Strategies to overcome the crisis and leverage the legal control of measuring instruments in Brazil

A N Soratto, B A Rodrigues Filho, L L Nunes
National Institute of Metrology, Quality and Technology – Inmetro
Av. Nossa Senhora das Graças, 50, Xerém, Duque de Caxias, Rio de Janeiro, Brazil

E-mail: ansoratto@imetro.sc.gov.br

Abstract. The economic crisis in Brazil, has led to the reduction of the services regarding periodic verifications in legal metrology, however it has been an opportunity to incentize the initiatives focusing the efficiency of the legal metrological control in Brazil. The present study presents the impact of the reduction of the budget allocate to legal metrology and the initiatives carried out by the National Institute of Metrology, Quality and Technology – INMETRO, and the Brazilian Network of Metrology and Quality – RBMLQ-I, in order to leverage the efficiency the services provided in legal metrology to the commerce and industry. A survey with specialists working in the sector was conducted in order to identify strategies to improve the performance of the services in legal metrology. As a result, we present and discuss the main proposed strategies, such as partnership with either different regulatory bodies or private enterprises, fraud control and the development of information systems. The presented strategies aims to improve the legal control of measuring instruments more efficiently.

1. Introduction
Due to one of the biggest financial crisis in Brazil, the Federal Government has introduced several budget cuts to the governmental bodies during 2015 and 2016, including Inmetro, the National Metrology Institute (NMI), responsible for the legal metrological control in Brazil.

Consequently, this budget shortage has also impacted the Brazilian Network of Legal Metrology and Quality (RBMLQ-I), the branches of Inmetro, represented by 27 delegated bodies, covering the entire territory, conducting verifications and surveillance activities in legal metrology. In order to minimize the effects of the crisis, both Inmetro and the RBMLQ-I are developing and implementing initiatives optimizing the efficiency of the activities in legal metrology [1-6].

The present study evaluates the impact of the economic crisis in the results of the RBMLQ-I, discussing strategies to increase the number of periodic verifications of measuring instruments in the commerce and industry.

2. Materials and methods
In order to identify the more relevant measuring instruments to the present study, we applied a risk analysis approach, according to the Welmec 5.3 Guide [7].

The number of verifications from 2014 to 2016 for each class of measuring instrument is obtained using the Inmetro Integrated Management System (IMS). We analyzed the data regarding periodic verification since it represents the activity demanding more resources to be executed in the legal control of measuring instruments in Brazil.
We also conducted a survey to specialists from the RBMLQ and Inmetro, as a tool to support the strategies to increase the efficiency of the legal control of measuring instruments in Brazil.

3. RBMLQ-I results in 2014, 2015 and 2016
After the first semester of 2015, RBMLQ-I has suffered a significant reduction of infrastructure to support the activities of legal metrology, due to the budget shortage of the Federal Government, leading to a considerable impact of periodic verifications and inspections of regulated products in both industry and commerce in Brazil.

Table 1 presents the results of verifications and inspections carried out by RBMLQ-I from 2014 to 2016 [8]. A risk analysis method was conducted in order to prior the measuring instruments to be studied: Non-automatic weighing instruments; fuel dispensers; and sphygmomanometers [7].

Table 1. RBMLQ periodic verifications in 2014-2016

| Type of measuring instruments | 2014   | 2015   | 2016   |
|-------------------------------|--------|--------|--------|
| Non-automatic weighing instruments Class III e IV | 1,338,327 | 1,074,783 | 889,232 |
| Non-automatic weighing instruments Class I and II | 46,496  | 39,814  | 32,963  |
| Fuel dispensers                | 363,810 | 343,821 | 360,752 |
| Sphygmomanometers              | 83,519  | 67,691  | 52,103  |

Table 1 shows a significant decrease of quantities regarding periodic verifications for Non-Automatic Weighing Instruments (NAWI) class III and IV, plummeting down 34% from 2014 to 2016. In the same period, sphygmomanometers periodic verification had a reduction of approximately 38%.

An Integrated Management System allowed a significant increase of periodic verification in the last five years [8], which allowed controlling and managing the performance of the parties working in subsequent verifications. Then, the current reduction in verifications is a critical scenario to legal metrology in Brazil.

Based on the perspective of a scarce budget for 2017, it is necessary to implement new strategies to enhance the operational activities of the legal control of measuring instruments permitting the execution of activities using limited resources.

4. Strategies to leverage the metrological control in Brazil
The proposed strategies in this section are based on the survey applied to specialists in legal metrology and management from the RBMLQ-I and Inmetro, and in successful initiatives already in use.

4.1 Strategy for the legal control of sphygmomanometers and medical scales
The number of verified instruments among medical devices that demand metrological verification represents only 5%.

Then, a partnership among Inmetro and the health regulatory authorities to require the Verification Certificate of both sphygmomanometers and medical scales in order to emit the authorization for a clinical facility would increase significantly the demand for verifications. However, an infrastructure improvement would be necessary to attend this demand. The use of private services would also be an option to attend it.

