Information Quality in The Public Sector: The Case of The Santa Catarina State Directorate for The Management and Development of Government Workers

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Abstract

In the world of organizations, computerized systems have become indispensable as tools to support management. With regard to public service, people management requires the use of these systems to meet the expectations of its users and its customers — both the government workers themselves, and the population — through functionalities that meet the demands of the decision, strategic, tactical, and operational levels. This paper focuses on research of the Information Quality (IQ) involved in the routines and processes of the Integrated Human Resources Management System, Sistema Integrado de Gestão de Recursos Humanos (SIGRH); managed by the Santa Catarina Department of State Administration, Secretaria de Estado da Administração de Santa Catarina (SEA); or more specifically, by the Directorate for the Management and Development of Government Workers, Diretoria de Gestão e Desenvolvimento de Pessoas (DGDP). The objective of the research was to verify the current state of IQ through its dimensions and categories, the identification of items with low quality levels, and the correlation between the dimensions. The research method used was the application of the House of Quality (HoQ) tool, adapted to the specifics of the organization selected by the authors. Finally, it is through the consequent analysis of the results obtained that it was possible to suggest actions of improvement to be taken by managers.
KEYWORDS: House of quality (HoQ), information quality (IQ), people management.

1. Introduction

This work is composed of a number of steps which are well defined and presented below. The first step is the introduction of the research methods and their application, which encompass the most commonly used information and its degree of importance, and the quality characteristics in relation to the information and

the strategic data. The article is complemented by the presentation and analysis of the research results and the authors final considerations.

Before looking at the research itself, it is necessary to present some relevant concepts. Starting with the differentiation between data, information, and knowledge. In the context of organizations, according to Prusak and Davenport (2003), it is especially relevant to know how to identify with which of the three (data, information, or knowledge) one is working so that efforts of the managers and workers are correctly directed and decision making is appropriate. The same authors define data as numbers and text that are out of context, which become information when some contextual value is added to them.

Nonaka and Takeuchi (1997) state that "information is a flow of messages, while knowledge is created by that very flow of information, anchored in the beliefs and commitments of its holder. This understanding emphasizes that knowledge is essentially related to human action."

It is noticed that the amount of information available is increasing; therefore, according to Eppler (2006), the quality of information has become an essential factor for the effectiveness of organizations and individuals, and holding that knowledge is inspiring managers. This managerial challenge — known as knowledge work — requires continuous coordination and governance, and according to Zidel (1998), requires analysis and expertise to solve problems, generate ideas, or create new products and services.

Among the methods available for measuring information quality, SERVQUAL and QFD (quality function deployment) stand out, the latter being selected for use in this research. According to SANTOS (2016), QFD is an analytical tool that has the ability to quantify the relationship between the needs of customers and the process of developing new products, through the use of matrices.

The House of Quality (HoQ) tool, which has this name due to its design reminiscent of a house, employs the basic principles of QFD. Its fundamental objective is to find the technical characteristic that is most related to the needs of customers. It also looks to identify the contradictions between the wishes of these customers and the technical characteristics of the IQ, and to present projects to improve items that are underperforming (LIN; JING; FANG-FANG, 2011).

In the context of public management, since this work used a public agency of the state government (more specifically in the internal area of people management) as a case study, the emphasis is on the IQ of the service offered. The "customers" are the government workers themselves, who ultimately serve the interests of the population.

In order to keep up with global changes and remain competitive, the Brazilian public administration had to adapt and employ new management technologies in the same way that the private sector did. Thus, according to Paludo (2010), competitiveness, globalization, and new technologies have become challenges that also need to be faced by public entities. In addition to this, IQ is of high importance in public management.

The goal of this study is to verify, through the HoQ tool, the dimensions and categories of information quality (IQ) in a state public sector organization, more specifically in a management department selected from the Directorate for the Management and Development of Government Workers, *Diretoria de Gestão e Desenvolvimento de Pessoas* (DGDP).

