

## **THE IMPACT OF ARTIFICIAL AND COGNITIVE INTELLIGENCE ON ROMANIAN PUBLIC PROCUREMENT**

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### **Abstract**

*This conceptual paper discusses the Romanian Public Procurement System in the context of the World Economic Forum (Davos, 2016) addressed trends. The paper addresses trends impacting public procurement in the context of artificial and cognitive intelligence and advances the hypothesis of a new age for public procurement. The paper is discussing possible impacts of the fourth industrial revolution on public procurement. The environment used to contextualize the information is Romania. The paper ends with arguments supporting a proposal for a new perspective on the Romanian public procurement system: that of a social system instead of a mechanistic one.*

**Key words:** Artificial Intelligence Public Procurement Social System

**JEL classification:** H57: Procurement

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### **1. Introduction**

During 2016 World Economic Forum (WEF) in Davos, economists discussed about mastering The Fourth Industrial Revolution, the term coined by Klaus Schwab to describe the new generation of technological advances (the next wave of progress). In Davos, economists entered in the discussion of artificial intelligence impacts on economics and business. One of the main conclusions is that the changes introduced by the use of the new technologies will impact the way organizations from public or private sector do business. Public Procurement is a relevant part of business transactions at the EU level and for Romania.” Public procurement represents approximately 19% of EU GDP and EU wide e-procurement is expected to save EUR 50 billion

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annually” according to “A Digital Single Market Strategy for Europe”, a communication from the Commission To The European Parliament, The Council, The European Economic and Social Committee And The Committee Of The Regions.

For Romania, public procurement is the main instrument to satisfy the needs of the contracting authorities financed from Romanian budget. As of 2013, 13.3 % of Romania GDP is advertised via [www.e-licitatie.ro](http://www.e-licitatie.ro). For the content of this paper, trends exposed during the 2016 Davos WEF relevant for the public procurement area are further summarised. For the supply side the following are expected: (i) global supply chains will become more effective and will lead to new markets opening; (ii) many industries will disrupt existing value chains by introducing new technologies, creating new ways of satisfying actual needs, (iii) agile, innovative organizations will disrupt the actual market by improving the quality, speed, or price at which value is delivered. On demand side growing transparency force organizations to adapt the way they design, market, and deliver products and services. Technology-enabled platforms (different of supply networks or supply chains) combining demand and supply are increasingly under development and disrupt existing industry structures. With reference to the public authorities the main challenge identified during 2016 Davos WEF refers to their ability to adapt. Public authorities will survive only if they prove capable of embracing a world of disruptive change. This implies an expectation for evolving. Participants in Davos argue that the actual linear and mechanistic decision making process within the public sector, which follows a strict “top down” approach is no longer feasible. Thus, the presumption is for public authorities to embrace “agile” governance, a model successfully used in the private sector in the last decades.

## **2. Literature Review**

The term „artificial intelligence” was first coined in 1955 by John McCarthy during Dartmouth Artificial Intelligence (AI) Conference. As of today, the artificial intelligence is part of daily public procurement operations. Below few „facts” in public procurement, part of our life at operational level are nominated. These are:

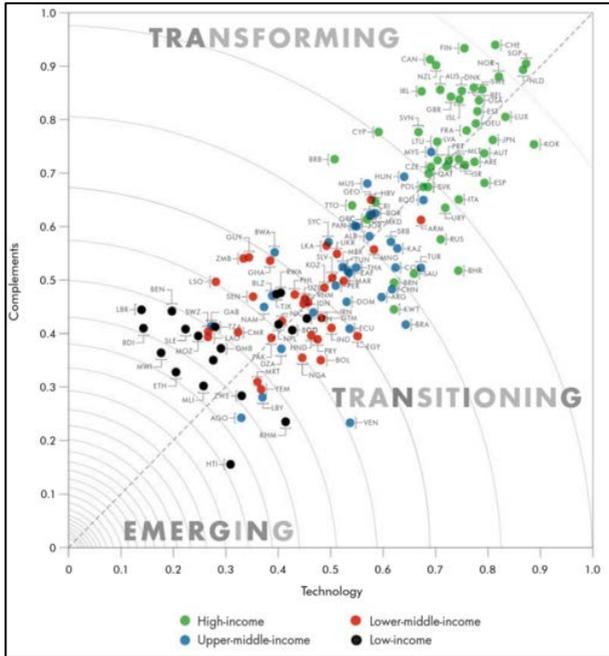
- i. **Mandatory introduction of e-procurement (Directives 2014/24, 25). This action implies among others, data being centrally and**

