



Bayesian Analysis to the Experiences of Corruption through Artificial Intelligence

Erica Pascual-Garcia

Division of Postgraduate Studies,
Sierra Sur University, Mexico

Guillermo De la Torre-Gea

Division of Postgraduate Studies,
Sierra Sur University, Mexico

ABSTRACT

In a democracy, the link between government and society is fundamental to prevent corruption and to ensure the functioning of mechanisms for transparency, accountability of the guaranteeing bodies and access to information. This is why the State implements public policies on transparency. However, corruption has been a phenomenon that is present in the Public Administration and has not been able to diminish with these policies. The objective of this study is to analyze the variables on the perception of corruption in society using the Bayesian method. For this, the data were obtained from the National Institute of Statistics and Geography in the part of its portal National Survey on Quality and Government Impact 2015, in the section on corruption. For its later Bayesian analysis using the software ELVIRA through the algorithm K2.

Keywords: *Transparency, accountability, corruption and Public Administration*

Introduction

At present, it is essential to have effective mechanisms that encourage the honest and efficient use of public resources and government actions. In addition, at the same time, they strengthen the culture of legality, transparency, and accountability, as essential elements of the State Reform. However, corruption is a serious problem that has not been diminished despite the public policies on control and transparency that are being implemented. Likewise, it

affects the effectiveness of institutions, breaches goals, and objectives in government programs, prevents the resolution of citizen demands, and at the same time generates distrust of citizens in their government and discontent with society. This has become, in the last decades, a pandemic in the areas of government (Diego, 2006).

In Mexico the levels of perception of corruption are alarming and the strategies implemented to reduce them have not had the expected results. In 2014 Mexico obtained a rating of 35 points out of 100 possible and the number 103 place in 175 countries (International Transparency, 2014). In this study, the objective was to analyze by means of the Bayesian method the variables on the perception of corruption of the society in the State of Oaxaca.

Corruption Theory

According to González (2005), corruption is acted by which a public official is driven to act in a different way to the normative standards of the system to favor particular interests in return for a reward. These rewards may be monetary or otherwise, and those who most frequently incur such rewards are those in a position of power. In addition, corruption occurs not only in the public sector but also in the private sector.

The phenomenon of corruption is complex and it has multiple causes and effects, from the simple act of an illicit payment to the endemic functioning of the political and economic system. In general terms, it is

usually understood as any abuse of public power for private purposes (Del Castillo, 2008).

It should be mentioned that corruption is multidimensional because it involves moral dilemmas, economic incentives, personal benefits, professionalism in the administration of the State, size and effectiveness of the public sector, functioning of legislative and judicial institutions, access of citizens to information Public accountability, professionalization of public servants, among others (Solimano, 2008).

According to Villoria (2000), corruption can be found at four different levels: in the political regime, in politics, in public administration, and in the judiciary. As far as the political regime is concerned, experience shows that if political regimes are corrupt, public servants can be linked to and adapt to that regime.

The phenomenon of corruption in the Public Administration is present in all three levels and orders of government. This may be because public servants obtain benefits that benefit them or allow them certain privileges they might not otherwise have.

Materials y method

To perform this work, we used a computer with 6 GB of RAM and Windows 10 operating systems. For the modeling, we used the Elvira software version 0.162, to released the development of the Bayesian network model. Which describes the relationships among all variables studied.

A Bayesian network is a graphical representation of dependencies for probabilistic reasoning (Ortiz-Vázquez *et al.*, 2015); In which each node represents a variable, and each arc a probabilistic dependency, where the conditional probability of each variable is specified (De la Torre-Gea *et al.*, 2011). The variable pointed to by the bow is dependent (cause-effect) of the one at the origin of the bow (Fernández, 2005).

For this study, the data were obtained from INEGI in the part of its portal National Survey of Quality and Government Impact (ENCIG) 2015, in the section on corruption. For its later Bayesian analysis using the software ELVIRA through the K2 algorithm, which according to Manzo-García *et al.* (2016) and Wang *et al.* (2006) has provided good results in its implementation as an analysis tool. The data were obtained from the survey of the corruption section, the

questions and variables are as follows, as shown Table 1.

