Evaluation of the Food Service provided in the 2nd Engineering Group

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Abstract

The food system of the Brazilian Armed Forces is governed by specific rules and financed by federal collections. In this context, the research proposes a methodology that allows evaluating the average level of satisfaction of users of the foodservice provided in the Procurement of the 2nd Engineering Group, located in the city of Manaus, capital of Amazonas. Therefore, an online questionnaire was developed and applied, adapted from the model proposed by Barros (2013), using four quality dimensions: (i) product quality; (ii) Environment Conditions; (iii) facilities; and (iv) staff. The questionnaire has 19 items distributed among the four dimensions, in which the respondent indicated their level of satisfaction using the 10-point Likert scale. The questionnaire was available for ten days and obtained 105 respondents. Data were analyzed using the mean and standard deviation of dimensions and items. It was observed that the "staff" dimension obtained the best evaluation, and the item with the best performance was "staff' hygiene". On the other hand, the "facilities" dimension had the worst performance, and the main item that needs improvement is "access to people with disabilities". After analyzing the data, the main conclusion of the survey was that the level of customer satisfaction with the aforementioned food service is "GOOD". In the end, improvement suggestions were made for five items considered to be the most critical. For future studies, it is suggested to evaluate the level of customer satisfaction with that service after applying the improvement actions suggested in this work.

Keywords: SERVQUAL; SERVPERF; Customer Satisfaction.

1. Introduction

According to the Ministry of Defense (2021), the Armed Forces must, by law, provide food to active military personnel. The effective number of active soldiers is 370 thousand, who eat their meals daily in 1600 military organizations spread throughout the country.

In the Brazilian Army (EB), the Plan for the Decentralization of Logistic Resources (PDR Log) 2020, provided for an amount exceeding 600 million reais for the acquisition of foodstuffs for the effective, according to Brazil (2020a). And the purchases of the goods are divided between the Supplying Agencies that are part of the EB's supply chain and the Military Organizations that have a Supply Sector, where the foodservice is carried out.

This study will be limited to the 2nd Engineering Group (2nd Gpt E), located in Manaus, Amazonas, whose staff is 360 soldiers who carry out their meals in the Unit's Supply Sector. As disclosed by Araújo (2015), the 2nd Gpt E is subordinate to the Amazon Military Command, for purposes of administration, military service, and discipline, and is linked to the Department of Engineering and Construction (DEC) and its boards, via a technical channel, for matters relating to the management of

cooperation works, military works, real estate, and the venue. Covering the states of Amazonas, Acre, Roraima, Rondônia and Pará.

Although the Food Safety Audit Program (PASA) standardizes procedures aimed at the safety of meals served, there is no methodology to assess military satisfaction with the services provided during meals. From this perspective, the main question of this research is "What is the general level of satisfaction of the military with the foodservice provided in the 2nd Engineering Group?"

So, the main objective of the research is to propose a methodology that allows assessing the average level of satisfaction of users of the foodservice provided in the Procurement of the 2nd Engineering Group, located in the city of Manaus, capital of Amazonas. Therefore, the following specific objectives were outlined: a) to investigate methodologies for evaluating food services; b) develop and test a methodology to assess the satisfaction of military users of the foodservice of the 2nd Engineering Group; c) propose improvement suggestions to the Procurement Sector managers.

This research can be considered relevant in the following contexts: 1) For the academic world, contributing to Production Engineering in quality research in services, since a scientific methodology will be applied to a real problem in the 2nd Engineering Group, which is distinguished from private and university restaurants, in which it currently concentrates a relevant part of the research; in addition to bibliographic research; 2) For the Brazilian Army, because the presented methodology can be used as a benchmark, reapplied in other Military Organizations that have a Supply Sector, contributing to the continuous improvement of the service over time.

2. Theoretical Reference

2.1 Importance of Healthy Eating

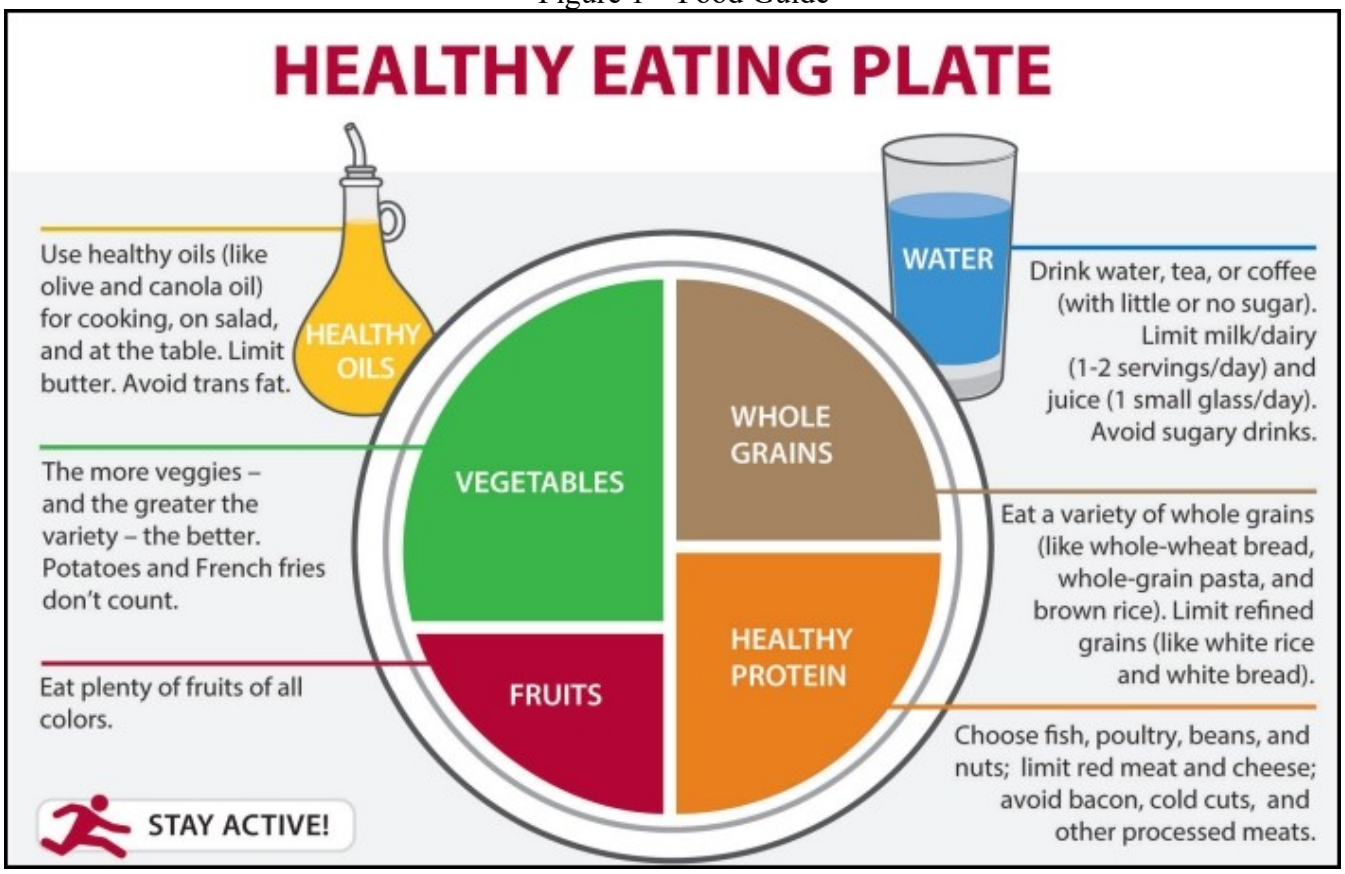
The search for healthy eating is a trend (CRUZ, 2018). It can be defined as providing adequate amounts of macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals); rich in fruits and vegetables; moderate in fat, salt, and sugar; one that provides good hydration and that has a fractionation between four and six meals a day (DEON et al, 2015; TERRA et al, 2011).

