

## E-Government, Proposal of Indicators for Tax Culture with Digital Transformation Support in The Canton of Jipijapa-Ecuador

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### Abstract

*Technological advancement offers a plethora of benefits, including the potential for novel forms of government management. In recent years, electronic governments have become increasingly relevant due to the numerous advantages they offer, including the convenience of making tax payments and carrying out tax procedures, as well as the opportunities they provide for citizens to actively engage in the decision-making process of a government. Nevertheless, these services are not universally accessible for a number of reasons. The objective of this research is to propose a set of indicators that can contribute to fostering a culture of tax compliance in Canton Jipijapa, Ecuador, through the implementation of an e-government strategy. A procedure that is close to a systemic conception will be applied. To this end, a systemic mapping will be carried out, allowing the proposal of a group of candidate indicators based on the study of the literature. Subsequently, the aforementioned indicators are evaluated by experts within the Ecuadorian context, employing the 2-tuple linguistic model as a methodological approach. The ensuing results facilitate the formulation of actions that foster the tax culture of individuals in Jipijapa Canton, Ecuador, in addition to conducting information surveys that align with the proposed indicators.*

**Keywords:** Tax Culture, E-Government, Taxes, Fiscal Management, Indicator

### INTRODUCTION

The advent of new technologies has had a profound and pervasive impact on all facets of society, with a particularly notable influence on the domain of electronic administration, also referred to as electronic government or e-government. This concept advocates the extensive utilization of information and communication technologies (ICT) to facilitate more effective forms of management. One of the primary objectives of e-government is to facilitate a rapid and comprehensive advancement in society, with the aim of fostering sustained and inclusive economic growth for all inhabitants of a given country (Oré & Lozada, 2017). For citizens, the overarching objective of e-government is to enhance their quality of life (Gustafsson & Fiedler, 2004; Páez et al., 2022).

The existing base technologies, as well as the incorporation of new technologies, have significantly transformed social dynamics and the scope of individual action. The Internet represents a platform for technological innovation in communication processes, where interaction in the digital environment is conducted by the population with access to it and serves as the foundational technology in society (Wahyuddin & Rachmat, 2023).

In recent years, Ecuador has devised a series of strategies with the objective of promoting e-government (Centeno-Maldonado et al., 2021). In the Ecuadorian context, it is essential to enhance various factors that contribute to the quality of life of citizens, including the implementation of robust tax culture mechanisms with the support of cutting-edge technologies, which in turn propels digital transformation in the country.

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To ensure the desired tax effect based on technology, it is essential to establish the conceptual foundations related to the subject of the research, as well as the principal international trends, in order to identify the optimal practices that can be implemented in Ecuador. The objective of this research is to propose a set of indicators that can contribute to the development of a robust tax culture in the canton of Jipijapa. In this context, the rationale for implementing e-government indicators to support tax culture in the Jipijapa canton emerges as a response to the limited development of public entities and the lack of interest in adopting technological and agile tools in government entities. This has led to instances where such initiatives are only undertaken temporarily, driven by immediate needs rather than a long-term vision. The importance of these initiatives lies in their ability to enhance the administrative capabilities of entities through the application of technological strategies.

The findings of the study may offer suggestions for enhancing the efficacy of procedures within the country, thereby facilitating the advancement of e-government in tandem with the growth of the tax culture.

A review of the literature is conducted on the primary concepts and trends associated with tax culture, as well as their interrelation with technological development.

## **LITERATURE REVIEW**

The concept of e-Governments gained significant traction in the 1990s, coinciding with a surge in investments in e-government services. These investments were driven by the objective of interconnecting government networks, enhancing infrastructure, and promoting transparency in governance (Hung et al., 2006). Nevertheless, despite the numerous advantages associated with this approach, the levels of acceptance among users remain a crucial indicator that requires further refinement to achieve the desired outcomes.

The development of effective practices, support tools, and useful computer systems, among other things, represents a significant challenge when it comes to promoting equitable development in localities with the support of e-governments. This concept should cultivate public trust and enhance the efficacy and transparency of public administration. It is imperative that the issues associated with the finances of countries and localities be improved on a daily basis in order to provide citizens with more information for the purpose of facilitating informed decision-making (Martati & Suminto, 2021).

As posited by various authors (Villegas-Cervantes & Velásquez-Gutiérrez, 2023), e-government progresses through a series of phases in a sequential manner. The following represent the most notable of these:

**Presence:** In this case, government offices use technologies mainly to provide information to the citizen.

**Transaction:** Self-service applications are made available to citizens so that they can carry out procedures online.

**Transformation:** It carries with it a cultural leap, it implies the redefinition of government services.

**Participation:** It implies that citizens actively participate in the definition of public policies, as well as in the transformation of their country itself.

The presence of e-government in a given locality serves as an indicator of development, given the role it plays in the provision of services to the public. The implementation of e-government has been shown to have a number of advantages, including the creation of a more favourable business environment, which in turn has a positive impact on economic growth. It also facilitates easier access for citizens to public services and enhances transparency in public administration. As posited by Davies (2015), digital governance engenders efficiency, curtails administrative burdens, and stimulates economic growth predicated on citizen participation in a democratic manner.

One of the issues identified at the international level is that a significant number of studies concentrate on companies and for-profit organisations, rather than on government and public organisations, with notable discrepancies between the two (Hung et al., 2006). It is also important to consider that e-government is a

multifaceted concept that extends beyond the mere provision of online services. It encompasses not only technological infrastructure but also the analysis of user acceptance and the examination of the underlying cultural factors.

Additional issues have been identified, namely the dearth of resources and knowledge among taxpayers, as well as the perceived risks and concerns pertaining to security and privacy (Bhuasiri et al., 2016).

