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ORIGINAL ARTICLE

Cybernetic governance of the Peruvian State: a proposal

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Abstract
This paper aims to make a proposal to govern the Peruvian State under the umbrella of management cybernetics, following the paths of the viable system model (VSM), proposed by Prof. Stafford Beer, enriched with other soft and hard systemic methodologies and technologies, to cover the soft and hard issues that are part of the complex Peruvian reality at different levels of recursion. For doing this, four defined perspectives were adopted to understand the complexity of Peru: the sectoral view, the regions view, the river basins view and the macroregions view. Peru is seen as a system in focus, defining, for each of these four perspectives, the five systems that VSM has. The application of the VSM in each perspective serves to apply it in two modes: diagnosis and design, according to the respective perspective. Then an integrative analysis and reflection is done considering the four perspectives, to analyze the viability of the VSM approach in the governance of the Peruvian State to establish some conclusions and recommendations in relation to the proposal, appearing at the end of the paper.

Keywords Business process management (BPM) · Competitiveness · Expert systems · Issue-based and primary task analysis (IB&PTA) · Perspectives · Peru · Law of requisite variety · Social network analysis (SNA) · Soft system dynamics methodology (SSDM) · Soft systems methodology (SSM) · Systemic methodology for risk evaluation and management (SYSMEREM) · Viable system model (VSM)

1 Introduction

The present paper proposes the possibility of applying the viable system model (VSM) developed by Prof. Stafford Beer (Beer; 1979, 1981, 1985), to manage the complexity arising in the governance of the Peruvian State.

As the aim of the present paper is to consider the idea of applying a cybernetic approach for the governance of the Peruvian State, a brief history of the system thinking introduction and practice in Peru would be interesting for the readers, to contextualize the proposal of the paper.

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2 A brief history of the system thinking and cybernetics introduction and practice in Peru

Operational research, a branch of systems thinking and cybernetics, was introduced initially in Peru, at San Marcos National University, where an operational research career was founded in 1969. Among the outstanding professionals from this faculty, Profs. Carmen Neyra-Balderrain, Carmen Gomez-Ticeran and Luis Ulfe-Vega can be mentioned.

The same happened at the National Engineering University (UNI), in the early 1970s, with the introduction of subjects like Operational Research I (linear programming), Operational Research II (systems simulation) and Operational Research III (dynamic programming). Profs. Augusto Mellado-Mendez, Eduardo Toledo-Gonzales and Luis Flores-Fonseca were principal lecturers in these subjects at the Industrial and Chemistry Faculty-UNI, so that diverse academic applications on operational research and discrete simulation models began to be done by industrial and chemical engineering students. Also, during those years, Prof. Jose Portillo-Campbell, another principal lecturer at UNI, began to teach system dynamics to postgraduate students, and some

system dynamics models started to be made by him and his students.

On the other hand, in the Economics Engineering Faculty at UNI, a research center called Grupo de Investigaciones Economicas (GIECO), led by Arch. Fernando Carbajal-D'Angelo, began to develop, in the mid-1970s, economic models using the numerical experimentation method, proposed by Prof. Oscar Varsavsky (Varsavsky and Calcagno 1971), an Argentinean mathematician modeler with important influence in Latin America at those times.

Starting in the the 1970s, as well, Dr Francisco Sagasti, disciple of Prof. R. L. Ackoff at the Wharton School, University of Pennsylvania, USA, began to use optimization models based on operational research techniques (Sagasti 1972), looking for improving the decision-making process in Peruvian government dependencies and in Peruvian higher education. Afterward, he became strategic planning manager at the World Bank and an international consultant. Lately, in 2020, he became interim President of Peru.

At the same time, a Peruvian artist, Teresa Burga, made an important contribution to introduce a holistic view in Peru. Using her artistic perspective, she did an integration of the arts (painting), with technology, cybernetics ideas, as well as with what is now known as data science (Burga 1972).

In the 1970s and 1980s, there were operational research experts working in diverse Peruvian State organizations like Eduardo Toledo-Gonzales, Luis Medina-Caro, Zalatiel Carranza-Avalos (Entel-Peru), Larry Reusche, Diomedes Sarmiento (Centromin Peru), Luis Bullon-Salazar, Genaro Figueroa, and Milton Rodriguez-Cornejo (PetroPeru), among others.

In 1983, Prof. Ricardo Rodriguez-Ulloa, disciple of Prof. Peter B. Checkland at Lancaster University (U.K), introduced systems thinking concepts and methodologies in the Faculty of Industrial and Systems Engineering—UNI. In 1985, he lectured at the Business Graduate School—Pacific University, in Lima, introducing the soft systems approach to graduate students, publishing a paper (Rodriguez-Ulloa 1988) and two books related to systems thinking (Rodriguez-Ulloa 1994a, 1994b).

In April of 1990, Prof. Rodriguez-Ulloa founded the *Instituto Andino de Sistemas—IAS*[1]. From that time till now, IAS has been working in diverse consulting and research projects, doing systemic training for Latin American and Spanish participants, organizing international conferences and publishing articles (Rodriguez-Ulloa 1990, 1993, 2001), books and the *Journal Sistemica*[2], a well-known journal on systems thinking, published in English and Spanish editions.

Since more than two decades, IAS belongs to the *International Federation for Systems Research (IFSR)*.[3] Diverse systemic methodologies have been created at IAS, among them the following can be mentioned: soft system dynamics methodology—SSDM (Rodriguez-Ulloa 1995, 2002; Rodriguez-Ulloa and Paucar Caceres 2005; Rodriguez-Ulloa et al. 2011, 2021); *systemic methodology for dynamic balanced scorecards—DM* (Rodriguez-Ulloa 2010); *systemic methodology for risk evaluation and management—SYSMEREM* (Rodriguez-Ulloa 2018), *soft-business process management methodology—Soft-BPM* (Rodriguez-Ulloa 2020, 2021).

In August 1992, with the occasion of the First International Working Conference of IAS, the *Latin American Association of Systemics (ALAS)*[4] was founded and since that date has been the organism to link systems thinking organizations and practitioners of Latin America. Now its Secretary Office is managed from the Instituto Politecnico Nacional—IPN, Mexico.

It is also important to comment that since that time until now, there are more than 29 faculties in Peru, teaching the career of systems engineering, where the main topics about systems thinking methodologies are covered.

3 The viable system model: an overview[5]

The viable system model (MSV), proposed by Prof. Stafford Beer (Beer 1979, 1981, 1985), is an approach that considers the structure of the system under study and allows to increase the variety of responses of the system toward the environment, to interact successfully with it, in terms of viability, understanding by this, the ability to deal with the variety of situations that the system encounters in the environment with which it interacts.

The viable system model (MSV) is composed of five (5) systems: System 5, System 4, System 3, System 2, and System 1.

Each of them have special characteristics, which, using Ashby's Law on Requisite Variety, allows its integration and permanent and effective interaction as a total system with the environment, through the principle of recursion and the development of autopoietic processes that allow the total systems to have the ability to adapt themselves to the environment, precisely in search of their viability over time.

[1] https://iasvirtual.net.

[2] http://www.iasvirtual.net/libros/lrsv11i.htm.

[3] https://ifsr.org/.

[4] https://ifsr.org/asociacion-latinoamericana-de-sistemica.

[5] This version has been adapted and improved from the original version that appeared in ***Sembrando un Futuro Sostenible: Innovación Agraria del Perú al 2050***, Instituto Nacional de Innovación Agraria – INIA (2020), pp. 178-188, Lima. Initially it appeared in the Milennia Magazine, Vol. 2, No. 2, Instituto de Investigacion, Facultad de Ingenieria Industrial y de Sistemas – FIIS, UNI, 2000, Lima.

The central idea of the VSM is the design of a system, as perfect as possible, capable of handling the variety existing in the environment. This system must be internally organized in such a way that it is possible to generate, as emergent properties, a set of capacities that allows it, as a living system, to be viable along time. In this sense, the idea is to conceive viable systems, that is, systems that have the capacity to generate a variety of responses equal to or greater than the variety that exists in the environment.

The way it interacts with the environment implies taking into account two concepts of great importance for the management of the variety: attenuation and amplification. The most perfect machine that humans know to do attenuation and amplification is the human nervous system.

Attenuation: To face the variety of the environment and to be able to have a greater variety of responses than the environment, what is required is precisely to attenuate the variety that the environment brings. If this were achieved, then it would be possible to reduce the variety of the environment on the system and in this way the problem of the interaction between the two would be manageable for the system, achieving its viability.

Amplification: On the other hand, one of the things which should be done, so that the variety of the system can respond adequately to the conditions of the environment and influence it, is to amplify (through a procedure, process or algorithm) the variety of its actions, so that the environment feels its effect multiplied several times, thus achieving the possibility of being able to influence the environment, from a variety of responses equal to or greater than those that are possible to receive from the environment.

The viable system model (VSM) proposed by Beer (1979, 1981, 1985) is shown in Fig. 1, in which it can be clearly appreciated how the five systems that make it up interact in a way that they form a viable whole, capable of establishing a viable relationship with the environment and the variety that it brings. For its conception, Beer was based on neurophysiology, to be applied to the study of human organizations of any type and size.

3.1 Description of the components of the viable system model (VSM)

Each of the systems that comprise the VSM are described below:

System 5: System 5 is the consciousness of the organization, in which resides the values, principles, and what the organization considers ethically correct or incorrect. There are also the paradigms, illusions, expectations, hopes, dreams and desires of the organization and its members at all levels. The organization's raison d'être resides in System 5, consciously or unconsciously, which comes from the wishes, desires and fears of all of its members (stakeholders).

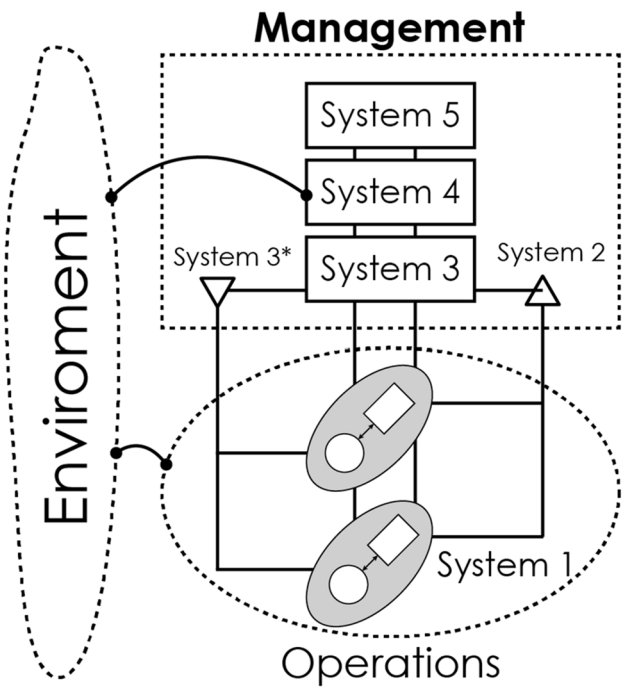

Fig. 1 Viable system model (VSM) overview. Source: A holistic approach for Cyber Assurance of Critical. Infrastructure with the Viable System Model, Theodoros Spyridopoulos, Ioanna Topa, Theo Tryfonas and Maria Karyda. IFIP SEC 2014

All of this is formed over time, and it also evolves as the organization learns from its experience with the environment. The way by which it learns and receives information is by System 4, the same one that filters information from both the environment and System 3, which in turn collects information directly from the various System 1 or through System 2 or 3*.

System 5, on one hand, conditions the actions of Systems 4, 3, 2 and 1, but in turn, it is influenced, modified, updated and even rethought, based on the information it receives from the aforementioned systems.

System 4: System 4 is one that has to do with the strategic management of the organization. At this level, the organization interacts with the environment, but with the one that has to do with its strategic implications, unlike the environment with which Systems 1 interact, because they are at an operational level.

