The impact of explanatory factors on a bidimensional model of transparency in Spanish local government

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ABSTRACT

The aim of this paper is to analyse the transparency provided by local public managers and to determine whether this disclosure is limited to the minimum quantity permissible (in accordance with Agency Theory) or whether a maximum amount of information is supplied (following Legitimacy Theory). To do so, we present a Bidimensional Transparency Index (BTI), developed as an instrument for measuring the provision of information (i.e. e-disclosure), which contains two components, breadth and depth, to reflect the pattern of behaviour observed. The results obtained show that on average local managers disclose information corresponding to 60% of the indicators considered, but that only 52% of these indicators of transparency present a moderate or considerable depth of content. These findings reflect a pattern of limited information disclosure, with incomplete information. In addition, our study shows that explanatory factors have an asymmetric impact on the components of the BTI.

KEYWORDS Transparency, E-government, Privatisation, Decentralisation, BTI

1. Introduction

Transparency is viewed as a determining factor in responsible, good governance (Bertot, Jaeger, & Grimes, 2010; Tavares & Da Cruz, 2018). Many studies have addressed this concept, and opinions differ as to which elements should be addressed by it (Kauffmann & Kraay, 2002; Matheson, 2002; Meijer, 2003, 2007; Premchand, 1993) recommending variously that information should be timely and include the economic, social and political fields (Kauffmann & Kraay, 2002), provide a comprehensive, but readily-accessible approach (Da Cruz, Tavares, Marques, Jorge, & de Sousa, 2016), be relevant and disclosed regularly (Matheson, 2002) and constitute a key element in accountability (Meijer, 2003, 2007).

For the purposes of the present study, we agree with the definition proposed by Da Cruz et al., 2016for whom transparency is "the online publicity of all the acts of government and their representatives to provide civil society with relevant information in a complete, timely, and accessible manner". This definition highlights the fact that transparency is now instrumentalised

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through e-government (Alcaide-Muñoz et al., 2018), via web portals that allow great access to information (Armstrong, 2011; Barrutia & Echebarria, 2013; Guillamón, Ríos, Gesuele, & Metallo, 2016; Meijer, 2007). Transparency has been promoted by various regulatory developments. In Spain, Act 19/2013 on Transparency and Access to Public Information, adopted in 2013, set out a series of rules for public entities concerning information disclosure (Alcaide et al., 2017; Garrido-Rodríguez, Zafra-Gómez, & López-Hernández, 2017). However, in addition to regulation, appropriate tools for measuring the level of transparency are needed.

One of the major shortcomings in the literature on transparency is the absence of a suitable model for measuring transparency (Hollyer, Rosendorff, & Vreeland, 2018; Piotrowski & Bertelli, 2010; Tavares & Da Cruz, 2018). This lack of a reliable, operational measure of transparency can be explained by the existence of different theoretical approaches (agency theory and legitimacy theory, among others) to characterise the level of transparency by a public administration and to address and resolve the conflicting interests of public managers and citizens (i.e., the principal-agent problem). In view of these considerations, our first research question arises from an analysis of the main indexes of transparency by public entities (Transparency International, Dyntra and Infoparticipa, among others). Another problematic aspect of the above models is that of the difficulty often encountered in accessing the necessary information. Our analysis highlights the incomplete nature of many current approaches to measuring levels of transparency in public administrations (Da Cruz et al., 2016).

To resolve this perceived gap, as the first major objective in the present study, we propose a new method for measuring transparency, taking into account both the Freedom of Information Act (FOIA) and the theoretical behaviour of public managers regarding information disclosure. This new method is based on a bidimensional transparency index (BTI) that breaks down the level of public information into two dimensions: on the one hand, identifying the level of indicators for which at least a minimal degree of information is supplied (termed breadth), and on the other hand, reflecting, for each of these indicators, the level of completeness or maximum information that is presented and the ease of obtaining this information (termed depth). If public managers followed the postulates of agency theory, it can be argued that only minimal information would be disclosed for each of the indicators. In this case, the municipalities evaluated would present a high value for the breadth component of the BTI. On the contrary, if their behaviour reflected the postulates of legitimacy theory, and the highest possible level of information was disclosed, then the depth component of the BTI would be maximised. The BTI can also be used to consider a second question: whether the factors that influence transparency correspond to the tenets of agency theory or whether public managers disclose information merely to achieve a slight reduction in conflicts of interest with citizens. In the latter case, our model would need to contain more explanatory factors of the breadth component. On the contrary, if the pattern of transparency put into practice the values expressed in legitimacy theory, there would be a greater number of factors related to the depth component, because public managers would be seeking to maximise their disclosure of fully characterised information.

The second major objective addressed in this study is to detect, identify and analyse factors that may influence municipal transparency. Therefore, following our review of the literature, we selected for analysis three blocks of factors that may influence transparency: economic-financial, political and (the main novelty of this study) the effect of the municipality's creation of public

and private entities (autonomous agencies and public companies) or supra-municipal entities (enabling inter-municipal cooperation via consortiums and associations), as well as municipal relations with private companies through privatisation. In this analysis, we consider the impact of these factors on breadth and depth, the two dimensions of the BTI.

The method described above was applied to analyse all Spanish municipalities with >20,000 inhabitants, for the year 2015. The results obtained confirm that information disclosure tends to be incomplete and does not resolve the principal-agent problem highlighted in agency theory, because, on average, information is only published for about 60% of the indicators considered. This information cannot be considered complete, since a moderate or higher level of information (i.e. representing moderate to good depth) is only supplied for 52% of the indicators analysed. In relation to the explanatory factors, the financial indicators better explain municipal information disclosure when the latter is minimal (in accordance with agency theory, reflecting breadth) while the creation of instrumental entities explains both types of models, except for the privatisation of public services, a factor that is associated with the provision of complete information (depth), as is also the case with citizens' participation.

The rest of this paper is structured as follows. Section 2 presents the theoretical framework used and reviews the previous literature in this field. In Section 3, we describe Spanish rules and legislation on information disclosure and introduce the Bidimensional Transparency Index. The following section details the study method applied and the data considered. Finally, we discuss the results obtained and present the main conclusions drawn from this analysis.

2. Theoretical framework and previous studies of transparency

In recent years, the demand for public information has increased considerably (Joseph & Taplin, 2011; Pilcher, Ross, & Joseph, 2008; Scott, 2006). In response, public entities have been obliged to reveal more about their activities and hence become more accountable, which in turn has spurred research interest in these questions (Van de Walle & Cornelissen, 2014).

