

# Financial accounting information presented with infographics: does it improve financial reporting understandability?

Accounting understandability and infographics

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Received 29 November 2021  
Revised 23 February 2022  
19 April 2022  
14 June 2022  
Accepted 1 July 2022

## Abstract

**Purpose** – Governmental financial reporting is prepared for accountability and decision-making purposes and is directed to a wide range of users, including citizens. However, this may sound easier than it actually is as citizens without specific accounting knowledge may find it difficult to understand the financial information prepared by governments. The study analyzes citizens' perceptions toward infographics as well as their ability to improve accounting understandability by nonaccounting experts compared to the traditional financial statements.

**Design/methodology/approach** – The paper presents the results of an exploratory analysis conducted with the participation of a group of citizens in three European countries through a questionnaire.

**Findings** – The results show that infographics improve accounting understandability by nonaccounting experts compared to the traditional financial statements. However, infographics alone are not enough to succeed in making nonaccounting literate citizens experts in fully understanding accounting information.

**Originality/value** – The novelty of the research consists in its ability to give voice to citizens' preferences regarding the way the financial information is presented, which has been largely neglected by previous studies. In parallel, it analyzes the effect of accounting knowledge on accounting understandability. Moreover, it is the first study that analyzes the use of infographics in public sector financial reporting.

**Keywords** Accounting understandability, Citizens' needs, Governmental financial reporting, Infographics

**Paper type** Research paper

## Introduction

While governmental financial reporting is considered a suitable medium for public sector organizations to discharge accountability (Ryan *et al.*, 2002), financial reports – due to their

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The research was partly supported by the facilities available at the Interdisciplinary Laboratory in Accounting Studies, Financial Management, and Economic and Financial Law and the Business Informatics Laboratory (BILab), both at the Athens University of Economics & Business, Greece.



Journal of Public Budgeting,  
Accounting & Financial  
Management  
Vol. 34 No. 6, 2022  
pp. 263-295  
Emerald Publishing Limited  
1096-3367

DOI 10.1108/JPBAFM-11-2021-0163

technical nature – make it difficult for people without specific accounting knowledge to understand them (Cohen and Karatzimas, 2017). Recent literature analyzes whether alternative presentation formats (Langella *et al.*, 2021), the inclusion of explanations and illustrations (van Helden and Reichard, 2019) or a comprehensive management report and analysis (Stalebrink, 2019) would alleviate such difficulties. In parallel, simplified financial reports addressing citizens, the popular financial reports, have been proposed as an alternative way to meet citizens' financial information needs. A simplified citizens-centered report, easily accessible on the website of local governments to gain citizens' engagement in decision-making processes, could become the tool to facilitate a dialogue, increasing the opportunities for civic participation and public engagement (Biancone *et al.*, 2016; Meng *et al.*, 2019; Stanley *et al.*, 2008; Metallo *et al.*, 2020; Manes-Rossi *et al.*, 2019).

It is therefore rather clear that there is a need to provide financial accounting information for citizens differently compared to other user groups to meet the accountability goals toward this specific group of stakeholders. Our paper aims at unraveling the importance of an adequate presentation format for accountability to citizens (Samkin and Schneider, 2010; van Helden and Reichard, 2019). In this paper, we follow an innovative stance, and we analyze whether infographics would be a suitable presentation format. More specifically, we examine the views of citizens on the use of infographics as a means to present financial accounting information and we test whether infographics would enhance financial information understandability compared to traditional financial statement formats.

By using financial data of a hypothetical local government for two successive years, we analyze the views of a sample of citizens from three European countries (Greece, Italy and Spain), with ranging accounting knowledge, on a set of financial statements presented in two different formats (traditional presentation and infographics), as well as their understanding toward disclosed accounting information.

Our results provide corroborative evidence that citizens prefer infographics to traditional financial statements. These findings support the need for the adoption of simplified language and format in reporting addressed to citizens with important implications for popular reporting (Stanley *et al.*, 2008; Biancone *et al.*, 2016; Manes-Rossi *et al.*, 2019).

However, our findings unravel that the infographics, albeit being acknowledged as a more attractive format of communicating accounting information by citizens and as a means to increase the perception of citizens regarding their understanding of accounting numbers (perceived understanding), do not affect their actual understanding of the financial information (i.e. the ability to provide correct answers that relate to accounting data). This provides evidence that the notions of accounting are more profound and the mere presentation of information in a more easily digested way does not improve, in essence, the understandability of accounting information. This finding has important policy implications for users' accounting literacy.

The paper presents an exploratory research conducted among samples of citizens in three European countries that share similarities in the use of accrual accounting, administrative systems and citizen accountability orientation (Bastida *et al.*, 2022). The novelty of the research consists in its ability to give voice to citizens' preferences regarding the way financial information, related to both financial performance and financial condition, is presented. In parallel, it analyses the effect of accounting knowledge on the understandability of financial information under different presentation formats. Moreover, it is the first study that analyses the use of infographics in public sector financial reporting.

The research offers interesting implications for theory and practice by suggesting future research avenues and inviting policymakers to set up policies to improve the accounting literacy of users and to involve citizens in the designing of suitable formats for financial reporting that can enhance the understandability of local government reporting in order to enhance LGs' accountability to citizens.

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The structure of the paper is as follows: The next section presents a synthesis of previous research on the notion of understandability of financial information and the use of infographics in accounting. Section three contains the development of the hypotheses. Section four describes the sample and the methodology used. Section five contains the analysis of the results. Section six offers a discussion of the results. The last section draws some conclusions, highlights the contributions of the research, the limitations and the way forward.

## Literature review

### *Understandability of accounting information by citizens*

There is a consensus in accounting literature that, in the public sector, accounting information should be focused on accountability to stakeholders and decision-making support (IPSASB, J., 2014; GASB, 1987; van Helden and Reichard, 2019; da Silva Nogueira and Jorge, 2017). A broad group of users of accounting information in the public sector has been identified, including managers and politicians, citizens, creditors and lenders, oversight and regulatory boards and media. Thus, accountability to citizens goes hand in hand with the production of accrual-based financial statements (Cohen *et al.*, 2013). This can be even more important in the post-COVID-19 era (Bastida *et al.*, 2022).

Citizens can be considered the most significant group of users in terms of numbers, voting power and financial support provided by paying taxes. Preparing financial information in a language that the average citizen can understand may serve as the first step toward a different role of citizens in local government management (Kloby, 2009). Consequently, understandability has been considered the basic qualitative characteristic to discharge accountability and support citizen interaction with governments. Citizens encounter local governments' accounting information in a structured way through the accounting reports. Thus, understandable information is a prerequisite for financial reporting to be useful for both accountability and decision-making purposes while accessibility in an open format offers users the opportunity to elaborate data in accordance with their information needs (Ruijter *et al.*, 2020). Stalebrink (2019) concludes that well-crafted Management Discussion and Analysis documents are relatively successful in transmitting key information about a government's financial performance to laymen, regardless of their prior exposure to financial statement analysis.