System 4 has to fulfill a rather delicate mission, since it has to know how to "read" what happens and will happen in the medium- and long-term environment. It must also consider the principles, philosophy, values and existing culture of the "Owners of the situation" in the organization (who are in System 5). Identity is expressed in System 5, which contains values, mission, vision, philosophy, and principles on which the actions of the organization are based on. In addition to having to consider the principles and identity

(consciousness) of the organization and the aspects of the strategic environment, System 4 must consider all the information and demands that System 3 makes, according to how things are being developed internally in the organization. So, System 4 must again make use of the concepts of attenuation and amplification, to achieve its viability and, therefore, the viability of the organization as a whole.

System 3: The task of System 3 could be defined as that related to ensuring that internally "things go well" within the organization seen as a living organism.

Making a simile, System 3 could be seen as that system that is in a permanent state of alert to verify, in real time, that all the internal parts of the human body are working without incidents and are displaying all their capacities for which they have been designed, also considering that according to the control information received (System 2) the necessary changes and adjustments will need to be made in Systems 1 and in real time.

There are three types of activities that System 3 develops:

A1: Planning of norms, procedures, and policies.

A2: Negotiation of orders and demands of Systems 1s.

A3: Allocation of resources to achieve the objectives, challenges and goals, through the procedures, guidelines, norms and policies established.

Additionally, System 3, for the proper achievement of its control action on Systems 1, also has an audit-type interaction (called 3*), the same one that aims to establish the verifications of the case to achieve the objectives, challenges and goals established, as well as compliance with the procedures, standards, policies and guidelines considered as part of the ways in which the organization must interact with the environment.

All this will be possible to fulfill, if System 3 provides the necessary resources to Systems 1s, according to the complexity that Systems 1s face in their respective local environments.

System 2: System 2 is the system that allows sensitive information (indicators) to be collected and communicated to System 3, so that it is possible to establish some control action to manage variety on Systems 1s.

The responsibility of System 2 is broad, since if this system does not function properly it will be impossible to establish permanent control over the variety coming from Systems 1s.

This aspect is important, because the information that System 2 must process and communicate must be one that has the characteristics of describing the phenomena that occur in the environment–executor component (EC)–directive component (DC) chain of each System 1, from ontological and epistemological perspectives, over time and space. This implies that the information can be qualitative or quantitative, formal and informal, past, present or future, about the characteristics of the elements involved in the situation, as well as information on the actions or acts that the mentioned elements perform in the space and time and the anti-oscillatory measures that System 2 has to do over Systems 1s.

Another important aspect of the type of information that System 2 must provide is the information that should be managed in real time, to establish the pertinent and timely feedback to System 3, such that right and precise actions can be taken on Systems 1, so that the interactions with the operating environment, with which they interact, are as appropriate as possible.

System 1: System 1 becomes that system that is on the battlefront, the one that has to deal with everything that is related to the immediate now, with the operational issues. It is made up of two components: the directive component (DC) and the executor component (EC).

The directive component (DC) is the one that establishes the procedures, rules, ways of operating, operational guidelines, policies, standards, and specific functions that must be performed in the routine tasks. The executor component (EC) is one that is oriented to execute everything proposed by the directive component (DC) of System 1.

It is also the one that interacts with the environment, but an environment that is at its operational level.

In addition to the considerations of amplification and attenuation in the chain environment–EC–DC and vice versa, to be able to build a viable situation, the aspects that also influence these amplification or attenuation interactions and their pathologies are those related to the concept of sender, receiver and transducer channel.

It should also be mentioned that there can be as many Systems 1s, as necessary, to describe, epistemologically speaking, various activities that an organization could be doing.

Figure 2 shows the VSM in much more detail, showing various aspects that are taken into account in the study of organizations of any kind, sector or size. The concept of recursion is also included, in each of the Systems 1, becoming new viable systems models, with their respective five systems, in a system of a lower recursion level. In this way, it is possible to travel to any level of recursion that is required, according to the problem being studied.

4 Applying the viable system model in mode I: diagnosis of the Peruvian situation

4.1 Peru after two decades of the twenty-first century

Peru after two decades of the twenty-first century continues still having deep structural problems that are affecting its

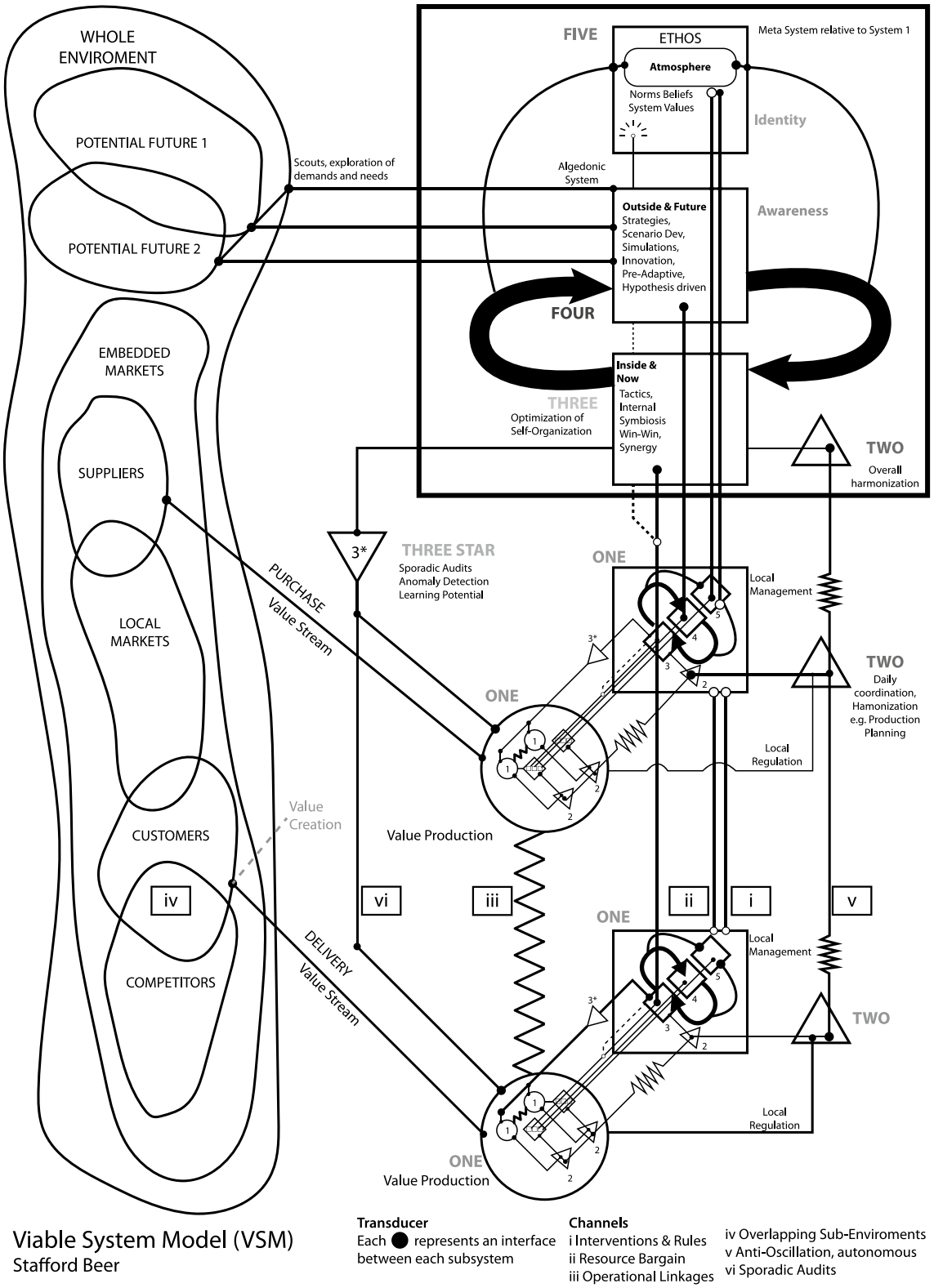

Fig. 2 Viable system model (After Beer 1985). Source: Wikiwand

growth and development. One of the main issues is corruption at all levels in the private and government sectors.

Another aspect that is affecting Peru's development and growth is its traditional paradigm under which Peruvian society has been and currently are being educated. By traditional paradigm it is mean the paradigm based on reductionism, positivism and objectivism that Peruvian citizens have been educated with, adopting unconsciously a binary way of thinking, making people assume divergent and conflictive positions when they interact in groups.

For the application of the VSM in Mode I (diagnosis), four perspectives are applied: (a) sectoral perspective, (b) regional perspective, (c) river basins perspective and (d) macroregions perspective.

4.2 Sectoral perspective

4.2.1 System 5

System 5, in a sectoral view (Fig. 3), is composed of the Executive, the Legislative and the Judicial branches, as well as autonomous constitutional organizations such as: The National Jury of Elections, the National Office of Electoral Processes, the Judiciary National Council, the Constitutional Court, the Public Ministry—Prosecutors Office of the Nation, the Ombudsman's Office, Comptroller General of the Republic, Superintendency of Banking, Insurance and Pension Fund Administrators (PFAs)s and the Central Reserve Bank.

- The structure of the Peruvian State is based in a structuralist—functionalist, approach, coming from Frederick W. Taylor (2006) and Henry Fayol (2013), where the organigram is a key concept that describes the diverse functions and hierarchies that any organization can have.
- Concerning science, technology and innovation (ST&I), Peru shows a low development. The budget in the last 15 years has been increasing; however, the amount of budget assigned to science, technology and innovation is low compared with countries of Latin America such as Colombia, Chile, Argentina, Mexico or Brazil (See Fig. 4).
- Systems 5 delineates the Peruvian State to work in a slow way, reacting to events instead to proactively preventing the effects of them.

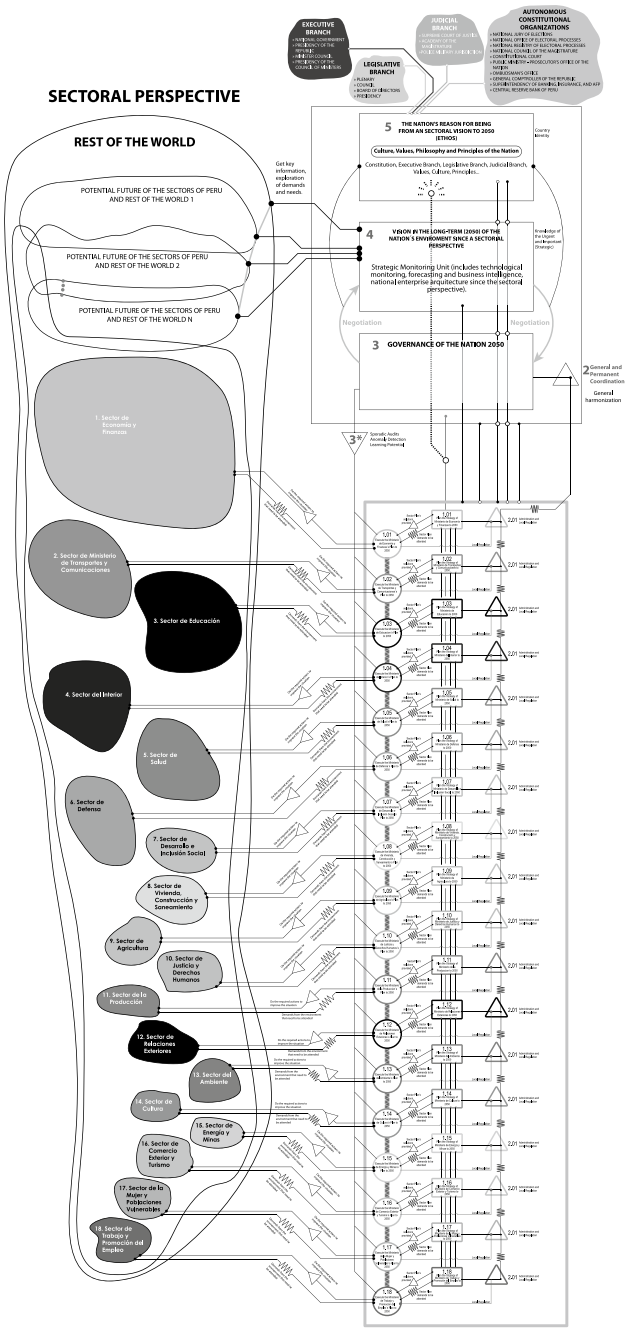

Fig. 3 Applying the viable system model in mode I: diagnosis of Peru: sectoral perspective (Adapted from Beer 1985) Source: Own Elaboration

4.2.2 System 4

The Presidency of Ministers' Council is a key component of Systems 4. There is an incipient use of foresight techniques to visualize the future of ST&I scenarios for Peru.