The research problem involves verifying which dimensions of IQ perform better and worse in the institution, considering the HoQ tool used and the assignment of numerical and percentage values to

questions that may seem very subjective at first glance. The objective is therefore to be able, through the HoQ methodology, to record a snapshot of the current situation in which these different IQ dimensions are distributed and correlated. Additionally, to identify where there is a problem, the correlation between the pieces of information, and to consequently be able to open the range of possibility for improvements to be made by managers.

2. Research and Application Methods

2.1. Most commonly used pieces of information and their degrees of importance

Considering the structure of the Santa Catarina Department of State Administration, *Secretaria de Administração do Estado de Santa Catarina* (SEA); the DGDP (which is part of the SEA) is composed of eight organizational units — the board of directors, six management teams, and one coordinator.

Initially, the director, the managers, and the coordinator (or senior managers) in each of these units were consulted. During this meeting, the following question for the initial survey of this research was asked: "In the context of the SIGRH (and other systems used by the directorate), which pieces of information are used the most for decision making?"

For the purpose of this article, one of the management units was selected as reference for the research, the Management of Attendance to the Government Worker, *Gerência de Atendimento ao Servidor* (GEATS). The choice of this unit was made due to the representation that it offers as a scaled-down version of the directorate, in attending to the employees of the SEA itself, while the other management units serve the employees of all departments of the General Group of Executive Power, o Agrupamento Geral do Poder Executivo, (state secretaries, military, foundations, and local authorities), public companies, and some departments of other areas such as the State Auditor's Office and the State Public Prosecutor's Office.

The initial consultation with the GEATS manager provided seven of the most commonly used pieces of information for decision making. Of these seven, four were considered most relevant by the manager, according to Table 1 below:

Table 1. Selected strategic information

Strategic Information
1. Worker allocation
2. Worker clocking in system
3. Internship program
4. Control of functional benefits

Source: Prepared by the authors.

At a subsequent meeting, the same manager was asked to present two or more pieces of data with identification of the research source (the SIGRH, other SEA systems, or the HR sector managers) related to each of the pieces of strategic information mentioned. The results are presented in Table 2 below:

Table 2. Data and sources related to the information

Data	Source
1.1. Worker start date	SIGRH
1.2. Organizational unit of the worker	SIGRH

1.3. Worker ID	SIGRH
1.4. Job title of the worker	SIGRH
2.1. Entry / exit timestamp	SIGRH / SGPE
2.2. Worker ID	SIGRH / SGPE
3.1. Intern ID	SIGRH
3.2. Education level of the intern	SIGRH
3.3. Organizational unit of the intern	SIGRH
3.4. Duties of the intern	directly from management
4.1. Benefit vesting period	SIGRH
4.2. Benefit start and end dates	SIGRH
4.3. Worker ID	SIGRH
4.4. Organizational unit of the worker	SIGRH

Source: Prepared by the authors.

The next step was to obtain the degree of importance of the strategic information. For this purpose a questionnaire was applied to three respondents: GEATS's own manager (hereafter referred to as respondent "X"), another management employee with extensive public experience (respondent "Y"), and one of the authors of this present work, as an IQ expert and career government worker in the same directorate as the research target (respondent "Z").

Each respondent then assigned values from 1 to 4 for the information, following the pattern below:

1 - Of no importance
2 - Slightly important
3 - Very important
4 - Absolutely important

Through the application of the questionnaire it was possible to assign values to the degree of importance for each of the listed pieces of strategic information. The results with the individual answers (respondents X, Y and Z) and the weighted average, can be seen in Table 3 below:

Table 3. Degree of importance of the strategic information

Strategic Information	**(X)**	**(Y)**	**(Z)**	**Average**
1. Worker allocation	4	4	4	**4,00**
2. Worker clocking in system	4	4	3	**3,67**
3. Internship program	4	3	3	**3,33**
4. Control of functional benefits	4	4	4	**4,00**

Source: Prepared by the authors.

