# Usability measures

## Learnability measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Le-1-G | Easy of learning | The user easily uses the site. | $X = \sum_{i=1}^{U} S_i / U$<br>i = user identifier<br>U = the total number of users<br>$S_i$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related question can be found in Appendix A.<br>Note 2  To answer the questionnarie, users must use the site before.<br>Note 3  Minimum 31 users ( to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (e.g., Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Le-2-G | Navigation | The navigation through the web pages is consistent, it is easy to understand the paths and move from one page to another. | $X = \sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix B.<br>Note 2  To answer the questionnarie, users must use the site before.<br>Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (e.g., Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Le-3-G | Coherent buttons | The images or texts in the buttons correspond to the functionality they effectively execute. | $X = \sum_{i=1}^{U} S_i / U$<br>i = user identifier<br>U = the total number of users<br>$S_i$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related question can be found in Appendix C.<br>Note 2  To answer the questionnarie, users must use the site before.<br>Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)). | | | | |

| Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
|---|---|---|---|---|
| Le-4-G | Coherent menus | The labels of menu items correspond to the functionality that they effectively execute. | $X=\sum_{i=1}^{U}\sum_{j=1}^{Q} S_{ij}/(U*Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |

Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix D.
Note 2  To answer the questionnarie, users must use the site before.
Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).
Note 4 The site must be tested in different browsers (e.g., Firefox, Chrome, Safari) and with a minimum of 10 users in each browser.

## Efficiency measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Ef-1-G | General flexibility | The site provides page personalization options such as the inclusion of shortcut keys. | $X=\sum_{i=1}^{U}\sum_{j=1}^{Q} S_{ij}/(U*Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |

Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix E.
Note 2  To answer the questionnarie, users must use the site before.
Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).
Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser.

| Ef-2-S | Environment flexibility | The site is flexible to be used in different browsers and devices. | $X=\sum_{i=1}^{U}\sum_{j=1}^{Q} S_{ij}/(U*Q)$<br>i = user identifier<br>j = question identifier | Questionnarie |

| | | | U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | |
|---|---|---|---|---|

Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix F.
Note 2  To answer the questionnarie, users must use the site before.
Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).
Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser.

| Ef-3-G | Responsive | The website can be accessed correctly not only on computers such as desktops and notebooks, but also on mobile devices. | X= {1,0}<br>1 – it indicates the site is responsive<br>0 – it indicates the site isn´t responsive | Automatic tool |
|---|---|---|---|---|

Note 1 Minimum one tool. The return should indicate whether the site is ready to run on mobile devices or not.
Note 2 For example, Mobile Friendly Test tool can be used (https://search.google.com/test/mobile-friendly).

| Ef-4-G | Performance | The website load time | $X = \frac{1}{n}\sum_{i=1}^{n} S_i$<br>i = tool identifier<br>$S_i$ = value obtained from tests with each tool<br>n = number of tools | Automatic tool |
|---|---|---|---|---|

Note 1 Minimum of 3 automatic tools. For example, PageSpeed Insights (https://developers.google.com/speed/pagespeed/insights/?hl=pt-BR), Pingdom Website Speed Test (https://tools.pingdom.com/), GTMetrix(https://gtmetrix.com/), tools can be used.
Note 2 Minimum of 10 tests per configuration (browser, machine, network).
Note 3 Each tool must return a value between 0 to 100, when loading the site; values closer to 100 is better.
Note 4 This sub attribute is the same as the one indicated as Pe-4-G.

## Safety in use measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Sf-1-S | Failure handling | The site handles and treats the errors. | $X=\sum_{i=1}^{U}\sum_{j=1}^{Q} S_{ij}/(U*Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix G. | | | | |
| Note 2 To answer the questionnarie, users must use the site before. | | | | |
| Note 3 Minimum 31 users (to meet statistical significance in accordance to Triola(1999)). | | | | |
| Note 4 The site must be tested in different browsers (e.g., Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Sf-2-S | Rate of failures | The number of failures of the site. | X = A/B<br><br>A = Number of failures detected during observation time<br><br>B = Observation duration | Test with users |
| Note 1 The users must use the site to raise the number of failures of the site. | | | | |
| Note 2 Minimum 31 users (to meet statistical significance in accordance to Triola(1999)). | | | | |
| Note 2 The site must be tested in different browsers (e.g., Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Sf-3-S | Uses facing failures | The rate of users who found failures of the site | X = A/B<br>A = the number of users detected failures<br><br>B = the total number of users | Test with users |
| Note 1 The users must use the site to raise the number of failures of the site. | | | | |
| Note 2 Minimum 31 users (to meet statistical significance in accordance to Triola(1999)). | | | | |
| Note 2 The site must be tested in different browsers (e.g., Firefox, Chrome, Safari) and with a minimum of 10 users in each browser | | | | |