- There is a lack of an active presence of the National Planning Center (CEPLAN), to lead the strategic transformation of the whole country.

4.2.3 System 3

Concerning System 3, it can be seen that this work is done, currently, by the Presidency of Ministers' Council, the

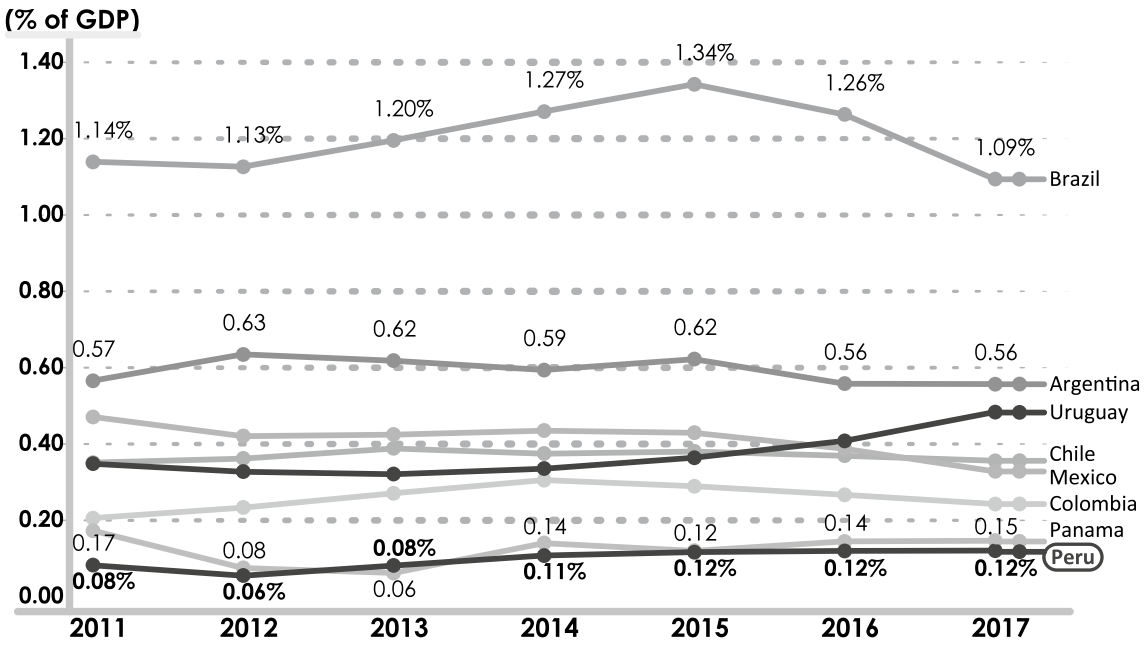

Fig. 4 Research and development spending in some Latin American countries. Source: World Bank, Retrieved on 16.11.2021 from https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS

Ministers' Council, the Public Ministry—Prosecutors Office of the Nation, Ombudsman's Office, Comptroller General of the Republic, Superintendency of Banking, Insurance and PFAs, the Central Reserve Bank and several Congress's commissions.

- Currently, there is a lack of speed in the decision process made by System 3. There is a slow feedback from Systems 1s (i.e., the sectors); there is lack of monitoring and control in real time about the performance of each System 1. Diverse corruption incidents have been detected in the past in Systems 1s, and System 3 has not been able to act with speed and firmness.

4.2.4 System 2

An area or entity under the umbrella of the Presidency of Ministers' Council has this role.

- The information provided to System 3, at present, is not in real time and usually it is sent and stored in physical documents, due to established administrative rules.

4.2.5 Systems 1s

The environment of Systems 1s are composed by all the sectors existing in the public administration. Currently, there are 18 sectors (see Fig. 3).

- Peruvian's economy structure is based, traditionally, on raw material exportations, especially from the mining, agriculture and fishing sectors (See Fig. 5).
- There exist corruption practices in the public administration as well as in the private sector (See Fig. 6).
- Corruption exerts an impact on the economic performance of the country which has been well in macroeconomic terms, but very low in competitiveness and productivity terms.
- Peru is located since time ago in the lower 1/3 of the less competitive countries around the world, however the situation is getting worse in the last 15 years, where there is a negative trend, according to the IMD Competitiveness World Ranking (see Fig. 7).
- One of the main weaknesses of Peru is the lack of a road infrastructure to connect the whole country, which can support the logistic network needed to develop the internal economy.
- The quality of Peruvian education is very low since almost 30 years onward. There is a deep crisis in the educational system at all levels, which is affecting the overall performance of the country. Figure 8 shows the results of 2018 Pisa Test for secondary schools.
- In the internal affairs sector, problems with drug dealing and insecurity of citizens because of the crimes in the main cities have been increased significantly in the late years, and the existence of drug–terrorism activities, especially in jungle area of the country, are the main problems.

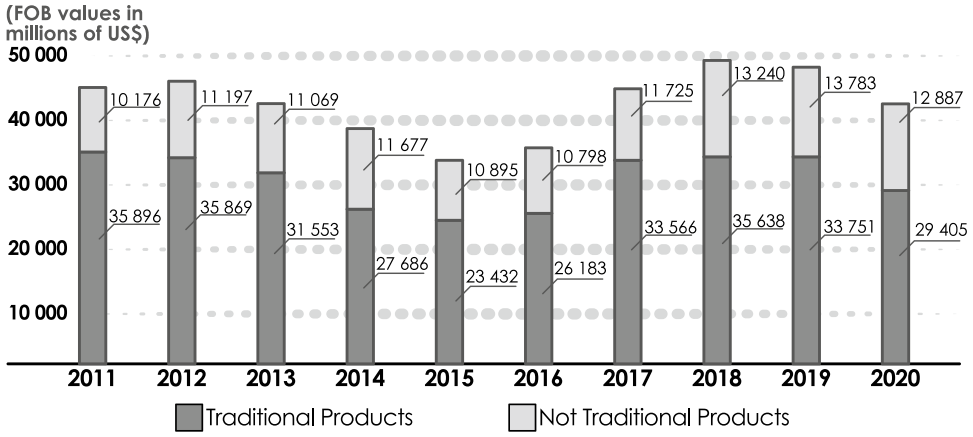

Fig. 5 Composition of exports—Peru. Source: BCRP 2020 Memory, Appendix 24

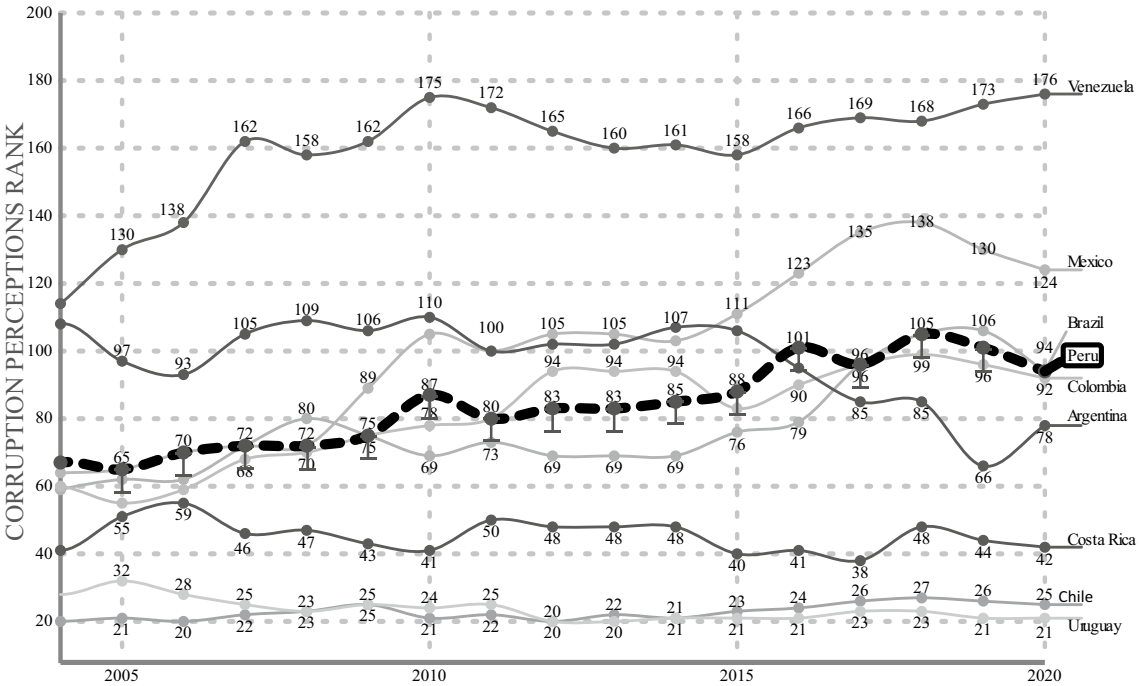

Fig. 6 Corruption perceptions rank (1998–2020). Source: Corruption Perceptions Index. Transparency international. Retrieved on 16.11.2021 from: www.transparency.org/en/cpi/2020/index/nzl

- The health system has collapsed and has not replied adequately to the challenges of COVID-19. The amount of deaths per 100,000 population (see Fig. 9) was the highest in the world in a specific moment. The mean time (in days) for a patient to be attended in a hospital of the Social Security System (EsSalud) is about 90–120 days. There is a lack of physical infrastructure, modern equipment, physicians and nurses.
- In the defense sector, the main challenge nowadays is to face the terrorists operating in the Valle de los Rios Apurimac, Ene y Mantaro, also known as the VRAEM area in the Peruvian jungle. In addition to this, the surveillance of the borders, especially in the southeast, the east and northeast of the country is very necessary to combat smuggling, drug dealing, illegal mining, illegal forest exportations and illegal human traffic.
- The great social and economic differences in diverse geographic areas from the highlands and the jungle are the challenges of the development and social inclusion sector.
- One of the main challenges in the agricultural sector is the extinction of species in the flora and fauna due to illegal practices of informal businesses located in the highlands and the jungle. In addition to this, the coca cultivation in the jungle, done by people acting outside the law and with the support of drug–terrorists is a factor

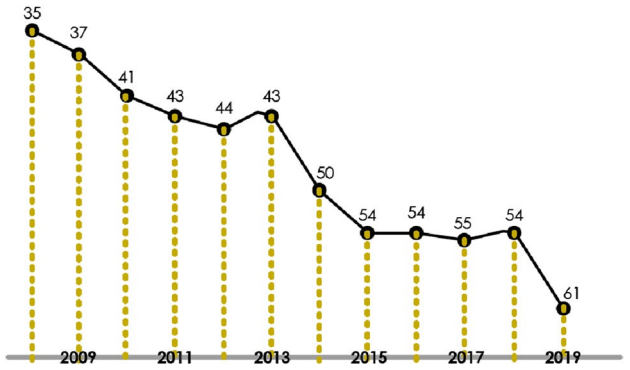

Fig. 7 The competitiveness ranking IMD index—the case of Peru. Adapted from Source: https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/

that contributes to pollute the flora and fauna environment.

- A great weakness in the justice sector is the existence of a high level of corruption, with Peru being one of the most corrupt countries around the world. Corruption exists in the private and the public sectors. The justice system is the one where surveys made to Peruvian citizens indicate to be considered as the most corrupted sector of the Peruvian State's structure (see Fig. 10), affecting its overall performance. Impunity is related to corruption as well.
- In the foreign affairs sector, the challenge is to develop a diplomatic strategy that contributes to increasing Peru's image as a country that can offer world class products and services around the world.