It can be observed that respondent "X" assigned the highest grade (4 – Absolutely important) to all the information listed, which demonstrates their concern as the sector's main manager that the same attention should be given to different management issues and demands, and that all have the same relevance. Respondent "Y" considered that one of the items (Internship program) does not have the same degree of importance as the others (3 – Very important). Finally, the Respondent "Z" considered that two of the items (Worker clocking in system and Internship program) were not worth the same full degree of importance, defining them as grade 3. As an IQ expert and SIGRH development and support technician, Respondent

"Z" has a slightly different view of the status of each functionality in the system. There were no answers with the degrees "1 – Of not importance" or "2 – Slightly important".

The averages of the degree of importance of the strategic information and, consequently, of the data related to this information must be filled into matrices 2 and 1 respectively and used to calculate the IQ attributes of the two HoQ matrices adopted in this study.

2.2. Information quality characteristics vs. strategic information and data

The next stage of the research involved the development and application of two questionnaires, the first involving the *data* (related to each piece of strategic information) which will serve as the basis for completing Matrix 1; and the second involving the *strategoc information* which will serve as the basis for completing Matrix 2.

Table 4. Quality characteristics and definitions

Category	Dimension	Description
INTRINSIC	Accuracy	Is the information correct?
	Believability	Is the information considered true and reliable?
	Objectivity	Was this information collected objectively and is it fact based?
CONTEXT	Completeness	Does the information contain all important data?
	Timeliness	Is this information current enough for our needs?
	Value-added	Does this information have benefits and advantages for those who use it?
	Relevancy	Is this information applicable to a particular task?
REPRESENTATION	Ease of understanding	Is this information easily understood by those who will need it?
	Interpretability	Is this information represented in appropriate language, using correct symbols and codes that provide clear and precise definitions?
	Concise representation	Is the information presented in a compact way?
	Representational consistency	Is information presented following a pattern?
ACCESSIBILITY	Accessibility	Can the information be quickly accessed when need arises?
	Ease of use	Does this information allow easy manipulation and applicability in different tasks?
	Security	Is access to this information restricted or properly maintained to ensure its security?

Source: SANTOS (2016), based in Strong, Lee and Wang (1997), Lee et al. (2002), Bentancourt (2015).

Considering Table 4 above and the categories and dimensions of quality, the questions were created for the two questionnaires, taking into account the *strategic information* listed and the related *data* (obtained through SIGRH, other systems used by DGDP, or through third parties [sectoral HR]). The quality

categories and dimensions were adapted and reordered for the assembly of the HoQ matrices, according to the tables below.

Table 5. Quality categories and dimensions (Matrix 1 – data)

Category	Dimension
INTRINSIC	Accuracy
	Believability
	Objectivity
CONTEXT	Completeness
	Timeliness
ACCESSIBILITY	Accessibility
	Ease of use
	Security

Source: Prepared by the authors, based in SANTOS, 2016.

Table 6. Quality categories and dimensions (Matrix 2 – information)

Category	Dimension
CONTEXT	Value-added
	Relevancy
REPRESENTATION	Ease of understanding
	Interpretability
	Concise representation
	Representational consistency

Source: Prepared by the authors, based in SANTOS, 2016.

The questionnaire for completing Matrix 1, identified as QI1, was divided into four sections, one for each *data* grouping related to the four pieces of strategic information. The following eight questions were asked:

(1) Is this data correct / error free?

(2) Is this data considered reliable / true?

(3) Was the data collected objectively and is it fact based?

(4) Is the data complete (contains all that is important)?

(5) Is this data current enough for the needs of the research?

(6) Can the data be quickly accessed when required?

(7) Does this data allow easy manipulation and applicability in different tasks?

(8) Is access to this data restricted (or properly maintained to ensure its security)?

The eight questions were repeated for each of the 14 pieces of data in Table 2 listed above, totaling 112 items from A1 to A8, B1 to B8 and thus subsequently ending at N1 to N8.

Following the method adopted, the second questionnaire (identified as QI2) was applied for completing Matrix 2, which is related to the four pieces of *strategic information* previously selected by the managers and which presented the following six questions:

(1) Does this information have benefits and advantages for those who use it?

(2) Is the information applicable to a particular task?

