Globalization, the State and the Individual, No 1 (13)/2017, s. 29–37

**Agnieszka Żywicka**

PhD, University of Economics and Innovation in Lublin (WSEI)

# The significance of legal units of measurement and national measurement standards for the development of entrepreneurship – legal aspects

## Значение легальных единиц мер и государственных образцов единиц мер для развития предприимчивости – юридические обусловленностьи

Summary

The uniformity of measurement and the correctness of measures are essential elements of the economy, which contribute to the growth of entrepreneurship in various sectors. These two factors make a significant impact on the quality of manufactured products and influence the decisions regarding their acceptance or rejection. The state supervises the correctness of measurements in areas connected with the protection of public interests (health and safety) as well as consumer and environmental protection. The legislature appoints certain authorities of administration of measures to the implementation of public tasks in the field of ensuring the uniformity of measurements and the required accuracy of measures, which at the same time grants the administration of measures competencies in providing the metrological security of the country.

Keywords: legal units of measurement, administration measures

Аннотация

Единообразие мер и правильность измерениия – один из основных элементов хозяйственного оборота обуславливающим рост предприимчивости в разных отраслях экономики. Существенно влияет на качество производа продуктов а также на приняте решения относительно их одобрения или отвержения - следовательно инструмент генерирующий рост предприимчивости. В пространство жизни быть тесные связи со защитой государственных интересов (здоровье и безопасность) и защитой потребителей и среды, над правильностью совершанных измерение заботится государство. Единицы мер и измерители представляют собой технический инструмент хотя их применяние в хозяйстве вызывает следствия о значительно более широком значении юридический-экономический и общественном обуславливанный рецептами общеобязательного права. По этой причине можно их анализировать велёвонтково как на технической плоскости как и юридической, экономической и общественной.

Ключевые слова: легальные единицы маир, администрация измерения

## Introduction

The uniformity of measurement and the correctness of measures are essential elements of the economy which contribute to the growth of entrepreneurship in various sectors. These two factors make a significant impact on the quality of manufactured products and influence the decisions regarding their acceptance or rejection. Consequently, the uniformity of measurement and the correctness of measures are instruments which provide the growth of the entrepreneurship. The state supervises the correctness of measurements in areas connected with the protection of public interests (health and safety) as well as consumer and environmental protection. Units of measurement and measuring instruments are kinds of technical instruments. However, their use in the economy has a much broader – legal, economical and social sense, which is governed by the generally applicable legal provisions. For this reason, they can be analyzed in many ways, e.g. technical, legal, economical and social one. The legislature appoints certain authorities of administration of measures to the implementation of public tasks in the field of ensuring the uniformity of measurements and the required accuracy of measures, which at the same time grants the administration of measures competencies in providing the metrological security of the country.

The scope and the forms of activity of metrological administration of measures evolved as a result of changes in the economy implied by legal regulations and market needs. Since the Polish accession to the European Union, EU policies and directives have been an essential determinant of shaping the national legal order in the field of metrological regulations. Significant changes in this area started to appear much earlier – in 1993. Since that time the legislator has started to gradually delegate the responsibility for the correctness of measures from the area of metrology regulated by law to the area of voluntary metrology. The first clear symptom of the new direction of normative changes was the introduction of the authentication pursuant to the Act of 3 April 1993 – the Law On Measures[1]. According to the definition, the authentication meant checking a measuring instrument for its compliance with the metrological requirements set not only in the metrological legislation but also in international standards and recommendations. The indications of a measuring instrument were referred to the national measurement standards thus ensuring the consistency of measurement[2]. At the same time, the catalogue of measuring instruments subject to metrological control was reduced. However, pursuant to the Act of 11 May 2001 – the Law On Measures[3] the authentication ultimately ceased to exist, which resulted in a more important role of calibration of measuring instruments remaining under

[1] Dz. U. (Journal of Laws) from 1993, No. 55 item 248.
[2] Act of 3 April 1993 – the Law On Measures, Art. 11 Paragraph 2.
[3] Dz. U. (Journal of Laws) 2016 item 884, uniform text.

the exclusive competence of the administration of measures and the maintenance of other types of legal metrological control.