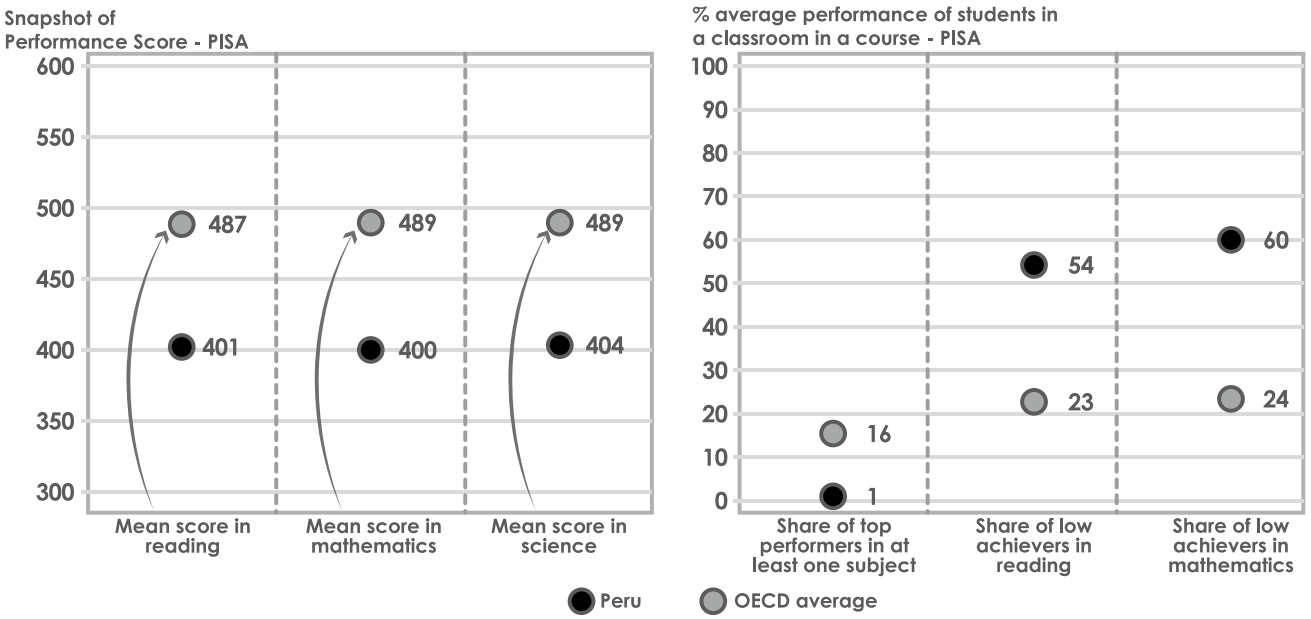

Fig. 8 Snapshot of performance in reading, mathematics and science. Adatped from Source: The Programme for International Student Assessment—PISA

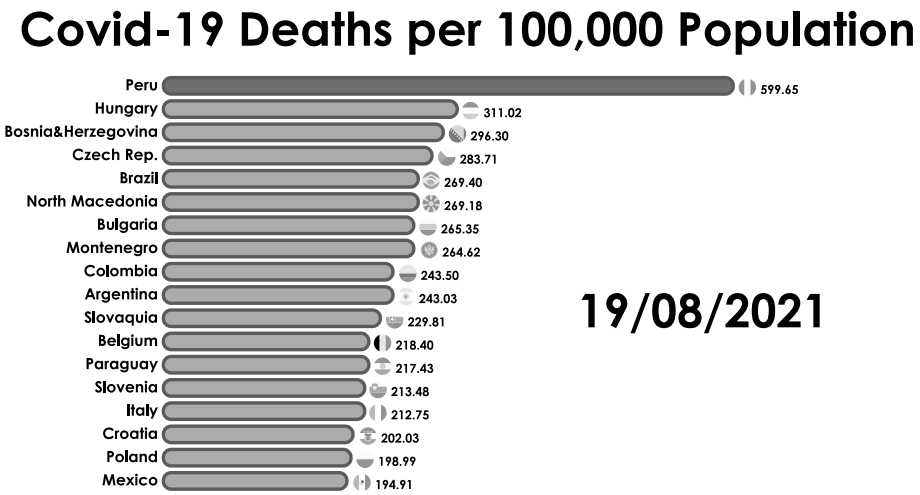

Fig. 9 Deaths per 100,000 population in selected countries. Retrieved on 16.11.2021 from: https://www.usnews.com/news/best-states/coronavirus-data/covid-death-rate

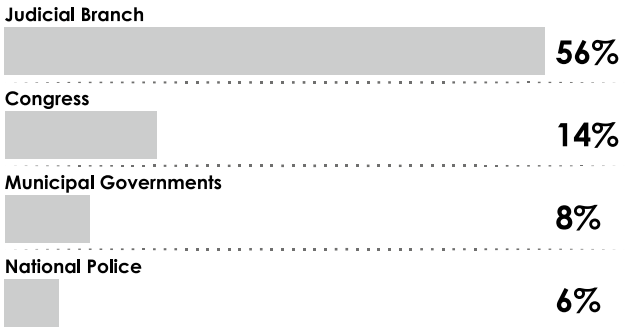

Fig. 10 Perception of the level of corruption in the Peruvian judicial branch and others institutions. Retrieved on 16.11.2021 Source: https://bit.ly/3wRld4n

- Concerning the environment sector, the Peruvian State should adopt measures to guarantee the development of mining activities of any size, respecting the environment and the health of the people. Illegal mining should be eradicated and the jungle reserves should be highly protected as one of the last corners of the natural world of this planet.
- Most of the river basins are contaminated, negatively affecting the living conditions of towns and the flora and fauna of the surroundings.
- Additionally, pollution affects main cities such as Lima, Arequipa, Trujillo, and Piura due to a mismanagement of the trash in those cities.
- One of the challenges of the Culture Ministry is to look for expanding the practice of those universal values that can contribute to face the corruption culture that has been spreading in Peruvian society.
- Energy and mining sector is one of the main contributors of the Peruvian economy, especially mining; however, the impact of them on the environment has been negative on diverse occasions, with the origin of a high rate of conflicts related to environmental issues.
- Concerning the foreign trade and tourism sector, the pandemic has affected its performance.
- The main challenge of the women and vulnerable populations sector is in relation to improve the defense of women against violence in familiar environments (Fig. 11). Another challenge is on how to improve the quality of life of poorest people and those Peruvians with some kind of disability.
- In the labor and employment promotion sector, many Peruvians have lost their jobs because of the current COVID-19 situation, the lack of job opportunities and the low preparation of people to work in a virtual mode are part of the problematic situation.

4.3 Regional perspective

The regional perspective looks at the Peruvian State from the view of the regions that politically conforms to Peru as a country. Figure 12 shows the viable system model of Peru, from the regional perspective, showing the region's environment from those with large area (upper side) to the ones with less area (down side).

4.3.1 System 5

System 5 in a regional view is composed of the same elements as System 5 in sectoral perspective.

- Concerning ST&I the diagnosis is the same as mentioned for the sectoral perspective.
- Concerning the National Project and the National Agreement (Secretaria Ejecutiva del AN 2002), a weakness of this issue considering the regional view is that this instrument should be updated permanently with the participation of the people, considering their problems, aspirations and desires, which can change according to the times we live.

4.3.2 System 4

System 4 is composed, essentially, of the Presidency of Ministers' Council.

- There is a lack of a deep and updated (real time) knowledge of the problematical situation of each of the regions.

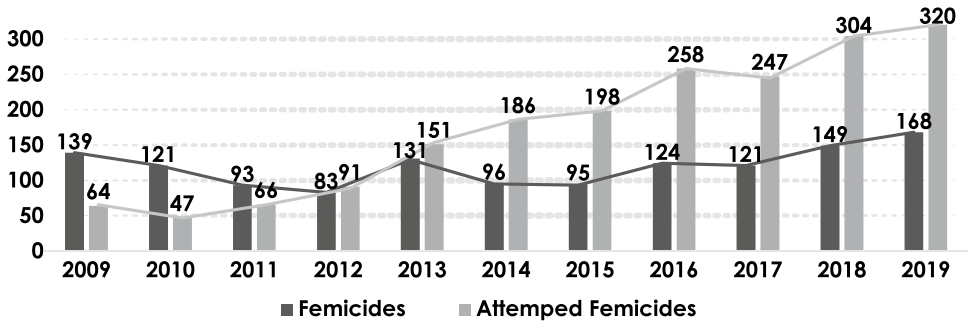

Fig. 11 Femicides and attempted femicides in the last decade in Peru. Retrieved on 16.11.2021 Source: https://bit.ly/2YSTJid

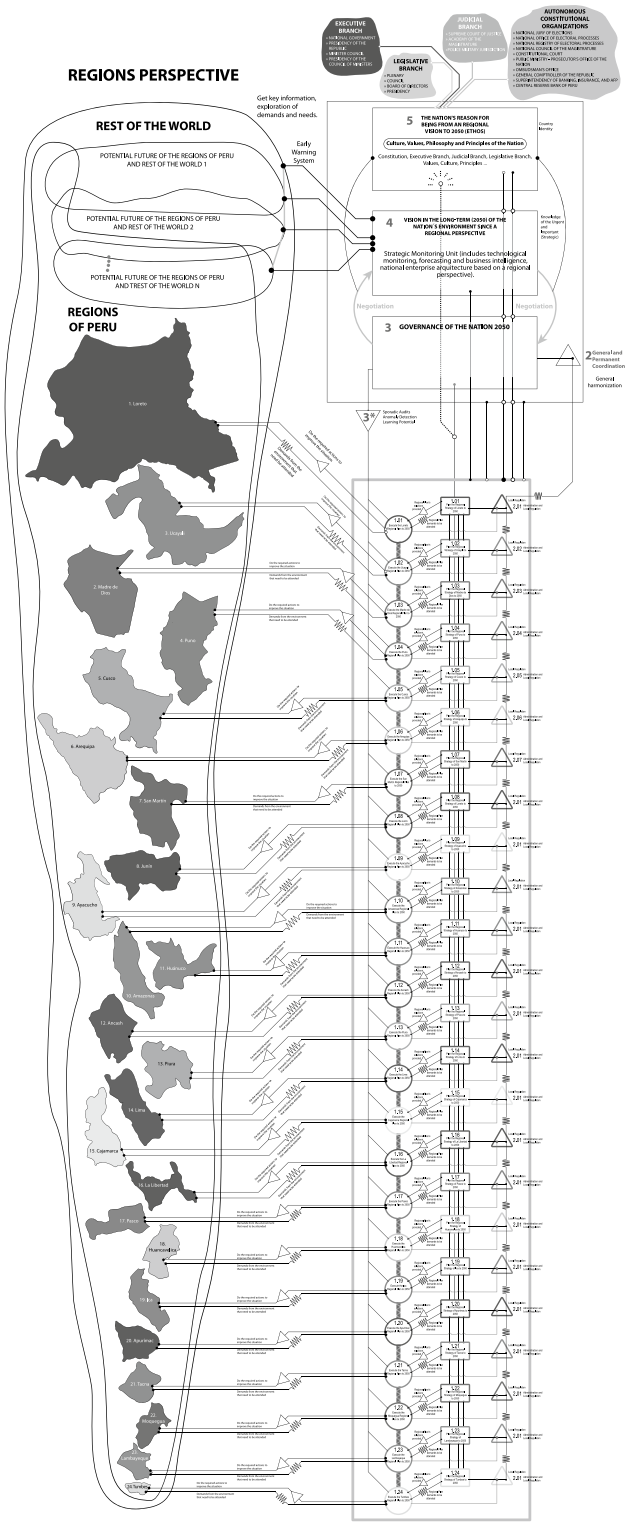

Fig. 12 Applying the viable system model in Mode I: diagnosis of Peru: regional perspective (Adapted from Beer 1985). Source: Own Elaboration

- There is a lack of a deep and updated knowledge of the future world trends to improve the planning process of the country as a whole. This requires work in strategic issues of each of the regions.