(3) Is this information easily understood by those who will need it?
(4) Is this information represented in appropriate language and with clear and precise definitions?
(5) Is the information presented in a compact way?
(6) Is the information presented following a well-defined pattern?

The six questions in this questionnaire were repeated for each of the four pieces of information in Table 1, totalling 24 items, O1 to O6, P1 to P6, Q1 to Q6, and R1 to R6.

The questionnaires were made available via Google Forms through the following web addresses (sent via email to respondents):

- questionnaire 1 -> https://forms.gle/E1Pt3DtqMhadFyhq6
- questionnaire 2 -> https://forms.gle/SYEniB4BQRMkQWjM8

The tabulation of the answers of these questionnaires with the weighted average of the respondents can be viewed in the following section.

2.3. HoQ matrices

Following the research, the tabulated data from QI1 and QI2 was put into the HoQ matrices to analyze the quality dimensions and correlations between them, aiming to facilitate managerial decision making.

This work adopted the standard chosen by SANTOS (2016) and was based on the studies by OHFUJI et al (1997); CHENG et al (1995); CHENG; MELO FILHO (2010); TOLEDO et al (2013) in determining the degree of importance of the dimensions of IQ. The following weightings were used to define the relationship between each quality characteristic indicated by the researcher and the information (and data) selected by the managers of the organization:

Table 7. Representation used in the correlation between items and quality characteristics

Correlation	Value
Strong	9
Average	3
Weak	1
Nonexistent	0

Source: Prepared by the authors, based in SANTOS, 2016.

These same weightings were presented as answer options for each of the questions on the QI1 and QI2 questionnaires.

Figure 1 below presents the individual QI1 responses for each of the respondents, along with the degree of importance defined in the previous step of this paper, for each of the listed pieces of *data*.

	Intrinsic									Context						Acessibility									
	Accuracy			Believability			Objectivity			Completeness			Timeliness			Accessibility			Ease of use			Security			Degree of importance
Data	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
1.1. Worker start date	9	9	9	9	9	3	9	9	9	9	9	9	9	9	3	9	9	9	9	3	9	9	9	9	4
1.2. Organizational unit of the worker	3	9	9	3	9	3	3	9	3	9	3	3	9	9	9	9	9	9	9	9	9	9	3	9	4
1.3. Worker ID	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	3	9	9	9	9	4
1.4. Job title of the worker	9	9	3	9	9	9	9	9	3	9	9	3	9	9	3	9	9	9	9	3	3	9	9	9	4
2.1. Entry / exit timestamp	1	9	3	9	9	3	9	9	3	1	9	3	1	9	3	3	9	3	3	3	3	9	9	9	3,67
2.2. Worker ID	9	9	9	9	9	3	9	9	3	3	9	9	3	9	3	3	9	9	3	3	9	9	9	9	3,67
3.1. Intern ID	3	9	9	3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	3,33
3.2. Education level of the intern	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	3,33
3.3. Organizational unit of the intern	3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	3,33
3.4. Duties of the the intern	3	3	3	3	3	3	9	3	3	9	1	9	9	1	3	9	3	1	9	1	1	9	3	3	3,33
4.1. Benefit vesting period	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	3	9	9	9	4
4.2. Benefit start and end dates	3	9	9	3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	3	9	9	9	4
4.3. Worker ID	3	9	9	3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	4
4.4. Organizational unit of the worker	3	9	9	3	9	9	9	9	9	9	9	3	9	9	9	9	9	9	9	9	3	9	9	9	4

Figure 1. QI1 questionnaire answers (data)

Source: Prepared by the authors.

From the QI1 responses, the correlation values for each of the quality dimensions was added (sum of the X, Y and Z responses) and their simple average value [(X + Y + Z) / 3)] was multiplied by the degree of importance listed in the last column, generating the results presented in Figure 2, which form the base of Matrix 1 of the HoQ.