- automatically collated. As a result better premises for** transparency, for management of the corruption risks, for a better quality of public administration in general and a better capacity of public procurement system in particular are created
- ii. Mandatory introduction of e-signatory and e-payment and e-invoicing
  - iii. initiation of Semantic Web applications, through projects such as LOTED 2 (Linked Open Tenders Electronic Daily) aiming at the creation of linked data-compliant representations of information regarding tender notices in public procurement at the level of European Single Market, while focusing on placing such representations within their legal context.
  - iv. IMI Public Procurement pilot project as part of– used for **Information requests**, with the aim to check information and documentation provided by economic operators participating in the public procurement exercises within the Single European Market
  - v. The Digital Single Market Strategy for Europe launched on May 2015 and “Once-Only Large Scale Pilot” launched in December 2015 as part of H2020 Work Programme 2016, with the ultimate aim for businesses should supply information only once to any public administration

The above exemplified legal provisions and trends in public procurement belong to the world of information systems. For the specific area of public procurement the above facts are the result of processes using as entry data hardware, software and educated public procurement officers. Currently, the information systems are of relevance both at the level of contracting authorities and contracting entities (for facilitating the planning, control, coordination and decision making) and at the level of Public Procurement System as a whole for designing and implementing the specific functions of the system (policy making, support for operations of the contracting authority, monitoring and supervision, etc.). Nowadays, e-procurement (from e-advertising to e-invoicing and e-payment) is part of daily life of contracting authorities or contracting entities. Worldwide countries are at different stages in implementing e-procurement, since its implementation is also conditional on regulatory, institutional, and human resource factors for impact (World Bank, 2016) and of the general context in which is used, as depicted in the

figure below (World Bank, 2016). Romania is currently in the transitioning phase.

**Fig 1 – The Quality of complements and technology rises with incomes Digital Dividends**



Source– World Development Report – The World Bank Group pg. 252

Meanwhile, in the last two years IBM systematically promoted cognitive procurement, a solution that introduces procurement practitioners to a whole new world. According to information available on the market, Watson goes beyond business intelligence and is involved in finding answers to questions related to content of contract clauses that could solve a particular issue that needs to be addressed in a public procurement transaction. It follows that Watson is able to provide more than answers to numerical problems. It generates hypotheses, reasoned arguments, and recommendations

about more complex bodies of data (which is not the case of procurement intelligence).

### **3. Hypothesis**

The first hypothesis employed for this paper is that a new age has begun in the world of public procurement. This development must not be seen isolated, but within the context of the impact of artificial intelligence on government as promoted within WEF 2016. Second hypothesis is that Romania needs to employ a social system perspective on its Public Procurement System in order to set the ground for performing in public procurement policy area.

### **4. Romania: 2015 snapshot performance within its cultural environment**

Starting with September 2015, Romania benefits of a strategy in public procurement (HG 901 from 27<sup>th</sup> October 2015, published in the Official Journal number no 881 from 25<sup>th</sup> November 2015), aligned with the EU public procurement strategy and developed within a structured dialogue with the European Commission. It follows that the performance ground is set up.

The performance, the outputs and the outcomes of the public procurement impacts national competitiveness. According to OECD, the main determinants of competitiveness “pillars” included in Global Competitiveness Index are linked with public procurement. Overall, Romania is ranked 53 out of 144 countries worldwide, with ascending trend line for the rank evolution in percentile since 2007.