The Department of Nutrition (2021) states that:

> Maintaining a healthy lifestyle is critical to keeping our immune system strong. In addition to immunity, research has shown that individuals who follow five key habits—eating a healthy diet, exercising regularly, maintaining healthy body weight, not drinking too much alcohol, and not smoking—live more than a decade longer than those who don't. they do. Furthermore, maintaining these practices can not only help us live longer but also help us live better. Adults who follow these five major habits in midlife live longer years free from chronic diseases, including type 2 diabetes, cardiovascular disease, and cancer.

Figure 1 shows the guide created by the nutrition experts at Harvard T.H. Chan School of Public Health to guide the creation of healthy meals, consisting of recommendations divided into four segments: vegetables, whole grains, healthy proteins, and fruits.

Figure 1 – Food Guide



Source: Department of Nutrition (2021, p. 7)

Brazil (2014) clarifies that adequate and healthy food is a basic human right and that it must be following special dietary needs; be referenced by the food culture and by the dimensions of gender, race, and ethnicity; accessible from a physical and financial point of view; harmonic in quantity and quality, meeting the principles of variety, balance, moderation, and pleasure; and based on adequate and sustainable production practices.

Food and nutrition are basic requirements for the promotion and protection of health, enabling the full affirmation of the potential for human growth and development, with quality of life and citizenship (BRASIL, 2013). A balanced diet, therefore, must meet the individual's needs, is provided in sufficient quantity, and with good manufacturing practices (GELBVAKS, 2012).

Also according to Gelbvaks (2012), in the case of food for military personnel, in particular, good food is essential to assist in growth, development, strengthening, and, above all, in preventing diseases when available in adequate quantities. Brazil (2010) emphasizes that cardiovascular diseases, such as acute myocardial infarction, arterial hypertension, atherosclerosis, and cerebrovascular accidents (CVA),

among others, constitute the main cause of mortality in Brazil and the world.

Thus, it can be concluded that nutritional intervention is an important tool in the prevention of chronic diseases since the risk factors associated with nutrition can be modified through the adoption of healthy eating habits (BRASIL, 2010).

According to the Tribuna de Ituverava (2020), a study carried out by the IBGE, between 2017 and 2018, in partnership with the Ministry of Health, involving 46,164 residents of 20,112 households aged 10 years or over, revealed that:

a) coffee is the food most consumed by Brazilians (78.1% of the population), followed by rice (76.1%) and beans (60%);

b) the consumption of fruits and vegetables remains below the recommended level. The consumption of raw salads, for example, increased from 16 to 21.4%, but the consumption of fruits, however, decreased compared to 2009. Fresh or minimally processed foods have a greater share of total calories (53.4 %), especially rice, beans, meat, fruits, milk, pasta, greens, vegetables, roots, and tubers;

c) fiber consumption, in turn, fell between 2009 and 2018. The consumption of saturated fatty acids was less than 10%, while that of monounsaturated fatty acids, considered healthy, increased in practically all groups evaluated. Among micronutrients, intake below needs or inadequate was observed for calcium, vitamin D, vitamin E, pyridoxine, vitamin, cobalamin, and copper;

d) in the ultra-processed food group, participation in total calories was higher for adolescents (26.7%), followed by adults (19.5%) and elderly (15.1%). On average, ultra-processed foods have relative participation of 19.7% in the total caloric content.

2.2 Main components of the Armed Forces Food Manual

According to Brasil (2010), a nutritionally balanced diet, in addition to promoting healthy eating habits and better quality of life, ensures the maintenance, restoration, and growth of tissues.

Thus, it is established that:

> The Armed Forces must, therefore, promote the health of the troops through a nutritionally balanced diet, that is, one that provides macro and micronutrients in adequate quantity and quality. Even due to the peculiarity of the target audience, which is composed of service teams that must have 100% of their nutritional needs met, as they stay 24 hours in Military Organizations; and by the group of military personnel who spend more energy, such as adolescents (growth), pregnant women, lactating women and those who go through a period of more intense physical activity. Therefore, the troops' efficiency depends on the use of a diet that is adequate to the living conditions. (BRASIL, 2010, p. 13)

In this context, the Armed Forces Food Manual presents a methodology for preparing a menu according to the dietary classification of foods. Clarifying, Brazil (2010), that healthy eating is that pleasant, pleasurable, varied and balanced.

In addition, the Manual presents nutritional concepts and principles applied to military meals. Among the topics covered, there is the prioritization of a safe, balanced, and balanced diet that follows the nutritional recommendations for this specific group. Furthermore, there are also sessions aimed at the management of food and nutrition units of Military Organizations in the scope of receiving, handling, storage, transport, distribution, conservation, use of waste, and preparation of menus (BRASIL, 2010).

A summary of the contents of the Armed Forces Food Manual is presented in Chart 1, which focuses on Nutrition, Menu, and Diet.

Chart 1 – Summary of the content of the Armed Forces Food Manual.

Category	Abstract
Nutrition	1. Addresses nutritional principles such as energy balance, macro, and micronutrients; 2. Brings recommendations for amounts of proteins, vitamins, and minerals; 3. Provides nutritional guidelines to minimize the risk of developing the disease.
Menu	1. Indicates methodology for preparing a menu considering the customer, food, preparations, and restaurant management; 2. Shows sample menus for 100 people with a shopping list; 3. Displays glossary of terms used in the kitchen.
Diet	1. Brings the dietary classification of foods and a food pyramid adapted to Brazilian habits; 2. List with dietary guidelines for military personnel with pathological conditions; 3. Shows an attachment with the harvests of fruits, fish, vegetables, and various products.

Source: Authors (2021).

2.3 Food Safety Audit Program

The Food Safety Audit Program (PASA) aims to improve the food activity by standardizing procedures that ensure the adoption of the essential requirements of Good Practices in the Supply Sector (St Aprv), of Military Organizations (OM), in the scope of the Brazilian Army (EB), aiming at the safety of the meals served (BRASIL, 2020b).

According to Brazil (2020b), the Program began in 2010 to adapt procurement services to national health legislation. Initially, a single assessment tool was created to carry out regional audits, the Checklist, which contained 120 objective items and covered the entire production flow.

Brazil (2020b) also states that in 2016, the assessment system was improved with the introduction of different weights in each item according to the associated health impact. Therefore, the Supply Department introduced the Risk Checklist as an assessment tool, focusing exclusively on the health impact. From this measure, it was possible to assess the sanitary conditions of the Land Force OM.