The level of information disclosed varies, partly because public managers have particular interests, which are sometimes to the detriment of the public interest, as proposed by the theory of financial illusion and by agency theory (Alesina & Perotti, 1996; Buchanan & Wagner, 1977; Campbell, 2004). In this context, many citizens have called for more information to be provided about how politicians manage public affairs, in order to overcome the asymmetry of information between government and society that is highlighted in agency theory (Alcaide Muñoz, Rodríguez Bolívar, & López Hernández, 2017; Gandía & Archidona, 2008; Guillamón, Bastida, & Benito, 2011). If this is achieved, and levels of transparency are raised, then external agents will have succeeded in influencing the behaviour of public managers, in accordance with legitimacy theory (Archel, Husillos, Larrinaga, & Spence, 2009; Patten, 1992; Powell & Di Maggio, 1991; Preston & Post, 1975; Suchman, 1995; Wang, 2002). From this standpoint, to justify public sector management it is not sufficient to reveal a bare minimum of information (Prior et al., 2018); more and higher-quality information must be provided, to enable a profound understanding of every aspect of government performance (Florini, 2007; Harrison & Sayogo, 2014; Macintosh, 2004). Accordingly, complete information must be disclosed so that citizens may be properly equipped to evaluate the actions of public managers (Tajfel & Turner, 2004).

Theoretical models of transparency have evolved to take into account the development of information and communication technologies, which have increased transparency in public administrations (Roberts, 2006; Shim & Eom, 2008; Andersen, 2009; Stamati, Papadopoulos, & Anagnostopoulos, 2015. Indeed, access to internet is widely viewed as a vital resource, underpinning information disclosure by public bodies (Da Cruz et al., 2016; Tolbert & Mossberger, 2006; Welch, Hinnant, & Moon, 2005). In addition, disclosure has been promoted by the generalised adoption of laws regulating transparency and access to public information (Guichot, 2014). Thus, web portals, as instruments for the development of e-government (and hence online information disclosure) (Guillamón et al., 2011; Saraite-Sariene et al., 2018) have become the principal means of disseminating information related to the management of public administrations (Yavuz & Welch, 2014), and municipal administrations play a fundamental role in ensuring the accessibility and sustainability of this relationship with citizens (Barrutia & Echebarria, 2013; Meijer, 2007).

In this context, we present a new method which considers the quantity and the quality of the information supplied, rather than dichotomous indicators that do not provide an exhaustive analysis of the transparency of a municipality. This new method is based on the application of what we term the Bidimensional Transparency Index, as explained in the following section.

3. Bidimensional transparency index and study hypotheses

Society can only form well-grounded opinions on an organisation, activity or level/type of public spending, and thus participate in the actions of public entities, if it has access to the necessary information. Accordingly, new legislation has been adopted worldwide governing transparency and access to public information (Caamaño-Alegre, Lago-Peñas, Reyes-Santias, & Santiago-Boubeta, 2013), both national and international, for example in the 2008 Council of Europe Convention on Access to Official Documents (Treaty No. 205), EU Regulation 1049/2001 and over 100 national laws on transparency and free access to public information (Guillamón et al., 2011). Evidently, the existence of Freedom of Information Acts (FOIAs) influences perceptions of transparency (Relly & Sabharwal, 2009).

On 9 December 2013, the Spanish government adopted Act 19/2013, on transparency and access to public information and good governance, in application of the principle set out in article 105.b) of the Spanish Constitution, which until then had been implemented by article 37 of Act 30/1992, of 26 November, on the legal regime of public administrations and the common administrative procedure, by Act 27/2006, of 18 July, on access to environmental information, among other questions, and by Act 37/2007, of 16 November, on the reuse of public information, together with sectorial regulations that included transparency obligations in the corresponding fields (Guichot, 2014)[2].

The above-mentioned Act 19/2013 increased public sector transparency by imposing active obligations in this respect on all public administrations and entities, recognising access to information as a right, setting out the obligations of good governance that public officials must

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[2] In relation to the requirments to disclose information by the companies with more than the 50% of public participation, with the introduction of the Act 19/2013, the companies of this kind are obligated to disclose the same level of information as the governments. If we focus on privatisation, the obligation to provide information comes from the Act of Public Contracts.

meet and the legal consequences derived from non-compliance, making transparency a major responsibility for all those involved in public service (Garrido-Rodríguez et al., 2017).

From an academic standpoint, various proposals have been made for measuring the performance of web portals, usually by evaluating certain dichotomous indicators and describing the results obtained according to an index of transparency (Da Cruz et al., 2016; Jorge, Sá, Pattaro, & Lourenço, 2011; Lourenço, Sá, Jorge, & Pattaro, 2013; Piotrowski & Bertelli, 2010) (see Table 1). Thus, Jorge et al. (2011) and Lourenço et al. (2013) created transparency indexes based on 13 items evaluating the financial information of Portuguese and Italian municipalities. In this field, too, Piotrowski and Bertelli (2010) evaluated a sample of municipalities in New Jersey (USA), using an index with 35 indicators grouped into three categories. Da Cruz et al. (2016) in collaboration with various public institutions in Portugal, generated an index of transparency for Portuguese municipalities, with 76 indicators in seven dimensions. Finally, Rawlins (2008) designed an index of transparency with 38 indicators, including accountability, secrecy, substantial information and participation, providing a different perspective, in which transparency was measured via aspects other than information disclosure.

Table 1. Main indexes of transparency.
Source: The authors.

Index	Type	Number of indicators	Description	Source
ITA	Practical	80	6 areas and sample of 110 largest municipalities	https://transparencia.org.es/ita-2017/
DYNTRA	Practical	159	Collaboration with citizens	https://www.dyntra.org
Infoparticipa	Practical	41	Mapped, colour-coded representation	http://www.mapainfoparticipa.com
Jorge et al. (2011)	Scientific	13	Financial information	Jorge et al. (2011)
Lourenço et al. (2013)				Lourenço et al. (2013)
Piotrowski and Bertelli (2010)	Scientific	35	3 categories	Piotrowski and Bertelli (2010)
Da Cruz et al. (2016)	Scientific	76	Collaboration with public institutions	Da Cruz et al. (2016)
Rawlins (2008)	Scientific	38	Accountability, secrecy, substantial information and participation	Rawlins (2008)

In addition, from a practical point of view, some organisations have designed indexes to measure municipal transparency according to a series of indicators (see Table 1), on the basis of which transparency rankings have been published (Cuadrado-Ballesteros, 2014). Among these indexes, one of the most widely used at the international level is that provided by Transparency International. This index is composed of 80 indicators grouped into six areas. For Spain, it represents the information supplied by the 110 most populous municipalities in the country (Guillamón et al., 2011). Another index of transparency, which is dynamic and has a more generic scope, is DYNTRA, which has 159 indicators and is devised with the cooperation of citizens (Garrido-Rodríguez et al., 2017). Finally, the Infoparticipa map contains 41 indicators and was proposed by researchers at the Autonomous University of Barcelona. This instrument provides generic information about Spanish cities, representing each one on the map with a specific colour to identify its level of transparency (Molina, 2015).