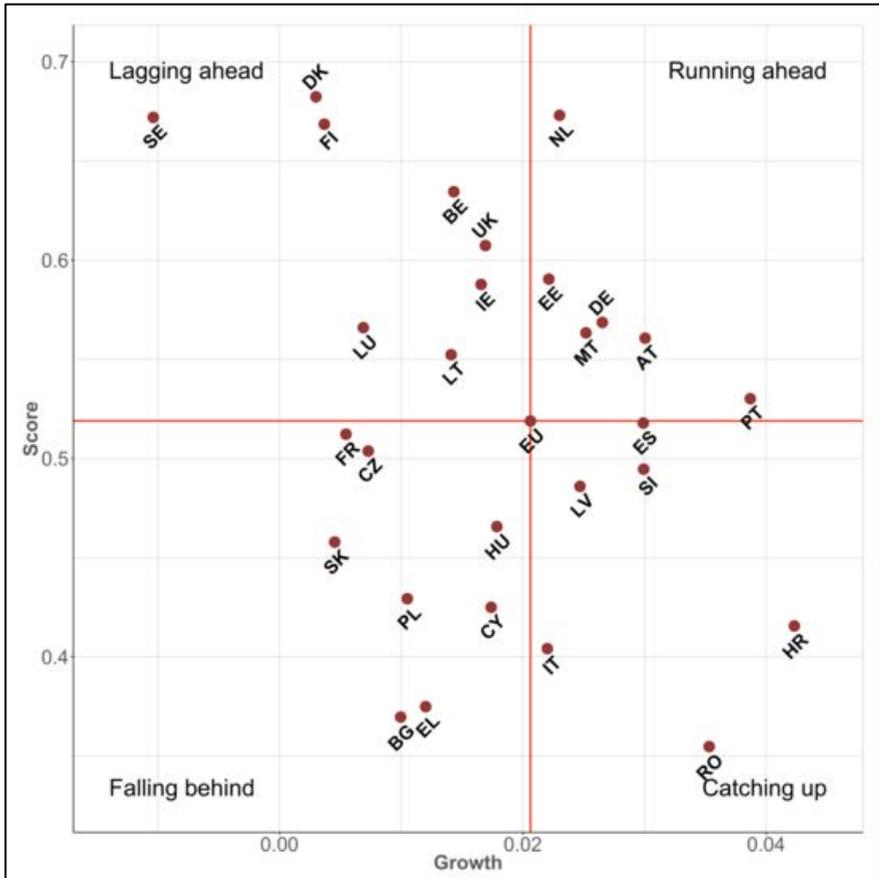
According to EU Single Market Scoreboard: (i) the overall performance of Romania in PP policy area in 2015 is below average, scoring unsatisfactory for first 4 out of the 6 dimensions

### **Fig. 2 - Procurement Performance Indicators Dashboard**



With reference to Digital Economy and Society Index (DESI), summarising relevant indicators on Europe’s digital performance and tracks the evolution of EU member states in digital competitiveness, Romania is in the „**Catching up**” cluster, in terms of development stage and pace.

**Fig 3 – Countries grouped in clusters according to their score in DESI 2016**



Source: European Commission (2016) The Digital Economy & Society Index (DESI)

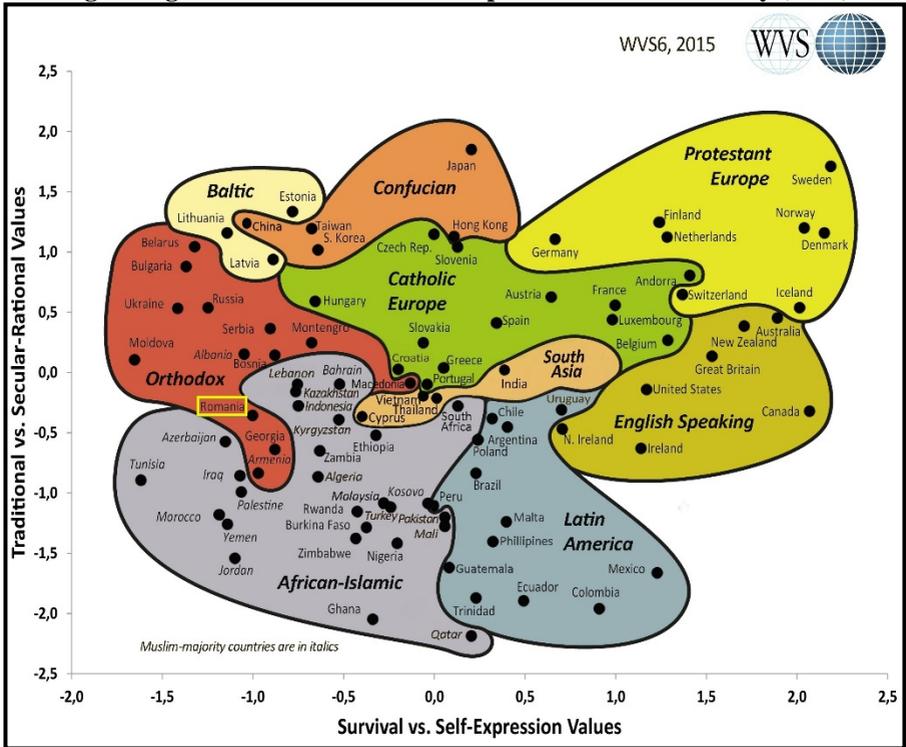
The „culture” concept benefits of many definitions in the literature while the impact of culture on societies is subject of many researches. Two definitions are selected as relevant for the frame of this paper, namely: (i) “the collective programming of the mind which distinguishes the members of one group or category of people from another” (Hofstede, Minkov: 2010) and (ii) “the way in which a group of people solves problems” (Trompenaars: 1998).