## 1. Legal units of measurement in Poland

The establishment, the implementation and the harmonization of legal units of measurement on a national and above all global level is undoubtedly a necessity, primarily due to the need of consistency of measures in the international trade. Currently, the vast majority of countries in the world, including Poland, applies a uniform International System of Units (SI). This system is the result of work which started with the Metre Convention on 20 May 1875. Seventeen countries signed the Convention whose purpose was to provide worldwide uniformity of measurements by spreading and enhancing the metric system. The Convention created three main international organizations: the General Conference of Measures (Conférence Générale des Poids et Mesures – CGPM), the International Bureau of Weights and Measures (Bureau international des poids et measures – BIPM), the International Committee for Weights and Measures (Comité International des Poids et Mesure - CIPM). Moreover, the work on international prototypes of units of measurement was initiated. The activity concerning these matters lasted until 1971 when the International System of Units (Systeme International des Unites – abbreviated: SI) was accomplished. Clearly, the attempts to enhance the system are still being held[4]. Currently, the International Metre Convention has 58 members and associates further 41 members[5]. Poland joined the Convention in 1925.

In the current legal status, units of measurement in Poland are regulated by the Law on Measures, Art. 7. According to this Act, legal units of measurement in Poland are:

1. Units of the International System of Units (SI);
2. Units which do not belong to the International System of Units (SI), approved for use on the territory of the Republic of Poland;
3. Decimal aliquots and multiples of the aforementioned units.

Legal units of measurement in the Republic of Poland are defined in the Regulation of the Council of Ministers of 30 November 2006 on Legal Units of Measurement[6] which regulates: names, definitions and symbols of legal units of measurement, legal units of measurement which do not belong to the International System of Units (SI) but can be used on the territory of the Republic of Poland, prefixes and their symbols used to create decimal aliquots and multiples

[4] K. Markiewicz, D. Habich, W. Popiołek, E. Michniewicz, Ł. Litwiniuk, Z. Ramotowski, J. Borzymiński, P. Fotowicz, A. Goszczyńska, *Polska administracja miar. Vademecum*, Warszawa 2015, p. 120.

[5] State on September 17, 2016 according to data published on an Internet website of BIPM http://www.bipm.org/en/about-us/associates/.

[6] Dz. U. (Journal of Laws) 2006 No. 225, item 1638.

of legal units of measurement as well as spelling rules for symbols of legal units of measurement[7].

The units of measurement which are the basic units of the International System of Units (SI), have the following names and symbols:

1. „meter" refers to a unit of length with the symbol „m";
2. „kilogram" refers to a unit of mass with the symbol „kg";
3. „second" refers to a unit of time with the symbol „s";
4. „ampere" refers to a unit of electric current with the symbol „A";
5. „kelvin" refers to a unit of thermodynamic temperature with the symbol „K";
6. „mole" refers to a unit of the amount of substance with the symbol „mol";
7. „candela" refers to a unit of luminous intensity with the symbol „cd".

The obligation to apply the legal units of measurement refers to the use of measuring instruments, carrying out measurements and expressing physical quantities. Under the international agreements on maritime, aviation and rail transport, it is acceptable to use different units of measurement from the legal ones as well as to use additional symbols expressed in other units of measurement. However, the symbol expressed in the legal unit of measurement has precedence, which is clearly shown in the obligation to express the symbols using characters not smaller than the ones expressing a different unit of measurement.

The use of other than legal units of measurement by the entrepreneurs is a practical problem of technical and legal nature. This phenomenon is connected with the accuracy of measurement and is also reflected in the illegal activity of entrepreneurs. Such activity is still quite often used by the entrepreneurs of some sectors of the economy and poses new challenges for the authorities of the administration of measures in the field of searching for optimal ways of enforcing the requirements set in the legislation in a manner which is comfortable for entrepreneurs and consumers. The following problem arises: how, if at all, should legal units of measurement be introduced to absolutely all areas, if we do not intend to generate or at least want to minimize the risk of negative consequences of such activities? The introduction of legal units of measurement may sometimes – which sounds absurd – result in a lack of understanding and hamper the communication between parties of commercial contracts, thus bringing more losses than benefits to the economy and it may act in a collision with the public interest. Other than legal units of measurement, which are fixed in the economic trade, are uneasy to remove from use. An example is such a unit of measurement as an inch (used by

[7] Due to the Polish membership in the EU, Polish law was harmonized in this field with EU legislation through the implementation of Council Directive 80/181/EEC of 20 December 1979 on the Approximation of the Laws of the Member States relating to Units of Measurement (and repealing the Directive No. 71/354/EEC) Official Journal L 039 of 15 February 1980 (amended by Directives 89/617/EEC and 99/103/EEC).

TV manufacturers for years) which is not a legal unit of measurement regulated by the Polish legislator.

However, the problem of eliminating illegal units of measurement from the market must always be considered in a global context. Nowadays, the international trade is highly developed and the exchange of goods and services is universal. Therefore, it is necessary to link the national system of measurement with the world system and to continually fulfill the conditions so that other countries recognize the link. The implementation of this task in the Polish legal and political conditions has been fulfilled since 1925 and lies within the scope of responsibility of the President of Central Office of Measures (GUM).