	Intrinsic			Context		Acessibility		
	Accuracy	Believability	Objectivity	Completeness	Timeliness	Accessibility	Ease of use	Security
Data	1	2	3	4	5	6	7	8
1.1. Worker start date	36,00	28,00	36,00	36,00	28,00	36,00	28,00	36,00
1.2. Organizational unit of the worker	28,00	20,00	20,00	20,00	36,00	36,00	36,00	28,00
1.3. Worker ID	36,00	36,00	36,00	36,00	36,00	36,00	28,00	36,00
1.4. Job title of the worker	28,00	36,00	28,00	28,00	28,00	36,00	20,00	36,00
2.1. Entry / exit timestamp	15,90	25,69	25,69	15,90	15,90	18,35	11,01	33,03
2.2. Worker ID	33,03	25,69	25,69	25,69	18,35	25,69	18,35	33,03
3.1. Intern ID	23,31	23,31	29,97	29,97	29,97	29,97	29,97	29,97
3.2. Education level of the intern	29,97	29,97	29,97	29,97	29,97	29,97	29,97	29,97
3.3. Organizational unit of the intern	23,31	29,97	29,97	29,97	29,97	29,97	29,97	29,97
3.4. Duties of the the intern	9,99	9,99	16,65	21,09	14,43	14,43	12,21	16,65
4.1. Benefit vesting period	36,00	36,00	36,00	36,00	36,00	36,00	28,00	36,00
4.2. Benefit start and end dates	28,00	28,00	36,00	36,00	36,00	36,00	28,00	36,00
4.3. Worker ID	28,00	28,00	36,00	36,00	36,00	36,00	36,00	36,00
4.4. Organizational unit of the worker	28,00	28,00	36,00	28,00	36,00	36,00	28,00	36,00

Figure 2. Matrix 1 base (data)

Source: Prepared by the authors.

Similarly, the answers to the QI2 questionnaire were tabulated and are shown in Figure 3 below:

	Context						Representation											
	Value-added			Relevancy			Ease of understanding			Interpretability			Concise representation			Representational consistency			Degree of importance
Strategic Information	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z	
1. Worker allocation	9	9	9	9	9	3	9	9	3	9	9	3	9	9	9	3	9	9	4
2. Worker clocking in system	1	9	3	3	9	3	9	9	3	3	9	1	3	9	3	3	9	1	3,67
3. Internship program	9	3	9	3	3	9	9	3	3	9	3	3	3	3	3	1	9	9	3,33
4. Control of functional benefits	9	9	9	9	9	9	3	9	3	3	9	9	3	9	9	3	9	9	4

Figure 3. QI2 questionnaire answers (information)

Source: Prepared by the authors.

The results of the equivalent calculation for the *information* items generated what is presented in Figure 4, which form the base of Matrix 2 of the HoQ.

	Context		Representation			
	Value-added	Relevancy	Ease of understanding	Interpretability	Concise representation	Representational consistency
Strategic Information	1	2	3	4	5	6
1. Worker allocation	36,00	28,00	28,00	28,00	36,00	28,00
2. Worker clocking in system	15,90	18,35	25,69	15,90	18,35	15,90
3. Internship program	23,31	16,65	16,65	16,65	9,99	21,09
4. Control of functional benefits	36,00	36,00	20,00	28,00	28,00	28,00

Figure 4. Matrix 2 base (information)

Source: Prepared by the authors.

In both matrices, the sum of the values per column to be transformed into percentages was calculated, which points out the gaps between the dimensions of IQ.

In the HoQ, for each of the matrices (bases listed and assembled in the items above), there is still the interrelationship matrix, or "roof", which points out the correlation between each of the information quality attributes. The criteria for this correlation are listed in Table 8 below:

Table 8. Correlation criteria of the interrelationship matrix (roof)

Correlation	
++	Strong positive
+	Weak positive

0	Nonexistent
-	Weak negative
--	Strong negative

Source: Prepared by the authors, based in SANTOS, 2016.