The score obtained in the Risk Checklist, that is, the sum of verified compliance, allows you to view, in general, the sanitary quality of the MO. The higher the percentage of compliance obtained, the less impactful on health the observed non-compliances will be (BRASIL, 2020b). The categories, according to the degree of compliance, can be seen in Chart 2.

Chart 2 – Food Safety Audit Program Categories

Category	Percentage of Compliance	Sanitary Quality	Condition
A	Above 85%	**Excellent**	No critical failures observed, compliance with most classification items
B	63,0 to 84,9 %	**Good**	Observed occasional critical failures that can be improved so as not to compromise food quality
C	41,0 to 62,9 %	**Acceptable**	Observed critical failures that can compromise the quality of food and the health of diners
D	Under 40,9 %	**Critical**	Observed critical failures that compromise the quality of food and the health of diners. Probable to interdiction by health surveillance

Source: Adapted from Brasil (2020b).

2.5 Methodologies to assess the quality of services

In the literature, there are several methodologies with models to assess the quality of services, but the main ones are GRNROOS, 5 Gaps, SERVQUAL, SERVPERF, and DINNERPERF. These models have a generalist approach and are adaptable concerning the type of service to be evaluated.

Grönroos' model (1984) places the customer at the center of the company's decision-making. The model assumes that knowing the customer, their perception of service quality, and how service quality influences them is essential to ensure the company's competitive success. Grönroos (1984) suggests three dimensions of service quality. The first dimension, technical (result), means what customers received as a result of interacting with a company. The other component is the functional quality (process) which means how a technical service is received by the customer. The third dimension of service quality in this model is the corporate image, which is the customer's view of the company or brand.

The Grönroos model was the first attempt to introduce a real model to measure the perceived quality of the service, but the main problem with this model was the lack of explanation for measuring technical quality and functional quality.

The 5 Gaps model, developed by Parasuraman, Zeithaml, and Berry (1985), measures service quality by measuring the gap between perceived service and expected service. The authors measure five

gaps in the concept of quality and its perception to understand the origins of problems in the quality of services offered by the company and how to improve them:

GAP 1: Difference between customer expectations and managers' perception of these expectations; GAP 2: Difference between managers' perception of customer expectations and service quality specifications; GAP 3: Difference between service quality specifications and services offered; GAP 4: Difference between the service provided and what is communicated to the customer about it; GAP 5: Difference between customer expectations and their perception of the services provided.

The Grönroos model, the first quality metrics model, is not widely used today. On the other hand, the 5 Gaps model is still used in several types of companies, such as, for example, the hotel industry (LEE et al., 2016), the aviation sector (TSAI, HSU, and CHOU, 2011), the banking sector (TAHIR and ABU, 2007) and supply chains in general scopes (LARGE and KÖNIT, 2009).

The 5 Gaps model gave rise to the Service Quality Gap Analysis or SERVQUAL model (PARASURAMAN; ZEITHAML; BERRY, 1988). The SERVQUAL model measures the difference between the customer's expectation and perception with a given service, through items of the quality dimensions (Equation 1).

$$Q_j = D_j - E_j \quad (1)$$

The model comprises 22 items that make up the five Dimensions or Determinants of Quality: reliability, responsiveness, security (competence, courtesy, credibility, and security), tangible aspects, and empathy (access, communication, and understanding of the customer).

The model individually measures the differences between expectation and perception (Qj) for each item in the quality dimension by collecting data in two steps:

1. Collection of data regarding customer expectations regarding service performance for a given item (j), denoted by Ej, before the service is performed.

2. Data collection regarding the perception of the performance of the service provided for a given item (j), denoted by Dj, after the service is performed.

Data collection is done through individual questionnaires and applying a 7-point Likert scale, ranging from “strongly disagree” to “strongly agree”. For each item, the difference between expectation and perception (Qj) is defined. Positive differences indicate that the service provided is superior to the quality expected by consumers.

Carman (1990) emphasizes that the SERVQUAL model is versatile through the adjustment of items and dimensions of greater and lesser application, adapting to different types of services due to its great capacity to cover dimensions. The SERVQUAL model is the most famous in service quality. However, some researchers believe that measuring the gap between expectation and perception is not psychometrically capable of obtaining a superior assessment of service quality (BRADY and CRONIN,

2001).

This model is currently used in the evaluation of library services (FREITAS et al., 2008), hotels (VEIGA and FARIA, 2005), public services (BRYSLAND and CURRY, 2001) quality of websites (VAN IWAARDEN et al., 2003), among others, including the quality of food services (ARAÚJO et al., 2017).

The Service Performance or SERVPERF model, developed in 1992 by Cronin and Taylor, is an improved version of the SERVQUAL model. Cronin and Taylor (1992, 1994) concluded, through the analysis of a satisfaction questionnaire applying the SERVQUAL model, that the quality of service (Qj) is better evaluated, disregarding the variable of customer expectations. The SERVPERF model, therefore, measures the quality of each item that makes up the quality based only on the consumer's perception of performance (Dj), as expressed in Equation 2.

$$Q_j = D_j \quad (2)$$

Data collection and measurement of results is carried out analogously to the SERVQUAL method.

Cronin and Taylor (1992, 1994) argue that the difference between expectation and performance, proposed by the SERVQUAL model, only measures the perception of quality, but does not directly determine it. Its main determinant is the performance of the service itself. The authors argue that performance assessment alone offers more adequate results to measure service quality, thus eliminating the need to measure expectations.

The SERVPERF model is applied in various types of companies, such as the restaurant sector (SILVA; MEDEIROS; COSTA, 2009), laboratories (GONÇALVES; FREITAS; BELDERRAIN, 2010), hospital services (FREITAS; COZENDEY, 2008), hospitality (AQUINO; JERÔNIMO; MELO, 2015), among other applications.

Despite the differences between the SERVQUAL and SERVPERF models, studies suggest that both methodologies are adequate to assess the quality of services, without restrictions regarding their validity and reliability (SALOMI, MIGUEL, and ABACKERLI, 2005).

Based on the SERVPERF model, Barros (2013) developed the DINNERPERF model consisting of 59 items and 15 dimensions, to assess the quality of services in the restaurant sector by measuring the perception of performance according to customers. Like the SERVPERF model, the DINNERPERF model measures the quality of a given item/dimension based on the consumer's perception of performance (Equation 2).

However, the DINNERPERF model considers 15 dimensions that are directly related to measuring the quality of services provided in food venues: a) reliability; b) receptivity; c) security; d) empathy; e) product quality; f) Environment Conditions; g) cleanliness; h) facilities; i) layout; j) electronic equipment; k) comfort in the seat; l) service staff; m) table settings; n) venue actions; o) accessibility for people with disabilities.

3. Data Collection and Analysis Methodology

3.1 Choice of evaluation model

Considering the customers of the food service provided in the Procurement of the 2nd Engineering Group (2nd Gpt E), the evaluation model chosen was the DINNERPERF, which evaluates and classifies the quality of food services based on the customers' perception by using specific dimensions and items.

