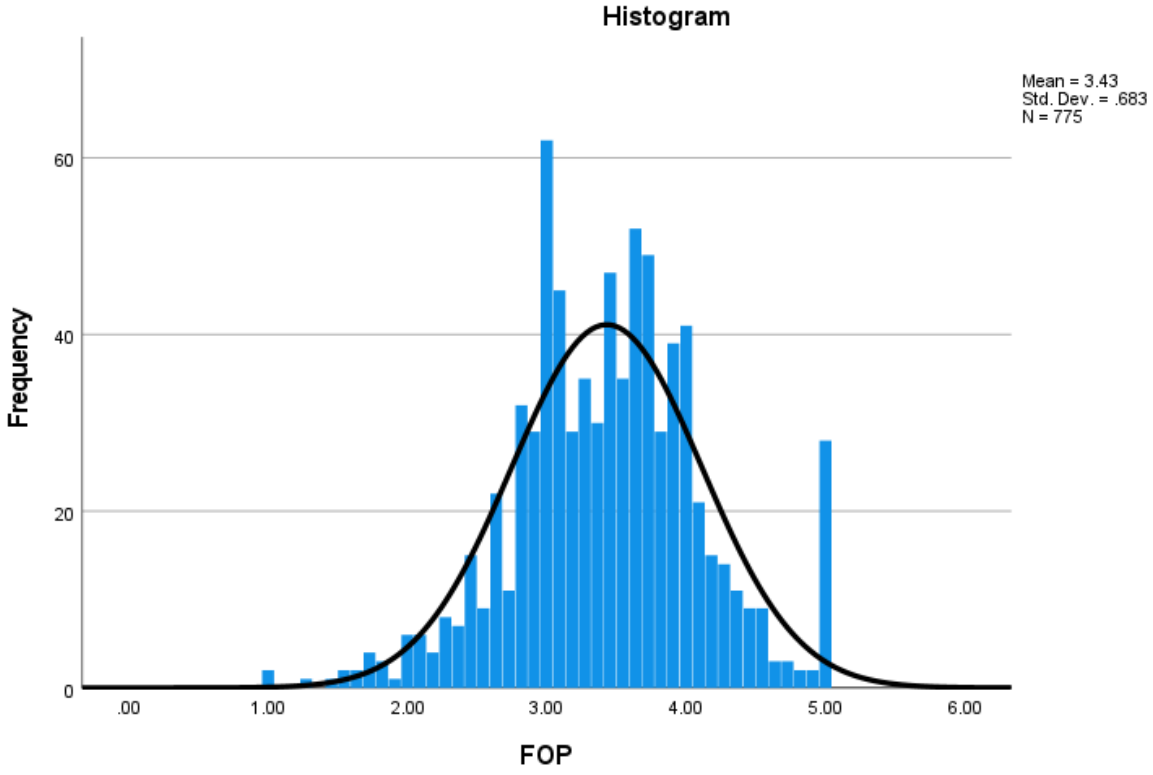
In addition to the above-mentioned information, the following Demographic Information is also important for our study:

1. Gender a) Female b) Male	6. household composition Adults Only Adults and Children
2. Age 18-24Years 25-34 Years 35-44 Years 45-54 Years 55-64 Years	7. Health (Body Mass Index-BMI) (BMI = weight (kgs)/ height(inches*0.0245)) ≤18.5 Underweight 18.5-24.9 Normal 25.0-39.9 Overweight ≥40 Obese

≥65	
3. Education Level Up to Primary Up to Secondary Up to Higher Secondary Undergraduate Postgraduate Doctorate	8. How often do you work out to maintain your health and fitness? Daily Once a week Twice a week 4-5 times per week None of these
4. Occupation (Open-ended)	9. Are you currently facing any food borne health condition (i.e., diabetes, high cholesterol, hypertension)? a) Yes b) No
5. Family Income (PKR Per Month) ≤50000 50000-100,000 100,001-200,000 200,001-300,000 ≥300,000	10. Responsible for grocery shopping Solely responsible Co-responsible

Please provide your email address in case we need to contact you.