### **Impact of e-Government on Tax Culture**

De la Mota (2011) makes the point that tax rules and planning are not effective if aspects such as beliefs, citizens' behaviors, modes of action, culture, and so forth are not also taken into account in the social component.

Conversely, García (2021) posits that tax collection is directly correlated with the generation of public resources. Moreover, income tax is regarded as the primary source of revenue for the country's economy, which fulfills its function through the obligations assumed by taxpayers (Lluvichusca Guaman et al., 2021).

Among the components of the tax culture based on technological development, a technological infrastructure capable of providing feedback on training plans for tax payments and tax evasion is indispensable. Furthermore, such a technological infrastructure would generate efficiency and timeliness of strategies and contribute to the control of failures (Ponce & Cañarte, 2021). Information and communication technologies (ICT) facilitate the equitable enforcement of legal regulations among citizens and the administration of those responsible for monitoring the processes.

Cardozo (2021) posits that the deployment of agile technologies from their inception can facilitate the structural transformations occurring in the domain of tax culture and in tax administrations, due to their agility and transparency in processes.

The implementation of e-governments is contingent upon substantial government support and the acceptance and utilization of the services they offer by citizens (Married and Lesbian, 2018). There is a significant interconnection between e-government as a conduit of transparency and public financial management. The effective functioning of tax activity is a crucial determinant of economic and social development for the inhabitants of any given country or region. In the contemporary era, where the pace of life is accelerated, the impact of new technologies can play a pivotal role in fostering the growth of tax culture (Ponce & Cañarte, 2021). It is crucial to enhance tax education in order to foster greater civic responsibility with regard to tax collection (Centeno-Maldonado et al., 2021). Nevertheless, while the advancement of e-government is not always directly correlated with the development of tax culture, a number of disparate factors influence the payment of taxes.

As posited by Martati and Suminto (2021), organizational culture serves as an indicator that exerts influence over tax culture. Given that this is a system of shared values, beliefs, or norms that have been established by the members of an organization, such a culture may enhance employee organizational commitment, as it is also associated with values such as attention to detail, regard for individuals, and risk-taking (Giri, 2019). Organizational culture can be defined as a pattern of thinking that is introduced into individuals on a daily basis with the objective of achieving common goals.

Conversely, public trust in government is enhanced when the government is able to meet the expectations of its citizens. This indicator is of significant importance, as the belief in local governments is a key factor in the development of a positive tax culture. If individuals have confidence in an organization's capacity, they are more likely to engage in innovative behaviors (Smith, 2011). The research conducted by Martati and Suminto (2021) substantiates the assertion that employee trust is associated with strategic innovation, which is a crucial

aspect of effective governance. This research validates the contribution of several indicators to the development of tax culture. These include the quality of the system, the quality of services as basic components of e-government, innovation, attention to people, transparency and efficiency of e-government, as well as institutional trust.

Conversely, a study conducted in Zambia by Married and Lesbian (2018) indicates that the cultural context is a pivotal determinant of the feasibility of e-governance in developing countries. The research is validated through the use of electronic services, which are employed by users to submit requests and make electronic payments. Furthermore, the extent to which individuals have access to and accept new technologies is also evaluated.

Ponce & Cañarte (2021) indicate that e-government is a valuable instrument for fostering social innovation at the governmental level. This can be achieved through the implementation of targeted action initiatives that address social needs through more effective regulations or by supporting and promoting social organizations that utilize or develop ICTs for digital transformation. In light of these considerations, the authors propose the utilization of e-Government as an ICT tool for digital transformation, with a particular focus on the development of tax culture in Jipijapa, Ecuador.

The research conducted by Ponce & Cañarte (2021) indicates that there are challenges associated with the tax culture in the context of digital transformation. It was observed that there is a dearth of knowledge and a lack of digital maturity among taxpayers with regard to undertaking electronic government activities, such as tax collection. It is imperative to reinforce factors such as user manuals, dissemination policies, business promotion, administrative simplification, and other initiatives that collectively aim to enhance the overall quality of life for the general population.

The e-feeling has a considerable impact on the residents of a country who are liable to pay taxes. The e-government instrument serves to enhance the efficiency of public administration. The administration of processes is enhanced, thereby increasing the efficiency of public administration (Married and Lesbian, 2018).

The implementation of electronic tax returns has been shown to confer benefits to citizens, as it eliminates the necessity for them to appear in person to submit their returns. Furthermore, a study conducted by Married and Lesbian (2018) utilising linear regression analysis indicates that an increase in the number of electronic tax returns is associated with an increase in tax revenues. In this research, the following elements are identified as significant variables influencing tax culture: access to the internet, the quality of service provision, the effort required by citizens to make payments, and the social influence of using services, which is moderated by individual respect. In order to comply with the provisions of the law, facilitate conditions for making payments, and encourage the use of services, e-payment makes it easier for taxpayers to self-assess their tax debts in a convenient way and with less margin for error.

In a separate study conducted in Taiwan by Hung et al. (2006), the theory of planned behavior was employed to analyze a substantial amount of data. This research validates the variables that influence the tax culture of users in this environment, including perceived usefulness, ease of use, perceived risk, trust, compatibility, external influences, interpersonal influence, self-efficacy, and facilitating conditions. In this country, an exemplar of an e-government service is the Online Tax and Financial Services Portal (OTFPS), which has been operational since 1998 and has undergone a successful evolution. The primary recommendation of this study is that policymakers enhance the strategic planning of investments in e-government services, considering the aforementioned variables. Furthermore, it is recommended that successful experiences be publicized in order to enhance user trust.