The development of indexes of transparency is usually subject to limitations, such as the impossibility of analysing the characteristics of the content disclosed (Alonso & García-García, 2014; Garrido-Rodríguez et al., 2017) and the fact that the evaluations made are often derived

from questionnaires completed by the municipal managers involved, which may be subject to response bias (Da Cruz et al., 2016). Finally, in the case of the Transparency International index and in others of this kind, municipalities have prior knowledge of the indicators that are included in the evaluation, and so they can focus on publishing information related to the aspects being evaluated (Alonso & García-García, 2014).

Taking into account these limitations and, in the context of applicable Spanish legislation, we present a new index of transparency, termed the Bidimensional Transparency Index (BTI). This instrument was developed in collaboration with the Chamber of Accounts of Andalusia, which audits compliance with transparency obligations, together with the Andalusian Study Centre Foundation. The BTI is based on a FOIA approach, according to which the local entity responds to the publication of a legal requirement, thus adopting an action-reaction stance. The BTI is different in nature from the index used by Transparency International, the ITA. The latter was created for general information purposes, while the BTI is intended to assist in auditing and to enhance accountability. In fact, the Chamber of Accounts of Andalusia is currently using this method to monitor Spanish municipalities, with respect to their compliance with transparency regulations. Thus, the BTI has a normative implementation, rather than providing general information or seeking to reflect transparency to the population in general.

The main focus of the BTI is to evaluate the information disclosed on municipal websites, according to currently-applicable regulations. It does so by addressing two questions that have not previously been considered. This index contains both specific indicators to measure each of the aspects necessary to comply with the overall objective of transparency, which we term breadth, and also considers the completeness of the information presented, which we term depth (see Fig. 1) (Dawes, 2010; Fernández-Planells, 2016).

Fig. 1. BTI method.
Source: Adapted from Garrido-Rodríguez et al., 2017.
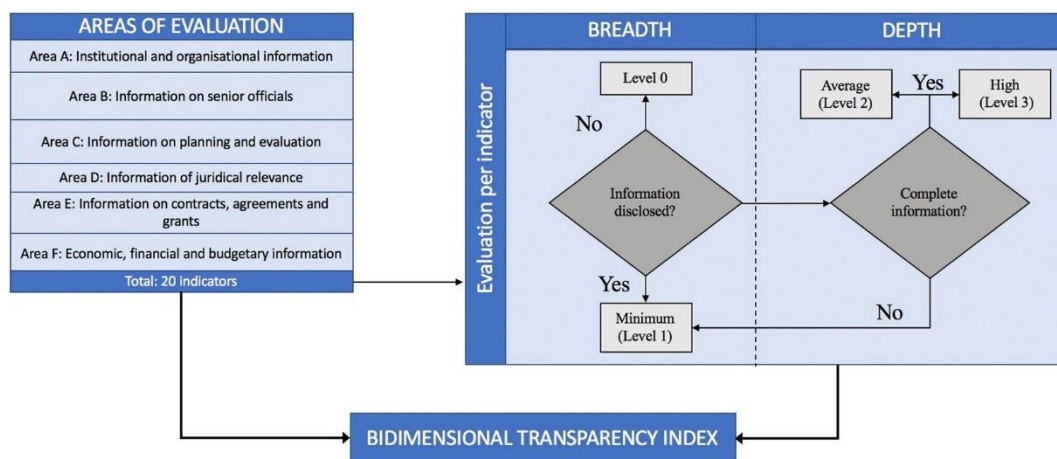
From Act 19/2013 and the areas addressed in this law, we identified 20 indicators for analysis, and established the necessary dimensions of breadth and depth for each one. These indicators are classified as follows:

- Area A: Institutional and organisational information (5 indicators).
- Area B: Information on senior officials (2 indicators).

- Area C: Planning and evaluation (2 indicators).
- Area D: Legal aspects (5 indicators).
- Area E: Contracts, agreements and transfers (4 indicators).
- Area F: Economic, financial and budgetary information (2 indicators).

For each of the proposed indicators, the level of information disclosed is evaluated, first in accordance with its compliance with the criteria set out in Act 19/2013, and second to determine the degree of availability of this information to the user. If no such requirement is met, the indicator is scored 0. As the level of information disclosed increases, so does the score awarded, from 1 for a low level, to 2 for an intermediate level and 3 when access to information is complete, and the level of transparency is maximum (see Fig. 1).

This indicator, incorporating the components of breadth and depth, was developed to reflect the theory of how public managers may behave regarding transparency. According to agency theory, a municipality will disclose information in order to reduce conflicts of interest with citizens (Alcaide Muñoz et al., 2017; Gandía & Archidona, 2008; Guillamón et al., 2011). However, the information provided will not be complete, because public managers do not want citizens to obtain complete information about their management and thus be able to evaluate their performance. Accordingly, in this case the reduction in information asymmetry will be minimal (Archel et al., 2009; Florini, 2007). Therefore, we propose the following hypothesis:

H1. According to agency theory, public managers will disclose minimal information in order to avoid problems arising from their conflict of interests.

On the other hand, according to legitimacy theory (Preston & Post, 1975), the interests of public managers are aligned with those of citizens and so the former will wish to provide complete information in order to corroborate their management performance. This situation will reduce information asymmetries and enable citizens to evaluate the government, thus making them participants in public management (Archel et al., 2009; Florini, 2007; Harrison & Sayogo, 2014; Patten, 1992; Suchman, 1995). This theoretical approach suggests that in order to provide complete information to citizens, i.e. the maximum level of transparency, citizens should be involved in municipal management via instruments such as those related to citizen participation. Accordingly, we propose the following hypothesis:

H2. According to legitimacy theory, public managers will provide complete management information of each action executed, to allow citizens to evaluate their performance.

After designing the above-described method, the following questions arose. Does any factor significantly influence the level of transparency of a municipality? If so, which dimension is most strongly influenced in this sense? To answer these questions, we analysed different factors that may influence transparency, including the influence of different forms of service provision, as explained in Section 4.