During the last few years, a specific strand of literature has been developed on the need of producing citizen-centric reports (popular reports) that are easily understandable to meet the information needs of citizens (Stanley *et al.*, 2008; Yusuf and Jordan, 2012; Cohen *et al.*, 2017; Manes-Rossi *et al.*, 2019), while other authors call for the use of integrated reporting in the public sector (Päril *et al.*, 2020). The emergence of popular reports is significantly based on the premise that annual reports are not easily understood by people with no accounting background (Lee and Tweedie, 1976) since they find their contents too complex and more detailed than needed (Rezaee and Porter, 1993). This literature suggests that popular reporting can provide financial information in a more comprehensive and concise format in comparison with traditional financial reporting (Biancone *et al.*, 2016; Cohen *et al.*, 2017).

More broadly, van Helden and Reichard (2019) relate the use of accounting information with the usability concept that involves both relevance and understandability. As tensions between the complexity of financial reports prepared with accounting standards and their understandability, clearness and "digestibility" may occur, accounting knowledge is necessary for understanding financial statements (van Helden and Reichard, 2019). Thus, users without accounting skills would need accounting information made easier through, for example, explanations and illustrations to understand (Yusuf and Jordan, 2012). Langella *et al.* (2021) provide evidence that the provision of explanations to clarify obscure technical jargon helps users better understand financial statements.

*The use of visual aids in financial reporting*

The use of graphical information that offers an enhancement to the communication process in a more effective manner, could make accounting data easier to understand. The use of information presentation formats and data visualization (i.e. text, tables, graphics and photographs) is a key issue in accounting when trying to improve understandability and, in turn, informed decision-making (Dilla *et al.*, 2010; Tufte, 2001; Ware, 2012). Research indicates that users with low knowledge of cost accounting, better understand data displayed in graphical formats, whereas tables support the understanding and decisions of more sophisticated users (Cardinaels, 2008). Smith and Taffler (1996) show experimentally that readers can process accounting information more quickly through schematic faces or 'emoicons' than through traditional financial ratios or statistics and relatively unsophisticated users responded well to the schematic faces used as an accounting medium.

The financial information presented in graphs allows readers to focus on the most relevant aspects (Huang *et al.*, 2011). Research in corporate reporting shows that users find graphical information displayed in annual reports very useful as they make financial information more easily understood (Mohd Isa, 2006). Thus, it could be expected that the same holds true for public sector reporting. However, research demonstrating that the same benefits are also evident in relation to public sector financial accounting information is still in its infancy. Langella *et al.* (2021) provide evidence that graphical and visual representations increase financial statements' understandability. However, they also evidence that there is no additional benefit in financial reporting understandability when simultaneously providing both explanations of technical jargon and visual aids. Further research is, therefore, necessary for a better assessment of how and to what extent the use of graphs or visuals enhances understandability of accounting reports.

Infographics are an extension of graphical representations. Infographics are visualizations of data or ideas that combine text data, lists, graphics and other visual elements to transmit complex information quickly and understandably (Smiciklas, 2012). Infographics serve communication goals and focus on grabbing readers' attention. They are often used to convey complicated quantitative and/or qualitative information to users, addressing different stakeholder information needs (Toth, 2013). They break down the massive amount of data into digestible chunks. Infographics can be a powerful visual approach, supporting conceptual understanding because people see with their brains (Smiciklas, 2012).

The use of infographics, as visual representations, is not new. They have been around for centuries in the form of icons, pictures, graphics, maps and other illustrations (Smiciklas, 2012). According to Dunlap and Lowenthal (2016), effective infographics should have specific characteristics such as primarily reliance on visual elements and structure, as opposed to text, to convey content/messages, limited length and inclusion of all important content so that they do not mislead the reader. However, Young and Hinesly (2014) reveal that reading infographics requires time, as does the traditional text, while there might be no significant differences in the understanding of the information for text and infographics (Bracci *et al.*, 2019).

The study of infographics use in accounting literature is very recent and mainly deals with nonpurely financial accounting reporting in the private sector (Malola and Maroun, 2019; Kanbaty *et al.*, 2020).

**Hypotheses**

Following the literature already examined (Lewis, 2012; Kloby, 2009), enhancing the understandability of financial reporting constitutes the first step to allowing citizens to interpret the financial information disclosed in the financial statements of local governments. The layout of popular reports aims to constitute a user-friendly interface which is also achieved by the adoption of visuals. Moreover, the use of visual aids and graphical representations enhances the informativeness of financial reports (Langella *et al.*, 2021). Even

though the use of infographics has not been yet assessed as a means to convey accounting information, studies have shown that visuals are easier to comprehend and, as a consequence, infographics may provide a superior communication tool to text (Young and Hinesly, 2014). Based on the fact that infographics are visualizations that by combining text data, graphics and other visual elements permit the transition of complex information in a quick and understandable manner (Smicklas, 2012), we hypothesize that citizens will prefer them over traditional financial statements. Thus, our first hypothesis is the following:

*H1.* Citizens prefer infographics to traditional accounting reports for the presentation of accounting information.

Understanding requires cognition processes. Williams (2004) has identified two cognitive processing systems: a rational cognitive system, which is analytical and relies on reason as a means of understanding, and an intuitive cognitive system used for visual intelligence. He assumes that visual information can stimulate the complex process of knowing by drawing on perception, memory, imagination, or logic. To analyze accounting information both cognitive energy and time to think are needed. When the information is presented through visual means (e.g. drawings, icons, graphs) some structure has already been performed and the reader does not need to construct new ones. Infographics are designed in such a way that resembles humans' intrinsic method of processing information (Smicklas, 2012). As a result, visual communication bypasses the processing of the accounting data and there is a sense of "intuitively knowing" left.

Thus, the citizens are left with a sensation of understanding. This corresponds to the individuals' self-perception of their understanding and therefore it is subjective (Langella *et al.*, 2021). This sense does not provide a clear, rational-based explanation of how the information was obtained (Williams and Newton, 2009) but information seems to be easier to comprehend and quicker to digest. Therefore, under these conditions, the financial statements may seem more understandable to the users. Nevertheless, this relates to the perceived understanding of the information presented in the financial reports. Based on the above our second hypothesis is defined as follows:

*H2.* Accounting information presented with infographics increases perceived understanding compared to the traditional format.

Still, as infographics are supposed to convey financial information in a more understandable manner (Smicklas, 2012), their use in financial reporting is expected to increase users' actual understanding of the information disclosed. This could be done by presenting complicated quantitative and/or qualitative information to users in an easier way (Toth, 2013). Langella *et al.* (2021) provide evidence that graphical and visual representations, albeit not infographics, increase financial statements' understandability. This dimension, i.e. actual understanding, is objective and is not influenced by individuals' self-perceptions. Our last hypothesis is therefore the following:

*H3.* Accounting information presented with infographics increases actual understanding compared to the traditional format.