A study conducted in Thailand by Bhuasiri et al. (2016) examined the determinants of citizens' intention to adopt an electronic tax declaration and payment system. Following the analysis of the results of a

comprehensive taxpayer survey, it was determined that the expectation of return, facilitating conditions, social influence, and perceived credibility are the determining factors. The introduction of an online public service for tax reporting and payment in this country in 2002 led to a notable increase in collection rates and a high level of popularity. Additionally, the study indicates that the perceived autonomy of users to learn how to utilize electronic payment systems is a significant influencing indicator, as it enhances motivation and has a favorable impact on the utilization of such systems.

A number of studies (Páez et al., 2022) have identified tax culture, perceived risk associated with making payments, and credibility as a common factor influencing the intention to use online transactions. These two variables are closely related, as the perceived risk has a direct effect on consumers' intention to use online transactions. The concept of perceived risk can be understood as a combination of uncertainty and the consumer's subjective expectation of potential loss in pursuit of a desired outcome.

The perceived lack of credibility is the transfer of personal information to third parties, which is a significant concern for users of the electronic tax return.

It is crucial to underscore the existing conditions in the town that can facilitate the integration of technology in addressing the challenge of tax culture. In the research conducted by Ponce and Cañarte (2021), and in the research conducted by Allam et al. (2023), a structural equation model was utilized to examine data from European Union countries between the years 2014 and 2018. The findings indicate that the rule of law, the quality of regulation, and the effectiveness of government are the most influential indicators of tax evasion. In light of the aforementioned evidence, it is recommended that policymakers in countries with unfavorable tax cultures prioritize the enhancement of national institutional quality as a means of mitigating the adverse consequences associated with such cultures.

Conversely, Wahyuddin and Rachmat (2023) demonstrate that the modernization of tax administration has a beneficial impact on tax revenues, which directly affects the motivation of taxpayers. This study was conducted in Indonesia, where taxes and regional distribution are significant sources of revenue for regional development, enabling the realization of genuine, dynamic, compatible, and responsible regional autonomy. A significant finding of the research is the impact of taxpayers' age on their capacity to adopt new technologies, which can directly influence their willingness to contribute through digital channels.

The author (Wahyuddin & Rachmat, 2023) indicates that organizational culture is another indicator that leads to benefits in tax culture. This lends support to the theory of motivation as an internal state that motivates individuals to pursue their objectives.

In the study conducted by Martati and Suminto (2021), the authors describe a method for assessing the accuracy and coherence of indicators used to construct latent variables related to e-government, organizational culture, good governance, and public trust in government in the cities of East Kalimantan in Indonesia.

## **E-Government in Ecuador**

Despite the United Nations' designation of internet access as a fundamental right, a 2019 study by Valverde Landívar revealed that 65% of Ecuadorians had already achieved this level of connectivity. This figure has since demonstrated a notable upward trajectory.

The Internet is an indispensable technological tool for implementing electronic governments, as it ensures individuals have access to information that contributes to transparency. E-government represents the potential offered by technology for the administration to connect with a greater number of citizens, providing them with access to information, interactive spaces, and avenues for collective discourse, with the objective of fostering increased citizen participation. In the present era, a more sophisticated form of e-government is emerging in

Ecuador. A growing number of citizens are registered with broadband connections and are expressing their opinions through a variety of digital platforms (M. I. Rodríguez et al., 2021).

As outlined by Centeno-Maldonado et al. (2021), the e-government plan was established in Ecuador in 2009 as a means of modernizing the state apparatus. The plan is designed to enhance institutional endeavors to develop novel modes of engagement between the government and Ecuadorian civil society. Nevertheless, research findings indicate that the reach of e-government initiatives has not been equally effective at the provincial and territorial levels. It is evident that decentralized autonomous governments exhibit a comparatively lesser degree of advancement.

In a study conducted by Oré & Lozada (2017), the levels of maturity of e-government in Ecuador were analyzed. The authors concluded that the development of e-government at the municipal level in Ecuador offers numerous advantages, including: (1) Electronic administration allows the use of web technology and computer networks as communication channels between the municipality and citizens.

(2) The e-services of the municipality allow the local government to optimize its human, technical, and budgetary resources.

(3) The proper use of ICT allows for efficient Furthermore, e-administration allows for the effective management of municipal and citizen information. Additionally, e-administration is a continuous administration, which is always available to the public. Finally, the Internet is rapidly becoming a gateway for the government to broader social and cultural sectors that have traditionally been deprived of expression. In recent years, a number of research projects have made a significant contribution to the development of e-government. This development has been progressive in the sense that it has sought to create a developed country that offers its inhabitants a better quality of life (Oré & Lozada, 2017). As Albornoz and Rivero (2007) observe, the most significant gap pertains to the utilisation of the internet, contingent upon the cultural and educational preparedness of citizens to confront the novel concepts associated with artificial intelligence, big data, virtual reality, and other analogous domains.

Among the country's development strategies in the technological area is the promotion of the performance of administrative procedures such as taxes and electronic invoices in search of greater availability, usability, and reliability (Valverde Landívar, 2019). The findings of this author's research corroborate the significant strides made in the implementation of E-Government in numerous state institutions, establishing it as a vital and indispensable tool for individuals. Nevertheless, it is imperative to integrate solutions to bridge existing gaps and enhance electronic spaces for citizen service. There is a pressing need for greater integration among different government ministries and agencies, as well as the availability of unified norms, best practices, and standards.

## **E-Government and its Relationship with tax culture in Ecuador.**

In Ecuador, the tax administration is structured in a way that allows the President of the Republic to oversee the direction of the tax administration at the national level. This is achieved through the relevant agencies, namely the Internal Revenue Service and the Ecuadorian Customs Corporation (Ponce & Cañarte, 2021).