4.3.3 System 3

- Concerning System 3, senior management, it can be seen that this role is developed, currently, by the Presidency of Ministers' Council, the Ministers' Council, Congress commissions and the Board of Regions Governors.
- The National Competitiveness Council (NCC) has developed a set of indicators according to the six pillars of competitiveness and these are: (1) economic environment, (2) infrastructure, (3) health, (4) education, (5) labor, (6) institutions (Fig. 13).
- Within each of them a set of indicators (Fig. 14) has to be determined to measure the competitiveness for each regional government. These indicators are being used since 2012 till now, so it is possible to examine the trend of each pillar for each region, and also to integrate all the pillars to get an overall diagnosis on the performance for each region.
- Unfortunately, the information concerning the indicators of each of the components in each region is from past events. The NCC does not work with information in real time.

4.3.4 System 2

- The National Council of Competitiveness (NCC) takes the role of System 2.
- System 2 should provide all the information needed to System 3, where diverse reports and indicators about the performance of each region's government should be received. This information should be defined according to each region and in real time.

4.3.5 System 1

Under this perspective, the environment by System 1 is composed of 24 regions, each region has an authority, the Governor, who exerts the government of the region with the support of a team covering diverse positions in the regional government (System 1).

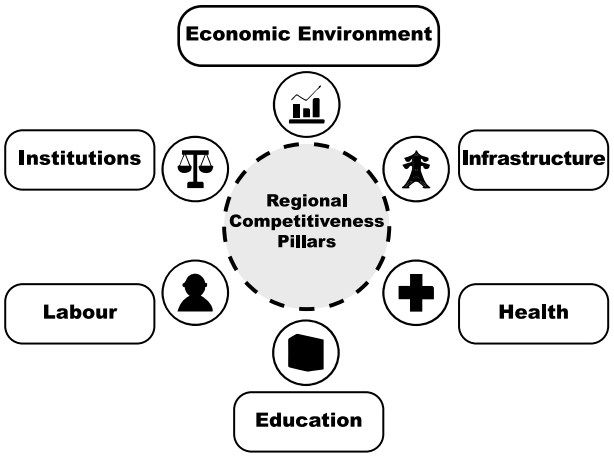

Fig. 13 The six regional competitiveness pillars. Source: National Council of Competitiveness (NCC)

- Figure 15 shows the scores that the 24 regions have achieved in each of the six pillars in the period 2012–2021, on a scale from 0 to 10.
- Figure 16 shows the mean score achieved for each region, considering the six pillars, for the 2012–2021 period, in a scale that goes from 0 to 10. Those regions which appear in black are the regions whose performances are the worst. Those regions that appear in dark grey have a regular performance and those regions which appear in light grey are the five regions which have the best performance among all.
- Taking into consideration these results and for brevity, the overall result for the regions in the 2012–2021 period is shown. Thus, the worst regions in the overall performance are Huancavelica (2.99), Cajamarca (3.14), Puno (3.15), Loreto (3.30) and Huanuco (3.37), and the most competitive regions considering the overall performance results are: Ica (5.96), Tacna (6.38), Arequipa (6.44), Moquegua (6.73) and Lima (7.57). All other regions have a regular overall performance.
- This information should be used for decision making in a permanent process. Additionally, this information instead to be a yearly information should be in real time.
- Each region's government constitutes a System 1 which governs its region's environment.

4.4 River basin perspective

River basin perspective allows to study Peruvian reality from the perspective of water management. Water means life, and its adequate management is crucial to have a sustainable planet. Figures 17, 18 and 19 show the application of the VSM under this perspective.

4.4.1 System 5

System 5, in a basin's view, is composed of the same elements of Systems 5 in the sectoral perspective.

- The basin's perspective is applied to understand Peruvian reality considering a naturalistic view to consider diverse factors that affect the natural world, where water is the key component of life and the development of the flora and fauna. Peru is one of the most biodiverse countries around the world, and from this point of view understand which should be the role and management of the Peruvian State is a need.
- The structuralist–functionalist structure of the Peruvian State does not correspond to the management of the Peruvian reality from the basin perspective, a fact that

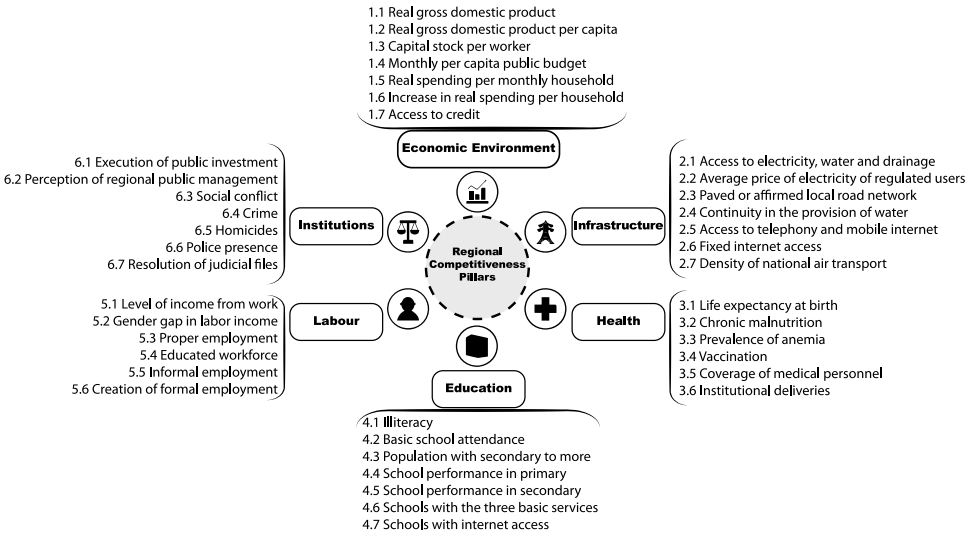

Fig. 14 The regional competitiveness indicators. Source: National Council of Competitiveness (NCC)

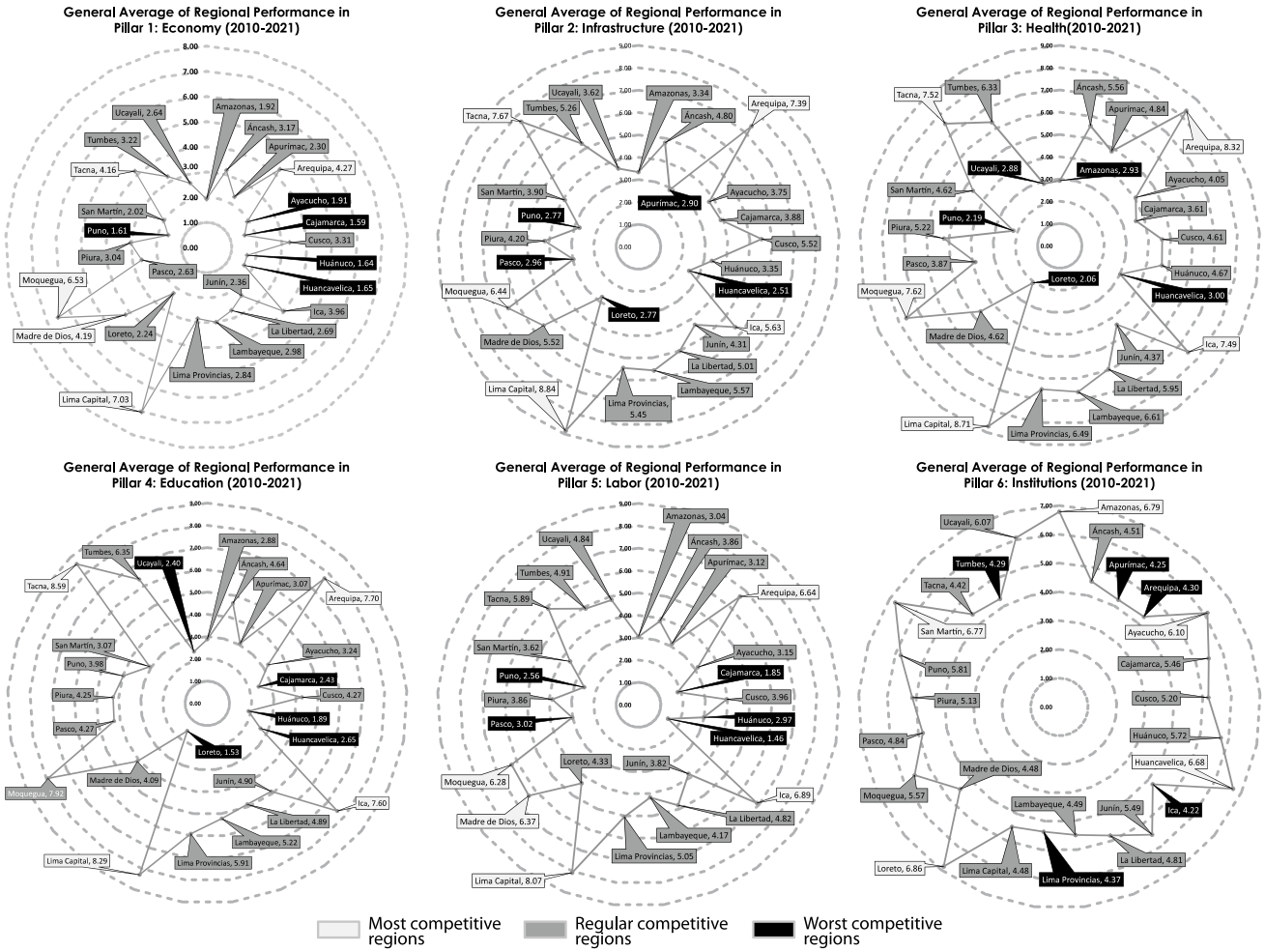

Fig. 15 Average of regional competitiveness 2010–2021, in each of the six pillars of competitiveness. Source: National Council of Competitiveness (NCC)

can affect negatively the management of water, the facing of climate change or the proper management of the flora and fauna existing around Peru.

4.4.2 System 4

- There is no deep knowledge of the problematic situation of each of the Peruvian basins, in real time, to improve the decision-making process concerning them.
- There is a lack of a deep knowledge on the future world trends, especially issues related to climate change, pollution, species in extinction, illegal mining, and drug dealing, among other important issues, to improve the planning process of the country as a whole.
- The National Water Authority (ANA) needs to implement prospective models and platforms to visualize the future of water for Peru, in the long term, considering the impacts of climate change.

4.4.3 System 3

- System 3 (Presidency of Ministers' Council and ANA) is not working adequately. Currently, there is a lack of speed in the decision process made by System 3 There is, also, a slow feedback from System 1s (i.e., the basins), there is lack of monitoring and control in real time about the overall performance of each system 1 (the basins).

4.4.4 System 2

- Currently, the information about basins provided to System 3, by System 2, is not in real time and is not used for decision making in search for the sustainable management of the basins. An area of ANA should develop the role of System 2.
- Additionally, ANA does not have a set of indicators that can measure the sustainability of the basins (Warhurst 2002) in real time.