## Methodology

### *Research instrument*

In order to assess to what extent citizens prefer infographics to traditional local governments' financial statements and whether infographics compared to traditional financial statements improve citizens' understanding of accounting information, a questionnaire containing the Balance Sheet and the Income Statement of a hypothetical local government for two successive years has been developed. The financial statements were developed using the notions of accrual accounting. Each statement was one page long and it used a simplified

presentation of the financial statements (see [Appendix 1](#)). Then, the information content of the financial statements was transferred into infographics. For the development of infographics, we used the vibrant colors that were used in the analysis of [Courtis \(2004\)](#) and [García-Sánchez and Araújo-Bernardo \(2020\)](#). In the visual process, color is an emotional part ([Curtiss, 1987](#)) and is also a pleasing feature in visual presentations ([Detenber et al., 2000](#)). Our infographics are mainly annotated charts, incorporating the perceived quantitative reliability of graphs to facilitate the communication of numerical data and to present time trends. They also included nonnumerical information in the form of explanations allowing, therefore, a unique text and visuals combination (see [Appendix 2](#)).

As the nature of the study is exploratory, the size of the instrument had to be rather small to keep a balance between covering a wide range of questions and having respondents committed to its completion. The questionnaire had two different parts: the first one with traditional financial statements and the second one with the same financial information presented with infographics. Each part had the same questions grouped into two sets. The questionnaire was web-based and could be answered on all electronic devices, smartphones included (see [Appendix 3](#)). Both the reports and the infographics were downloadable and printable.

To avoid bias in question answering (as infographics might be more attractive), the respondents were first asked to access the financial statements developed using the traditional format and answer two sets of questions. The first set of questions included eight questions referring to specific accounting information and assessments based on the information disclosed in the financial statements (e.g. was the local government more indebted in year  $X$  compared to year  $X+1$ ?). Respondents were not advised whether they should look into the Balance Sheet or the Income Statement to answer the questions. Answering these questions would disclose the level of actual understanding of the accounting information. For these questions, there was only one correct answer. Nonetheless, respondents had the option to answer that they did not know, i.e. they could not find the answer in the reports. Therefore, this first set of questions provided data to test [H2](#). The second set was about the characteristics of these reports in terms of information presentation (Q1), satisfaction with the information disclosed (Q2), speed of information retrieval (Q3), easiness of getting the information (Q4), understandability of the information (Q5) and the appreciation toward a local government that decides to produce this type of financial statements (Q6). This set of questions was based on information quality ([Lee et al., 2002](#)) and financial reporting quality characteristics ([Herath and Albarqi, 2017](#)) and provides data to test [H1](#). The scale was 1 = very low to 5 = very high. Question 5 refers to the understandability of the information and was used to proxy users' perceived understanding of the accounting information.

Then, the respondents were asked to access the financial statements presented through infographics and repeat the same process. It has to be noted that the eight questions which begged for a correct answer regarding the actual understanding of accounting information, while focusing on the same accounting element (e.g. inventory, expenses, etc.) for both the financial statements and the infographics, did not ask for the same figure. Following the aforementioned example, the question would be whether the local government was more indebted in year  $X+1$  compared to year  $X$ . In this way, we expected that the respondents could not rely on their previous given answers in the part of the questionnaire referring to traditional financial statements and they had to study the infographic reports to give a new informed answer.

The sequence of the two sets of questions in the questionnaire was intentional. The respondents had to go through the questions asking for uniquely defined correct answers that would disclose their ability in understanding the accounting information and then make an assessment about their perceived understanding of the information content of the reports (Q5 discussed above). Comparing the correct answers, which discloses actual understanding, with their perceptions of understanding, could provide evidence in relation to [H3](#).

The last part of the questionnaire included demographic information as well as a self-assessment of their accounting knowledge and familiarity with financial statements.

The questionnaire was administrated to three European countries that adopt accrual accounting reporting systems at the local government level. Greece, Italy and Spain fall into the Continental European Napoleonic administrative classification and they do not have a tradition of publishing reports specifically developed for citizens (Bastida *et al.*, 2022). The questionnaire was initially developed in English and it was then translated, pilot tested and administrated into the three national languages (i.e. Greek, Italian and Spanish).

The questionnaire was sent to a wide range of potential respondents, including undergraduate students, graduate students, professionals and colleagues and has been uploaded to the LinkedIn accounts of the researchers. The survey was open from February 2020 to May 2020 [1].

### Sample

The total number of valid responses has been 176. Table 1 shows the descriptive statistics of the participants by country, sex and age.

Table 2 shows the occupation and academic level of participants. It can be seen that more than half of the respondents (about 56.30%) are university undergraduate students. As for the academic level, 20.5% of the respondents have a bachelor's degree and 19.3% have a master's degree. Thus our sample is biased toward more educated people.

Table 3 presents the results of the descriptive analysis regarding both the knowledge of accounting and the familiarity with accounting statements based on the self-assessment of respondents. A significant percentage (39.8%) of the participants acknowledge that they have a medium level of accounting knowledge. In addition, 32.4% of the participants claim that they have a medium level of familiarity with financial statements. The percentage that has very low to low knowledge and familiarity is 17.6 and 23.3% respectively. Thus, the sample seems to encapsulate citizens whose accounting knowledge and familiarity with financial statements fall into a wide range. Further analysis based on a Mann–Whitney test suggests that students (PhD Candidates, postgraduate and undergraduate students) do not

Country			Sex		Age			
Greece <i>N</i> = 73	Italy <i>N</i> = 60	Spain <i>N</i> = 43	Female <i>N</i> = 89	Male <i>N</i> = 87	18–30 <i>N</i> = 126	31–45 <i>N</i> = 19	46–55 <i>N</i> = 23	over 55 <i>N</i> = 8
41.5	34.1	24.4	50.60%	49.40%	71.60%	10.80%	13.10%	4.50%

**Note(s):** *N* = 176

**Table 1.**  
Demographic statistics

	Occupation		Academic level		
	Frequency	%	Frequency	%	
Academic	4	2.30	High School	92	52.3
Freelancer	14	8.00	Bachelor's Degree	36	20.5
PhD Candidate	7	4.00	Master's Degree	34	19.3
Postgraduate Student	23	13.10	Ph.D. or higher	14	8.0
Private/Public Employee	25	14.20	Total	176	100
Undergraduate Student	99	56.30			
Other	4	2.30			
Total	176	100			

**Table 2.**  
Occupation and  
academic level of  
participants

have statistically significant differences in terms of accounting knowledge ( $Z$ -score,  $-0.489$ ,  $p$ -value  $0.625$ ) and familiarity with financial statements ( $Z$ -score,  $-0.437$ ,  $p$ -value  $0.662$ ) compared to the rest of the respondents.

**Results**

*Financial statements versus infographics*

The first hypothesis to test is to compare the information presented in financial statements under the typical format with that of infographics to understand participant preferences. Table 4 shows the mean value of each question for both formats. In order to compare the assessments of participants to both presentation formats, a Wilcoxon signed-rank test has been performed. The results are presented in the last column of Table 4. Wilcoxon signed-rank test is a nonparametric test (i.e. it does not assume a normal distribution of the data) that is used to compare two sets of measurements that originate from the same sample to assess whether their population means are different.