4. Explanatory factors of the BTI

Another key objective of our study is to determine the extent to which certain explanatory factors may favour transparency, as diverse factors may influence perceptions of transparency

(Relly and Sabharwal (2009). Taking into account the method used to derive the BTI, we validate these factors by reference to the components of breadth and depth to determine whether they affect both components equally – in line with agency theory – or whether depth is more emphasised, which would support the application of legitimacy theory. The hypotheses argued in this study are introduced in accordance with the latter theory. In this respect, previous studies have analysed financial factors (Albalate, 2013; Alcaide Muñoz et al., 2017; Caamaño-Alegre et al., 2013; Da Costa Carvalho, Camoes, Jorge, & Fernandes, 2007; Guillamón et al., 2011; Justice, Melitski, & Smith, 2006; Rodríguez, Alcaide, & López, 2013), political ones (Albalate, 2013; Gandía & Archidona, 2008; García-Sánchez, Frías-Aceituno, & Rodríguez-Domínguez, 2013; Romolini, Fissi, & Gori, 2015; Saez-Martin, Caba-Perez, & Lopez-Hernandez, 2017; Serrano-Cinca, Rueda-Tomás, & Portillo-Tarragona, 2009) and those related to regulation, the user's level of education and the ease of access to internet (Armstrong, 2011; Bonsón, Torres, Royo, & Flores, 2012; Caba-Pérez, Rodríguez, & López-Hernández, 2014; Garcia-Tabuyo, Sáez-Martín, & Caba-Pérez, 2015; Harrison & Sayogo, 2014). However, little research has been undertaken to determine the relationship between public sector transparency and the presence or absence of instrumental agencies (Cuadrado-Ballesteros, 2014; Grossi & Mussari, 2008).

Beginning with the financial factors, and unlike previous research in this area (Da Costa Carvalho et al., 2007; Gandía & Archidona, 2008; Alcaide et al., 2016), in our approach financial condition is broken down into several indicators, the first of which is short-term solvency, i.e. a municipality's capacity to generate sufficient liquidity to respond to all its short-term debts (Groves, Godsey, & Shulman, 2003). The relationship between this indicator and transparency can be viewed in terms of legitimacy theory. In general, it is understandable that this relationship will be positive if good short-term solvency is considered to lend credibility to public management performance, and therefore managers will wish to increase their level of transparency (Andersen, 2009; Guillamón et al. (2011); Alcaide Muñoz et al., 2017). On the other hand, some municipalities with poor short-term solvency may be providing more services and therefore have greater interest in reporting this situation. In view of these considerations, and following previous research in this area, we propose the following hypothesis:

H3. The greater the short-term solvency of a municipality, the higher its level of transparency.

A similar relationship can be hypothesised with the indicator of budgetary sustainability, i.e. the municipality's ability to maintain, promote and protect the welfare of its population, using the resources at its disposal (Hendrick, 2011). This concept is measured by the non-financial budget result, which is the ratio of non-financial income to non-financial costs. According to previous studies (Alcaide Muñoz et al., 2017; Navarro-Galera, Alcaraz-Quiles, & Ortiz-Rodríguez, 2016; Rodríguez et al., 2013; Serrano-Cinca et al., 2009), when there is a budget surplus, managers will foreseeably devote more effort to improving public transparency. Nevertheless, as with short-term solvency, some municipalities that have a poor record of budget sustainability are sometimes carrying out more activities and therefore have an interest in disclosing this fact. Nevertheless, and in line with Alcaide Muñoz et al. (2017), we propose the following hypothesis:

H4. The higher the level of budget sustainability, the higher the level of transparency.

Another relevant factor is financial dependence, expressed as the proportion of funding obtained via government transfers (Alcaide Muñoz et al., 2017; Geys, Heinemann, & Kalb, 2010). This variable has been analysed in various studies related to the determinants of transparency among local entities (Alcaide Muñoz et al., 2017; Geys et al., 2010; Saez-Martin et al., 2017), in the view that such transfers are subject to control by the issuing body (Copley, 1991; Ingram, 1984). According to legitimacy theory, a municipality that receives this type of funding will need to publish more information than one that does not, in order to demonstrate that it has acted correctly (Ingram & Dejong, 1987). Another viewpoint might be to consider that when a municipality is not financed by transfers, it is funded by borrowing and by tax receipts, which might lead it to make greater efforts in transparency in order to comply with obligations of accountability. In this respect, and following Geys et al. (2010) and Alcaide Muñoz et al. (2017), we propose the following hypothesis:

H5. The greater the proportion of government transfers received, the higher the level of transparency.

Also relevant to the degree of municipal information published is the ideology of the governing party, which may influence policies on information disclosure (Serrano-Cinca et al., 2009). Previous studies have shown that progressive governments usually disclose more information than conservative ones (Albalate, 2013; García-Sánchez et al., 2013), and therefore we propose the following hypothesis:

H6. A municipality with a progressive government will provide a higher level of transparency than one with a conservative government.

According to Florini (2007), citizens can only form a proper opinion of the municipality if they are adequately informed about its organisation, activities and public expenditure. Moreover, participation in public decision making is another crucial factor with respect to transparency, as its presence helps prevent corruption (Benito et al., 2018) and enhances confidence in the government (Reylea, 2009). Therefore, and in accordance with legitimacy theory, when citizens play an active role in decision-making in public affairs, local entities will disclose more and better quality information (Archel et al., 2009; Florini, 2007; Harrison & Sayogo, 2014; Patten, 1992; Suchman, 1995), and so we propose the following hypothesis:

H7. The higher the level of public participation in municipal decision making, the higher the level of transparency.

Another important aspect of this question is that public services may be provided through different forms of management. Our analysis focuses on three forms of service provision: privatisation, inter-municipal cooperation and the creation of public and mixed companies (Máñez, Pérez-López, Prior, & Zafra-Gómez, 2016; Pérez-López, Prior, & Zafra-Gómez, 2015; Pérez-López, Prior, & Zafra-Gómez, 2018; Pérez-López, Prior, Zafra-Gómez, & Plata-Díaz, 2016).

In recent years, many municipalities have resorted to privatisation, i.e. the provision of public services by a private company, which thereby obtains residual profits (Vickers & Yarrow, 1991;

Warner & Bel, 2008). Although the introduction of private companies into the sphere of public management may reduce transparency in terms of interest conflicts or corruption (González, Gascó, & Llopis, 2011; Pessoa, 2009), according to legitimacy theory, when contracts are signed with private companies for the provision of public services, higher levels of public information will be provided (Grossi & Mussari, 2008).