This model, developed by Barros (2013), was derived from the SERVPERF model. The DINNERPERF is more aimed at evaluating food services than the SERVPERF model and is more practical than the SERVQUAL model.

To optimize the collection without losing data quality, the 15 dimensions proposed by Barros (2013) were grouped into four: (i) product quality; (ii) Environment Conditions; (iii) facilities; and (iv) staff, with focus on only 19 items considered more relevant for this case study.

3.2 Development of the data collection instrument (Questionnaire)

The questionnaire was prepared with two sections:

In section 1 there are the four dimensions adopted by the DINNERPERF model (BARROS, 2013): Product Quality, Environment Conditions, Facilities, Staff. To avoid excess of items, for each of them, between four and five items were elaborated to be evaluated using the Likert scale from 1 to 10: 1 or 2 =Very Bad; 3 or 4 = Bad; 5 or 6 = Regular; 7 or 8 = Good; 9 or 10 = Excellent.

In section 2 there are three open questions to determine the time of use of the foodservice; identify the profile of the respondents regarding the post in the military service or graduation course; for suggestions for improvements and insertion of an email in case, the respondent wishes to receive the article.

3.3 Sample Size, Pilot and Final Tests

The questionnaire (Appendix A) was developed digitally using the Typeform platform <https://ufam.typeform.com/to/eKJLDC8K > to be sent to 360 customers of the food service provided in the 2nd Gpt E Provisioning. The invitation was made through an electronic message accompanied by the access link distributed by the WhatsApp application.

Initially, a pilot test was carried out on July 1 and 2, 2021, at which time the questionnaire was sent to 10 customers randomly, to verify whether there was a need to improve the understandability of its content.

As there was no need for changes, the definitive test took place until July 13, 2021. Because of the safety protocols to be followed during the pandemic, the short period of 13 days, as well as the customers being busy people, it was not possible to conduct interviews, which is why electronic means were used to collect data from a sample size of at least 100 respondents to be considered representative.

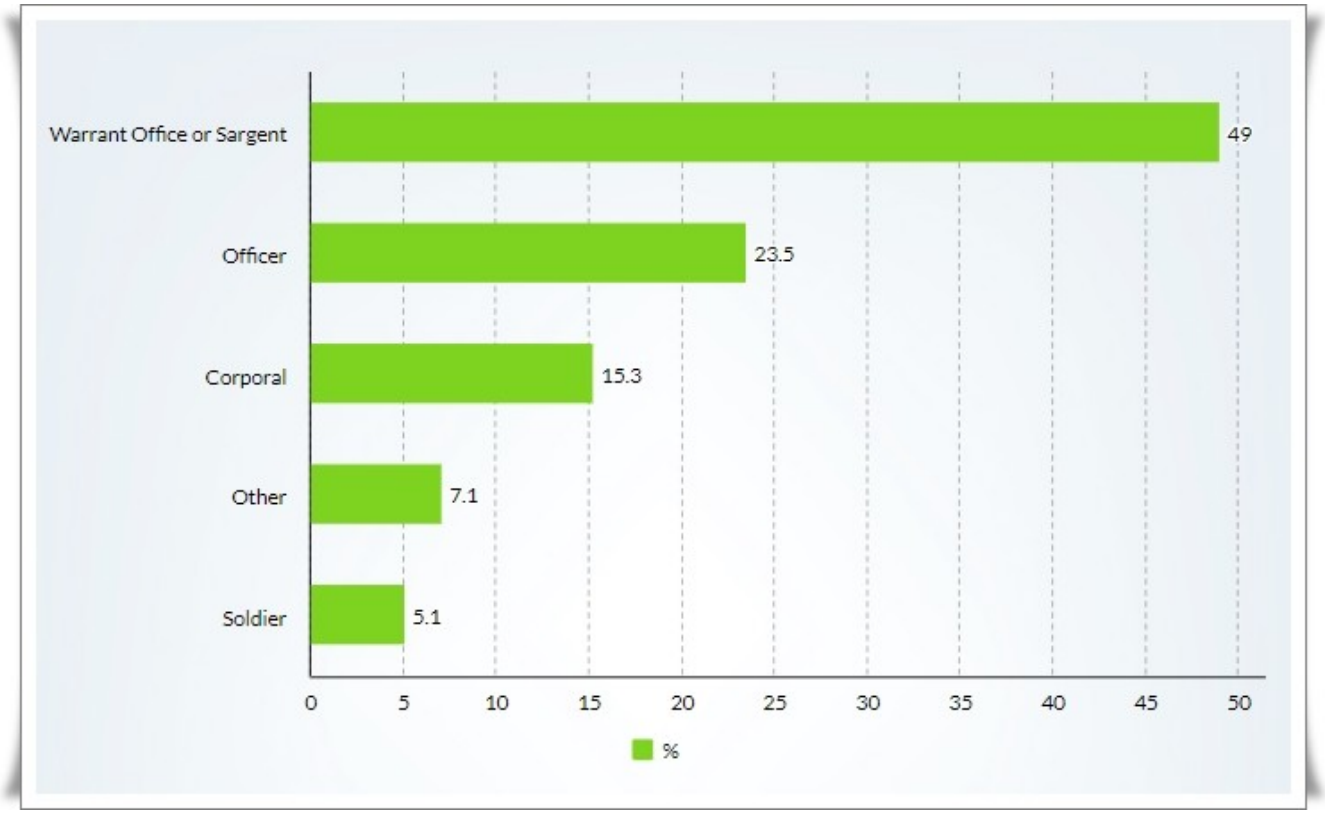
4. Results

4.1 Sample Representativeness and Respondent Profile

Of the total of 360 people who received the invitation, 105 (29.17%) correctly answered the questionnaire. Thus, for this population, the sample is representative when an 85% confidence interval and a 6% error margin are adopted, as estimated by Survey Monkey calculator <http://bit.ly/32DDzGF>.

Concerning to Respondent profile (Figure 2), 98 agreed to respond (93%), while 7 omitted. For those who responded, the majority (49%) is a warrant officer or sergeant, while almost a fifth (23.5%) is an officer, 15.3% is a corporal and 5.1% is a soldier. In addition, 7.1% occupy another type of post, such as civil servants.

Figure 2 – Profile of 98 Respondents Regarding the Post



Considering the time of service use, there were 100 responses (95.2%), most of which (53; 50.48%) use the service between 1 and 5 years, a fifth use the service between 5 and 10 years, 16% less than one year and 11% over ten years.

Finally, among respondents, only 8 (7.62%) provided their e-mails to receive the survey results.

4.2 Overall Dimension Performance

All respondents answered 10 items (53%), while at least 102 (97%) respondents answered 9 (47%) items. From the results obtained (Table 1), it is observed that the average level of satisfaction of foodservice customers is GOOD, considering that the total average attributed by the respondents was 7.43

± 2.23. In addition, it is noted that the most highly rated dimension was Staff (7.67 ± 1.99), followed by Environment Conditions and Product Quality. On the other hand, the dimension with lowest performance is the Installations (7.00 ± 2.28).

Table 1 – Statistics on the Level of Satisfaction by Item and Dimension.