Based on the results on the scale of 1 (Very low) to 5 (Very high) the infographics get on average higher values compared to the traditional layout in all the questions. The difference is statistically significant at a 1% level for presentation (Q1), information (Q2), understandability (Q5) and appreciation of the LG that has decided to use this statement presentation (Q6). In other words, citizens are more satisfied with the infographics presenting the financial condition and performance of a local government compared to the traditional financial statements. Moreover, the perceived understanding of the information is higher (Q5) and the difference is statistically significant at a 1% level.

**Table 3.**  
Accounting knowledge and familiarity with financial statements

	Level of accounting knowledge		Familiarity with financial statements	
	Frequency	%	Frequency	%
Very Low	8	4.5	11	6.3
Low	23	13.1	30	17.0
Medium	70	39.8	57	32.4
High	62	35.2	62	35.2
Very High	13	7.4	16	9.1
Total	176	100	176	100

**Table 4.**  
Comparing the views of citizens for traditional financial statements and infographics

	Financial statements		Infographics		Wilcoxon signed-rank test (financial statements vs infographics)	
	Mean	St. Dev.	Mean	St. Dev.	Z-score	Asymp. Sig. (2-Tailed)
Q1. Presentation	3.222	0.8497	3.773	0.9037	-6.904	0.000
Q2. Information	3.205	0.8836	3.710	0.8758	-5.957	0.000
Q3. Speed	3.705	0.9990	3.841	1.0129	-1.418	0.156
Q4. Ease of use	3.750	0.9885	3.903	1.0067	-1.624	0.104
Q5. Understandability	3.665	0.9172	3.960	0.9403	-3.866	0.000
Q6. Appreciation to LG that uses this statement presentation	3.563	0.9112	3.903	0.9543	-4.665	0.000

**Note(s):**  $N = 176$ , The scale is 1 = very low to 5 = very high

However, there is no statistically significant difference in the speed of getting the required information (Q3) or the easiness of doing so (Q4). This finding indicates that to interpret and retrieve accounting information, time and attention need to be devoted, even if the information is presented with infographics. In other words, infographics do not necessarily speed up or simplify the process.

To better understand the potential effect of accounting knowledge and familiarity with accounting statements on financial statements' understandability, speed of retrieving information and easiness of doing so, respondents were split into two subgroups based on their self-assessment regarding accounting knowledge and familiarity with accounting statements. The creation of the two subgroups was decided as the number of participants falling within the five separate sub categories is not homogenous and therefore treating the accounting knowledge and familiarity variable as a continuous variable might not be suitable for statistical analysis. The first subgroup included those who had very low to medium knowledge of accounting and very low to medium familiarity with financial statements and the second subgroup those who would score themselves above average in both dimensions. This resulted in a sample of 91 respondents in the first group and 85 respondents in the second. Mann–Whitney *U* Tests were run to analyze whether the level of accounting knowledge affects users' perceived understanding in these two subsamples (Table 5). The Mann–Whitney *U* test was used since it is suitable for comparing differences between two independent groups (i.e. accounting knowledge and financial familiarity subsamples). This test requires that the dependent variable is either ordinal or continuous, but not normally distributed. These requirements are met in our data. The results show that for the traditional accounting statements, the perceived accounting knowledge has a statistically significant effect on perceived understanding (differences are statistically significant at a 1% level). On the contrary, as for the results for the reports developed through infographics, the level of accounting knowledge does not seem to affect in a statistically significant manner the level of perceived understanding. Thus, the level of perceived understanding when infographics are employed is not related to prior accounting knowledge and financial statements familiarity. Infographics increase perceived understanding for both subgroups. Additional Mann–Whitney *U* Tests (non tabulated) indicate that for those familiar with accounting (i.e. participants with above-average accounting knowledge) the speed of retrieving accounting information under both traditional financial statements and infographics was higher compared to those with up to average accounting knowledge at a statistically significant level of 5%. As for the easiness in retrieving accounting information, while participants with above-average accounting knowledge consider finding financial information in the financial statements easier, the two groups were not different at a statistically significant level of 5%, regarding the easiness of getting information out of

	<i>N</i>	Mann–Whitney <i>U</i> test for financial statements				Mann–Whitney <i>U</i> test for infographics			
		Mean value	Mean rank	<i>Z</i> -score	<i>p</i> -value	Mean value	Mean rank	<i>Z</i> -score	<i>p</i> -value
Participants with low to average accounting knowledge (scale values 1 to 3)	91	3.48	78.80	–2.755	0.006	3.90	84.55	–1.122	0.262
Participants with above average accounting knowledge (scale values 4 to 5)	85	3.86	98.89			4.02	97.72		

**Note(s):** *N* = 176, The scale is 1 = very low to 5 = very high

**Table 5.** Difference in perceived understandability of the statements based on the level of accounting knowledge and familiarity with financial statements

infographics. In other words, both groups consider it, at a statistical significance level of 5%, equally easy to get the necessary information out of infographics.

Based on the analysis, infographics outperform the traditional way of reporting in the way citizens assess their information quality characteristics (H1) and they offer better perceived understanding (H2) that is not affected by the level of accounting knowledge. Thus, our first two hypotheses are supported by the evidence; participants better prefer information presented with infographics compared to the traditional financial statements layout and they seem to believe that they understand them more.

However, accounting is characterized by technicalities. Thus, it is important to assess with an additional test whether the level of understanding had been actually improved (i.e. the actual understanding). In fact, the final aim of providing financial information through infographics is not simply to make information attractive and create the sensation of understandability but to allow citizens to better understand the financial information.

*The actual understanding of financial reporting to assess financial condition and performance*

To test the third hypothesis, namely whether citizens would better understand accounting information presented with infographics compared to the traditional way of reporting, respondents were asked to answer a set of specific questions, as discussed in the methodology section.

Table 6 shows the correct and the wrong answers to each question and their analysis. Respondents have provided wrong answers under both formats. Questions denoted Un\_F refer to the questions related to the financial statements while questions denoted Un\_I refer to infographics. Un\_F and Un\_I are asking for a similar item both in the financial statements and in infographics, being  $n$  the number of the question ( $n = 1$  to 8). We have assigned the value of one (1) to each correct answer and the value of zero (0) to the wrong answers (including those that did not provide an answer at all). Wilcoxon signed-rank test was again performed to compare correct answers under both formats (Table 6).

Contrary to our expectations and the self-assessment views of the participants, infographics did not increase users' actual understanding. In other words, respondents did not provide more correct answers to specific questions by using infographics compared to the traditional financial statements. On the contrary, the information presented via the traditional financial statements seems to be in essence better understood or at least understood at the same level.

To test the validity of the results, we made another comparison. As each correct answer was assigned with the value of one, the maximum grade of a respondent with 100% correct answers in either financial statements or infographics would be eight. By concentrating only on those claiming very low to medium familiarity with accounting and financial statements ( $N = 91$ ), the analysis shows that the average score is 5.51 for financial statements and 5.21 for infographics. The median in both cases is 6. The difference is not statistically significant (not tabulated), indicating that the use of infographics did not end up in a higher number of correct responses and therefore better actual understanding of the accounting information for this subgroup.