Appendix B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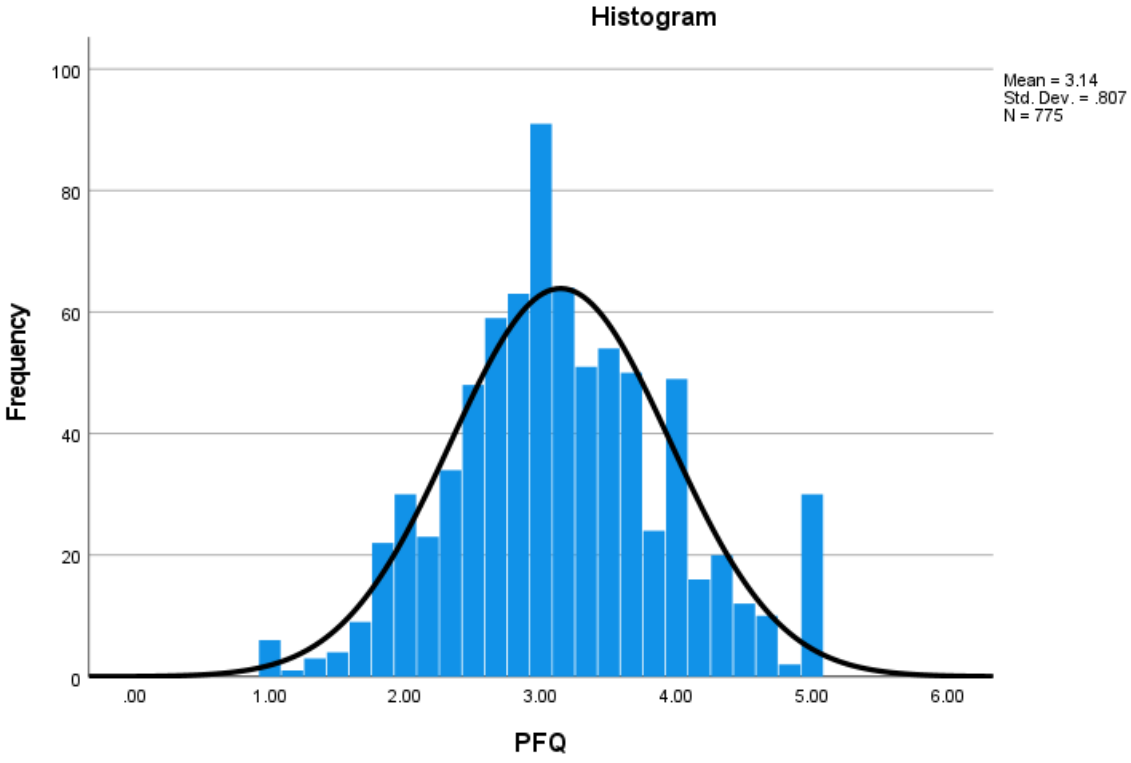
4.00
5.00
6.00
FOP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N = 775