## 2. Creation and maintenance of national measurement standards and providing the consistency of measurements

Measurement standards play a key role in the economic trade of a state in the national and international scale, as they allow the production and international exchange of goods, because they enable users to determine the clear quantitative relation between the products. The standards allow the reconstruction of units of measurement, and the increasing accuracy in this area facilitates the development of industry in key areas of the economy and enhances the progress in all branches. National standards provide consistency of measurement through the transfer of units of measurement to other standards or to measuring instruments used in the economy. Without the consistency with the standards no measurement result may be regarded as consistent with the applicable SI System. This implies the need for the state to maintain the standards with the highest measurement accuracy[8].

The following is meant under the national measurement standard – it is the standard of a unit of measurement characterized by the highest metrological quality in the country and linked to the international system of units, which is a reference for other standards. The measurement standard guarantees the consistency of measurement in the country. There are following terms of recognition of a measurement standard as a national one: providing the common access to the national standard and bearing the costs of upgrading and maintaining the

[8] K. Markiewicz, D. Habich, W. Popiołek, E. Michniewicz, Ł. Litwiniuk, Z. Ramotowski, J. Borzymiński, P. Fotowicz, A. Goszczyńska *Polska administracja miar. Vademecum*, Warszawa 2015, p. 136.

standard, including the costs of links with international standards and with the standards in other countries[9].

President of the Central Office of Measures has the following competencies: the development and the maintenance of national measurement standards and other measurement standards with the highest precision of units of measurement in the country and ensuring the consistency of national measurement standards with international standards. In the light of the Law On Measures Art. 16 Par. 1 the responsibilities of the President include: maintenance and development of the system of legal units of measurement and national measurement standards, in particular:

- construction, maintenance and modernization of national measurement standards and measurement systems used to transmit units of measurement stored and used in the Office, as well as development in this field,
- informing in the way of announcement about measurement standards fulfilling conditions set for national measurement standards,
- providing, in the way of comparisons, the link of national measurement standards with international measurement standards or measurement standards in other countries, as well as validation of competence in ongoing calibrations and measurement,
- providing the transmission of legal units of measurement from national measurement standards to measuring instruments, including the transmission to entities performing activities to provide consistency of measurement and accuracy of measurements connected with the defense and state security,
- supervising the activities of organizational units and laboratories outside the administration of measures which own national measurement standards, maintain and provide access to these standards,
- production and certification of reference materials,
- providing expertise and research of measuring instruments,
- determining the quantity through measuring the objects in relation to which the measurement activities are undertaken,
- organizing and conducting the national interlaboratory comparisons.

National measurement standards are maintained by the Central Office of Measures. They are measurement standards officially recognized in the Republic of Poland as the basis for assigning values to other measurement standards of a given physical quantity. According to the hierarchical system of testing, the

[9] Conditions and procedure for recognition of measurement standards as national ones are defined in the Regulation of the Minister of Economy, Labour and Social Policy of 30 January 2003 on the recognition of measurement standards as national measurement standards, Dz. U. (Journal of Laws) 2003, No. 31, item 257 and regulation of Minister of Economy of 27 February 2007 amending the regulation on the recognition of measurement standards as national measurement standards, Dz. U. (Journal of Laws) 2007, No. 44, item 280.

standards of lower order, which are accessible to the offices of measures, accredited laboratories or industry, are referred to national standards.

The link of the national system of measurement to the international system and providing the consistency of national measurement standards are carried out in the way of international comparisons of standards conducted by the metrological institutions of different countries. In Poland, the role of national metrological institutions is entrusted to the Central Office of Measures. The significance of these comparisons for the national economy is substantial, because their results show that the national measurement standards provide the transfer of units of measurement which are in compliance with the International System of Units SI to the measuring instruments. Thus, they give entrepreneurs the confidence that measurements carried out using the measuring instruments, which were calibrated using national measurement standards, are accepted in the country and in the world, acting as the first link in the chain which provides metrological safety of economic trade.

The statutory obligation of the administration of measures is providing the transfer of the legal units of measurement from national measurement standards to measuring instruments used in trade. In this regard, the authorities of administration of measures perform the calibration of measuring instrument at the request of interested parties. According to the definition in the International Vocabulary of Metrology „calibration means, firstly, determining the relationship between the values of quantity presented by the measuring standard together with their measurement uncertainties and the corresponding indications of a calibrated object together with their uncertainties, and secondly, using the information to determine the characteristics allowing to obtain the results of measurements on the basis of indications"[10]. The calibration can also include the evaluation of the compliance of the measuring instrument with requirements or specifications indicated by the applicant. The result of a calibration enables the assignment of the indications of a measuring instrument to the suitable measurements quantity values or the determination of corrections of these indications and errors. It is moreover certified by the authority of the administration of measures in the calibration certificate.