Dimension	Item	X	S	X	S
Product Quality	Food quality (104 respondents)	7,76	1,86	7,53	2,03
	Offering healthy options	7,30	2,14		
	Food taste (104 respondents)	7,83	1,85		
	Food temperature	7,64	2,26		
	Menu variability (103 respondents)	7,11	1,94		
Environment Conditions	Local lighting (104 respondents)	7,63	2,06	7,55	2,12
	Climatization of the venue	7,20	2,40		
	Smell of the venue (104 respondents)	7,48	2,02		
	Cleanliness of the venue	7,90	1,91		
Installations	Layout (103 respondents)	7,87	2,25	7,00	2,28
	Decoration (104 respondents)	7,23	2,04		
	Signaling (fire extinguisher, emergency exit, etc.)	6,96	2,35		
	Labels of food on the buffet (102 respondents)	6,89	2,11		
	Access to people with disabilities (102 respondents)	6,05	2,31		
Staff	Uniforms of the staff in the restaurant	7,69	2,09	7,67	1,99
	Agility of staff in replacing food from the serving line	7,86	2,04		
	Hygiene of the staff	7,96	1,76		
	Introducing new dishes	6,93	1,94		
	Courtesy of staff in the service	7,90	1,97		

4.3 Performance by Dimension

To detail each of the five dimensions evaluated, the results related to them were divided into the following topics.

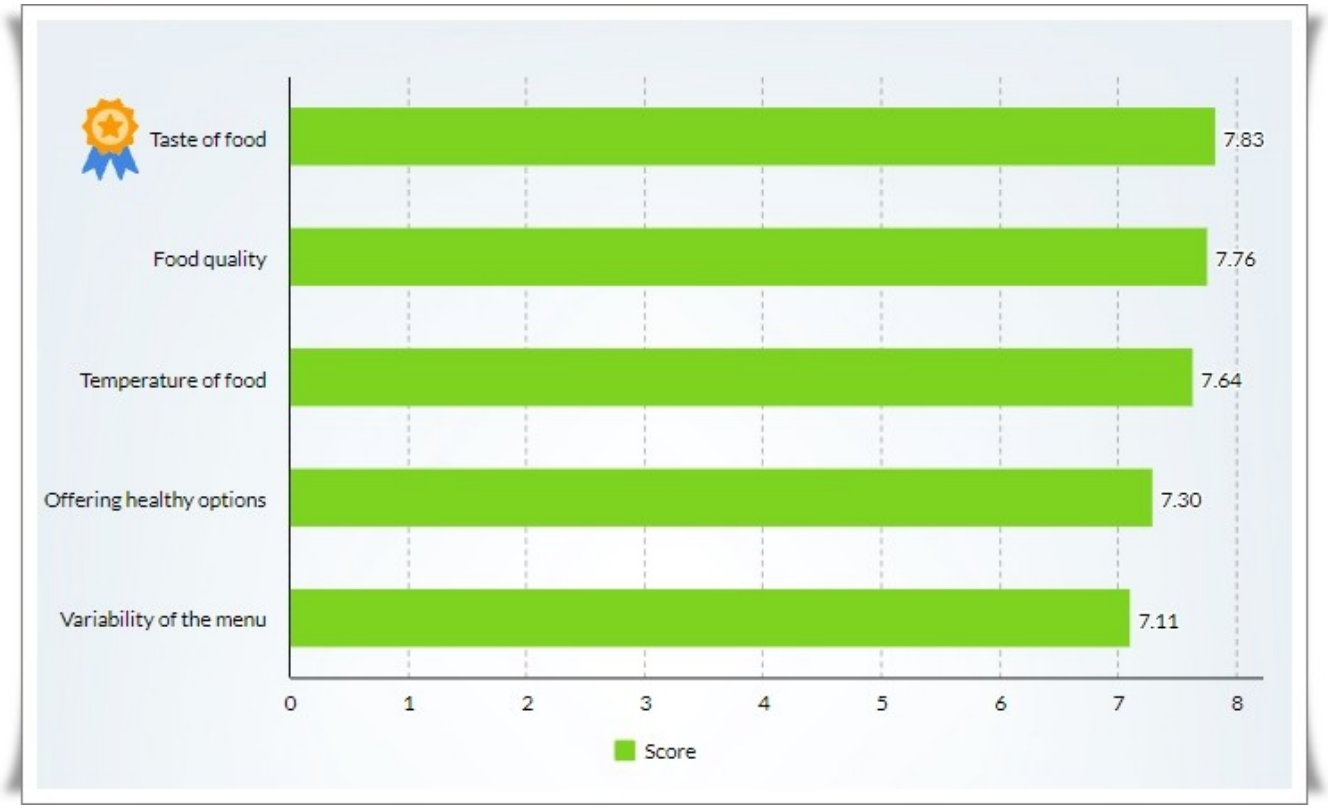
4.3.1 Product quality

The overall average of the Product Quality dimension is 7.53 (S=2.03), the second-lowest average among customers of the food service provided in the 2nd Gpt E-Procurement.

It is observed in Figure 3 that the item referring to taste of food was the one with the best evaluation (X=7.83; S=1.85), followed by food quality, temperature of food, offering healthy options, while the item referring to menu variability had the lowest average (7.11; S=1.94) among the items.

For the dimension of product quality, the need for “more varied juices and pulps” was highlighted.

Figure 3 – Performance of items in the Product Quality Dimension



4.3.2 Environment Conditions

The overall average for the Environment Conditions Dimension was the second highest (7.55). The standard deviation of this dimension is 2.12, the second-largest standard deviation among the four dimensions evaluated.

It is observed in Figure 4 that the item referring to the cleanliness of the venue obtained the best evaluation (X=7.90;S=1.91) in this dimension, followed by lighting and smell of the venue, while the item referring to the air conditioning of the place had the lowest average (7.20; S=2.40) among the items.

Among the general recommendations mentioned, one respondent suggested that they should turn on the air conditioning, and improve this system.

4.3.3 Installations

This dimension had an overall average of 7.00, the lowest average among the others. The standard deviation of this dimension is 2.28, the largest standard deviation among the four dimensions evaluated, considered the worst performance among customers of the food service provided in the Provisioning of the 2nd Gpt E.

It is observed in Figure 5 that the items referring to the layout (X=7.87; S=2.25), and decoration (X=7.23; S=2.04) were the best evaluated, while access to people with disabilities (X=6.05; 2.31), labels

of foods on the buffet (X=6.89; S=2.11), and signage (X=6.96; S=2.35) need to receive further attention and improvements.