The tax regime in Ecuador is based on the principles of generality, progressiveness, efficiency, administrative simplicity, equity, transparency, and collection sufficiency. In this context, direct and progressive taxes are given priority. Tax policy has the dual function of promoting redistribution and stimulating employment, the production of goods and services, and responsible ecological, social, and economic behaviors (Flores et al.,

2019). The tax system in Ecuador has become a fundamental source of public revenue, guaranteeing the development of social and economic policies that benefit the community. However, as Flores et al. (2019) have observed, the country lacks any meaningful incentives for its citizens to fulfill their tax obligations. Statistical data indicates that despite the implementation of various strategies, a significant proportion of Ecuadorians engage in tax evasion, either due to a lack of awareness or non-compliance with the legal framework. According to Villegas-Cervantes and Velásquez-Gutiérrez (2023), as well as Centeno-Maldonado et al. (2021), a significant finding was that merchants lacked sufficient knowledge regarding the utilization of technologies that facilitate payment. Conversely, taxpayers demonstrated an awareness of the positive impact of tax collection on their quality of life.

The author identifies several key factors that contribute to the phenomenon of non-payment of taxes by Ecuadorians. (1) satisfaction with state intervention, (2) a sense of social responsibility and solidarity, (3) ethical norms and altruism.

The research conducted by Centeno-Maldonado et al. (2021) indicates a strong correlation between tax culture and tax evasion. The identified criteria influencing tax culture include: The following factors have been identified as influencing tax culture: (1) a lack of awareness of the tax system, (2) a lack of transparency in the tax system, (3) an inflexible tax administration, (4) a low risk of detection, and (5) a lack of knowledge among citizens regarding the final destination of the taxes they pay.

The research conducted by Quispe Fernandez et al. (2020) indicates that an important aspect of tax culture is the manner in which administrative procedures and sanctions are conducted. This research identifies a number of variables that serve to measure the efficiency of fiscal management, including the personal capacities of those who pay taxes, technological capabilities, administrative capacities, and others.

Conversely, a recent study conducted by Villegas-Cervantes and Velásquez-Gutiérrez (2023) on users in the commercial sector of the Portoviejo canton in Ecuador revealed that the E-Government in this locality provides information, procedures, and digital services. The research also indicates that merchants lack the requisite knowledge to utilize the available technologies for tax cancellation effectively, despite having the necessary infrastructure to do so. The survey results indicate that 100% of respondents recognize the positive impact of tax collection on the quality of life of citizens. It is indicated that in the case of individuals who fail to fulfill their tax obligations, such noncompliance is frequently attributed to a lack of knowledge. The author (Villegas-Cervantes & Velásquez-Gutiérrez, 2023) asserts that Ecuador possesses the requisite technological resources to facilitate electronic tax payments.

The research conducted by the author (Oré & Lozada, 2017) indicates that the majority of the population in the country has access to news and the website through mobile devices, as well as information on productive activities. However, there are unfavorable values regarding the availability of services to citizens, such as online tax payments. These findings highlight the necessity for the promotion of e-government.

## **METHODOLOGY**

In order to achieve the proposed objective, the methodology established by Bárbara Kitchenham et al. (2007) will be employed. The method establishes three phases for the systematic review, though these are not obligatory. They serve as a guide for the study:

1. Plan the review
  - a. Specify research questions

- b. Develop review protocol
- c. Validity of review protocol
- 2. Conduct the review
  - a. Identify relevant sources/studies
  - b. Select primary studies
  - c. Assess study quality
  - d. Extract required data
  - e. Synthesize data
- 3. Document the review
  - a. Write Review Report
  - b. Validate Report

In order to facilitate the review process, research questions were formulated at the outset of the planning stage. These questions permit the identification of the principal indicators that exert an influence on the tax culture, with particular consideration given to the impact of digital transformation. Additionally, they allow for the examination of issues associated with e-government and their relationship with the tax culture.

**Table 1: Research Questions**

Questions	Thematic
Question 1 (Q1): How does bibliographic and documentary information contribute to the research process?	Verify that the information found is relevant.
Question 2 (Q2) How do E-Government contribute to the tax culture?	E-Government, Tax Culture
Question 3 (Q3) What are the indicators that can have an impact on the tax culture taking into account the E-Government?	E-Government, Tax Culture
Question 4 (Q4) What are the indicators that can have an impact on the tax culture taking into account the E-Government in Ecuador?	Examines the bibliographic data and thus be able to elaborate the systemic information analyzed.

Main bibliographic sources used

Various searches were carried out to answer the research questions. Among the main bibliographic sources consulted, the following virtual sources stand out:

- ACM Digital Library (<https://dl.acm.org/>)
- IEEE Digital Library (<https://www.ieee.org/>)
- Scopus (<http://www.scopus.com>)
- Scielo (<http://www.scielo.com>)

*Defining keywords to perform the search*

To carry out a more efficient search, a set of keywords in Spanish and English that suggest search strings was defined.

- E-Government
- Tax culture
- Indicator
- Tax management
- Taxation
- Ecuador

*Search strings*



The search strings were built from the defined keywords and virtual libraries. Some examples of strings used were the following:

TITLE ("E-Government" OR "Electronic Government" OR "Government Management") AND ("tax culture" OR "payment of tax")AND (indicators\* OR criteria))

(((((("Document Title": Cultura tributaria) AND "Abstract":E-Gobierno) AND "Abstract":Ecuador) OR "Abstract":pago de impuestos\*))

#### *Inclusion and exclusion criteria for searches*

To carry out the various searches, basic criteria were defined to obtain the desired results.

#### *Inclusive criteria*

Articles or books published since 2005.

Articles in English or Spanish

The article talks about the terms defined above

#### *Exclusion Criteria*

Articles from untrusted sources

Methods, procedures, protocols with ambiguity in their explanation.