It is worth noting that in Poland there are currently 20 national measurement standards and the Central Office of Measures maintains 18 of them[11]. National measurement standards provide a reference in many sectors of the economy, including most branches of industry and trade, health care, life and environment

[10] PKN-ISO/IEC Guide 99-2010 Międzynarodowy słownik Metrologii. Pojęcia podstawowe oraz terminy z nimi związane (VIM) – International Dictionary of Metrology – Basic Concepts and Terms Associated with them.

[11] The standards are immaterial and exist in the form of localized positions in calibrating laboratories of Central Office of Measures. Only the standard of mass – kilogram has a material form.

protection, public safety and order, protection of consumer rights, carrying out the customs control, the packaged goods, etc. The quantitative demand for the calibration of measuring instruments with less and less uncertainty has been growing for many years together with the development of technology and increasing number of precise measuring instruments.

The development of new technologies in the economy is connected with the increased demand for more and more precise measuring instruments, which can perform accurate measurements in many fields of economy. Both the process of calibration and legalization of measuring instruments are essential factors of economic development of the country due to the extensive use of measuring instruments in most areas of the economy.

## Conclusions

The implementation of public duties by the administration of measures in providing the uniformity of measurement and the required accuracy of measurements of physical quantities takes on a new meaning in the face of technological progress and the development of new branches of industry. There are more and more new areas that could not develop without the metrology. This situation causes that metrology does not play a secondary role in the technological development, but it co-creates it. This phenomenon determines the importance of accuracy and quality of measurements in new areas of the economy, which results in an increasing role of calibration of measuring instruments.

National measurement standards provide the uniformity of measurements, without which users of measuring instruments in the economy could not be certain if products manufactured or sold by them will meet the requirements necessary to ensure their quality and competitiveness in the national and international market. To meet these expectations, the administration of measures constantly develops the methods of calibration of measuring instruments which must comply with national and international requirements. The accuracy of measurement is one of the factors affecting the competitiveness of the economy, which makes this task pivotal for protection of the public interest.

Although metrology belongs to the technical sciences and the attention to measurement standards is put mainly in this area, one should not underestimate the normative area which regulates the scope of their use in trade, because the authorities of public administration exercise in this field the supervision over their use. The state is responsible for creating legal provisions which will properly protect both the public interest and the interests of individual entrepreneurs. It is therefore necessary to continuously improve the provisions of the Law on Measures depending on the changes in metrology and measurements used in the economy.

After the analysis of the Polish legislation regulating only the legal units of measurement and the rules of transmitting the values of legal units of measurement from national measurement standards to measuring instruments used in trade it can be concluded that they generally take into account the reality of Polish business transactions and the solutions worldwide. However, the legal situation is not that obvious when we refer to specific issues such as the supervision over the use of legal units of measurement, legal metrological control and the issues of the use of uniformity assessment systems for measuring instruments. In these areas there is still a lot of inconsistency and ambiguous regulations which require improvement.

## Bibliography

Act of 3 April 1993 – Law on Measures, Dz. U. (Journal of Laws) from 1993, No. 55, item 248.

Act of 11 May 2001 – Law on Measures, Dz. U. (Journal of Laws) from 2016, item 884, uniform text.

Regulation of the Council of Ministers of 30 November 2006 on Legal Units of Measurement, Dz. U. (Journal of Laws) from 2006, No. 225, item 1638.

Regulation of the Minister of Economy, Labour and Social Policy of 30 January 2003 on the Recognition of Measurement Standards as National Measurement Standards, Dz. U. (Journal of Laws) 2003, No. 31, item 257.

Regulation of Minister of Economy of 27 February 2007 amending the regulation on the Recognition of Measurement Standards as National Measurement Standards, Dz. U. (Journal of Laws) 2007, No. 44, item 280.

Council Directive 80/181/EEC of 20 December 1979 on the Approximation of the Laws of the Member States Relating to Units of Measurement (and repealing the Directive No. 71/354/EEC) Official Journal L 039 of 15 February 1980.

K. Markiewicz, D. Habich, W. Popiołek, E. Michniewicz, Ł. Litwiniuk, Z. Ramotowski, J. Borzymiński, P. Fotowicz, A. Goszczyńska *Polska administracja miar. Vademecum*, Warszawa 2015, p.136.

PKN-ISO/IEC Guide 99-2010 *Międzynarodowy słownik Metrologii. Pojęcia podstawowe oraz terminy z nimi związane* (VIM) – *International Dictionary of Metrology – Basic Concepts and Terms Associated.*

http://www.bipm.org/en/about-us/associates/