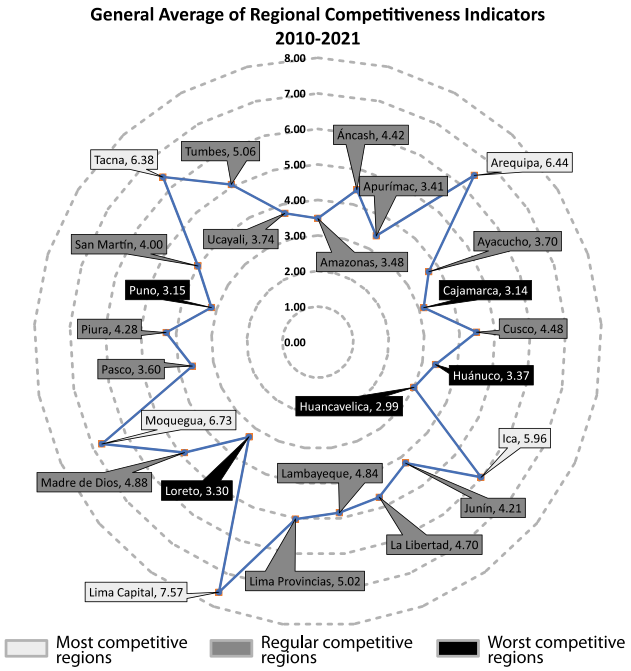

Fig. 16 Average of regional competitiveness 2010–2021, in the six pillars of competitiveness. Source: National Council of Competitiveness (NCC)

4.4.5 System 1

For brevity, the environments of Systems 1 that will be considered are the three main Peruvian basins (Fig. 18), where all the basins of the country are contained. Working in a next recursion level, it could be possible to describe the detailed situation of each of the basins in the second recursion level (Fig. 19).

4.4.5.1 The Atlantic hydrographic basin

- It covers the basins located in the Peruvian highlands and jungle. It is the biggest among the three basins. It covers almost 3/4 of the whole country.
- In its territory, there is a geography which is very varied, with diverse altitude, climate, flora and fauna.
- Water to this basin comes from the highlands located in the western part of the basin, occupying the northern, central and southern part of Peru.
- Indicators to measure its competitiveness and sustainability should be developed and managed by System 3 (i.e., ANA).

4.4.5.2 The Pacific hydrographic basin

- It covers the basins located to the side of the Pacific Ocean, in the Peruvian coast, which is about 2250 km long.
- Water to this basin comes from the highlands located at the eastern part of this basin, covering the north, central and south of Peru.
- It covers all the Peruvian coast which is basically a desert area with valleys where rivers coming from the highlands bring water making it possible to develop agricultural activities.
- Indicators to measure its competitiveness and sustainability of the basin should be developed and managed by System 3 (i.e., ANA).

4.4.5.3 The Titicaca hydrographic basin

- It covers the basin made by the Titicaca Lake, shared by Peru and Bolivia.
- Approximately, 4/5 of the basin is in the area of Peru and 1/5 of it is in the area of Bolivia.
- This basin has a special fauna as the giant frogs.
- It is important to mention that the Titicaca basin covers about 8730 km^2. The altitude is about 3800 above the sea level.
- Indicators to measure its competitiveness and sustainability of this basin should be developed and managed by System 3 (i.e., ANA).

4.5 Macroregional perspective

Macroregional perspective allows to study Peruvian reality in an integral way, linking the sea, the coast, the highlands and the jungle. This perspective is important to have a synergistic approach to Peruvian megadiversity, as well as to have an adequate management of diverse issues such as climate change, cultural diversity, multilanguage communication, Peruvian identity and integration, and sustainability of natural resources, among other crucial issues. Figure 20 shows the application of the MSV under this perspective.

4.5.1 System 5

System 5, in a macroregions view, is composed of the same elements of System 5 for the sectoral perspective.

- The structure of the Peruvian State does not correspond to the management of the Peruvian reality from the macroregions perspective, a fact that can affect negatively the integral management of each macroregion.
- Similarly, there is not a deep knowledge on the future world trends, especially, in issues related to climate change, to improve the planning process of the macroregions.

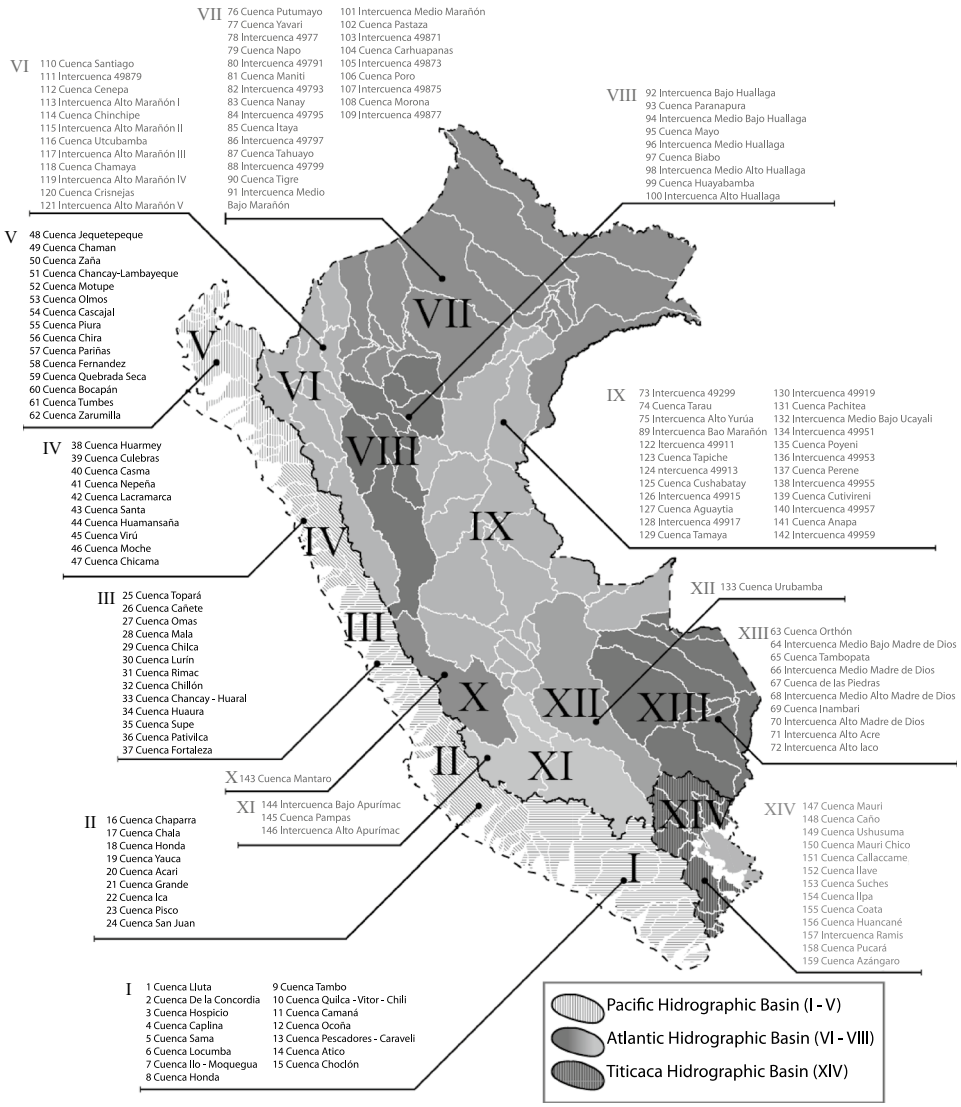

Fig. 17 Diagnosis of Peru: basins perspective. Source: Autoridad Nacional del Agua

4.5.2 System 4

- The macroregional perspective lacks a procedure to collect the information about the problems, desires and aspirations of people from each macroregion and in real time, so that the central government could have fresh information about the internal situation of the country, under a macroregion's view.

4.5.3 System 3

- Measure of performance for System 3 does not exist, so that there is lack of monitoring and control in real time about the performance of each system (each of the three macroregions).

4.5.4 System 2

- Currently, the information about macroregions does not exist, so System 3 does not have this strategic information.
- Additionally, it is required to have a set of indicators that can measure the sustainable development (Warhurst 2002) of the macroregions.

4.5.5 System 1

- The environments of each System 1, each of the three macroregions from the north, central and south of Peru, are considered. In a next recursion level, it is possible to describe the detailed situation of each region being part of each macroregion, including the portion of the territorial sea pertaining to each macroregion (see Fig. 21).

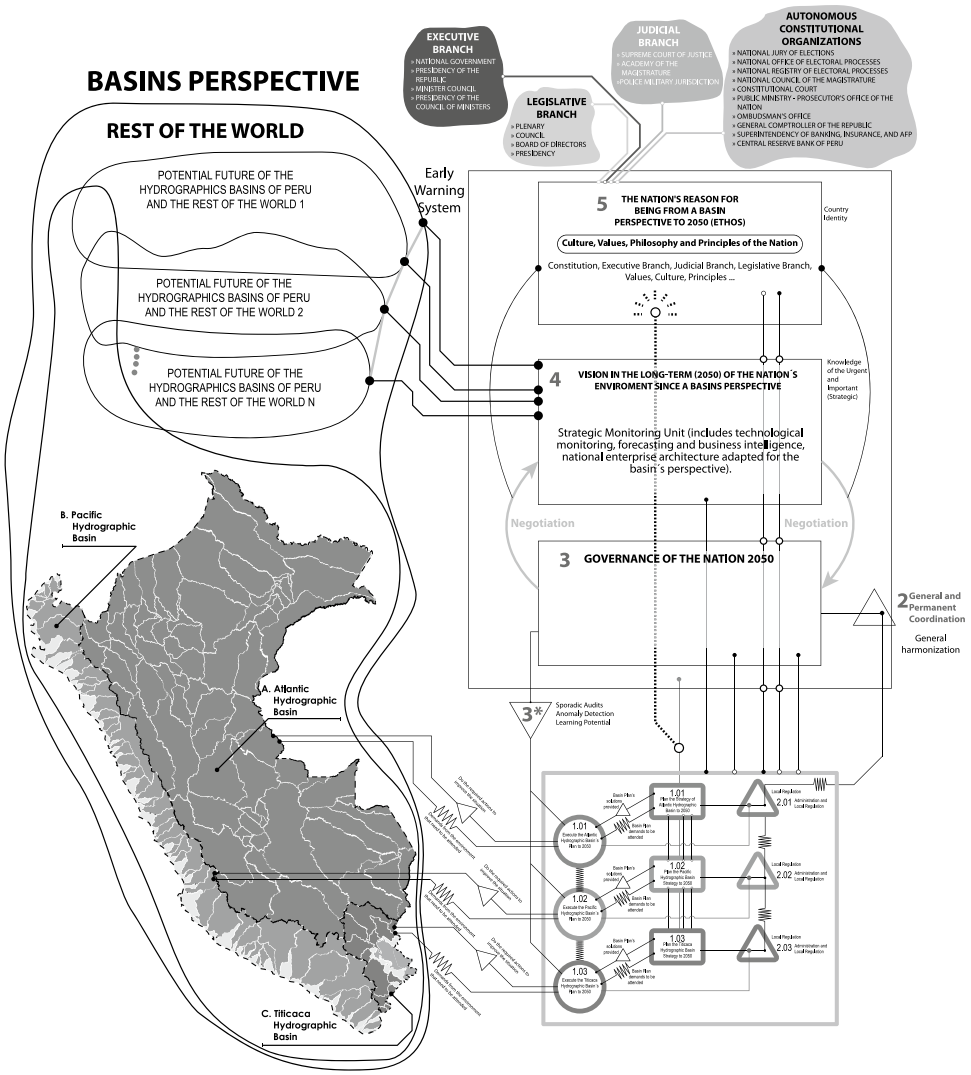

Fig. 18 Applying the viable system model in Mode I: diagnosis of Peru: basins perspective (Adapted from Beer 1985). Source: Own Elaboration

- Each of the macroregions is the environment for each System 1.

4.5.5.1 The north macroregion

- It covers the regions located in the northern part of Peru. These regions are: Tumbes, Piura, Lambayeque, La Libertad, Cajamarca, Amazonas, San Martin and Loreto. It also covers the portion of territorial sea pertaining to this macroregion.
- This macroregion is very rich in natural resources such as mining and petroleum, as well as the flora, fauna and agriculture lands. It also has industries and services.

4.5.5.2 The central macroregion

- It covers the regions located in the central part of Peru. These regions are: Ayacucho, Huancavelica, Huánuco, Junín, Pasco, Ica, Ucayali, Ancash and Lima. It also covers the portion of territorial sea pertaining to this macroregion.
- This macroregion is very rich in natural resources like mining (copper, silver, zinc), as well as the flora, fauna, agriculture lands and cattle raising. It also has industries and services.