### **Method For The Selection Of Indicators**

In order to evaluate the indicators proposed in the research that contribute to the tax culture, it is proposed to carry out the following order of activities in a logical way.

*Macro activity:* Selection of indicators that contribute to the tax culture

In the activity, indicators that can contribute to the development of a tax culture are selected from a set of steps based on a comprehensive literature review and the criteria of experts in the field. The indicators proposed subsequently serve as the foundation for the formulation of surveys and interviews that will be conducted subsequent to this research. In order to develop the proposal, a combination of traditional techniques is employed.

*Entries:* List of experts who evaluate, list of candidate indicators to improve tax culture.

*Solutions:* list of indicators to improve tax culture

### **Steps to Develop**

1.1 Select Participating Experts

1.2 Select indicators that can contribute to the tax culture of individuals in the Jipijapa Canton.

Detailed Description Step 1.1: Select Participating Experts

The objective of this step is to select the experts who will participate in the validation of the proposed indicators, for which it is proposed to apply the following methods: Curriculum synthesis analysis (González & León, 2013) o Competency assessment method (Spencer & Spencer, 1993). In this step, the following activities are suggested:

Activity 1: Review curriculum summary of candidates and competencies.

Activity 2: Validate evidence of competencies and curricular synthesis of candidates.

Activity 3: Select experts who will validate tax culture indicators.

Detailed description Step 1.2: Define indicators that can contribute to the tax culture

To implement the step, the following methods are combined: bibliographic analysis, the Delphi method and the 2-tuple method (Herrera & Martínez, 2000). The following activities are proposed.

Activity 1: Identify a set of candidate indicators for analysis.

Activity 2: Apply round of the Delphi method, an open survey where experts can propose new indicators.

Activity 3: Evaluate candidate indicators by experts using 2-tuple-based procedure 1 with a seven-label linguistic term set (CTL) as shown in Figure 1

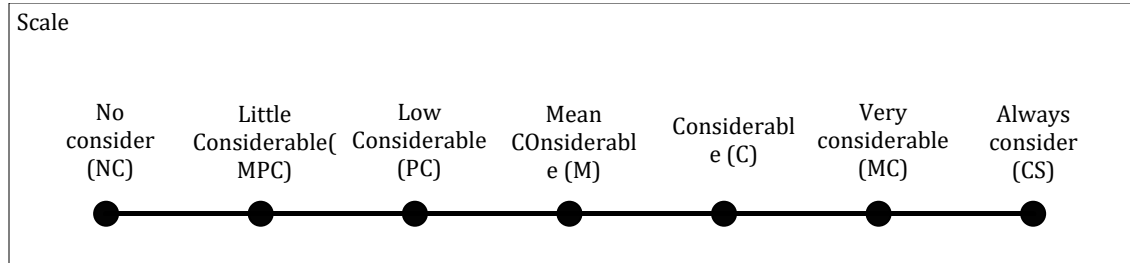


Figure 1: Linguistic labels used to assess tax culture indicators.

### Procedure 1

*Tickets:*

*I* - Candidate indicators to assess tax culture  $i_q \in I : q \in [1..z]$

*V* - A group of expert evaluators.  $v_l \in V : t \in [1..L]$

*Outputs:* List of indicators selected to evaluate the tax culture

*Beginning*

Define as a basic set of linguistic terms for the evaluation of indicators (CBTL). (Figure 1).  $S_T = \{NC, MPC, PC, MC, C, MC, CS\}$

For each indicator make  $i_q \in I$

For each expert evaluator to make  $v_l \in V$

Issue evaluator preferences on the indicator using a five-label linguistic scale (Figure 1). The evaluation matrix is constructed, where each element  $MV_l i_{q,v}$  represents the evaluation of indicator  $i$  by the evaluator  $v$ .

End of cycle step 4

Calculate the  $q$ -th element  $I_q$  of indicator evaluation such that  $I_q$  represents the aggregate evaluation of the participants of the indicator  $i_q$ , after the 2-tuple method has been applied.

End of cycle step 3

Based on the analysis of vector  $V_i$ , order the indicators according to their evaluation and select the indicators  $I_e$  that will finally be considered to evaluate the tax culture.

Return the list of selected requirements.

End of the procedure

## RESULT AND FINDINGS

### Results and Discussion

This section presents the results obtained after applying the methods proposed in the previous section.

#### Obtaining Results Step 1.1

In the initial phase of the evaluation process, a group of 15 expert candidates is assessed based on a number of criteria, including their curriculum vitae, which is used to ascertain their academic qualifications, experience in tax management, and familiarity with the principles of tax culture.

A competence coefficient was calculated for each expert candidate based on the results of the survey. Ultimately, 12 experts were selected based on the aforementioned criteria to ensure the reliability of their considerations:

80% have a high proficiency index and the rest have a medium index.

100% have worked for 6 years or more in fiscal management.

60% of them have publications associated with tax culture.

## Obtaining Results Step 1.2

### Activity 1

A set of 21 candidate indicators was identified from the literature review in accordance with the methodology proposed for the review, as detailed in Table 2.