From the many researches showing the impact of culture on performance, two models are selected: (i) the Inglehart–Welzel Cultural Map, resulting from time series investigation of human beliefs and values over more

than 30 years, published by World Values Survey (WVS) and (ii) the most referenced cultural value model associated to Hofstede's definition of culture, frequently used to describe cultures.

The figures below show the position of Romania in WVS Cultural map (fig. 1) and the score of Romania for each of the Hofstede's model on dimensions of national culture (fig. 2).

**Fig 4 - Inglehart–Welzel Cultural Map – World Values Survey (2015)**

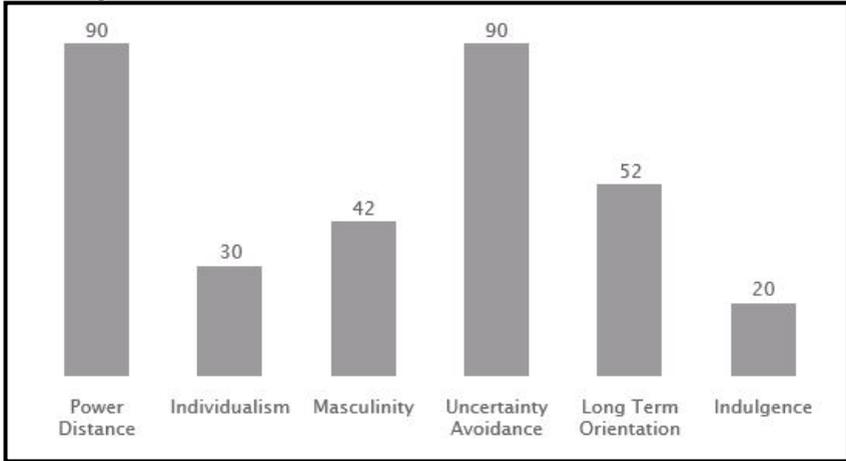


Source: World Values Survey: “Inglehart–Welzel Cultural Map (2015)”

„The WVS has over the years demonstrated that people’s beliefs play a key role in economic development”. On the map assessing two major dimensions of cross cultural variation in the world for 2010-2014, Romania scores negative on both dimensions. Features such as (i) the importance of deference to authority and (ii) the emphasis places on economic and physical security are

linked, among others, with low levels of trust and tolerance, with low priority for environmental protection and with no pro-active demand for participation in decision-making in economic (and political) life.

**Fig 5 - Romania's scores for the dimensions of national culture**



Source: based on the model developed by the validated research done by Professor Geert Hofstede, Geert Jan Hofstede, Michael Minkov (Hofstede, Hofstede, Minkov: 2010)

Romania scores: (i) 90 on „Power Distance Index” dimension, which means that people accept a hierarchical order in which everybody has a place and needs no further justification; (ii) 30 on „Individualism” dimension, which is considered a collectivistic society and in which loyalty is paramount; (iii) 42 on „Masculinity” dimension and therefore the focus is on “working in order to live”, managers strive for consensus, people value equality, solidarity and quality in their working lives; (iv) 90 on „Uncertainty Avoidance” dimension and thus has a very high preference for avoiding uncertainty; people have an inner urge to be busy and work hard, while innovation may be resisted; (v) 52 on „Long Term Orientation” dimension being interpreted as being in an inception phase of a pragmatic approach namely encouraging efforts in modern education as a way to prepare for the future; (vi) 20 on „Indulgence” dimension means people have the perception that their actions are restrained by social norms and feel that indulging themselves is somewhat wrong.

Romania benefits of specific national and organizational culture which impact on „doing business” behaviour. The specifics and dynamics of the

culture become even more relevant in a government policy area, subject of rules which require appropriate degree of transparency and a continuous alignment with the dynamics of the environment.

The challenge faced in public procurement in Romania, within the given cultural context and with the above highlighted performance are in my opinion, at least the following:

- i. Public procurement departments within the contracting authorities are being required to do more with less
- ii. Continuous “ad hoc” approach to market analysis
- iii. Very low usage of advanced analytics at the level of contracting authorities
- iv. The existence of numerous different systems (PREVENT, SEAP) which requires multiple types of data, while there is no overall view of the required information
- v. There is no common approach to gain knowledge across the contracting authorities; in practice this leads to inconsistent leveraging of information.