Table 7 shows that the level of accounting knowledge affects the actual understanding of the accounting information disclosed both in the financial reports and the infographics in a statistically significant manner at 5 and 10% respectively. Thus, accounting knowledgeable people are privileged compared to all others when reading reports regardless of their format; either traditional ones or those based on infographics. This might be due to the fact that they know at least in what type of report (Balance Sheet or Income Statement) to search in order to find information about LGs' financial condition or financial performance.

Questions assessing understandability	Correct answers	% Correct answers	Wrong answers	% Wrong answers	Mean	Std. Deviation	Z score	Asump Sig. (2-Tailed)
U1_F: Did the total property of the city increase between 2017 and 2018?	109	61.9	67	38.1	0.6193	0.48694	-5.658	0.000
U1_I: Did the total property of the city decrease between 2017 and 2018?	62	35.2	114	64.8	0.3523	0.47904		
U2_F: Is the city more indebted in 2018 compared to 2017?	124	70.5	52	29.5	0.7045	0.45755	-0.714	0.475
U2_I: Is the city less indebted in 2018 compared to 2017?	119	67.6	57	32.4	0.6761	0.46928		
U3_F: Did the city invest in buildings and other infrastructure in 2018?	140	79.5	36	20.5	0.7955	0.40452	-0.555	0.579
U3_I: Did the city have more inventories in year 2018 compared to 2017?	144	81.8	32	18.2	0.8182	0.38680		
U4_F: What was the highest category of revenue for 2018?	156	88.6	20	11.4	0.8864	0.31827	-2.596	0.009
U4_I: What was the lowest category of revenue in 2018?	140	79.5	36	20.5	0.7955	0.40452		
U5_F: What function had the highest cost in 2018?	155	88.1	21	11.9	0.8807	0.32509	-3.773	0.000
U5_I: What function had the lowest cost in 2018?	133	75.6	43	24.4	0.7557	0.43091		
U6_F: Was the financial result of the City improved between the two years?	133	75.6	43	24.4	0.7557	0.43091	-1.089	0.276
U6_I: Was the financial result of the City deteriorated between the two years?	125	71.0	51	29.0	0.7102	0.45495		
U7_F: Which cost categories increased from 2017 to 2018?	59	33.5	117	66.5	0.3352	0.47342	-6.750	0.000
U7_I: Which cost categories increased from 2017 to 2018?	113	64.2	63	35.8	0.6420	0.48077		
U8_F: Did the city's total own revenues increase in 2018 compared to 2017?	136	77.3	40	22.7	0.7727	0.42027	-2.714	0.007
U8_I: Did the city's total own revenues decrease in 2018 compared to 2017?	117	66.5	59	33.5	0.6648	0.47342		

**Note(s):** N = 176. Wrong answers include also the case that the respondent answers that he/she cannot find the answer, or he/she does not know Financial Statements vs Infographics

**Table 6.**  
Actual  
understandability of  
financial condition and  
performance -  
Wilcoxon signed-  
rank test

**Discussion**

Our analysis provides corroborative evidence that users rate infographics better compared to traditional financial statements as a presentation format to convey accounting information. However, in order for infographics to be used as means to enhance accountability, they should also improve the actual understanding of the information disclosed in the financial statements. As for this latter issue, our analysis provides some interesting findings.

First, the level of correct answers to the accounting questions reveals that citizens are able to understand a part of the accounting information relating to the financial performance and financial position of a local government regardless of its format. This implies that citizens are expected to understand, at least, a part of the financial information presented in a simplified way in the popular reports. This result allows us to advance our understanding of the importance for local governments to adopt formats and language while preparing their annual report that can meet the information needs of citizens without specific accounting knowledge.

Secondly, in the assessment of actual understanding of the accounting information presented under the alternative presentation formats, the number of correct answers achieved under both formats is not statistically different in three cases (U2, U3 and U6) while in all other cases but one exception, the traditional way of reporting outperforms infographics in terms of actual understanding at 1% statistical significance level (U1, U4, U5 and U8). Thus, the format of the traditional reports in some parts is clearer than that of infographics. The only case that infographics end up in more correct answers refers to a case where the graphs made it plain which expenses had increased between the two periods (U7). The size of the bars in a comparative form makes it easier to locate the expenses that had increased between two successive years compared to the typical table form of a financial statement. It has to be noted that in infographics expenses are explicitly stated while in the Income Statement they are presented in parallel to the revenues. Thus, the break-down of expenses and the comparative view through graphs seem to be easier to understand. This is in line with the literature (Beattie and Jones, 2001; Harris, 2000) that proposes to introduce graphs, dimensions and colors to underline data trends, changes in performance, or reveal patterns. This finding also supports the conclusions of Langella *et al.* (2021) which state that graphical and visual representations increase citizens' understanding of financial reports.

Thirdly, albeit infographics is a new reporting format, the prior level of accounting knowledge and familiarity still contributes to better understanding of the information. Thus, it seems that infographics do not improve the actual understanding of the financial information for citizens without an accounting background.

**Table 7.** Difference in actual understandability based on the level of accounting knowledge and familiarity with financial statements

	N	Mann-Whitney U test for financial statements				Mann-Whitney U test for infographics			
		Mean value	Mean rank	Z-score	p-value	Mean value	Mean rank	Z-score	p-value
Participants with low to average accounting knowledge (scale values 1 to 3)	91	5.51	80.45	-2.215	0.027	5.21	81.97	-1.797	0.072
Participants with above average accounting knowledge (scale values 4 to 5)	85	6.01	97.12			5.64	95.49		

**Note(s):** N = 176. The maximum score of actual understandability is eight (one point for each correct answer)

Based on the above, the use of infographics does not seem to improve the actual understanding of the financial information by those that do not have adequate accounting knowledge, as prior good accounting knowledge seems to affect reports' understandability at a statistically significant level. Thus, our third hypothesis that infographics could improve users' actual understanding of financial reporting cannot be supported. The scores attained by respondents claiming very low to medium accounting knowledge did not significantly improve nor deteriorated with the use of infographics. The results are in line with those found by [Young and Hinesly \(2014\)](#) when comparing text and infographics for business communication, where there were no differences in the understanding of information between respondents reading text and infographics. However, even though there is no actual improvement in the understanding of accounting information, respondents with up to average accounting knowledge had the *impression* of better understanding. This finding is important in relevance to popular reports, that are addressed to citizens ([Cohen et al., 2017](#); [Biancone et al., 2016](#); [Manes-Rossi et al., 2019](#)). More studies are needed to assess whether citizens understand better the information disclosed in these reports or due to their more user-friendly layout they have the impression of understanding.