Table 1: Perception of Corruption

Question	Answer	Variable
1.- Mentions the three most important problems:	No = 0 Yes = 1	
Poor performance of government	No = 0 Yes = 1	Mal_des_Gob
Poverty	No = 0 Yes = 1	Pobreza
Corruption	No = 0 Yes = 1	Corrupción
Unemployment	No = 0 Yes = 1	Desempleo
Insecurity	No = 0 Yes = 1	Ins_del
Poor enforcement of the law	No = 0 Yes = 1	Mal_apli_ley
Poor quality of public education	No = 0 Yes = 1	Baj-cal_edu
Poor care in public health centers	No = 0 Yes = 1	Mal_aten_salud
Lack of coordination between different levels of government	No = 0 Yes = 1	Falta_coord_gob
2.- The corrupt practices of the Government are:		
3.- How often do you think corruption practices occur in:	1. Very Frequent	
Public universities?	2. Frequent	Univ_pub
Cops	3. Uncommon	Policías
Public hospitals?		Hos_pub
Presidency of the Republic?	4. Never	Pres_rep_sec
Businessmen?		Empresarios

People no longer believe in political parties and are reflected in rates of abstention. Likewise, the Presidency of the Republic, its secretariats, including public security (police) is committed many acts of administrative, judicial and legal corruption. Figure 4 shows the relationships of the variables to the institutions where corruption practices also occur.

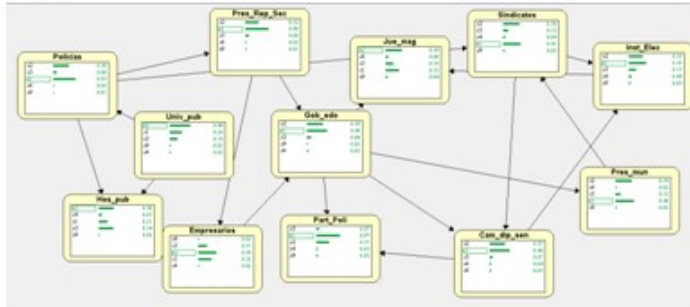


Fig 3: Bayesian network: inference of practices of corruption in institutions.



Fig 4: List of instructions variables where corruption practices occur.

In Figure 4, we showed that the variable of the State government is the one that most closely relates to the other variables, because it is directly influenced by the presidency of the Republic and by the secretaries, that is, the State Has to be adapted to the conditions of the federal scope. In addition, the private sector (entrepreneurs) that in some way intervenes in the decisions that the State takes and in turn also has a direct relation to the federal scope.

Therefore, the decisions taken by the state government are reflected in state institutions, as well as the chamber of deputies and senators and political parties which is the highest corruption index institution, which depends on the federal, state and chamber government Of Deputies and Senators and directly the municipal presidency is affected by the actions of the state government, that although it has autonomy, it continues to depend on the state and the federation. In this sense, municipalities are the first

level of government where corruption practices are started directly.

The analysis shows a level of perception of corruption practically in all the analyzed institutions. As Casar (2015) points out, the levels of perceived corruption in institutions considered as the pillars of a representative democracy (political parties and legislative power) are extraordinarily high and this makes governance more difficult since it reduces legitimacy to government decisions.

In sum, the three variables (poverty, unemployment, and corruption) are related to each other. In addition, the main cause of these problems has been the poor performance of the government, since the actions and strategies in their public policies have not had the expected results. However, the other problems that for people are less important, are also related and are effects of the three most important. Likewise, public institutions where corruption practices occur do not apply strict mechanisms to reduce these rates and recover the legitimacy of citizenship.

5. Conclusion

The Bayesian network allowed us to analyze a large number of variables at a time and infer in specific situations. In this case, it was possible to analyze the three main problems and perception of corruption in Oaxaca and the relationship that the variables have with others. In this sense, the problems that Oaxaca has is due to the poor performance of the government, since its policies and programs have not been able to counter such problems. As for corruption, in all institutions, there are these practices, some with a higher index than others. However, they depend on the federal government and the Chamber of Deputies, since by hierarchical level they are the ones that establish the laws and mark the guidelines, but are the ones that more acts of corruption comment. As the theory says, if the regime is corrupt, institutions adapt, this is reflected in the statistics of the perception of people, who no longer trust institutions. It is a great challenge for the government to regain the legitimacy and confidence of its governed.

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