**Table 2: Indicators identified in the literature review**

	Indicator	Reference that validates it
1	Tax education	(Oré & Lozada, 2017)(Martati & Suminto, 2021)(Smith, 2011)(Lluvichusca Guaman et al., 2021)
2	Perceived credibility	(Villegas-Cervantes & Velásquez-Gutiérrez, 2023)(QUISPE FERNANDEZ et al., 2020)
3	Tax Awareness	(Ponce & Cañarte, 2021)(Flores et al., 2019)(Giri, 2019)
4	Tax payment knowledge	(Oré & Lozada, 2017)(Centeno-Maldonado et al., 2021)(Flores et al., 2019)(Smith, 2011)(QUISPE FERNANDEZ et al., 2020)
5	Tax Evasion	(Married and Lesbian, 2018)(Villegas-Cervantes & Velásquez-Gutiérrez, 2023)(Martati & Suminto, 2021)
6	Tax obligations	(Villegas-Cervantes & Velásquez-Gutiérrez, 2023)(Davies, 2015)(García, 2021)
7	Citizen Culture	(Albornoz & Rivero, 2007)(Ocha Toledo, Luis; Kamper Valverde, 2009)(Villegas-Cervantes & Velásquez-Gutiérrez, 2023)(Married and Lesbian, 2018)(Wahyuddin & Rachmat, 2023)
8	Availability of norms and standards	(Smith, 2011)(Villegas-Cervantes & Velásquez-Gutiérrez, 2023)(Centeno-Maldonado et al., 2021)
9	Organizational culture	(Giri, 2019)(Martati & Suminto, 2021)
10	Public trust in government	(Smith, 2011)(Married and Lesbian, 2018)(Giri, 2019)(V. M. C. Rodríguez, 2015)
11	Quality of computer systems	(Ponce & Cañarte, 2021)(Lluvichusca Guaman et al., 2021)
12	Transparency in the system	(Martati & Suminto, 2021)(Centeno-Maldonado et al., 2021)(Davies, 2015)
13	E-Government Efficiency	(Giri, 2019)(Lluvichusca Guaman et al., 2021)(V. M. C. Rodríguez, 2015)
14	Madurez digital	(Ponce & Cañarte, 2021)(García, 2021)
15	Tax Incentives	(Ocha Toledo, Luis; Kamper Valverde, 2009)
16	Ignorance of the final destination of the payments	(Davies, 2015)(Centeno-Maldonado et al., 2021)
17	Internet access	(Ponce & Cañarte, 2021)
18	Taxpayer effort to make the payment	(García, 2021)(QUISPE FERNANDEZ et al., 2020)
19	Facilitating conditions	(Davies, 2015)
20	Perceived risk	(Giri, 2019)(QUISPE FERNANDEZ et al., 2020)
21	Perceived autonomy	(Giri, 2019)(Páez et al., 2022)(Centeno-Maldonado et al., 2021)

The experts evaluated each of the candidate indicators to identify which ones could be directly affecting the tax culture of individuals in the Jipijapa Canton. This evaluation was based on the group of candidate indicators. In accordance with Procedure 1 and utilizing the linguistic labels illustrated in Figure 1, the twelve evaluators articulated their preferences through the use of linguistic terminology, which was subsequently incorporated into the analysis. The evaluations were aggregated using the arithmetic operator proposed by Herrera and Martínez (2000).

**Table 3: Matrix expert assessment by indicator**

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	I
I1	(MC, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(MC, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(C, 0)	(CS, 0)	(CS, 0)	(C, 0)	(CS, -0.5)
I2	(C, 0)	(MC, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(M, 0)	(CS, 0)	(MC, 0)	(M, 0)	(M, 0)	(C, 0)	(C, 0)	(C, 0.42)
I3	(MC, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(MC, 0)	(CS, 0)	(CS, 0)	(CS, -0.17)
I4	(M, 0)	(C, 0)	(MC, 0)	(CS, 0)	(C, 0)	(M, 0)	(MC, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(C, 0)	(C, 0)	(MC, -0.5)
I5	(MC, 0)	(CS, 0)	(M, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(C, 0)	(MC, 0)	(C, 0)	(MC, 0)	(C, 0.08)
I6	(M, 0)	(M, 0)	(C, 0)	(MC, 0)	(M, 0)	(C, 0)	(C, 0)	(MC, 0)	(MC, 0)	(C, 0)	(C, 0)	(C, 0)	(C, 0)
I7	(CS, 0)	(MC, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, -0.08)
I8	(M, 0)	(M, 0)	(C, 0)	(CS, 0)	(C, 0)	(MC, 0)	(C, 0)	(M, 0)	(C, 0)	(M, 0)	(C, 0)	(MC, 0)	(C, 0)
I9	(M, 0)	(MC, 0)	(C, 0)	(MC, 0)	(M, 0)	(MC, 0)	(CS, 0)	(M, 0)	(C, 0)	(CS, 0)	(PC, 0)	(C, 0)	(C, 0.17)
I10	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(MC, 0)	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(M, 0.42)
I11	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(C, 0)	(MC, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(CS, -0.25)
I12	(MC, 0)	(C, 0)	(M, 0)	(C, 0)	(MC, 0)	(M, 0)	(MC, 0)	(CS, 0)	(C, 0)	(M, 0)	(CS, 0)	(C, 0)	(C, 0.33)
I13	(C, 0)	(CS, 0)	(CS, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(CS, 0)	(CS, 0)	(CS, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(CS, -0.5)
I14	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(MPC, 0)	(MPC, 0)	(NC, 0)	(PC, 0)	(NC, 0)	(NC, 0.33)
I15	(MC, 0)	(C, 0)	(M, 0)	(C, 0)	(C, 0)	(M, 0)	(M, 0)	(MC, 0)	(M, 0)	(CS, 0)	(C, 0)	(M, 0)	(C, -0.08)
I16	(M, 0)	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(C, 0)	(M, 0.42)
I17	(MC, 0)	(CS, 0)	(CS, 0)	(MC, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(C, 0)	(CS, 0)	(MC, 0.33)
I18	(MPC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0)	(NC, 0.08)
I19	(MC, 0)	(CS, 0)	(CS, 0)	(MC, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(MC, 0)	(CS, 0)	(MC, 0)	(C, 0)	(CS, 0)	(MC, 0.33)
I20	(M, 0)	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(C, 0)	(M, 0.42)
I21	(MC, 0)	(CS, 0)	(M, 0)	(C, 0)	(M, 0)	(M, 0)	(C, 0)	(M, 0)	(C, 0)	(MC, 0)	(C, 0)	(MC, 0)	(C, 0.08)

In light of the findings presented in Table 3, which illustrate the indicators with the most significant influence on the tax culture of individuals in the canton of Jipijapa, the following recommendations are put forth for consideration:

Include in all the actions to be carried out in the locality the strengthening of the indicators that reached the "considerar\_siempre" and "muy\_considerable" labels.