Another possibility is for public services to be jointly provided by several municipalities, through the creation of associations or consortia. Such supramunicipal entities are included in the concept of inter-municipal cooperation (Warner & Hefetz, 2008). Under legitimacy theory, it is assumed that the more entities of this type that are created, the higher the level of municipal information that will be disclosed. Public services may also be provided via the creation of joint-venture companies, which presents an alternative to direct public provision by the municipality and to outright privatisation (Bel & Fageda, 2010; Marra, 2007; Warner & Hefetz, 2008). In this case, the municipality participates in the business, normally by exercising control of a new entity, which may be public (as an autonomous body or public company) or private, in which a large proportion of the share capital is held by the municipality (Da Cruz & Marques, 2012). Some authors believe that the creation of these companies is often related to individual interests (Du Gay, 2000; Van de Walle & Hammerschmid, 2011) while others argue that they tend to seek short-term results (Meyer-Sahling, 2009). However, according to legitimacy theory, when there is more such joint provision of local public services, the level of transparency will be higher. In accordance with these considerations and taking into account the results of Cuadrado-Ballesteros (2014), the following hypotheses are proposed:

H8. According to legitimacy theory, the decentralisation of public services through alternative forms of management has a significant influence on the level of transparency. a: The presence of inter-municipal cooperation will significantly increase levels of transparency. b: The creation of companies by the municipality will significantly increase levels of transparency. c: Privatisation will significantly increase levels of transparency.

These hypotheses are summarised in Fig. 2, and associated with the BTI in Table 2.

Fig. 2. Hypotheses and transparency.
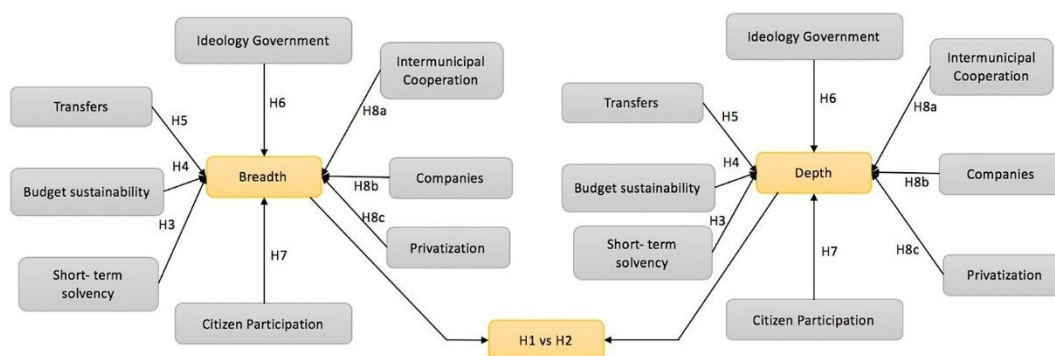Source: The authors.

Table 2. Hypotheses testing each element of the bidimensional matrix, in terms of breadth and depth.

Source: The authors.

Hypothesis	Factor	Expected effect on breadth	Expected effect on depth
H1 vs H2	Breadth vs Depth	Breadth > Depth, Agency theory prevails	Depth > Breadth, Legitimacy theory prevails
H3	Short-term solvency	Positive	Positive
H4	Budget sustainability	Positive	Positive
H5	Transfers	Positive	Positive
H6	Government ideology	Positive	Positive
H7	Participation	Positive	Positive
H8a	Intermunicipal cooperation	Positive	Positive
H8b	Public and mixed companies	Positive	Positive
H8c	Privatisation	Positive	Positive

5. Data and study method

To address the first study goal, the BTI was determined for 395 Spanish municipalities, each with >20,000 inhabitants. This criterion was applied because larger municipalities usually have more qualified staff and a larger budget for the dissemination of public information (Navarro, Alcaraz, & Ortiz, 2010). To our knowledge, this is the first study to focus on medium-sized and large municipalities, as most previous research in this field has addressed only the 110 Spanish municipalities included in the Transparency International index.

For our second key objective, a Tobit regression was performed (Tobin, 1958), taking into account that the levels of transparency in this study are censored between 0 and 100, i.e. they are subject to floor and ceiling effects. Table 3 shows the variables used and Table 4, the descriptive statistics included.

Table 3. Study variables.

Source: The authors.

Variable		Description	Source
Short-term solvency	*Liquidity Index*	Ratio of liquid funds to financial obligations	Directorate General for Financial
Financial dependence	*Financial dependence index*	Ratio of government transfers to total income	Coordination with Regional and Local Authorities (DGCFCAEL, Ministry of
Budgetary sustainability	*Index of non-financial budget result*	Non-financial current budgetary receivables and non-financial capital budgetary receivables divided by current budgetary payables and non- financial capital budgetary payables	Finance and Public Administration)
Political ideology		Dummy variable that takes the value of 0 if the municipal government has a conservative ideology and a value of 1 if it is progressive	Ministry of the Interior
Intermunicipal cooperation		Number of intermunicipal cooperation agreements entered into	Ministry of Finance and Public
Privatisation		Number of privatisation operations performed	Administration
Companies		Number of public companies, joint ventures and autonomous organisations formed	
Citizen participation		Dummy variable that takes the value 1 if the municipal website presents mechanisms for participation and 0 otherwise	The authors

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6. Results

In order to analyse the BTI results obtained from this evaluation of the 395 municipalities of the sample, the transparency results are represented graphically, showing the two BTI components of breadth and depth, to create the bidimensional transparency matrix (Fig. 3), in which the breadth is shown on the horizontal axis (depicting the proportion of indicators containing any level of information per indicator, although it does not show complete information, i.e., level 1[3]), and the depth is shown on the vertical axis (depicting the proportion of indicators that contain information additional to the minimum level of information, i.e., levels 2 and 33[4]).

Table 4. Descriptive statistics.

Source: The authors.

Variable	Obs	Mean	S.D.	Min	Max
Citizen participation	395	0.557	0.497	0	1
Political ideology	395	0.299	0.458	0	1
Short-term solvency	395	1.386	2.123	−9.104	20.713
Financial dependence	395	0.339	0.170	0.076	1.980
Budget sustainability	395	1.143	0.125	0.600	1.566
Intermunicipal cooperation	395	4.324	3.269	0	39
Privatisations	395	2.051	2.620	0	21
Companies	395	3.380	3.656	0	25

Fig. 3. Bidimensional transparency matrix.