## Conclusions

Our study contributes to the literature discussing financial reporting as an accountability medium of LGs to their citizens ([Ryan et al., 2002](#); [van Helden and Reichard, 2019](#)) and pertains to alternative financial reporting presentation formats that could affect financial reporting understandability ([Manes-Rossi et al., 2020](#)). By analyzing the views of a sample of citizens in three countries (namely Greece, Italy and Spain) about the presentation of accounting information through a simplified layout of financial statements and infographics, the study aims at unraveling whether the different presentation formats affect users' comprehension of financial accounting information. In addition, we further elaborated on our findings by taking into account users' accounting knowledge and financial statements familiarity. In this study, we use infographics as a form of visualization, introducing therefore in the public sector reporting research era a visual means not yet studied.

Our study provides corroborative evidence that citizens prefer infographics to traditional financial statements. This provides a significant justification for infographics to be used in alternative reporting formats specifically addressing citizens (e.g. popular reporting).

In fact, the general appreciation of participants is that information presented with infographics is more understandable than that presented with traditional financial statements, which confirms our second hypothesis. Moreover, prior accounting and financial reporting knowledge does not affect the level of perceived understanding of financial information when the presentation format is infographics-based. However, when we move away from just relying on users' self-assessment of accounting information understanding (perceived understanding) and we test their actual understanding regarding the local government's financial condition and performance, based on the information presented in the reports (traditional ones and infographics), we find that the use of infographics does not increase the number of correct answers. On the contrary, in most of the questions, the percentage of correct answers is higher when citizens use the traditional format of financial statements. Thus, infographics albeit being a more attractive format for communicating accounting information do not seem to actually affect accounting understanding. The results support previous literature about the use of infographics for business communications ([Young and Hinesly, 2014](#)), where no significant differences were found between text and infographics in the understanding of the information and the preference for visual tools ([Bracci et al., 2019](#)) as well as the finding of [Langella et al. \(2021\)](#) that no additional benefits in financial statement understanding are achieved by

simultaneously providing both explanations of technical jargon and visual aids. Moreover, respondents that have above average accounting knowledge understand accounting information better than those that have up to average knowledge, regardless of the presentation format, i.e. financial statements or infographics.

The study is not limitations-free. Notwithstanding that this is an exploratory study with a constrained number of participants, the use of questionnaires has inherent limitations related to the diligence given by respondents to its content. But that might be the case when citizens read financial statements from their local government. Users are not expected to devote much time and effort to study these documents unless there is a reason for that. In the same realm, albeit students are a considerable part of our sample we expect that they dealt with the study by adopting a citizens' stance. That is why we did not perform an in-the-class study where students would try to give correct answers as it is likely that they would consider it a form of a test. Moreover, while the infographics used in this exploratory study tried to meet the requirements found in literature about their characteristics, they might not meet the specific information presentation needs of the citizens. In addition, our decision to split the sample into two subgroups based on the respondents' self-assessment regarding accounting knowledge and financial statements familiarity may sound subjective. Future studies could benefit from this limitation and try acknowledging accounting knowledge and familiarity through objective measures. Finally, our sample includes participants that have adequate knowledge of accounting and familiarity with financial statements which might not be representative of the profile of an average citizen-user.

The research, despite the above-mentioned limitations, provides results that have several implications for practice and future research. Firstly, infographics do not seem to be a standalone solution for improving the understandability and subsequently, the usability of accounting information in the public sector (van Helden and Reichard, 2019). Based on the empirical evidence, infographics increase the perception of understanding of the financial numbers, thus making financial data more attractive. Nonetheless, infographics do not increase financial reporting understandability *per se*, except in case they are related to graphs with trends. So, the results confirm that infographics can be useful to understand changes or patterns in data (Beattie and Jones, 2001; Harris, 2000) and the importance of visual appeal to meet citizens' information needs (Yusuf and Jordan, 2012). Consequently, this result can contribute to the literature on popular reporting, to better understand the benefits deriving from the inclusion of infographics in these reports.

As the use of infographics is not enough to increase financial statements' understandability, the need for the design of policies to improve the accounting literacy of users, i.e. supporting them to acquire the skills to read and understand accounting information becomes apparent. Removing technical accounting and financial jargon and using plain language helps but it does not seem to be adequate. Citizens likely need to learn basic public sector accounting notions to be able to efficiently monitor what the local governments report. Citizens' government accounting literacy could be achieved if citizens were infused with a sufficient level of public sector accounting knowledge and comprehension that would enable them to evaluate public administration performance and for assessing the value for money of taxes paid (Karatzimas, 2020).

A third implication for practice is in line with the proposals of van Helden and Reichard (2019) to give voice to different users in the realm of the co-creation of financial information. In order to increase the understandability and usability of accounting information both open-data initiatives (Cohen *et al.*, 2013) and the way accounting data is organized and displayed on the websites of local governments (Meng *et al.*, 2019) are important. Therefore, more studies on alternative ways of presenting accounting information to increase the understandability of financial reporting are needed.

In this realm, we also propose the engagement of citizens in the design of financial documents according to their specific interests and needs which is expected to increase the use of the information. Studying and understanding what better serves citizens' needs (e.g. specific infographics) and involving citizens in the identification of the formats that better convey accounting figures might be a promising way forward in making citizens more participatory. This prospect is even more applicable to the design of the popular reports, which by definition are not confined to the typical layout of financial statements imposed by the accounting reporting standards and could be easily prepared for online disclosure. As citizen involvement in local government matters is highly reliant on informed citizens, studies focusing on presentation formats and content matter for popular reports seem promising. In parallel, ideas on how technology and digitalization could impact and shape public sector financial reporting deserve further analysis. Report narrations based on artificial intelligence or the use of chatbots may be features of future reporting.

#### Note

1. A copy of the questionnaire is available upon request by the authors in all three languages. The English version is available in [Appendix 3](#).

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(The Appendix follows overleaf)

**Appendix 1**

**Balance sheet**

**280**

	2018	2017		2018	2017
Non current assets			<i>Net Assets</i>		
Intangibles	85	100	Capital	30	30
Property Plant and Equipment	92	78	Accumulated surplus/Accumulated loss	13	8
Investments	20	20	Reserves	3	3
Total non-current assets	197	198	<i>Net Assets</i>	46	41
Current assets			<i>Long term liabilities</i>		
Inventories	15	18	Bonds	50	50
Receivables	90	80	Long term Loans	110	120
Cash and Cash equivalents	8	5	Provisions	22	20
Total Current Assets	113	103	<i>Total Long term Liabilities</i>	182	190
			<i>Short term liabilities</i>		
			Short term loans	54	50
			Payables	28	20
			<i>Total Short term liabilities</i>	82	70
Total Assets	310	301	<i>Total Net Assets and Liabilities</i>	310	301

**Income statement by function**

	2018	2017
Revenues from tax and charges	820	800
Revenues from fees	235	250
Subsidies	738	700
Other revenues	8	10
<i>Total revenues</i>	<i>1,801</i>	<i>1,760</i>
General public services	860	850
Public safety	60	70
Education	90	80
Health	50	40
Recreation, culture and sports	80	75
Environment protection	90	80
Infrastructure and Transportation	520	507
Other expenses	25	20
Financial expenses	21	30
<i>Total expenses</i>	<i>1,796</i>	<i>1,752</i>
Net income	5	8