## User satisfaction measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Su-1-G | User satisfaction | The overall satisfaction of the user | $X=\sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$ <br> i = user identifier <br> j = question identifier <br> U = the total number of users <br> Q = the total number of questions <br> $S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix H. <br> Note 2  To answer the questionnarie, users must use the site before. <br> Note 3  Minimum 31 number of users (to meet statistical significance in accordance to Triola(1999)). <br> Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

## Usefulness measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Us-1-S | Usefulness | The degree to which a user is satisfied with their perception of achieving their goals | $X=\sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$ <br> i = user identifier <br> j = question identifier <br> U = the total number of users <br> Q = the total number of questions <br> $S_{ij}$ = the score of the question j given by the user | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix I. <br> Note 2  To answer the questionnarie, users must use the site before. <br> Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)). <br> Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

# Accessibility measures

## Perceivability measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Pe-1-S | Perception of system status | Realizing the current state of the website allows users to feel in control and take actions to reach their goals. | $X = \sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and  the related questions can be found in Appendix J.<br>Note 2  To answer the questionnarie, users must use the site before.<br>Note 3  Minimum 31 number of users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Pe-2-S | Simple screens | The amount of information on each page of the site is reasonable, there is no excess or lack of information | $X = \sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix K.<br>Note 2  To answer the questionnarie, users must use the site before.<br>Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Pe-3-S | Colors and fonts | The website uses colors with adequate contrast between the fonts and the backgrounds and | $X = \sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$<br>i = user identifier<br>j = question identifier | Questionnarie |

| | | verifies if the fonts have a good size for reading | U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | |
|---|---|---|---|---|
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix L.<br>Note 2  To answer the questionnarie, users must use the site before.<br>Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Pe-4-G | Performance | The website load time. | $X = \frac{1}{n}\sum_{i=1}^{n} S_i$<br>i = tool identifier<br>$S_i$ = value obtained from tests with each tool<br>n = number of tools | Automatic tool |
| Note 1 Minimum of 3 automatic tools. For example, PageSpeed Insights (https://developers.google.com/speed/pagespeed/insights/?hl=pt-BR), Pingdom Website Speed Test (https://tools.pingdom.com/), GTMetrix(https://gtmetrix.com/), tools can be used.<br>Note 2 Minimum of 10 tests per configuration (browser, machine, network).<br>Note 3 Each tool must return a value between 0 to 100, when loading the site; values closer to 100 is better.<br>Note 4 This sub attribute is the same as the one indicated as Ef-4-G. | | | | |

## Operability measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| p-1-S | Back button | All the pages in the website allow users to return to previously visited pages. | $X = \sum_{i=1}^{U} S_i \, / \, U$<br>i = user identifier<br>U = the total number of users<br>$S_i$ = the score of the question j given by the user i | Questionnarie |
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related question can be found in Appendix M.<br>Note 2 To answer the questionnarie, users must use the site before.<br>Note 3 Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