4.5.5.3 The south macroregion

- It covers the regions located in the southern part of Peru. These regions are: Apurímac, Arequipa, Cusco, Madre de Dios, Moquegua, Puno and Tacna. It also covers the portion of territorial sea and the part of the Titicaca Lake corresponding to Peru.
- This macroregion is very rich in natural resources such as mining (copper, gold, silver, zinc and lithium), and natu-

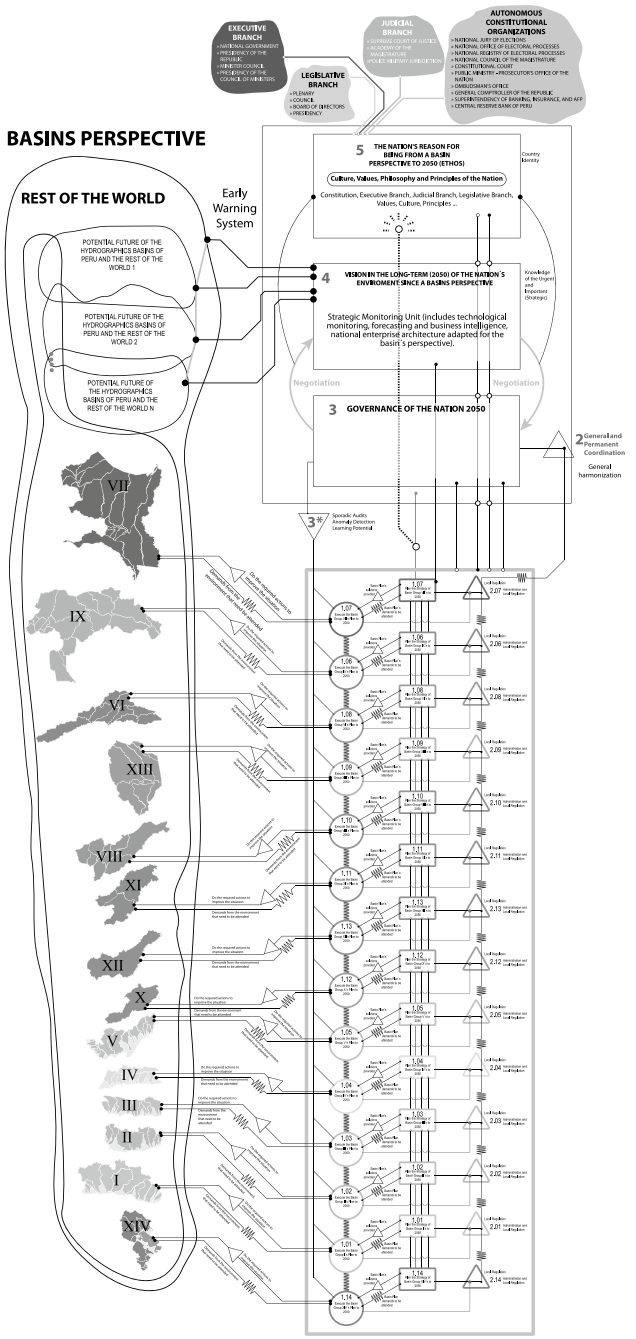

Fig. 19 Applying the viable system model in Mode I: diagnosis of Peru: basins perspective, in a second recursion level (Adapted from Beer 1985). Source: Own Elaboration

ral gas. Flora and fauna are varied, and the agricultural lands may have high productivity. It also has industries and services.

Indicators to measure the competitiveness and sustainability of these three macroregions should be developed and managed by System 3.

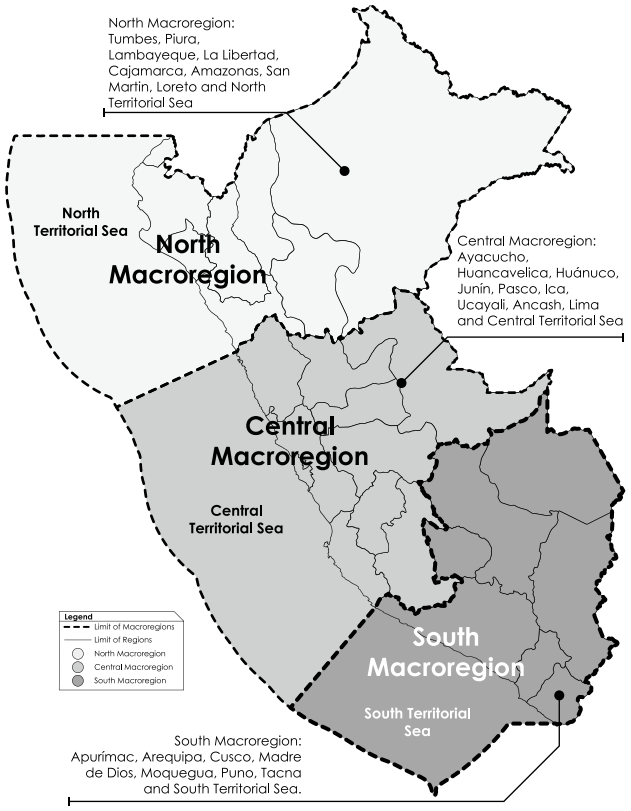

Fig. 20 Applying macroregion perspective. Source: Own Elaboration

5 Applying the viable system model in Mode II: design mode

5.1 Reasons for a proposal for a cybernetic the governance of the Peruvian State

The reasons for a proposal for a cybernetic governance of the Peruvian State are the following:

a) The VSM (Espejo and Reyes 2011; Beer 1979, 1981, 1985) allows to cybernetically observe and study the real world with diverse perspectives in an integral (i.e. systemic) way, following the five systems of the VSM, in each perspective, getting in this way a coherent holistic appreciation for the analysis and design of the system in focus being studied.
b) VSM is a flexible and open methodology that embeds within it other systemic methodologies and technologies, to manage the complexity of a specific case.

With all of this being said, what is presented onward is based on the diagnosis made in Sect. 4, considering the four perspectives.

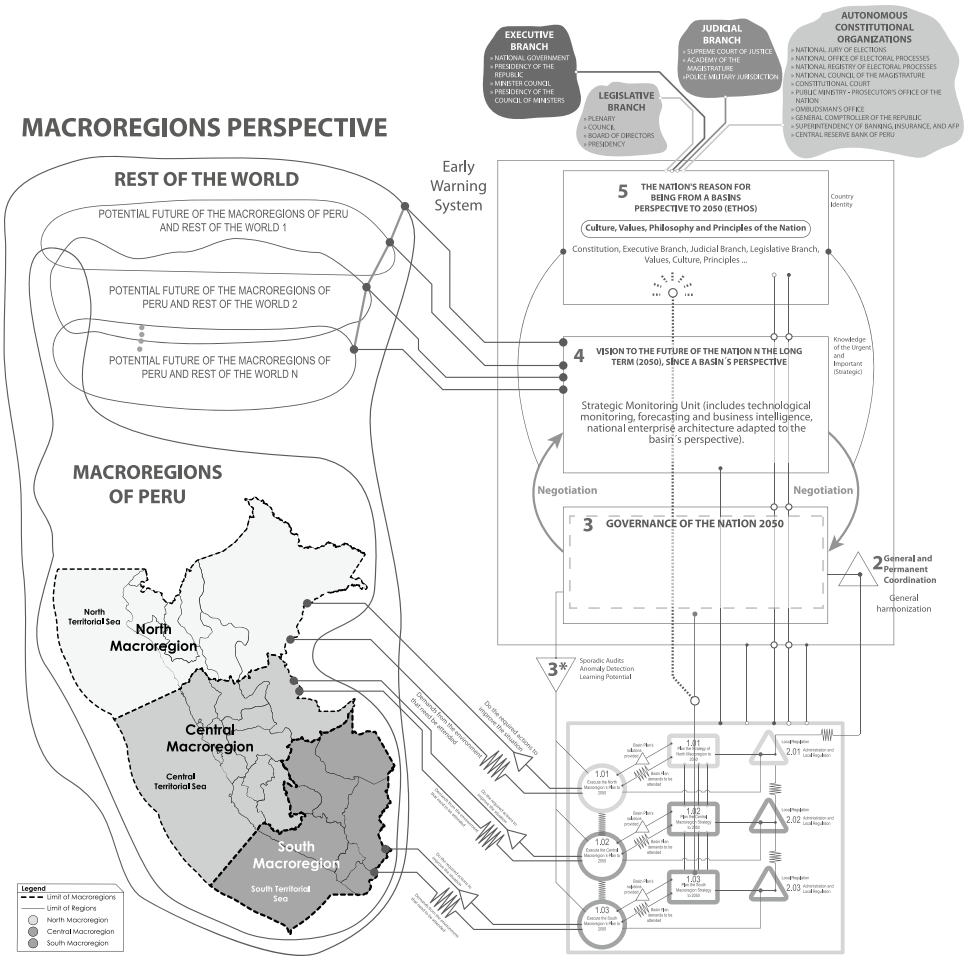

Fig. 21 Applying the viable system model in Mode I: diagnosis of Peru: macroregion perspective. Source: Own Elaboration

5.2 Sectoral perspective

5.2.1 System 5

An urgent and radical reform of the Peruvian State is required, based first of all on how the Peruvian State is conceived, changing from a functionalist and structuralist approach to a systemic understanding of the Peruvian State, where the management of the organizations is based on human activity systems (HAS) (Checkland 1981; Wilson 2002) and business process management (BPM) (Dumas et al. 2018), instead of using organigrams, which are static representations of a dynamic world.

Concerning ST&I, the budget assigned should be increased significantly, to support and develop an important group of Peruvian researchers that will can be able to create and set up the technological transformation and sustainable industrialization of the Peruvian society.

It is needed to work with the National Agreement and the National Project, but with an updated version in real time, to consider the viewpoints, needs, problems and desires of the people around the country.

5.2.2 System 4

There is a need to do foresight studies about ST&I for Peru, to see opportunities in the international markets for Peruvian goods and services. These studies should be the basis for implementing an ST&I strategy to transform Peru into a sustainable industrialized country.

5.2.3 System 3

It is required that it works in real time. What is required is to manage all sectors (System 1s) by processes, automating them and with very well-defined indicators to be able to diagnose what is happening in the environment, the operative issues and the general management issues, in real time, at each System 1 (i.e., the sectors).

5.2.4 System 2

This system is not working correctly, currently. It needs to work in real time and with defined indicators that can measure in a permanent way the performance of Systems 1s (the sectors).

For doing this, the soft approach (Checkland 1981) and processes' perspective (Dumas et al. 2018) are a need.

5.2.5 System 1

Giving a brief resume of the possible changes that can be implemented among the Systems 1s, it can be mentioned that the economy, currently based mainly on exportations of raw material, should be changed, so that most of the Peruvian exportations are based on high valued added products and services made in Peru.

There is a need to improve the infrastructure of roads along the country. The same happens with the Internet. Its use should be a right for every Peruvian citizen.

The productivity of agriculture should be improved in the highlands with the use of modern technology and providing high-quality education to peasants concerned with agricultural productivity, but respecting their cultures, beliefs and social practices.

Education at all levels should be a right for any Peruvian citizen, providing a high-quality education around the country at all levels. The exploitation of all technological resources to provide high quality online education along the country should be taken as a great opportunity to transform Peruvian society.

The level of nutrition of the people, especially of children and elder people, should be improved.

The Peruvian health system should be transformed radically, based on a systemic-cybernetic (Beer 1985; Checkland 1981) and business process management (Dumas et al. 2018) approach, with the use of indicators in real time. COVID-19 has brought the opportunity to do this radical transformation of the Peruvian health system.

The private sector, especially the SMEs, should be very well supported to implement the Productive Diversification National Plan proposed by the Minister of Production, to convert Peru into an industrialized country, based on a sustainable approach.

There should also be a radical fight against corruption at all levels in the Peruvian State, as well as in the private sector. The use of intelligent information technology concerning cyber security and process automation would be good allies to resolve this problem.