**Income statement by cost category**

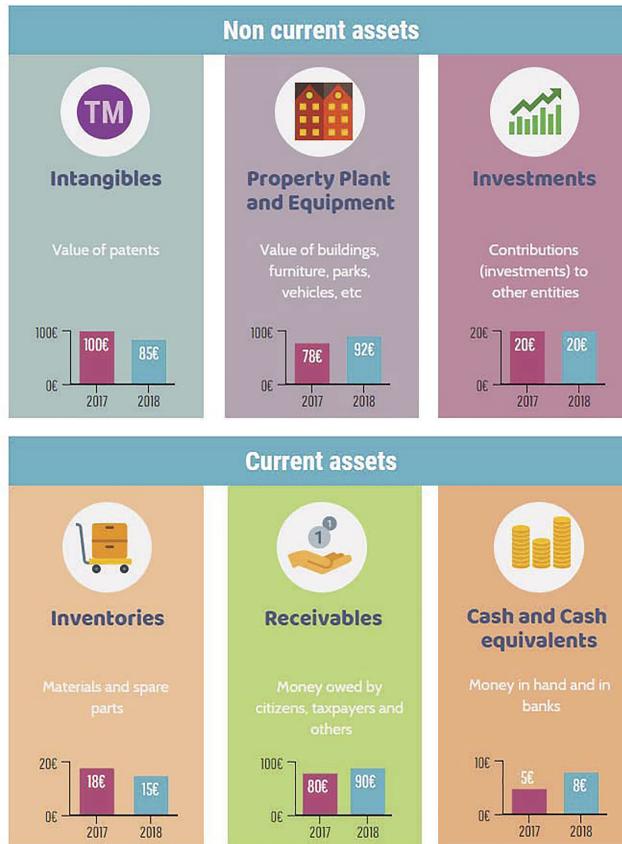
	2018	2017
Revenues from tax and charges	820	800
Revenues from fees	235	250
Subsidies	738	700

(continued)

	2018	2017
Other revenues	8	10
<i>Total revenues</i>	<i>1,801</i>	<i>1,760</i>
Salaries	1,180	1,150
Depreciation	320	300
Materials and supplies used	120	150
Other operating expenses	155	122
Financial expenses	21	30
<i>Total expenses</i>	<i>1,796</i>	<i>1,752</i>
Net Income	5	8

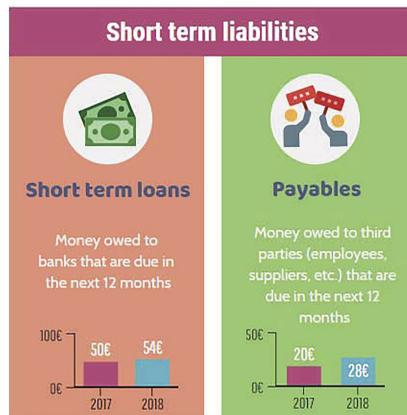
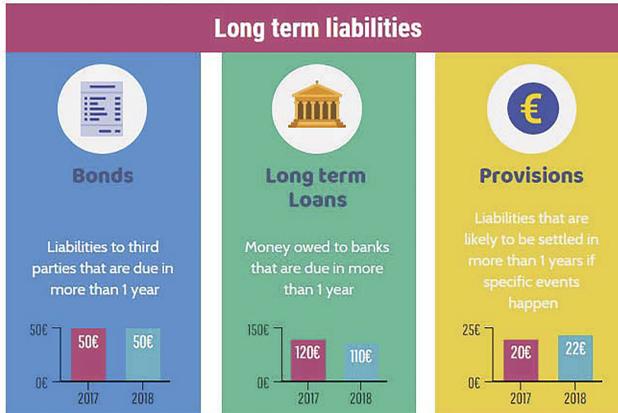


## Balance Sheet Asset elements



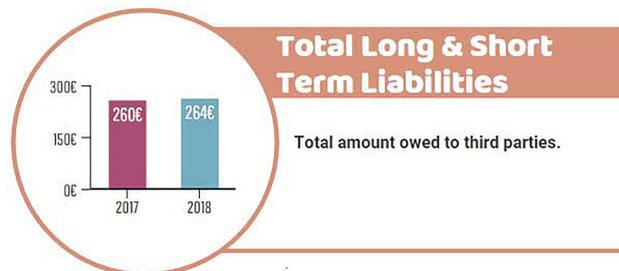
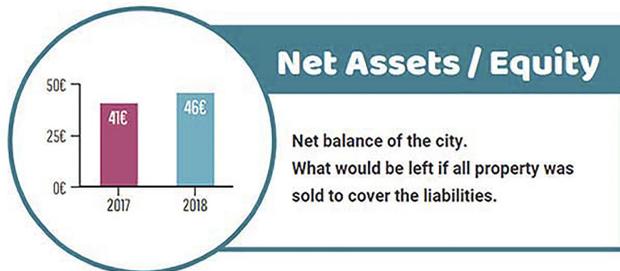
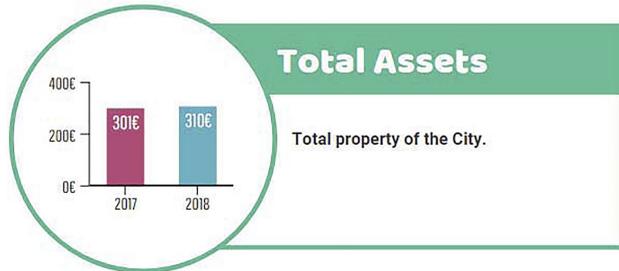