4.2 Strategy for a partnership with private stakeholders
As in several legal metrology models, a partnership to private entities to conduct verifications activities would be an alternative to overcome the decreasing numbers of the legal metrology model in Brazil. The participation of private stakeholders in state activities tend dismiss the demanded structure of public bodies and the usage of public resources, allowing the RBMLQ-I act in new areas and in quality surveillance of these bodies. Due to well-established requirements, the participation of private stakeholders may increase the productivity of metrological verifications, improving the technical quality of the services.

4.3 Strategy for re-distribute the workforce
The re-allocation of the workforce to finalistic areas, especially verification and inspection areas, would provide more efficacy to RBMLQ-I. Managers may incentive and offer the necessary conditions for an administrative worker to be engaged in technical activities. Recent studies showed that 45% of the workforce in RBMLQ-I are properly located in finalistic areas, when this percentage should be superior to 60% [9]. Then, managers may incentive and provide the demanded necessities to incentive the migration to finalistic areas. This strategy has showed that the bodies with majority of their workforce in finalistic areas are more productive and efficient regarding the services of periodic verification of measuring instruments.

4.4 Strategies to eliminate metrological frauds
An increasing number of metrological frauds has been noted in the last five years, mainly due to new technologies used in measurements, especially in fuel control and distribution [6]. The losses due to metrological frauds, for example in the fuel market of US$ 300 million, considering 1% of fraudulent petro pumps and a volume deviation of 10% [3]. Some initiatives of Inmetro and partnerships among RBMLQ-I and regulatory bodies have allowed the identification of a set of technological frauds, permitting proper legal penalties to the offenders [6]. The fraud control is vital to the maintenance of fair competition and consumers’ defense in the country.

4.5 Strategy for acting in more needy areas of the legal control
The System to Monitor the Coverage of Services – SIMCS has showed that several sectors of the economy are not been properly attended by legal metrology services. This information technology (IT) system provides support identifying the location of properties of measuring instruments, using information of several databases, according to the economic field of an enterprise. It provides tool to managers to plan and act more efficiently, in poorly explored areas in the legal metrology control. This strategy has the potential to increase significantly the efficiency of periodic verification services in the Brazilian market.

4.6 Strategy for online market surveillance
Several websites are nowadays putting inadequate measuring instruments in the market (scales, sphygmomanometers and others), such as not approved type ones. Consequently, managers working either to RBMLQ-I or Inmetro may direct efforts to online market surveillance to combat this practice protecting the market of inappropriate and not reliable devices. This strategy increases the reliability in the market demanding few resources.

4.7 Strategy for the legal control of chronotachographs
Regardless the instrument was not mention on the risk analysis, the periodic verification can be increased demanding few resources. The participation of other players as the transport regulation bodies can increase significantly the quantitative of verifications, demanding the Verification Certificate as a requirement to obtain the annual license for vehicles. In the last year, only 35% of the fleet that demands for the instrument was periodically verified. This initiative would not increase the costs of verifications since they are conducted by private inspection bodies, although it would increase the reliability of measurements for chronotachographs.
5. Conclusions
The economic crisis in Brazil since 2015 has affected the services of legal metrology, especially the legal control of non-automatic weighing instruments and sphygmomanometers.

To confront this scenario, Inmetro and RBMLQ-I have reached for new strategies to increase the efficiency and effectiveness of metrological verifications, due to partnership to regulatory bodies, private stakeholders, fraud control and implementation of IT.

Consequently, these strategies aim to improve the control in legal metrology consuming fewer resources. Then, partners in several other countries, considering local necessities, may also use the presented strategies to improve their legal metrology systems.

References
[1] Rodrigues Filho B A and Soratto A 2017 Legal Metrology in Brazil OIML Bulletin LVIII, 1, January
[2] Soratto A N, Pohlmann Filho O, Paiva M R, Giordani R B and Bringhenti C 2014 Development of a system to increase the legal metrological control of measuring instruments in Brazil International Journal of Metrology and Quality Engineering 5, n. 3, p. 5
[3] Rodrigues Filho B A and Gonçalves R F Measuring the economic impact of metrological frauds in trade metrology using an input-output model Advances in Production Management Systems. Initiatives for a Sustainable World p. 624
[4] Pohlmann Filho O et al 2014 Innovaciones de Inmetro en la gobernabilidad de la Red Brasileria de Metrología Legal y Calidad 9th International Symposium “Metrologia 2014” Proceedings
[5] Rodrigues Filho B A, Soratto, A N and Gonçalves R F 2015 Information systems as a tool to improve legal metrology activities Advances in Production Management Systems 459 p. 121
[6] Leitão F O, Vasconcellos M T and Brandão P C R 2014 Contramedidas de hardware e software sobre o fraude de alta tecnologia ao sertor de combustível al alcance de metrologia legal 9th International Symposium “Metrologia 2014” Proceedings
[7] Welme Guide 5.3 Risk Assessment Guide for Market Surveillance: Weigh and Measuring Instruments 2011 European Cooperation in Legal Metrology
[8] Relatório Consolidado do Plano de Trabalho da RBMLQ 2010 a 2014 Sistema de Gestão Integrado (Rio de janeiro: Inmetro)
[9] Levantamento da Distribuição da Força de Trabalho da Rede Brasileira de Metrologia Legal e Qualidade – Inmetro 2015 (Rio de Janeiro: Inmetro)