Deepen, through population surveys or other methods, the incidence of the indicators that obtained the label of "considerable".

Draw up an action plan that pays tribute to the indicators that are most relevant to the experts, these being: I1 (CS, -0.5), I3 (CS, -0.17), I4 (MC, -0.5), I7(CS, -0.08), I11(CS, -0.25), I12(C, 0.33), I13(CS, -0.5), I17(MC, 0.33)

The indicators deemed most pertinent by the experts were as follows: The indicators that were identified as the most relevant by the experts were as follows: I1 (Education), I3 (Tax Awareness), I4 (Knowledge about Tax Payments), I7 (Citizen Culture), I11 (Quality of Computer Systems), I12 (System Transparency), I13 (E-Government Efficiency), and I17 (Internet Access).

The results obtained are consistent with those of previous studies of comparable locations in Ecuador (Centeno-Maldonado et al., 2021; QUISPE FERNANDEZ et al., 2020; Páez et al., 2022; Lluvichusca Guaman et al., 2021).

In light of the aforementioned results, an information collection sheet was prepared (see Table 4), with a particular focus on the validated indicators. Similarly, additional instruments can be constructed to facilitate further research.

**Table 4: e-government, indicators for tax culture with digital transformation support in the jipijapa canton**

<b>E-GOVERNMENT, INDICATORS FOR TAX CULTURE WITH DIGITAL TRANSFORMATION SUPPORT IN THE JIPIJAPA CANTON</b>					
<b>VISION</b>					
<b>Indicators</b>	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Will the digital transformation affect the future of the tax culture program of the Jipijapa canton?	No, for sure	No, probably	I do not know	Yes, probably	Yes, sure
<b>The illustration delineates the processes that require transformation in the Jipijapa canton to ensure the success of the digital transformation of the canton's tax culture.</b>					
- The processes					
- Organizational culture					
- The leadership of the directors					
- The tools					
- The technology					
- Employee capabilities					
- The vision of public administration.					
- The vision of private administration.					
- The vision of the tax administration					
Do you notice changes in the tax culture of the Jipijapa canton due to the digital transformation with an e-Government approach that is being carried out for its development?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>Identify the primary obstacles that you believe are responsible for the persistent digital divide in the tax culture of the Jipijapa canton. Select the responses that you deem most appropriate.</b>					
- Lack of resources					
- Poor digital literacy on the part of employees					
- Lack of strategy					
- Organizational culture is not conducive to digital transformation					
- Outdated technology					
- Resistance to change					
- Little digital knowledge of the management team					
- Managers interfere with digital initiatives					
- There are no barriers					
Is there a well-defined and communicated strategy on the digital transformation that is carried out for the development of the tax culture of the Jipijapa canton?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>LEADERSHIP</b>					
Do you think that leadership is changing as a result of digital transformation?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>What are the most salient characteristics of the tax culture programs of the canton of Jipijapa, as established by Ecuadorian public entities, that are conducive to success in digital transformation?</b>					
- That they design a clear strategic plan to undertake digital transformation					
- That promote and encourage change in tax administration					
- Invest more in technology					
- Invest in dynamic websites					
- That they invest more in the capacities of public servants.					
- Greater autonomy at work and lower hierarchy in the tax administration					
- That a binding and mobilizing business vision is created					
- Mastering digital technology					
- Increased communication about digital transformation					
<b>Check an option on the transmission by the supervisors of the vision they have on the digital transformation that is carried out for the development of the tax culture of the canton of Jipijapa.</b>					
- They frequently convey the vision of digital transformation.					

*E-Government, proposal of indicators for tax culture with digital transformation support in the Canton of Jipijapa-Ecuador*