When analyzing the IQ dimensions of Matrix 1 (data) of the researched organization (local HR management of the SEA), some comments can be made by observing and determining the degree of correlation in the interrelationship between these dimensions. It is noticed that the *Believability* dimension is the one that presents the best index of correlation with the other dimensions, since its relationship with the *Accuracy* and *Objectivity* (Intrinsic category) and *Completeness* (Context category) are considered strong positive (++). Therefore, by improving *Believability*, these other aspects are also significantly enhanced; even at a lower degree of correlation (weak positive), increased *Believability* should also lead to improvements in the dimensions *Timeliness* (Context category) and *Security* (Accessibility category).

At the opposite end of this analysis, it can be observed that the *Security* dimension (Accessibility category) has a strong negative (--) correlation with *Accessibility* and a weak negative correlation (-) with *Ease of use* (both of the same Accessibility grouping). This is because it is easy to see that security enhancements (in this particular case, HR computer systems), by implementing stricter policies to protect data and its access, will eventually affect data *Accessibility* as well as *Ease of use* for its users.

Figure 5 below shows the other interrelationships verified between the dimensions of data quality (HoQ Matrix 1):

							Security
							-
						++	--
					0	0	0
				0	0	++	0
			-	0	0	++	0
		++	++	+	0	0	+
	++	+	0	0	0	0	0
	Intrinsic			Context		Acessibility	
	Accuracy	Believability	Objectivity	Completeness	Timeliness	Accessibility	Ease of use	Security

Figure 5. Interrelationship between IQ dimensions (Matrix 1 – data)

Source: Prepared by the authors, based in SANTOS, 2016.

Similar to what was pointed out in the previous item, after observation and analysis of the interrelationships between the information dimensions (Matrix 2 of the HoQ), the following indices of correlation were defined, as shown in Figure 6:

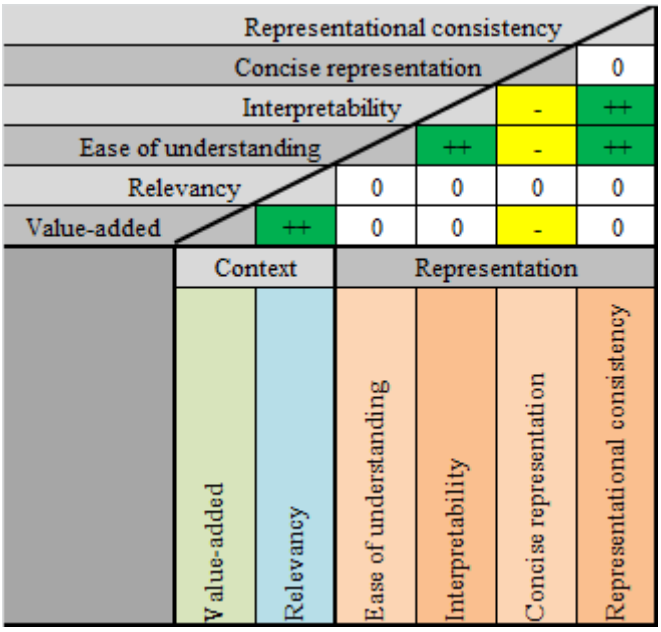

Figure 6. Interrelationship between IQ dimensions (Matrix 2 - information)

Source: Prepared by the authors, based in SANTOS, 2016.

The next stage of this research is the presentation and analysis of the results of the complete HoQ matrices. It is from there that the researcher will be able to suggest to the organization how to improve the quality of its strategic information, adding value to them. In addition, through the observation of the interrelationships between the attributes, the final analysis is further improved since it will be possible to develop strategies that can effectively help to solve the gaps found.

3. Presentation and Analysis of Results

Following the methodology presented, and the results obtained in the questionnaires and in the analysis of the interrelationships, the complete matrices of the HoQ are now shown.