Considering the internal security, it is very important to resolve issues related to drug dealers and terrorism. Improving better living conditions for the people and providing job opportunities and education for children and young adults around the country can collaborate in facing these issues.

5.3 Regional perspective

5.3.1 System 5

There is a need to do a radical state reform, changing the structuralist and functionalist approach of the Peruvian State to a systemic management of it based on a business process management.

5.3.2 System 4

There is a need to develop foresight studies in each of the regions to define the possible scenarios for each region.

Taking into consideration these foresight studies, systemic strategic planning at public organizations will be needed to be done, considering all the stakeholders, including non-human ones, to consider their power influence, their views and interests.

From these systemic strategic planning studies, it would be possible to consider and define the strategic processes needed to improve and automate using business process management intelligent technologies.

The National Agreement and the National Project, under this perspective, should be permanently updated, considering the desires, needs and problems existing in the regions. All these issues should be managed in real time.

5.3.3 System 3

System 3, the senior management, should have real time dashboards to do a follow-up to all System 1s (the regionals governments). For doing this, a set of indicators that can measure efficiency, efficacy, effectiveness, ethics and esthetic (5e's) (Checkland 1981) should be adequate.

Dashboards can also be developed to measure the competitiveness of regions, using the NCC approach and its indicators and/or the indicators proposed by Prof. Francisco Parra-Luna (Parra-Luna 2018).

Multicriteria and multiattribute expert systems (Bohanec and Rodriguez-Ulloa 2014) can be used to implement intelligent dashboards that can measure the competitiveness of regions in real time. These indicators can also be used to create dynamic balanced scorecards (Rodriguez-Ulloa 2010) to develop prospective performance studies for each region for decision making.

5.3.4 System 2

System 2 should work in real time to get indicators from the environment of each region as well as indicators from the operation and management functions of each region (System 1s).

Indicators from dynamic balanced scorecards to do prospective analysis about possible future scenarios for each region can be fed to System 3 as well.

5.3.5 System 1

According to the results shown in the diagnosis mode, there are five regions with the least scores in the mean overall

performance. As a measure to improve the situation, a policy to increase the performance of the regions with the worst performance must be developed. On other hand, it is also necessary to support those regions which have a regular performance to increase their performance and for the most competitive regions to maintain or increase their performance as well.

The worst regions in the overall performance, for the period 2012–2021, are Huancavelica (2.99), Cajamarca (3.14), Puno (3.15), Loreto (3.30) and Huanuco (3.37), and the most competitive regions considering the overall performance results are: Ica (5.96), Tacna (6.38), Arequipa (6.44), Moquegua (6.73) and Lima (7.57). All other regions have a regular overall performance.

A significant improvement of the performance of Systems 1 (regions) could occur if instead of getting the performance of regions in yearly reports, this information could be obtained in real time with a monthly follow-up. The use of cloud systems, expert systems and multicriteria and multiattribute analysis can be the tools to implement this kind of solution.

5.4 River basin perspective

5.4.1 System 5

It is important to take measures to implement this perspective within the state management.

Peru being one of the most biodiverse countries around the world, the river basins' perspective is so important for the proper management of natural resources such as water, land, air, flora and fauna, the main assets that Peruvian citizens have nowadays.

Considering the National Project and the National Agreement (Secretaria Ejecutiva del AN 2002), under this perspective, it is urgent to consider the claims and measures of protection that diverse ancestral communities are asking to implement by the state to preserve the Peruvian flora and fauna, water and land, recovering and using the still preserved Incas' andenes to create an organic agriculture.

These kinds of claims should be processed in real time to provide solutions in the short time.

5.4.2 System 4

The Water National Authority (ANA) should develop foresight studies and models about the future of water in each of the System 1s (i.e., basins), considering at least the second level of recursion in each System 1. These studies should estimate what should be the supply and demand of water till 2050 for each river basin.

It is necessary, as well, to develop studies oriented to decontaminate all the Peruvian rivers and lakes. This can be done with the support of the Peruvian universities network as well as international cooperation.

Again, systemic modeling as soft systems dynamics methodology (Rodriguez-Ulloa et al. 2011), agent-based modeling (Wilensky 2011) or analysis of scenarios (Godet 1995) would be important to develop and apply.

5.4.3 System 3

The river basins perspective needs a monitoring and control system in real time to follow the state of the rivers and lakes along the country. It should use indicators concerning the quality and quantity of water in rivers, lakes as well as in underground rivers and lakes, especially in the coast and the highlands, where mining activities are developed, and the jungle, where illegal mining and drug dealers–terrorists operate.

It must also show indicators and dashboards in real time about the competitiveness of each river basin as well as indicators related to river basin sustainability (Warhurst 2002).

5.4.4 System 2

A System 2 should be implemented in order to get the needed indicators from Systems 1s and their respective environments, in real time, in order that System 3 can implement the adequate dashboards in all issues concerned with the supply and demand of water around the country.

5.4.5 System 1

As mentioned in Sect. 4.4, Peru has three main river basins, and within each of them more river basins can be encountered (at the second and third recursion level).

Each river basin should be monitored through the use of indicators to measure the quality and quantity of water they manage in the basin. These indicators should be obtained in real time to be a tool for decision making.

5.5 Macroregional perspective

5.5.1 System 5

The state structure is not designed to manage the country from the macroregional perspective. In that sense it is important to take measures to implement this perspective in the state management.

Peru being one of the most biodiverse countries around the world, the macroregion perspective is important for an integrated management of the sea, the coast, the highlands and the jungle. Also, the integration of people from diverse geographical places will contribute to Peruvian society integration, where diverse cultures, customs, beliefs,

world views, languages and ethnicities coexist in each macroregion.

Considering the National Project and the National Agreement (Secretaria Ejecutiva del AN 2002), under this perspective, it is urgent to consider the claims, desires and problems expressed by people from macroregions. The use of social networks and intelligent chatbots (Sabharwal 2020) in real time could be very useful for the management of these claims and desires to be taken into account by the Peruvian State.

5.5.2 System 4

There is a need to develop foresight and soft system dynamics studies, considering the view of macroregions, to have an integral view.

To develop platforms that allow to visualize future scenarios of macroregions, using systemic methodologies, like soft system dynamics methodology—SSDM (Rodriguez-Ulloa et al. 2011, 2021) or foresight techniques (Godet 1995) could help in seeing alternative futures for each macroregion.

The use of agent based modeling-ABM (Wilensky 2011) will also collaborate to clarify what should be the needed path to follow in the future for each macroregion.

5.5.3 System 3

The Board of Regional Governors should have this role.

The macroregion perspective needs a monitoring and control system in real time in order to do a periodic follow-up of all regions pertaining to the macroregion being studied.

It must show indicators related to its competitiveness, using the NCC approach, sustainability indicators (Warhurst 2002) or those indicators proposed by Prof. Francisco Parra-Luna, (Parra-Luna 2018) and/or the 5e's indicators (Checkland 1981).

5.5.4 System 2

A System 2 should be implemented in order to get the needed indicators from Systems 1s and their respective environments, in real time, so that System 3 can implement the adequate dashboards in all issues concerned to the management of the macroregions. These indicators should be to measure the competitiveness and sustainability for each macroregion and the ones of the whole country.

The NCC should have this role.

5.5.5 System 1

As mentioned in Sect. 4.5, Peru has three macroregions, and within each of them, a group of regions are in.

Each macroregion should be monitored through the use of indicators to measure their competitiveness and sustainability. These indicators should be obtained in real time to be a tool for decision making.

6 Conclusions and recommendations

6.1 Conclusions

- Peru is a very complex country to manage. People in government should have a systemic view to understand and comprehend its complexity and provide viable solutions.
- The use of the VSM approach to diagnose and to propose a cybernetic governance of the Peruvian State has been very useful, mainly to understand in a transdisciplinary way the problematical issues of the Peruvian State and secondly to have an ordered and disciplined thinking process to propose an integral and viable change of Peruvian State and its ecosystem.
- The possibility of studying the Peruvian reality under four perspectives allows to have a more holistic understanding of it. The study shown in the present paper should be taken as an introductory one. However, it opens a new way of studying and proposing an alternative path to look for solving and facing the complex and unstructured problems of Peru.
- An additional perspective could be to adopt the one proposed by geographer Dr. Javier Pulgar-Vidal (1938), who considers that Peru should be studied through eight (8) regions.
- VSM allows to understand the complex and complicated issues of the Peruvian reality, like its culture, geography, ethnicities, or its unstructured problems like poverty, ill nutrition, corruption, drug dealing, terrorism, illegal mining, informal economy, low quality of education, and COVID-19, to propose integral and viable changes.
- The Peruvian State is not prepared to face the challenges of the twenty-first century. It is slow, bureaucratic, traditional, ineffective, inefficient and unprepared to face complex problems like the COVID-19 pandemic, natural disasters or climate change. A deep reform of the Peruvian State is a need, based in a systemic-cybernetic paradigm.
- Peru has cultural and paradigmatic barriers for change, like the reductionist, positivistic and objectivist paradigm under which the official education is based on, which creates serious difficulties for Peruvians to have an open-minded interaction among them. Besides, beliefs and almost fanatical ideological positions reinforce this

condition, making this a barrier to obtain mutual understanding, consensus, open cooperation and integration among Peruvians.

- Information technologies like social networks, business process automation, machine leaning, expert systems, robotic process automation (RPA) and chatbots can play a key role in transforming Peruvian culture if these technologies are well used under the umbrella of a systemic national policy to spread and increase the quality of education, and if the practice of critical systemic thinking is spread among Peruvians along the country.
- Systemic and cybernetics approaches are ideal to be embedded within the VSM approach applied here, so that for doing a deep study of System 5, *soft systems methodology (SSM)* (Checkland 1981; Checkland and Scholes 1990), *critical systems thinking* (Jackson 2000, 2003, 2019), *mind mapping* (Buzan 2013), *cognitive mapping* (Rosenhead and Mingers 2001), *strategic options development analysis (SODA)* (Rosenhead and Mingers 2001), *team sintegrity (TS)* (Beer 1994), *total systems intervention* (TSI) (Jackson 2019) and *social network analysis* (SNA) (Borgatti et al. 2018; Newman 2010) can be applied to get successful outcomes.
- In System 4, systemic methodologies like *system dynamics* (SD) (Sterman and Sterman 2000; Forrester 1961; Lyneis 1988) *soft system dynamics methodology (SSDM)* (Rodriguez-Ulloa et al. 2011), *agent based modeling (ABM)* (Wilensky 2011), and *dynamic balanced scorecards* (*DBSC*) (Rodriguez-Ulloa 2010) can be embedded within VSM.
- In System 3, *soft systems methodology (SSM)* (Checkland 1981; Wilson and van Haperen 2015), *soft-business process management (Soft-BPM)* (Rodriguez-Ulloa 2020, 2021), systemic methodology for risk evaluation and management (*SYSMEREM*), (Rodriguez-Ulloa, 2018), *robotic process automation* (Tripathi 2018), and *intelligent chatbots* (Sabharwal 2020) can be applied.
- In System 2, *multicriteria and multiattribute analysis with the support of expert systems* (Bohanec and Rodriguez-Ulloa 2014) can be applied.
- In Systems 1, *soft systems methodology (SSM)* (Checkland 1981; Wilson 2002; Rodriguez-Ulloa 1994a), *business process management* (Dumas et al. 2018), *robotic process automation* (Tripahti 2018), *intelligent chabots* (Sabharwal 2020) and *dynamic balanced scorecards* (Rodriguez-Ulloa 2010) can be applied.

6.2 Recommendations

- The work which started with the elaboration of this research paper can be continued and developed in a more detailed way.
- With the assignment of adequate resources, all the issues mentioned in the present paper can be studied in a more detailed and deep way to have a concrete proposal for a cybernetic governance of the Peruvian State.
- Besides, at the present state of technological development and the maturity of systemic methodologies, it is feasible, nowadays, to apply and implement a cybernetic approach for the governance of the Peruvian State.
- It is also a hope that this work can be taken as a reference or an incentive to implement this kind of approach in some other(s) country(ies) around the world.

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