Source: The authors.
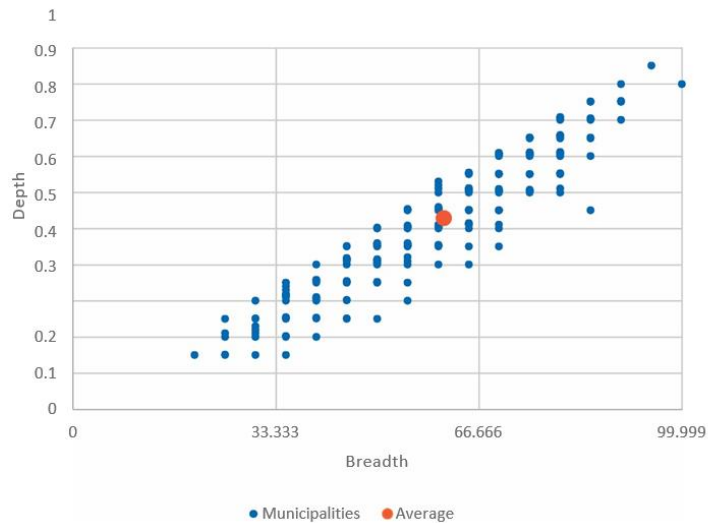
As can be seen, on average the breadth result indicates that the municipalities disclose information on 60% of the indicators; the average depth is 52%, meaning that 52% of these 60% of the indicators present information at levels 2 or 3. These values suggest that the information published by municipalities is more likely to be minimal than complete. Indeed, over the sample

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[3] For example, when a municipality has a breadth parameter of 80%, this means it provides a minimum of information in 80% of the indicators.

[4] For example, if the previous municipality has a depth parameter of 60%, this means that 60% of the above 80% of the indicators present a moderate-high level of information.

of 395 municipalities analysed, only 4% presented complete information (i.e. achieving breadth and depth scopes of close to 100).

These values were then used to test our study hypotheses 1 and 2. To do so, we examined whether the distributions of breadth and depth were similar, using the Wilcoxon signed-rank test (see Table 5), in which the null hypothesis is the equality of the means of both dimensions. In fact, the mean value of the breadth was found to be significantly greater than that of the depth and so we reject the null hypothesis of equality of the mean values of breadth and depth.

Table 5. Wilcoxon test.
Source: The authors.

	Negative ranks			Positive ranks			Equal ranks			Statistics	
	N	Mean rank	Sum of ranks	N	Mean rank	Sum of ranks	N	Mean rank	Sum of ranks	Z	p-Value
Depth-Breadth	332	166.50	55,278.00	0	0.00	0.00	63			−16.045	0.000

Traditionally, in order to test whether two distributions are significantly different, the value used is either the t-value for related parametric samples or the Wilcoxon value for nonrelated nonparametric samples. However, there exists an alternative to these tests (based on mean values), which refers to the notion of global distance, or closeness, between two densities f(x) and g(x), via their integrated square error (Pagan & Ullah, 1999). The method used to determine whether there exist significant differences, following Pastor and Tortosa-Ausina (2008) and Balaguer-Coll and Prior (2009), is based on Li (1996), which measures the distance between the two density functions using the integrated square error of these functions (Zafra-Gómez, Antonio, & Muñiz, 2010: 621).

Fig. 4 shows the main density functions obtained from the comparison of distributions. On comparing the distribution of the breadth and depth (to test hypotheses 1 and 2), it is evident that the two options present different shapes. While for the depth (dotted line), the concentration of the probability mass lies more towards the left, the breadth (solid line) presents a corresponding concentration towards the right. Furthermore, the breadth reaches higher values than the depth.

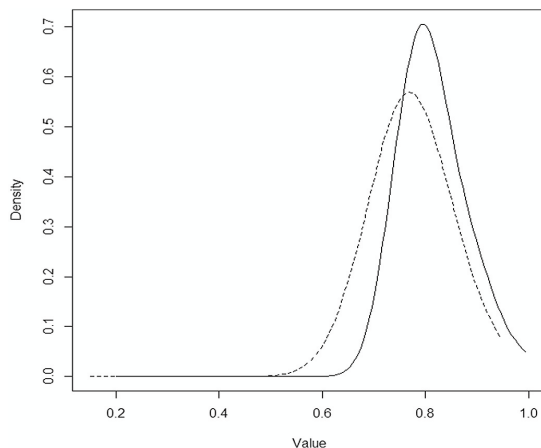**Fig. 4. Density functions.**
Source: The authors.

Table 6 shows the results of the Li test used to compare the two density functions. The results, for the distribution as a whole, confirm those of the Wilcoxon test, in that breadth and depth present different patterns of behaviour.

Table 6. Li test.
Source: The authors.

Li test	T	p-Value
H_1 vs H_2: Breadth and depth of transparency	8.470	0.000

The above results confirm that the average values for breadth are greater than those for depth, and so hypothesis 1 is accepted; on average, the municipalities in our sample disclose information about a majority of the indicators but with a low level of transparency in each case. Thus, we conclude that the pattern of transparency adopted tends to fit agency theory (H1) better than legitimacy theory (H2).

To consider our second main objective, we next tested the other hypotheses proposed (H, H, H, H, H, H), on the factors that may explain the disclosure of the breadth and depth components of the BTI, using Tobit regression. We also analysed the impact of these factors on each of the areas addressed by Spanish legislation on transparency.

Table 7. Analysis of breadth.
Source: The authors.

Variable	Total	Area A	Area B	Area C	Area D	Area E	Area F
Short-term solvency	0.729*	0.829	0.715***	0.094	0.423	0.915	0.482
	(0.414)	(0.569)	(0.098)	(0.622)	(0.370)	(0.657)	(0.866)
Budget sustainability	−16.390***	−20.023**	−4.533***	−21.303**	−9.571	−22.968**	−5.143
	(5.983)	(8.332)	(0.508)	(10.444)	(7.673)	(10.869)	(13.123)
Financial dependence	−0.166**	−0.290	−0.715**	−0.770**	−0.449	−0.278**	−0.331**
	(0.063)	(0.330)	(0.348)	(0.343)	(0.062)	(0.138)	(0.148)
Political ideology	−0.423	−0.696	0.588	4.539*	0.788	0.170	−0.735
	(1.587)	(2.087)	(0.420)	(2.732)	(1.924)	(2.729)	(3.120)
Citizen participation	7.626	6.252	12.146	13.836	4.878	8.190	10.782
	(1.519)	(1.899)	(4.301)	(2.528)	(1.802)	(2.520)	(3.468)
Intermunicipal cooperation	0.773***	0.643**	−0.134*	1.631***	0.956***	1.012***	0.558
	(0.255)	(0.290)	(0.075)	(0.524)	(0.337)	(0.343)	(0.417)
Companies	0.688***	0.871**	0.724***	0.982*	0.499	1.686***	1.959***
	(0.261)	(0.357)	(0.085)	(0.538)	(0.391)	(0.455)	(0.562)
Privatisations	2.209	3.268**	4.642***	4.133	3.574**	3.406*	1.511
	(1.155)	(1.375)	(0.335)	(2.926)	(1.674)	(1.982)	(2.690)
Pseudo R^2	0.0389	0.0173	0.0084	0.2665	0.0191	0.0127	0.0395

*** < 0.01; ** < 0.05; * < 0.1.

Short-term solvency was not found to be a significant variable in transparency (see BTI, Table 9), nor it is a significant factor in the intention to disclose complete information (see results for depth, Table 8), although it is a determining factor in a municipality's decision to disclose a broad array of information (see Table 7), especially as concerns area B, Information on senior officials. This implies that when financial magnitudes refer to positive short-term situations, these municipalities will disclose basic (incomplete) information. Therefore, hypothesis 3, based on the postulates of agency theory, is partially accepted.