| Op-2-S | Perceivable focus | The website makes perceivable which text box has the current focus. | $X = \sum_{i=1}^{U} S_i / U$<br>i = user identifier<br>U = the total number of users<br>$S_i$ = the score of the question j given by the user i | Questionnarie |
|---|---|---|---|---|
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix N.<br>Note 2 To answer the questionnarie, users must use the site before.<br>Note 3 Minimum 31 number of users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |
| Op-3-G | Broken links | The amount of website links pointing to non-existent web pages. | $X = Max(\sum_{i=1}^{t}(B_i/L_i))$<br>i = tool identifier<br>t = the total number of tools<br>B = the amount of broken links<br>L = the total links of site | Automatic tool |
| Note 1 Minimum of 3 automatic tools. For example, Dead Link Checker (https://www.deadlinkchecker.com/), Xenu's Link Sleuth (https://xenus-link-sleuth.softonic.com.br/), Screaming Frog Seo Spider (https://www.screamingfrog.co.uk/) can be used.<br>Note 2 Each tool must return the total number of links inspected and the number of defective links. | | | | |
| Op-4-G | Accessibility | Checks if the site is accessible, benefiting all people, with or without disabilities. | $X = AVG(\sum_{i=1}^{t} S_i)$<br>$S_i$ = the value of each tool<br>i = indicates the tool number<br>t = the total number of tools | Automatic tool |
| Note 1 Minimum of 3 automatic tools. For example, ASES (http://asesweb.governoeletronico.gov.br/ases/), Nibbler (https://nibbler.silktide.com/), Access Monitor (http://accessmonitor.acessibilidade.gov.pt/amp/) can be used.<br>Note 2 Each tool must return a value between 0 to 100, when loading the site; values closer to 100 is better. | | | | |

## User experience measures

### Company information measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Ci-1-G | Company information | It checks whether some company information is visible on the website's home page. | $X = \sum_{i=1}^{U} S_i / U$<br>i = user identifier<br>U = the total number of users<br>$S_i$ = the score of the question j given by the user i | Questionnarie |
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related question can be found in Appendix O.<br>Note 2 To answer the questionnarie, users must use the site before.<br>Note 3 Minimum 31 number of users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

### Company reputation measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Cr-1-S | Company reputation | The company's reputation based on consumer experiences. | $X = \sum_{i=1}^{U} \sum_{j=1}^{Q} S_{ij}/(U * Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix P.<br>Note 2 To answer the questionnarie, users must search the company on the reputation expert websites (for example, ReclameAqui (https://www.reclameaqui.com.br/) e-bit (https://www.ebit.com.br/).<br>Note 3 Minimum 31 number of users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

## Privacy policies measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Pp-1-G | Privacy policies | The way the customer information is collected and used, as well as the use of third parties for secure transactions and for the protection of personal data, are perceivable, bypassed with a consistent privacy policies. | $X=\sum_{i=1}^{U}\sum_{j=1}^{Q} S_{ij}/(U*Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix Q.<br>Note 2 To answer the questionnarie, users must use the site before.<br>Note 3 Minimum 31 users (to meet statistical significance in accordance to Triola(1999))<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. ||||||

## Customer opinions measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Co-1-G | Customer opinions | Information obtained from users through inspection feedbacks and comments from other customers | $X=\sum_{i=1}^{U}\sum_{j=1}^{Q} S_{ij}/(U*Q)$<br>i = user identifier<br>j = question identifier<br>U = the total number of users<br>Q = the total number of questions<br>$S_{ij}$ = the score of the question j given by the user i | Questionnarie |
| Note 1 The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix R.<br>Note 2 To answer the questionnarie, users must use the site before.<br>Note 3 Minimum 31 users (to meet statistical significance in accordance to Triola(1999)).<br>Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. ||||||

## Pleasure measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| SPI-1-G | User pleasure | The user enjoys using the system. | $X= \sum_{i=1}^{U} S_i / U$ <br> i = user identifier <br> U = the total number of users <br> $S_i$ = the score of the question j given by the user i | Questionnarie |
| Note 1  The questionnarie uses as Likert scale point (1 to 7) and the related questions can be found in Appendix S. <br> Note 2  To answer the questionnarie, users must use the site before. <br> Note 3  Minimum 31 users (to meet statistical significance in accordance to Triola(1999)). <br> Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

## Padlock measures

| ID | Name | Description | Measurement function | Method |
|---|---|---|---|---|
| Pa-1-G | Visible Padlock | The padlock, as a security symbol should be visible. | X= {1, 0} <br> 1 – it indicates that the site has the lock. <br> 0 – it indicates that the site hasn't the lock | Questionnarie |
| Note 1 The related question can be found in Appendix T. <br> Note 2 To answer the questionnarie, users must use the site before. <br> Note 3 Minimum 31 number of users (to meet statistical significance in accordance to Triola(1999)). <br> Note 4 The site must be tested in different browsers (i.e, Firefox, Chrome, Safari) and with a minimum of 10 users in each browser. | | | | |

**Reference**

TRIOLA, Mário F. Introdução à Estatística. 7a. Ed. Rio de Janeiro: LTC, 1999.