Matrix 1 with the listed *data*, sources, and assigned values for each dimension of quality, and the percentage of IQ had the following structure:

	Accuracy	Believability	Objectivity	Completeness	Timeliness	Accessibility	Ease of use	Security
Security								-
Ease of use							++	--
Accessibility						0	0	0
Timeliness					0	0	++	0
Completeness			-	0	0	0	++	0
Objectivity		++	++	+	0	0	0	+
Believability	++	+	0	0	0	0	0	0
Accuracy								
	Intrinsic			Context		Acessibility		

Data	Source	Accuracy	Believability	Objectivity	Completeness	Timeliness	Accessibility	Ease of use	Security	Degree of importance
1.1. Worker start date	SIGRH	36,00	28,00	36,00	36,00	28,00	36,00	28,00	36,00	4,00
1.2. Organizational unit of the worker	SIGRH	28,00	20,00	20,00	20,00	36,00	36,00	36,00	28,00	4,00
1.3. Worker ID	SIGRH	36,00	36,00	36,00	36,00	36,00	36,00	28,00	36,00	4,00
1.4. Job title of the worker	SIGRH	28,00	36,00	28,00	28,00	28,00	36,00	20,00	36,00	4,00
2.1. Entry / exit timestamp	SIGRH / SGPE	15,90	25,69	25,69	15,90	15,90	18,35	11,01	33,03	3,67
2.2. Worker ID	SIGRH / SGPE	33,03	25,69	25,69	25,69	18,35	25,69	18,35	33,03	3,67
3.1. Intern ID	SIGRH	23,31	23,31	29,97	29,97	29,97	29,97	29,97	29,97	3,33
3.2. Education level of the intern	SIGRH	29,97	29,97	29,97	29,97	29,97	29,97	29,97	29,97	3,33
3.3. Organizational unit of the intern	SIGRH	23,31	29,97	29,97	29,97	29,97	29,97	29,97	29,97	3,33
3.4. Duties of the the intern	directly from management	9,99	9,99	16,65	21,09	14,43	14,43	12,21	16,65	3,33
4.1. Benefit vesting period	SIGRH	36,00	36,00	36,00	36,00	36,00	36,00	28,00	36,00	4,00
4.2. Benefit start and end dates	SIGRH	28,00	28,00	36,00	36,00	36,00	36,00	28,00	36,00	4,00
4.3. Worker ID	SIGRH	28,00	28,00	36,00	36,00	36,00	36,00	36,00	36,00	4,00
4.4. Organizational unit of the worker	SIGRH	28,00	28,00	36,00	28,00	36,00	36,00	28,00	36,00	4,00
	∑ weighted IQ	383,51	384,62	421,94	408,59	410,59	436,38	363,48	452,62	3261,74
	% IQ	11,76%	11,79%	12,94%	12,53%	12,59%	13,38%	11,14%	13,88%	100%

Figure 7 – Matrix 1 of the surveyed HoQ (data)

Source: Prepared by the authors.

The dimension with the lowest IQ was *Ease of use* (in the Accessibility category) with 11.14%, closely followed by the *Accuracy* and *Believability* dimensions (in the Intrinsic category) with 11.76% and 11.79% respectively. These are therefore the items that should be considered first, as they point out the need for improvements in the organization.

It is noticed that *Ease of use* has an interrelationship with a strong positive correlation (++) with the dimensions *Objectivity*, *Completeness*, and *Accessibility* which indicates that actions proposed to improve this dimension (*Ease of use*) will also result in better performance of the others. In the specific case of the researched organization, it can be observed that the items that most contributed to the low percentage of the *Ease of use* dimension were the data related to the entry and exit of workers (clocking in system) and the definition of which activity a newly hired intern would perform. These listed pieces of data should be improved to allow easier handling and applicability in the system's routines.

The *Accuracy* and *Belivability* dimensions (both of the Intrinsic category) were also affected in their percentage of IQ, by the lack of definition or lack of clarity in the attribution of what type of activity will be performed by the new interns.

In the case of the *Accuracy* dimension, it is noted that it has a strong positive correlation (++) in its interrelationship with the *Believability* dimension, and weak positive (+) with *Objectivity*. Therefore, proposals for actions of improvement on the issue of *Accuracy* will also positively influence these other two dimensions.