The current impacts and the expected disruptive changes of the artificial and cognitive intelligence on the public procurement area in general and on the Romanian Public Procurement System in particular would be in the near future as follow:

- i. **A new profile of the public procurement officer.** The profile of the traditional (Romanian) public procurement officer who counted success through lowest price award criterion within the context of compliance with the legislation will be replaced by procurement teams that adopt a multidimensional approach to managing of the procurement process. As a result of procurement policy objectives, while reducing costs will be important (instead of price reduction) it will not be the overarching factor in all procurement processes. **New mind-sets are also of essence:** doing business in a more transparent society requires actively participation in the re-evaluation of the public organization relationship with its context/environment. Following this approach, procurement teams (instead of procurement

- officers) will play a critical role in sharing information about internal and external costs across the public sector.
- ii. **Changes in organizational charts both at the level of buyers** (contracting authorities and contracting entities) **and sellers** due to the technology based business environment and the strong role of information: big data is increasingly included into decision making processes. In turn, this requires public organizations to become more comfortable with advanced data mining and analysis techniques. The world of public procurement will be a data-driven world. This offers access to real-time updates on transactions across a wide spectrum of public organizations and a lot of ready to be used information, as a result of sharing technologies.
  - iii. **New requirements associated to a more efficient risk management**, since information can be accessed in real-time
  - iv. **Reduced transactional costs**, since many of the activities will be performed online on platforms.

Within the described context, the Romanian PP System's management needs to understand their changing environment and inexorably and continuously innovate. The immediate consequence is the need to continuously adapt to a new and dynamic environment. In particular the development of global platforms implies that skills and competencies, culture, and organizational forms have to be continuously redesigned.

This means regulators must continuously adapt to a new, fast-changing environment, reinventing themselves so they can truly understand what it is they are regulating. To do so, regulatory agencies will need to collaborate closely with business and civil society. For this approach, the perception of the Romanian Public Procurement System as social system is of essence.

According to Niklas Luhmann's theory of social systems, the field of public procurement may be perceived as a social system (Luhmann, 1995). In order to perceive the public procurement system as a social system the following issues need to be simultaneously considered:

- i. **The need to differentiate the public procurement system from its context by identifying its boundaries.** This can be done by using specific methods of system boundary management, such as planning the system's objectives or the development of the system's structures

- ii. **The need to analyze the context/environment of the system, and its connections to the context**, by using specific methods, such as the analysis of the relationship with other systems (for example between the public procurement with the public administration system, Romania's public procurement system as part of the European public procurement system)
- iii. **The need to accept the fluctuation of the system's complexity degree.**
- iv. **The necessity of the system's dynamics management**

**The need to change the traditional approach of procurement in Romania, by switching from a procedure orientation to a process orientation**

## **5. Discussions**

In contrast to the private sector, the public sector is expected to achieve a defined service level: in practice, this means this means 100% service level. Effective service delivery requires efficient and transparent government procurement. Procurement is particularly vulnerable to collusion and corruption; thus, e-procurement, through greater transparency and less discretion, can result in significant budgetary savings and better-quality infrastructure (World Bank: 2016). However, e-procurement cannot be performed without proper infrastructure and without the intervention of human dimension.

In parallel, digital disruption materializes in the use of digital technologies and business models aiming for improving business performance and reshapes the markets faster than any other previous forces acting on the market. Governments are currently explicitly required now to achieve value for money in the area of public procurement.

The discussions in the WEF stress the importance of artificial intelligence as well as the impact of it on the governments. The proposed solution is „ agile” government. In parallel, the Romanian Public Procurement Strategy encourages a shift in mind, and a new perspective in public procurement.

The economic literature mentions two options for this: Minimizing costs or maximizing value (Porter, 1985)

## **6. Conclusions**

In conclusion, approaching public procurement as a social system is essential to understand the premises that underlie the development and functioning of that system in the context of cognitive and artificial intelligence. Moreover, the acceptance of such an approach is necessary to the success of the declared intent to isolate and diminish the public procurement bureaucracy, to concentrate efforts and resources on efficiency and effectiveness of the system instead of just focusing on the shape of the system's framework.

Not accepting this approach and continuing to view the system as a multitude of institutional organisations, will translate into a continuous waste of resources without any connection to the system's legitimate purpose. Accepting the approach of the public procurement system as a social system establishes the basis of a proper administration of the system in the context of the general expectation of establishing the „agile government”.

Currently we are faced with a new age of procurement based on cognitive intelligence. This specifically requires a social system perspective of public procurement. This new age of procurement is characterised by the fact that cognitive intelligence provides answers to questions only procurement professionals were able to answer before. Now, cognitive intelligence replaces procurement professionals, especially in areas such as market research, monitoring, data collection, and supplier profiling.

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