Our analysis of budgetary sustainability shows that when a municipality has a budget surplus, the level of transparency tends to decrease, and vice versa (see BTI, Table 9). This finding is particularly significant in the areas of institutional and organisational information (area A), information on senior officials (area B) and information on planning and evaluation (area C). On breaking down the BTI, we see that this behaviour is mainly associated with the breadth component (see Table 7), where the same inverse relationship is found, especially in the areas of information on planning and evaluation (area C) and on contracts, agreements and transfers (area E), while no significant pattern of behaviour is apparent for the depth component. The latter, therefore, is not an explanatory factor with respect to the provision of more complete information (see Table 8). Accordingly, hypothesis 4 must be rejected. This result is contrary to those obtained by Serrano-Cinca et al. (2009), Caamaño-Alegre et al. (2013) and Alcaide Muñoz et al. (2017).

Table 8. Analysis of depth.
Source: The authors

Variable	Total	Area A	Area B	Area C	Area D	Area E	Area F
Short-term solvency	−0.166	−0.485	1.070	1.021	0.160	−0.822	−0.536
	(0.349)	(0.413)	(1.931)	(1.975)	(0.191)	(1.064)	(1.425)
Budget sustainability	−2.194	0.264	−56.932*	−45.466	6.984	−0.374	−23.283
	(5.198)	(5.421)	(31.548)	(37.567)	(9.299)	(15.491)	(17.505)
Financial dependence	−0.640	−0.875*	−0.827***	−0.163	−0.156*	−0.828	−0.484
	(0.450)	(0.051)	(0.168)	(0.011)	(0.093)	(0.078)	(0.105)
Political ideology	1.536	3.768***	−2.833	9.048	−0.488	1.428	5.047
	(1.191)	(1.364)	(7.672)	(9.083)	(1.811)	(3.296)	(4.050)
Citizen participation	1.782**	2.971**	14.476**	24.709***	2.250	−3.624	10.816***
	(1.110)	(1.364)	(7.203)	(8.807)	(1.769)	(3.235)	(4.081)
Intermunicipal cooperation	0.351**	0.120	2.166**	2.983**	0.227	0.601*	1.176**
	(0.149)	(0.190)	(1.056)	(1.468)	(0.194)	(0.362)	(0.507)
Companies	0.594***	0.674**	1.141	7.251***	−0.294	−0.398	−0.353
	(0.207)	(0.276)	(1.181)	(1.346)	(0.310)	(0.557)	(0.699)
Privatisations	3.688***	1.970**	13.016**	16.819***	0.998	6.142***	4.703*
	(0.840)	(0.808)	(5.124)	(5.872)	(1.201)	(2.083)	(2.531)
Pseudo R^2	0.0132	0.0099	0.0064	0.0209	0.0018	0.0022	0.0114

*** < 0.01; ** < 0.05; * < 0.1.

As the level of financial dependence increases, transparency decreases (see BTI, Table 9), an effect that is especially significant in the areas of information on senior officials (area B) and on planning and evaluation (area C). This implies that when a municipality obtains most of its funding through transfers from higher levels of government, it provides less transparency. This outcome is determined by the breadth dimension (see Table 7), especially in the area of information on planning and evaluation (area C), because the level of government transfers is not a relevant factor for the depth component (see Table 8). As the influence of this variable is negative, a sign that is contrary to our expectations and to the result of Guillamón et al. (2011), hypothesis 5 must be rejected.

Table 9. Tobit analysis for the BTI.
Source: The authors

Variable	Total	Area A	Area B	Area C	Area D	Area E	Area F
Short-term solvency	0.581	0.726	0.997	0401	0.547	0.837	0.172
	(0.580)	(0.465)	(1.141)	(0.571)	(0.377)	(0.813)	(1.230)
Budget sustainability	−14.662**	−16.860**	−33.161*	−14.675*	−5.085	−13.925	−16.650
	(6.223)	(7.246)	(17.927)	(7.825)	(8.443)	(9.313)	(13.592)
Financial dependence	−0.193***	−0.431	−0.443**	−0.271***	−0.147	−0.134*	−0.267**
	(0.069)	(0.046)	(0.176)	(0.099)	(0.091)	(0.082)	(0.128)
Political ideology	1.406	1.816	−1.061	3.287	0.630	0.697	3.294
	(1.632)	(1.809)	(4.394)	(2.113)	(1.976)	(2.367)	(3.645)
Citizen participation	7.907***	7.297***	11.148***	11.467***	4.628***	5.886***	11.639***
	(1.549)	(1.660)	(4.164)	(2.113)	(1.784)	(2.243)	(3.549)
Intermunicipal cooperation	0.934***	0.544**	0.995*	1.430***	0.875***	0.872**	1.388***
	(0.316)	(0.266)	(0.638)	(0.553)	(0.289)	(0.355)	(0.529)
Companies	1.024***	1.202***	1.058*	1.981***	0.245	0.744*	1.089*
	(0.271)	(0.308)	(0.719)	(0.374)	(0.405)	(0.451)	(0.643)
Privatisations	5.111***	2.956**	11.158***	6.461***	3.578**	3.986**	4.997*
	(1.170)	(1.152)	(3.400)	(2.058)	(1.705)	(1.758)	(2.627)
Pseudo R^2	0.0271	0.0201	0.0101	0.0312	0.0082	0.0085	0.0089

*** < 0.01; ** < 0.05; * < 0.1.

In relation to the political ideology of the governing party, neither of the models analysed revealed evidence of this factor influencing transparency (see Table 7, Table 8, Table 9), and therefore hypothesis 6 is rejected (although this outcome is contrary to the conclusions drawn by Albalate, 2013, and García-Sánchez et al., 2013).