Another point that can be observed through the results achieved is that even with high percentages of IQ in the *Accessibility* and *Security* dimensions (both in the Accessibility category), due to the strong negative correlation (--) between them, scenarios involving a reduction in quality in one of them may have the opposite effect on the other, and vice versa. This is important, so that weighting can be defined between them to deal with what could result in increases or reductions in IQ in an eventual improvement plan.

Starting with the analysis of Matrix 2 (*information*), it must initially be considered how it appeared after being completely filled-in, as shown in Figure 8 below:

			Representational consistency	Concise representation	Interpretability	Ease of understanding	Relevancy	Value-added
			0	-	++	++	0	0
			++	-	++	0	0	++
			0	0	0	0	0	0
			0	-	0	0	0	0
	Context		Representation					
Strategic Information	Value-added	Relevancy	Ease of understanding	Interpretability	Concise representation	Representational consistency	Degree of importance	
1. Worker allocation	36,00	28,00	28,00	28,00	36,00	28,00	4,00	
2. Worker clocking in system	15,90	18,35	25,69	15,90	18,35	15,90	3,67	
3. Internship program	23,31	16,65	16,65	16,65	9,99	21,09	3,33	
4. Control of functional benefits	36,00	36,00	20,00	28,00	28,00	28,00	4,00	
∑ weighted IQ	111,21	99,00	90,34	88,55	92,34	92,99	574,44	
% IQ	19,36%	17,23%	15,73%	15,42%	16,07%	16,19%	100%	

Figure 8. Matrix 2 of the surveyed HoQ (information)

Source: Prepared by the authors.

The dimension that presented the worst percentage for IQ was *Interpretability* with 15.42%, followed by *Ease of understanding* with 15.73% (both in the Representation category). The Context category showed the best performance with its *Value-added* and *Relevancy* dimensions presenting the best indices.

Actions of improvement should focus on enhancing the attributes of the Representation category, remembering that due to the dimension of *Interpretability* having a strong positive correlation (++) with *Ease of understanding* and with *Representational consistency*, proposals for improvement in one of these dimensions should result in benefits for the others and vice versa. Contrarily, as the correlation is weak

negative (-) between *Interpretability* and *Concise representation*, it should be noted that improvement actions in one of them may cause reductions in quality in the other.

It is also observed that the dimension with the best performance in the whole matrix, *Value-added* (19.36%), also has a weak negative correlation (-) with *Concise representation*. This leads to the conclusion that improvement projects in *Concise representation*, despite being beneficial in this Representation item, may cause a reduction in the *Value-added* dimension (Context category) of the organization.

4. Final Considerations

After analyzing the results of this research using the HoQ tool, some general observations and recommendations follow.

It can be seen that with regard to Matrix 1, the dimensions of *Ease of use*, *Accuracy*, and *Believability* were those that had the lowest indices of IQ. Translating into the world of the verified organization, the items that should receive special attention are the check-in and check-out of the workers (clocking in system) and the question of lack of definition or clarity about the activities that a newly selected intern will perform.

As for Matrix 2, the dimensions that require greater attention, due to their low performance, are those of *Interpretability* and *Ease of understanding* (both in the Representation category).

The relevance of the research presented here is observed in the identification of the dimensions and categories with the lowest IQ indices and the gaps between them, making it possible to inform managers which processes and functionalities of the related systems deserve greater attention in the search for improvement.

An important action would be to send this work and its results to the DGDP/SEA, to verify the possibility of implementing improvements in the items considered with low IQ levels; to be carried out with planning and proper analysis of the questions presented in this research.

It is worth remembering that the presentation of actions in the current work does not exhaust all possibilities for improving the performance of SIGRH (and other systems and routines of the DGDP). However, this work can serve as a basis for the formulation of other proposals, for other areas of interest, and at the discretion of the organization.

As limitations of the research, the short time for execution as well as the low number of respondents (relative to the total number of users) should be highlighted.

Recommendations for future research involve the subsequent application of the HoQ tool on a larger scale, considering the entire DGDP (and not just the management team selected for this work), monitoring the implemented action plans, and encouraging users to improve technological tools as a continuous and systemic management process.

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