- Lack of knowledge of the digital transformation process with an e-Government approach in the tax culture of the Jipijapa canton.					
- We've been told about it before, but it's still not clear					
- They have not transmitted anything to me, but I know it on my own initiative					
- No, in principle they have not transmitted anything specific to me.					
<b>Do you know how the tax culture of the Jipijapa canton will be with the implementation of digital transformation with an e-Government approach for its development?</b>					
- Yes, because I actively participate in forums for the construction of digital transformation, which have been created by public entities in Ecuador.					
- Yes, because the chiefs discuss the changes that are approaching with respect to the digital transformation for the development of the tax culture in the Jipijapa canton.					
- Yes, but out of self-interest, in the Jipijapa canton they do not usually comment on it.					
- I have no idea					
<b>Do they receive leadership training to manage the digital transformation in the development of tax culture?</b>					
- I receive training on leadership skills, but not specifically related to digital transformation					
- I receive training on leadership skills and specifically on how to manage digital transformation for the development of tax culture					
- I don't get leadership skills training, I only get technical training					
- I don't receive any training					
Do you feel part of the digital transformation that is taking place in the Jipijapa canton for the development of tax culture?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>CULTURE</b>					
To what extent would you agree with the phrase; "Does academia promote strategies applied to the development of tax culture with a focus on digital transformation that contributes to the local economy?"	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>The entities in the Jipijapa Canton meet the following characteristics to face the development of the tax culture with an e-Government approach</b>					
- Hierarchical decision-making					
- Employee autonomy in their day-to-day work					
- High learning in the workplace					
- Adapting to changes and the competitive environment					
- Outcome-based decision-making					
- Open and collaborative work style					
- Innovative					
- Little risk prevention					
- Transparency in communication					
- Agility in decision-making					
- None of the above					
<b>What changes has digital transformation brought to the tax culture in the Jipijapa canton?</b>					
- New ways of relating					
- New ways of working and organizing work (agile, Scrum)					
- New workspaces					
- Process agility					
- None of them					
<b>Which option is best for digital transformation in the development of the tax culture of the Jipijapa canton</b>					
- Creating an appropriate context for digital transformation in the development of tax culture					
- Expect employees to be motivated by the digital transformation underway in the development of tax culture					
- Receive a clear mandate from the program that addresses the tax culture in the Jipijapa canton					
- None of them					
In the Jipijapa canton is there a culture that favors the digital transformation that is carried out in the development of the tax culture?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
To what extent does the tax culture of the Jipijapa canton change due to the digital transformation?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
To what extent does the way of working (processes) of the Jipijapa canton change due to the digital transformation for the development of tax culture	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>To what extent do you agree with the digital transformation for the development of the tax culture in the Jipijapa canton?</b>					
- Digital transformation with an e-Government approach in the development of tax culture encourages the sharing of new ideas with all levels of the organization					
- Digital transformation with an e-Government focus on the development of tax culture generates more freedom at work					
- The digital transformation with an e-Government approach in the development of tax culture, allows decision-making to be carried out from lower hierarchical scales					

- In the canton of Jipijapa, investment is being made for digital transformation with an e-Government approach aimed at the development of tax culture					
- Due to the digital transformation with an e-Government focus on the development of tax culture, my job prospects have worsened					
<b>CAPABILITIES</b>					
<b>Degree of importance that employees and managers give to their abilities to undertake digital transformation with an e-Government approach in the development of the tax culture of the Jipijapa canton</b>					
- Technological knowledge					
- Change mindset					
- Knowledge in the use of digital tools					
- Strategic Thinking					
- Teamwork					
To what extent do you consider the digital transformation with an e-Government approach to be a success for the development of tax culture?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Is it in the hands of the employees of the Jipijapa canton that the digital transformation with an e-Government approach is a success?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>Variable: Tax culture</b>					
<b>DIGITAL DIVIDE</b>					
<b>Indicate what principles are taken into account in the canton of Jipijapa for the development of the tax culture</b>					
- Principle of digital service by default or with preference, but maintaining other channels for those who are disconnected.					
- Principle of only once referring to a single supply that must be provided by natural and legal persons.					
- Principle of inclusion and accessibility for the elderly and people with disabilities.					
- Principle of openness and transparency that allows public administrations to share information or data, allowing citizens and companies to have control of access and modification of data.					
- Cross-border principle for digital services available across borders, facilitating mobility within the Community.					
- Interoperability principle by default, according to which services will be designed to operate in the internal market but with free movement across organisational silos					
- Principle of trust and security, with strict compliance with the legal framework on the protection of personal data, privacy and security.					
Is there a legal framework that supports the privacy guarantees of a global model related to the digital transformation in the development of the tax culture of the canton of Jipijapa, Ecuador?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Do you consider that there is a digital divide between expert users for the development of tax culture with the digital transformation focused on e-Government?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>STAFF PREPARATION</b>					
In the canton of Jipijapa, are there strategies for users to be increasingly expert and demanding with respect to systems and technologies by virtue of the impact of digital transformation on the tax culture with an e-Government approach?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Do you consider that the disruptive cycles related to digital transformation with an e-Government approach are becoming less and less and always represent better opportunities for growth and performance in the tax culture of the Jipijapa canton?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Is there continuous training to assume remains in the face of digital transformation with an e-Government focus on the tax culture of the Jipijapa canton?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
<b>TECHNOLOGY</b>					
Will intelligent conversational platforms be implemented with virtual assistants or advisors with high cognitive capacity and directed towards the efficient solution of all procedures?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Is there technological and professional capacity for the modification of biometric data capture systems in accordance with the current developments of applications based on facial recognition as a cybersecurity measure in the development of tax culture with an e-Government approach?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>
Do you consider that there is the necessary technology for the processing of information between humans and computers that has a significant impact on the tax culture of the Jipijapa canton?	<b>Nothing</b>	<b>Something</b>	<b>Little</b>	<b>Pretty much</b>	<b>A lot</b>

## CONCLUSION

In recent years, technological advancement has driven the implementation of electronic governments around the world, which has considerably benefited the administrative management of governments and the quality of life of people. Notwithstanding the considerable efforts of countries and institutions, the development of e-government has reached all regions in equal measure, which is due to a number of factors at the governmental and individual levels. The research indicated that there is a strong correlation between the effective functioning of e-governments and the advancement of tax culture among individuals. In particular, Ecuador exhibits a prevalence of pivotal indicators that may facilitate the cultivation of this culture.

In order to ascertain these indicators, a review of the literature was conducted, resulting in the compilation of a list of candidate indicators that were most frequently cited by the authors. To validate the indicators and ascertain their relevance specifically in Canton Jipijapa, a two-tuple linguistic model is employed, which permits an evaluation with a reduced degree of uncertainty.

The results demonstrate that the most significant indicators are the level of education among individuals, tax awareness, the extent of knowledge about paying taxes, the culture of citizens, the transparency of computer systems, as well as their quality, access to the Internet, and the efficiency of e-government. In light of the findings, recommendations are put forth and an illustration is provided of how the indicators can be utilized to enhance the tax culture. The research findings substantiate the necessity to enhance the tax culture in the municipality of Canton Jipijapa to achieve a higher level of well-being for the local population.

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