Regarding citizen participation, the existence of mechanisms that enable citizens to participate actively in public management is associated with higher levels of transparency (see BTI, Table 9), especially in the areas of economic information (area G), information about senior officials (area B) and information on planning (area C). In addition, citizen participation is associated with the disclosure of complete information (see the depth dimension, Table 8), and specifically in the areas of planning (area C) and senior officials (area B), while this indicator is not significant in relation to breadth (Table 7). These results are in line those reported by Harrison and Sayogo (2014). Thus, we confirm that when there exist instruments promoting citizen participation in

public management, the level of transparency tends to be higher and more complete, which confirms hypothesis 7, based on legitimacy theory.

Our analysis of the influence of instrumental entities and of the privatisation option shows that hypothesis 8 must be accepted, since, in general (see Table 9), the creation of municipal entities and relations between the municipality and private companies are associated with greater transparency. Specifically, with regard to inter-municipal cooperation, the influence is positive and significant for all three indices evaluated (breadth, depth and BTI), especially in the area of information on planning and evaluation (area C), and so hypothesis 8a is accepted. Similarly, the creation of agencies has a positive, significant influence on the three indices, especially in the areas of planning and evaluation (area C) and institutional information (area A). Therefore, hypothesis 8b is accepted, a result that is contrary to the findings of Hodge and Greve (2007). Finally, the privatisation of public services presents a positive, significant influence on transparency (see BTI, Table 9), when complete information is published (this indicator is not significant for the breadth dimension, see Table 7), and specifically for the area of information on senior officials (area B). This result contrasts with that obtained in previous studies (Cameron, 2004; Mulgan, 2002), which reported this factor to have a negative influence, although it is in line with Cuadrado-Ballesteros (2014). In conclusion, hypothesis 8c, in accordance with legitimacy theory, is accepted.

In summary, we find that the presence of different forms of management and of relations with private companies is both favourable to higher levels of transparency, although this relationship has different effects on breadth and depth. When entities are created by municipalities, whether through intermunicipal cooperation or through company set-up, the effect is greater on the breadth than on the depth component (the coefficient of intermunicipal cooperation for breadth is 0.773, while for depth it is 0.351; similarly, the coefficient of companies for breadth is 0.688 vs. 0.594 for depth). Therefore, we conclude that agency theory has a greater effect on transparency than legitimacy, for this type of entity. However, when a relationship is established between the public and private entities through a contract (as in privatisation), the municipality is more likely to provide a higher level of complete transparency, in accordance with legitimacy theory.

Table 10. Summary of results.
Source: The authors

Variable	Breadth	Depth	BTI
Short-term solvency	Positive, significant	Non-significant	Non-significant
Budget sustainability	Negative significant	Non-significant	Negative significant
Financial dependence	Negative significant	Non-significant	Negative significant
Political ideology	Non-significant	Non-significant	Non-significant
Citizen participation	Non-significant	Positive, significant	Positive, significant
Intermunicipal cooperation	Positive, significant	Positive, significant	Positive, significant
Companies	Positive, significant	Positive, significant	Positive, significant
Privatisations	Non-significant	Positive, significant	Positive, significant

7. Conclusions and discusión

In recent years, public managers have been under increasing pressure to provide greater transparency, due to increased demand for information by citizens and to stricter rules and

legislation in this respect. In consequence, many municipal governments have created or adapted web portals to facilitate access to public information (Bertot et al., 2010; Gronlund, 2005). To evaluate the provision of information, various organisations have developed indexes to measure the transparency of such web portals. However, all of these indexes present limitations and the quantity and quality of municipal information published remains imperfectly known (Da Cruz et al., 2016).

In this context, we believe it necessary to determine the patterns of behaviour of public managers with respect to transparency and freedom of information legislation. The present study examines two aspects of this question: firstly, whether public information is supplied in accordance with a model that follows the postulates of agency theory, thus generating a principal-agent problem arising from the differing interests of public managers and citizens regarding transparency and leading to the persistence of information asymmetry. Secondly, we consider whether the transparency model adopted follows the postulates of legitimacy theory, according to which public managers will provide complete information on management performance because of their interest in obtaining the approval of citizens.

In addition, we seek to identify the factors that influence these models of transparency by public managers (Cuadrado-Ballesteros, 2014). Previous studies have analysed political and socioeconomic factors, but few have considered the influence of instrumental entities or of privatisation on the provision of municipal information. This perceived research gap is addressed in the present paper.

To achieve these study goals, we designed and applied a bidimensional transparency index, in collaboration with the Chamber of Accounts of Andalusia and the Andalusian Study Centre Foundation, following the requirements of the FOIA. This index consists of two dimensions: breadth, or the number of items that are included in the information disclosed, but which may contain only minimal information; and depth, which reflects the level of completeness of each item.

This approach was applied to a sample of 395 Spanish municipalities each with >20,000 inhabitants. The results obtained show that the transparency provided by these municipalities more closely follows the pattern established by agency theory. Thus, on average, the breadth component is more strongly represented than that of depth.

Subsequently, a Tobit analysis was performed to determine the effect of certain factors on the dimensions of the BTI, in order to consider our second study objective.

For the financial indicators, the results obtained indicate the existence of differing patterns of behaviour between budget indicators and short-term solvency indicators, with respect to levels of transparency. While improved solvency is associated with greater transparency, there is no evidence that more favourable budget indicators are associated with greater transparency. In every case, moreover, the relationships observed refer to the breadth of information, that is, to the minimum level of information that may be required. No relationship is observed between financial indicators and the disclosure of complete information, and this is an aspect that should

be taken into account in future studies, as it strongly suggests that the relationship between financial indicators and transparency reflects the postulates of agency theory. In addition, our model shows that when policies to promote citizen participation are implemented, the level of complete information increases, but that of minimal information does not. Hence, when public managers provide instruments for citizen participation, this usually increases the level of information of a complete nature (i.e., the depth component).

In relation to the influence of intermunicipal cooperation and agencies, and of the creation of supramunicipal entities, all of these entities favour the dissemination of information, at all levels (reflecting breadth, depth and the BTI) (Jensen & Meckling, 1976; Vrangbaek, 2007). However, the privatisation of public services only influences transparency when the municipalities disclose complete information (reflecting depth and, in turn, the BTI), thus corroborating the premises of legitimacy theory (Preston & Post, 1975).

In this paper, we show that public managers tend to publish information that is incomplete, with respect to the items considered in our evaluation, and that this aspect has not been taken into account in previous research on transparency in the public sector. Furthermore, we highlight the fact that the traditional factors that affect transparency do not have the same impact on its different levels – breadth and depth – and therefore future research in this area should take into account whether the information disclosure in question is minimal or more complete, thus facilitating an effective analysis of the factors that influence the levels of transparency by public entities.

Appendix A. Supplementary data
Supplementary data to this article can be found online at https://doi.org/10.1016/j.giq.2018.10.010.

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