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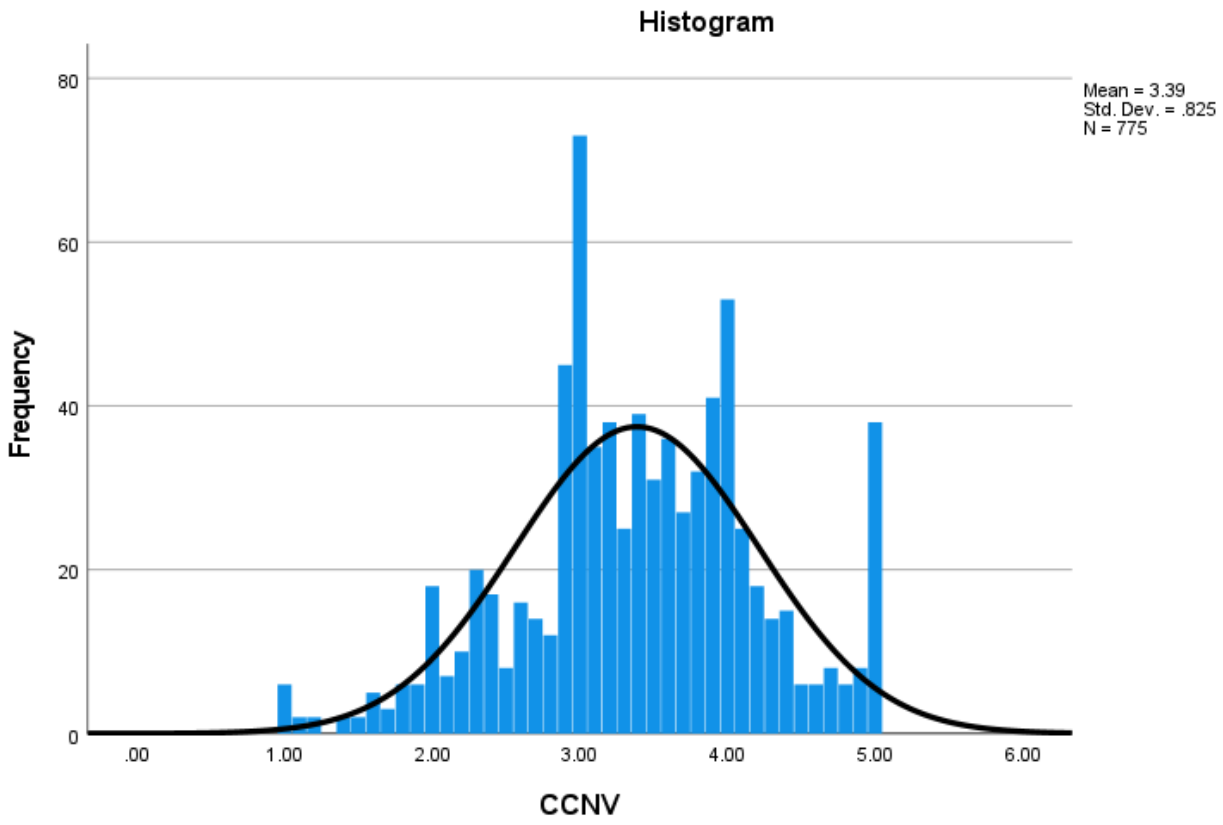
5.00
6.00
PFQ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6.00
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