## Balance Sheet Liabilities elements



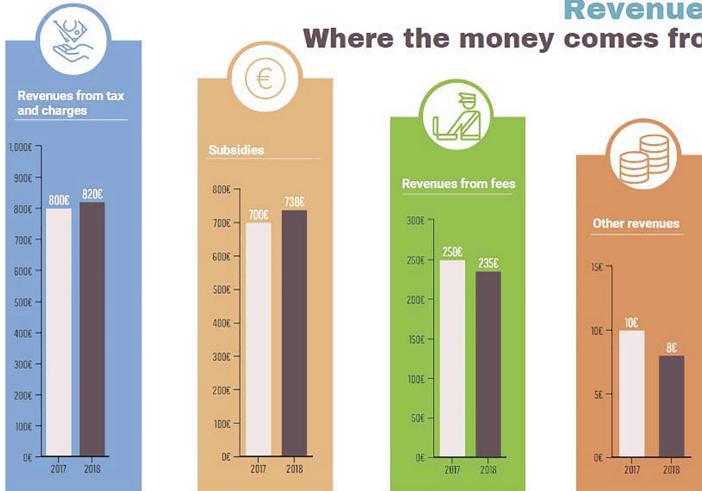


## Balance Sheet TOTALS



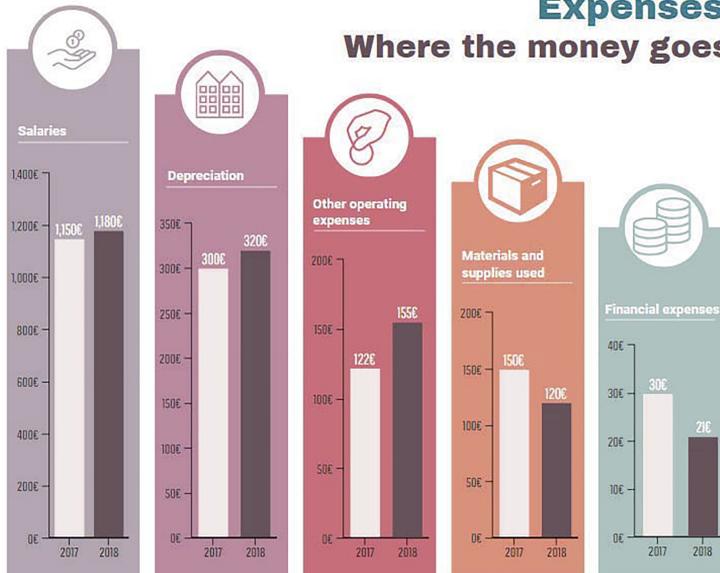
## Revenues:

### Where the money comes from



## Expenses:

### Where the money goes



---

## Accounting Information Presentation Types

Financial Statements

\*Required

Using the financial statements of the City found in the link below, please answer the following questions. You can see the file online, or print it if you prefer.

[https://drive.google.com/open?id=1XpflLtR\\_q7DVE-EHuHUiikt0guEQGle](https://drive.google.com/open?id=1XpflLtR_q7DVE-EHuHUiikt0guEQGle)

1. Did the total property of the City increase from 2017 to 2018? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know

2. Is the City more indebted in 2018 compared to 2017? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know

3. Did the City invest in buildings and other infrastructure in the year 2018? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know
-

4. What was the highest category of revenues for 2018? \*

*Mark only one oval.*

- Revenues from tax and charges
- Revenues from fees
- Subsidies
- Other revenues
- I do not know

5. What function had the highest cost in 2018? \*

*Mark only one oval.*

- General public services
- Public safety
- Education
- Health
- Recreation, culture and sports
- Environment protection
- Infrastructure and Transportation
- Other expenses
- Financial expenses
- I do not know

6. What presentation of expenses do you prefer best? \*

*Mark only one oval.*

- The one presenting the expenses by function
- The one presenting the expenses by expense type
- Both presentations are equally needed
- I am indifferent between the presentation of expenses by function or by expense type.
- I cannot find a report of expenses
-

7. Was the financial performance (i.e. the financial result) of the City improved between the two years? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know

8. Which cost categories increased from 2017 to 2018? \*

*Tick all that apply.*

- Salaries  
 Depreciation  
 Materials and supplies used  
 Other operating expenses  
 Financial expenses  
 I do not know

9. Did the City's total own revenue increase from 2017 to 2018? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know
-

10. Please answer the following questions regarding the use of the financial statements of the City \*

Mark only one oval per row.

	Very low	Low	Medium	High	Very high
How satisfied are you with the financial statements presenting the financial condition of the City?	<input type="radio"/>				
How satisfied are you with the information you found in the financial statements compared to what you would like to find?	<input type="radio"/>				
How quickly did you find the information you were looking for based on the asked questions in the City's financial statements?	<input type="radio"/>				
How easily did you find the information you were looking for based on the asked questions in the City's financial statements?	<input type="radio"/>				
How understandable is the way information is presented in the City's financial statements?	<input type="radio"/>				
How highly would you value this City that uses these financial statements to show its financial condition?	<input type="radio"/>				
To what extent do you find the need for a different representation type for the City's financial condition and performance?	<input type="radio"/>				

Using the financial infographics of the City found in the following link, please answer the following questions. You can see the file online, or print it if you prefer.

<https://drive.google.com/file/d/1qTss89qz0qiqZvAc0FzNZyR9cbLsDBV/view?usp=sharing>

11. Did the total property of the City decrease from 2017 to 2018? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know

12. Is the City less indebted in 2018 compared to 2017? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know

13. Did the City have more inventories in year 2018 compared to 2017? \*

*Mark only one oval.*

- Yes  
 No  
 I do not know

14. What was the lowest category of revenues for 2018? \*

*Mark only one oval.*

- Revenues from tax and charges  
 Revenues from fees  
 Subsidies  
 Other revenues  
 I do not know
-

15. What function had the lowest cost in 2018? \*

*Mark only one oval.*

- General public services
- Public safety
- Education
- Health
- Recreation, culture and sports
- Environment protection
- Infrastructure and Transportation
- Other expenses
- Financial expenses
- I do not know

16. Was the financial performance of the City deteriorated from 2017 to 2018? \*

*Mark only one oval.*

- Yes
- No
- I do not know

17. Which cost categories increased from 2017 to 2018? \*

*Tick all that apply.*

- Salaries
  - Depreciation
  - Materials and supplies used
  - Other operating expenses
  - Financial expenses
  - I do not know
-

18. What presentation of expenses do you prefer best? \*

*Mark only one oval.*

- The one presenting the expenses by function
- The one presenting the expenses by expense type
- Both presentations are equally needed
- I am indifferent between the presentation of expenses by function or by expense type.
- I cannot find a report of expenses

19. Did the City's total own revenue decrease in 2018 compared to 2017? \*

*Mark only one oval.*

- Yes
- No
- I do not know
-

20. Please answer the following questions regarding the use of Infographics of the City \*

Mark only one oval per row.

	Very low	Low	Medium	High	Very high
How satisfied are you with the infographics presenting the financial condition of the City?	<input type="radio"/>				
How satisfied are you with the information you found in the infographics compared to what you would like to find?	<input type="radio"/>				
How quickly did you find the information you were looking for based on the asked questions in the City's infographics?	<input type="radio"/>				
How easily did you find the information you were looking for based on the asked questions in the City's infographics?	<input type="radio"/>				
How understandable is the way information is presented in the City's infographics?	<input type="radio"/>				
How highly would you value this City that uses these infographics to show its financial condition?	<input type="radio"/>				
To what extent do you find the need for a different representation type for the City's financial condition and performance?	<input type="radio"/>				

Demographics

21. Sex \*

Mark only one oval.

- Male  
 Female

22. Occupation \*

*Mark only one oval.*

Undergraduate Student

Postgraduate Student

PhD Candidate

Academic

Freelancer

Public Employee

Private Employee

Other: \_\_\_\_\_

23. Age \*

*Mark only one oval.*

18 - 30

31 - 45

46 - 55

over 55

24. Degree level \*

*Mark only one oval.*

High School

Bachelor's Degree

Master's Degree

Ph.D. or higher

Other: \_\_\_\_\_

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25. Please answer the following \*

*Mark only one oval per row.*

	Very low	Low	Medium	High	Very high
What is the level of your knowledge regarding accounting and finance?	<input type="radio"/>				
How familiar are you with the use of financial statements?	<input type="radio"/>				

Thank you very much for your time!

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