Figure 4 – Performance of items in the Environment Conditions Dimension

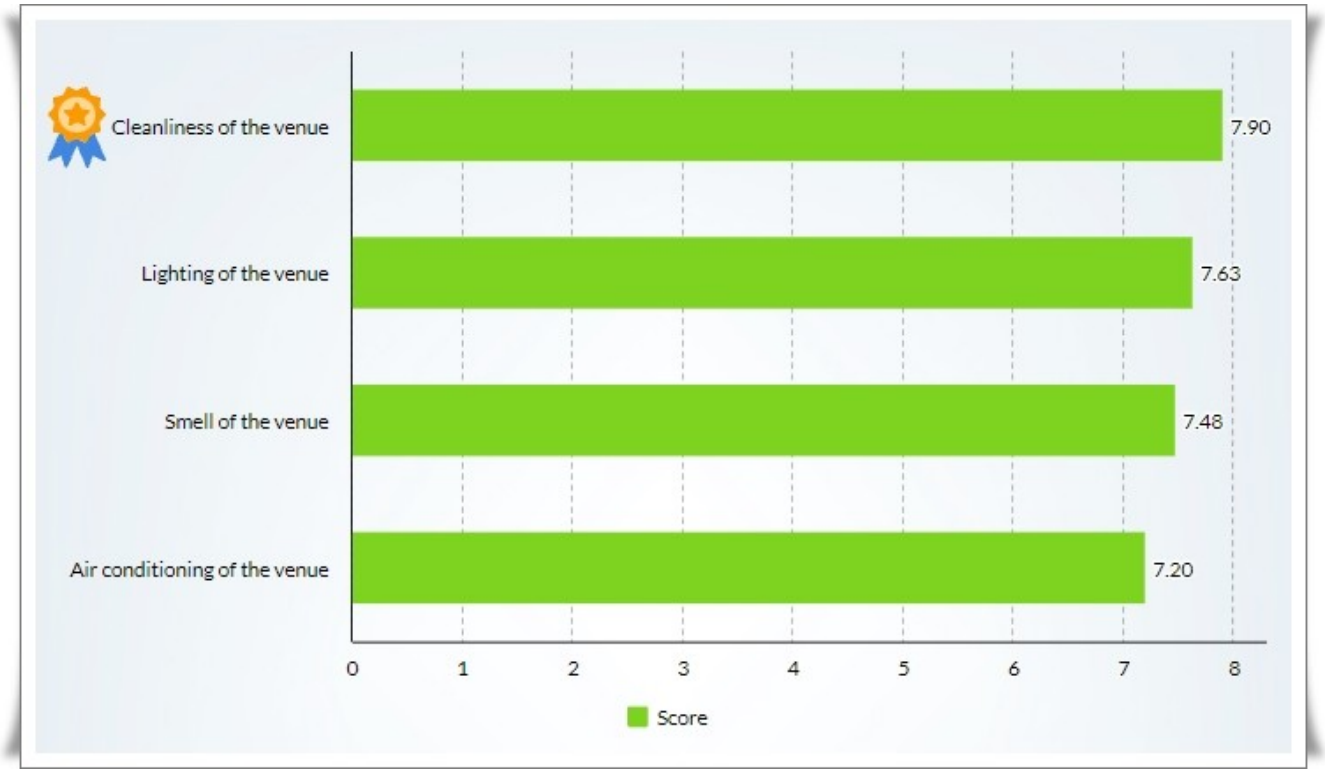
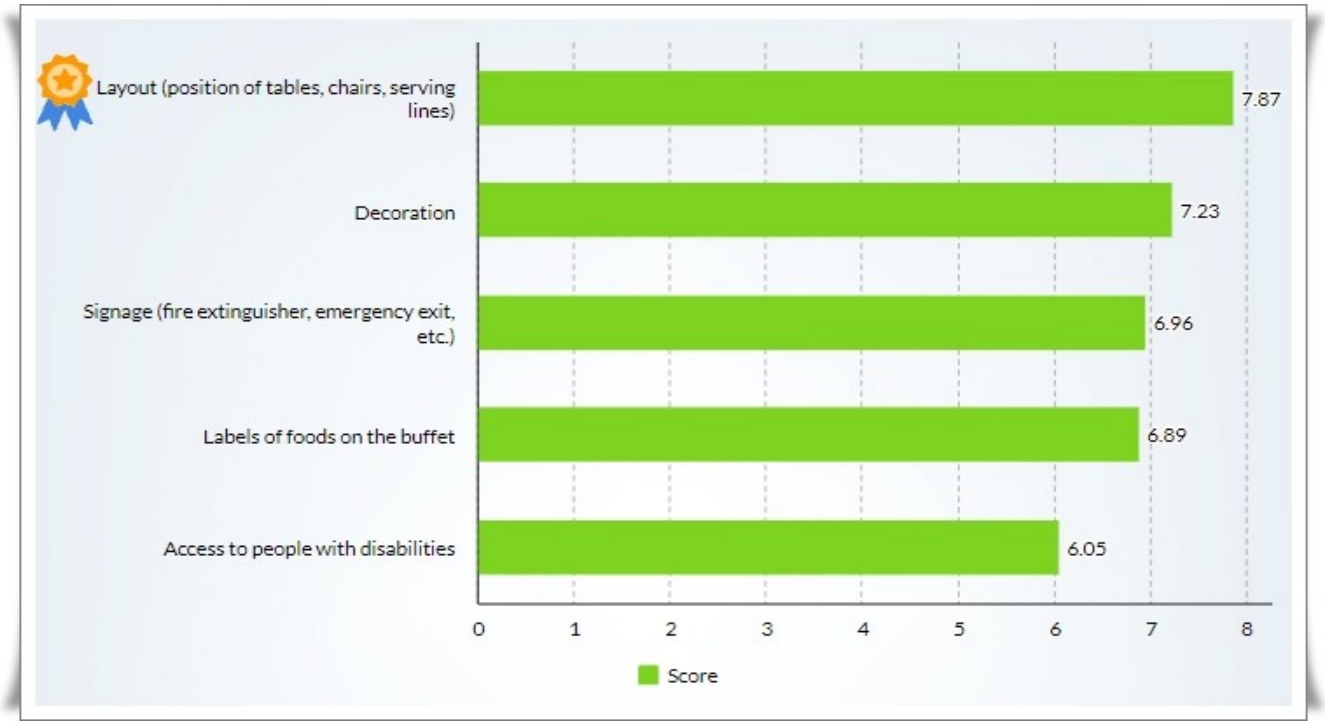