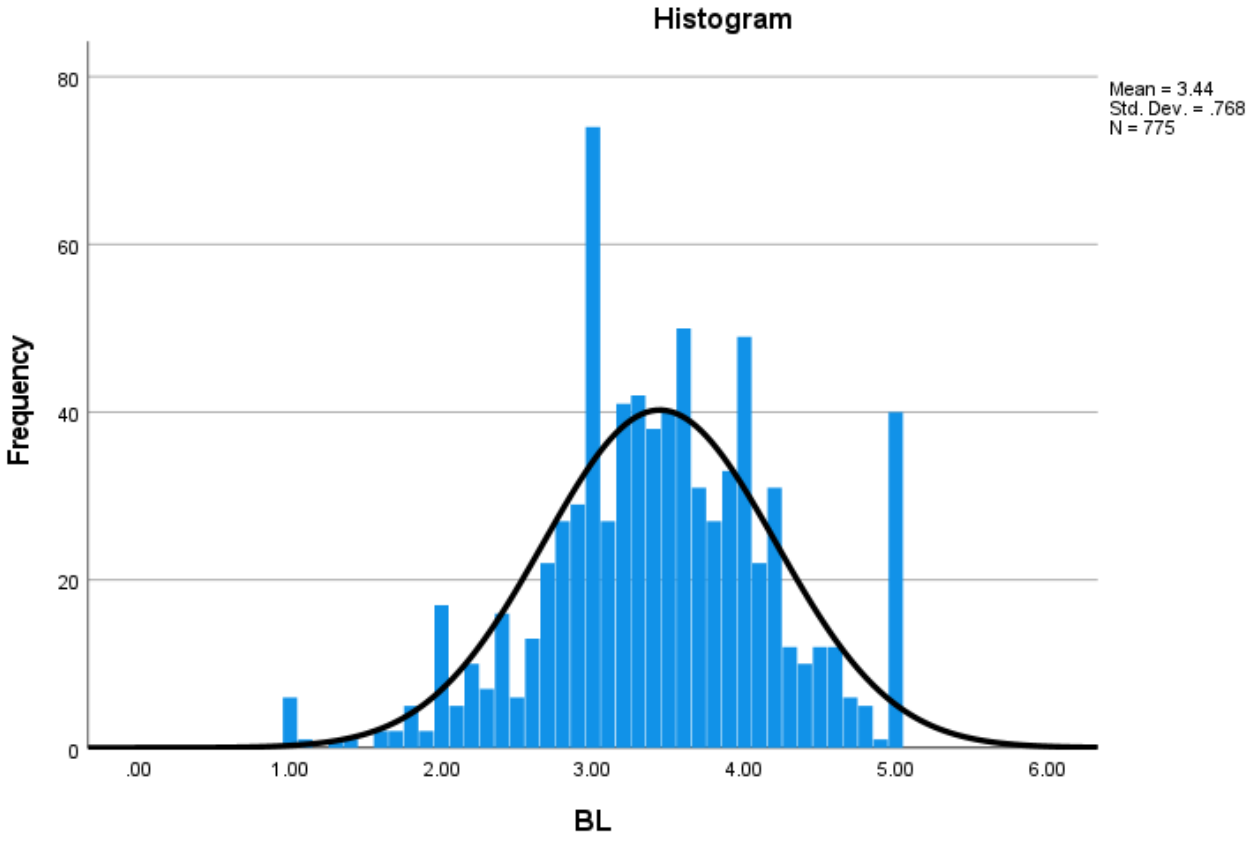
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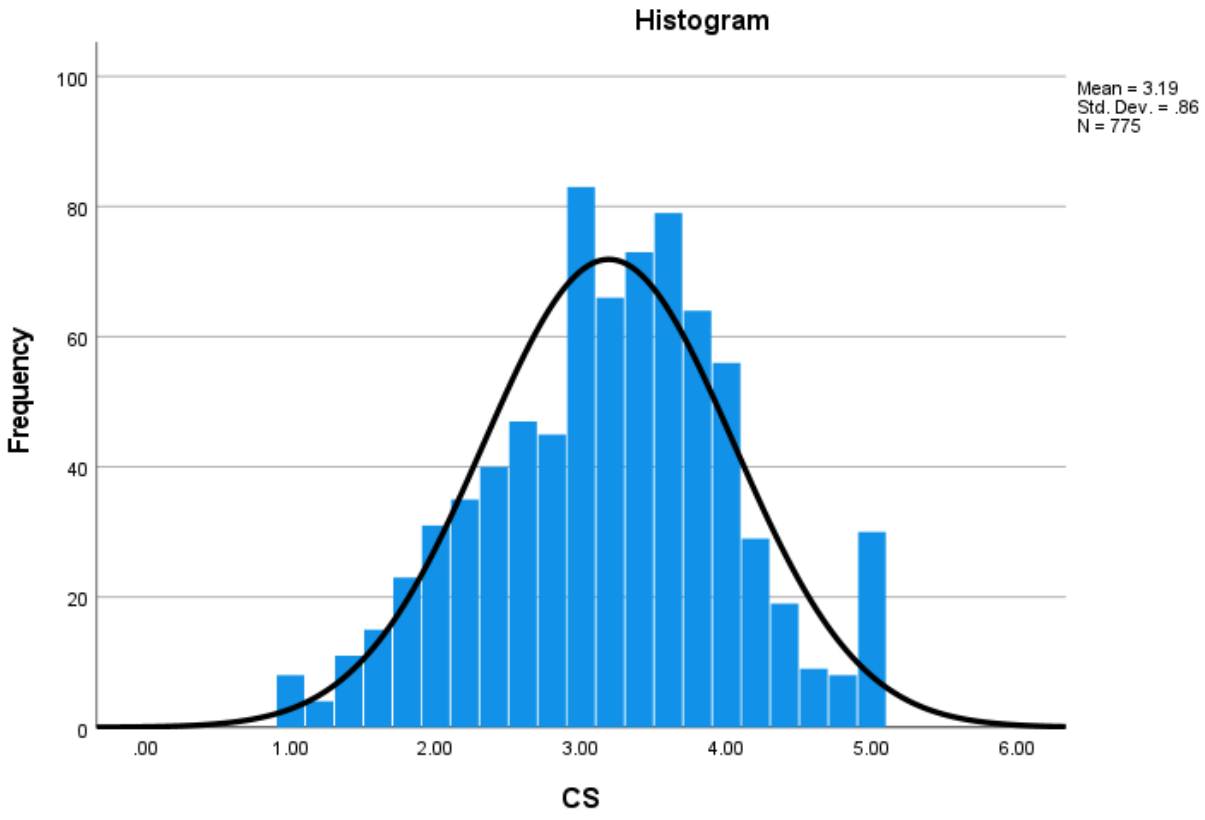
BL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6.00
CS