Figure 5 – Performance of the Installation Dimension

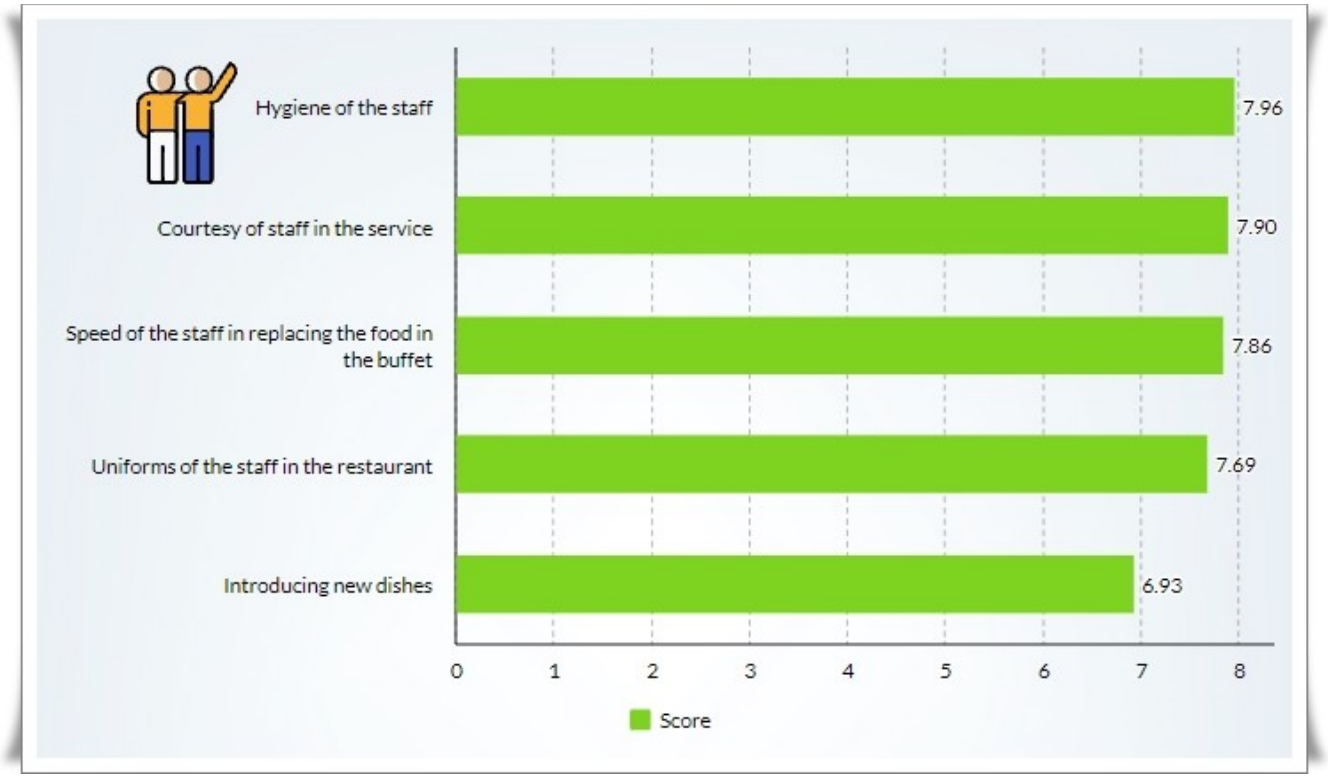


4.3.4 Staff

The Collaborators dimension (Figure 6) had the highest overall average (7.67), with the smallest standard deviation (1.99) among the four dimensions evaluated, considered the best dimension evaluated.

It is observed that the item referring to staff hygiene obtained the best evaluation (X=7.96;S=1.76), followed by Courtesy (X=7.9;S=1.97), speed to replace the food in the buffet (X=7.86;S=2.04), and uniform of the staff (X=7.69;S=2.09), while the item referring to the launch of new dishes had the lowest average (X=6.93;S=1.94), needing further improvements.

Figure 6 – Performance of the Staff Dimension

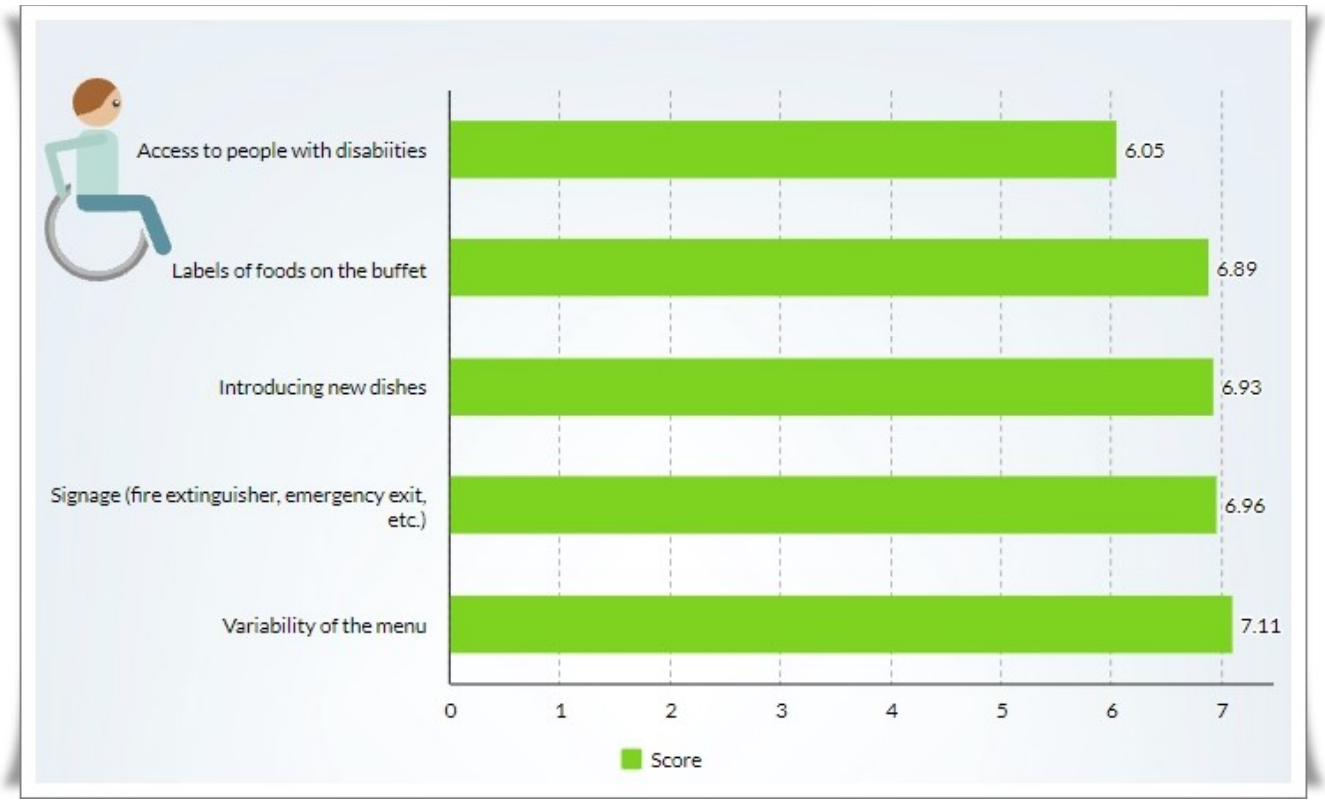


4.4 Five most critical items

After analyzing the results of the averages by dimension, the items were ranked in descending order of average, from which the five items with the lowest performance were identified.

In Figure 7, the five critical items are: access to people with disabilities (X=6.05; S=2.31), labels of food on the buffet (X=6.89; S=2.11), introducing new dishes (X=6.93; S=1.94), signage (X=6.96; S=2.35), and variability of the menu (X=7.11; S=1.95), whose improvement recommendations were proposed from section 4.4.1 to 4.4.5.

Figure 7 – Most five critical items



4.4.1 Item 14: Access to people with disabilities (6.05)

It was observed that the item with the lowest performance was the item referring to access to people with disabilities. In this context, a reform of the foodservice facilities is strongly recommended to cater to all minority groups, especially those with reduced mobility.

To this end, the implementation of the guidelines recommended in NBR 9050 (ABNT, 2015) is recommended, which deals with accessibility and how to adapt works with people with reduced mobility, such as the elderly or pregnant women, or even people with disabilities.

The access of people with disabilities to food services has already been addressed (SORIANO, MOLTO, and MÁNES, 2003). Ghiselli, Lee, and Almanza (2014) evaluating the layout of food services that serve elderly people with disabilities observed that the biggest complaints from consumers are about special diets, access to people with hearing impairment, people with visual impairment, people who need help to walk and people who require a wheelchair.

In this sense, it is worth noting that Almanza et al (2017), evaluating the accessibility status of 48 restaurants in the United States, observed that there are still many food services that have not been able to implement all accessibility measures, especially concerning accessibility of menus and bathroom facilities.

4.4.2 Item 13: Labels of food on the buffet (6.89)

It was observed that the item with the second-lowest performance was related to the labeling of foods on buffet. It is suggested the proper labeling of the different menus available, either regarding the name of the dish or the description of the ingredients and possible indications of the presence/absence of gluten, lactose, and other allergenic compounds or those causing possible intolerances.

Jones (2009), through focus group surveys of frequent foodservice consumers, observed that the correct and complete labeling of foods and, in particular, health information have a stronger effect on food choices in restaurants. The effect was seen in all people interviewed, however, the impact of choice is greater in groups of people who strongly desire health information on menus, specifically calories, grams of fat, and sodium levels.

4.4.3 Item 18: Launch of new menu (6.93)

Another item that achieved poor performance was the launch of new menus. For this item, a quarterly or semi-annual update of the menu of the aforementioned food service is suggested. This recommendation would not only aim at meeting the individual tastes of customers but also at the implementation of increasingly diverse and nutritionally complete menus, aiming at the dissemination of an increasingly diverse and complete diet among the users of the 2nd Gpt E food service.

To promote the launch of new menus, it would be interesting to invest in training and improvements and programs to recognize good manufacturing practices for food services. The manual of good practices for food services describes, among other aspects, the sanitary requirements for facilities, equipment, and utensils, the control of hygiene and health of handlers, and the control and quality assurance of the final product (BRASIL, 2006).

In this context, the development of more balanced and diversified menus would occur following current legislation and resolutions. Davis et al. (2014) evaluated the restructuring of US restaurant menus and noted that elaborate menus with complete information on nutritional content were preferred over classic menus.

4.4.4 Item 12: Local signage (6.96)

Another item with poor performance was the item referring to local signage. For this item, also related to local facilities, it is also recommended to implement the standards recommended in the aforementioned NBR 9050.

The signage of foodservice facilities is also addressed in the manual of good practices for food services (BRASIL, 2006).

4.4.5 Item 5: Menu variability (7.11)

The item referring to the variability of the menu, which is indirectly related to the item that deals with the launch of new menus, also had a low performance by the respondents. However, this item is related to the variability of the menu that already exists in the foodservice and not to the implementation of new menus.

In this context, a rotation of the implemented menu is suggested, respecting the above-mentioned update. For this, it is recommended that there are at least 5 different types of menus in the proposed menus so that the same dish is not repeated more than once in the same week and never on consecutive days.

Boger et al. (2021), evaluating consumption consistency and the relationship between social satisfaction and intention to revisit a restaurant, found that consumers satisfied with the quality of their preferred style were significantly more likely to revisit the foodservice.

Menu variability, in particular, is another aspect directly linked to consumer satisfaction. A study of 100 adult consumers indicated that a menu restaurant offering a variable daily menu was preferred by the subjects over one with a fixed menu under three different conditions (BERNSTEIN, OTTENFELD, WITTE, 2008). Kwun, Ellyn, and Choi (2013) evaluating the quality of food service on a large university campus showed that students are using the campus food service not only as a food service but also for other purposes, such as a place to eat meeting for social interaction and to relax.

The results showed that customer satisfaction and image are essential components for a successful campus foodservice operation. In particular, food quality, price value, service quality, and menu variety had significant and positive effects on consumption intent.

5. Final considerations

This article aimed to propose a methodology that allows evaluating the average level of satisfaction of users of the foodservice provided in the Procurement of the 2nd Engineering Group, located in the city of Manaus, capital of Amazonas, to propose improvements for the responsible sectors.

After studying the methodologies and analyzing 105 completed questionnaires, it is possible to conclude that:

1st) of the five investigated methodologies, for this study, the approach proposed by Barros (2013) was the most convenient for the development and application of the questionnaire. The DINNERPERF model was chosen because it directly assesses the essential quality dimensions for food services and disregards the “expectation” of customers, an advantage maintained from the SERVPERF model. It is recommended that 2nd Gpt E managers consider the possibility of applying this methodology periodically with improvement actions for those items considered critical;

2nd) the average level of customer satisfaction with the foodservice provided in the 2nd Gpt E was considered GOOD, with emphasis on the Staff, Product Quality and Environment Conditions dimensions, while the Infrastructure dimension demands more attention from managers;

3rd) in general, the five items that urgently need improvement are:

3.1) access to people with disabilities; 3.2) identification of foods on the serving line; 3.3) launch of new menus; 3.4) signage; 3.5) menu variability. Thus, it is recommended: a) to reform and update part of the facilities following the standards recommended by NBR 9050; b) develop an application with a virtual and physical menu for the presentation of food and beverages, as well as their nutritional properties, to comply with the Armed Forces Food Manual; c) update the food service menu at least twice a year, with the launch of new menus and services.

Among the limitations of the study, there is the low participation of respondents with a soldier's degree. The lack of access to an electronic device with the internet by this public was one of the causes.

The application of the questionnaire in person could not be performed due to restrictive measures due to the pandemic caused by the Sars-CoV-2 virus.

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7. Appendix A: Data Collection Instrument

QUESTIONNAIRE		
Research carried out by the student of the Production Engineering at FT/UFAM, Bruno Leveau, under the supervision of Dr. Jonas Gomes da Silva.		
Purpose: Assess your level of satisfaction with the food service provided by the 2nd Engineering Group (2nd Gpt E), in order to propose suggestions for improvements to the managers.		
All information will be treated confidentially for research purposes.		
Section 1: Satisfaction Assessment		
Please rate your current level of satisfaction with each item below from 0-10.		
Scale: 1 or 2 = Very Bad, 3 or 4 = Bad, 5 or 6 Regular, 7 or 8 Good, 9 or 10 = Excellent		
Dimensions	Items	Answer
Product Quality	01. Food quality	
	02. Offering healthy options	
	03. Food taste	
	04. Food temperature	
	05. Variability of the menu	
Environment Conditions	06. The local lighting level	
	07. The air conditioning of the venue	
	08. The smell of the venue	
	09. The cleanliness of the venue	
Installations	10. Layout (position of tables, chairs, serving lines)	
	11. Decoration	
	12. Local signage (fire extinguisher, emergency exit etc.)	
	13. Labels of food on the serving line	
	14. Access to people with disabilities	
Staff	15. Uniforms of the staff in the restaurant	
	16. Speed of the staff in replacing food in the buffet	
	17. Hygiene of the staff	
	18. Introducing new dishes	
	19. Courtesy of staff in the service	
Section 2: Respondent Profile		
Time	20. How long have you been using this service?	
Identification	21. What is your post/graduation?	
Suggestions for improvements and email to receive article		

Source: Adapted from Barros (2013)

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