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**THREATS TO CONSUMERS USING WEIGHT
ON POLISH MARKET OF MEASURING
INSTRUMENTS**

Abstract: According to European law, producers are responsible for the measuring devices they introduce to the market, and the country's authorities are responsible for activities aiming at minimizing threats connected with using non-conformable goods. Conformity assessment on the market is a kind of market control. State organs control the goods which are placed on the market, identify non-conformable goods, and arrange their withdrawal from circulation or limit accessibility on the market.

Measurements are a basic source of information about the condition and characteristics of a product. It is on this basis that products are accepted or rejected.

A measuring instrument is one of the elements of the measuring process, and its proper quality characteristics influence the measuring process and its outcome. Threats from non-conformable measuring devices and hazards to consumers are analyzed in the paper on two levels: on the stage of putting devices on market and during their use.

The legal aspects of the control over weights brought onto market and put into use are presented in the article. The main goal of the article is analysis of consumers' threats as a result of using non-conformable measuring devices. Public authorities have to describe the priorities to minimize the risk. Therefore, they need to evaluate the range of the risk. The procedure of risk assessment regarding non-automatic scales used in trade is presented in this paper. Risk assessment was done according to a seven-stage procedure. The influence of threats/irregularities on legal interest is identified in a supply chain of non-automatic weights in the Wielkopolska region. Legal interest is widely defined as protection of the consumer, fair play between the manufacturers, confidence in the CE mark indirect confidence of the

consumer and producer (manufacturer of the product, the manufacturer's representative, the importer into the EU or other professionals). Based on the threat analysis, which complies with EU guidelines, it is possible to determine the preferential actions for supervision.

Keywords: consumer protection, conformity assessment, producer, user, non-automatic weights, risk assessment.

JEL classification: L32.

ZAGROŻENIA DLA KONSUMENTÓW KORZYSTAJĄCYCH Z WAG WPROWADZANYCH NA KRAJOWY RYNEK PRZYRZĄDÓW POMIAROWYCH

Streszczenie: W systemie prawa europejskiego producenci są odpowiedzialni za wyroby wprowadzane do obrotu, z drugiej strony organy państwa są odpowiedzialne za działania podejmowane w celu minimalizowania zagrożeń związanych z użytkowaniem wyrobów niespełniających wymagań. Nadzór rynku jest rodzajem kontroli rynku. Organy państwa kontrolują wyroby wprowadzone do obrotu, identyfikują wyroby niezgodne, ich wycofanie z obrotu lub ograniczenie dostępności na rynku.

Pomiary stanowią podstawowe źródło informacji o stanie i właściwościach wyrobów. Na ich podstawie podejmowane są decyzje o akceptacji albo odrzuceniu wyrobu. Jednym z elementów procesu pomiaru jest urządzenie pomiarowe, a jego odpowiednie właściwości jakościowe przyczyniają się do poprawności przebiegu i wykonania pomiaru. W niniejszym rozdziale zagrożenia od niespełniających wymagań przyrządów pomiarowych i ryzyko dla konsumentów analizowane jest na dwóch poziomach, tj. na etapie wprowadzania urządzeń do obrotu oraz w trakcie ich użytkowania.

W rozdziale zaprezentowano aspekty prawne kontroli wag wprowadzanych na rynek albo do użytkowania. Celem artykułu jest analiza zagrożeń i ryzyka dla konsumentów jako rezultatu stosowania niezgodnych z wymaganiami przyrządów pomiarowych. Organy państwa muszą określić priorytety dla minimalizacji ryzyka, dlatego też należy oceniać wielkość tego ryzyka. Procedura oceny ryzyka w odniesieniu do wag nieautomatycznych przeznaczonych do stosowania w handlu jest zaprezentowana w siedmiu etapach. Identyfikowany jest wpływ zagrożeń/nieprawidłowości wag nieautomatycznych na obszarze Wielkopolski na interes prawny. Interes prawny rozumiany jest tutaj jako: ochrona konsumentów, etyczne postępowanie producentów (rzetelne, zgodne z prawem i odpowiedzialne postępowanie przedsiębiorców we wzajemnych relacjach z klientami, kontrahentami, pracowni-

kami oraz organami publicznymi), zaufanie do oznakowania zgodności oznaczające pośrednio zaufanie konsumentów (także użytkowników przyrządów pomiarowych) do producentów i dostawców przyrządów. Na podstawie przeprowadzonej oceny ryzyka możliwe jest określenie działań priorytetowych dla jednostek nadzoru.

Słowa kluczowe: ochrona konsumenta, potwierdzanie zgodności, producent, użytkownik, wagi nieautomatyczne, szacowanie ryzyka.

Introduction

Measurements play an important part in economy, health care, environment protection, trade, public safety, science and sport. Measurements are used by consumers as a basis of financial clearings, medical diagnoses, goods verification in industry and evaluation of the level of environmental pollution. The tools used for measurements are one of the key elements for their accuracy. Therefore, unreliable measuring instruments carry a great risk for consumers, resulting in insufficient weigh or quantity, as well as faulty decisions in health care and environment protection or non-conformable goods on the market. The basic target is to reach a high and common level of consumer protection on the whole EU market. The literature mentions many categories of risk. E. Skrzypek indicates the negative or neutral risk, i.e. the risk regarded as threats and opportunities [Skrzypek 2011]. According to [Kaczmarek 2006], several kinds of risks can be distinguished: insurance risk, currency risk and interest rate risk, credit risk, production risk, legal risk, organizational risk, medical risk, and the risk of civilization. The risk from non-conformable instruments is understood as pure potential risk of the public interest. It combines several elements: the social risk, the legal risk and the operational risk.

Weights are one of the most common measuring instruments used on the market in financial settlements between suppliers and consumers, as well as in the goods packing control process. In this article, a considerable attention has been given to the threats and risks concerning weights on the market. The risk can be analyzed on two levels: at the stage of weights implementation on the market and during their use.

In order to ensure safety of the public interest, it is vital to be aware of the possible risks and to ensure that adequate operations are taken by the inspection organs with respect to measuring the instruments market. The

assessment approach or methodology analyzes the relationships among assets, threats, vulnerabilities and other elements. There are numerous methodologies, but in general they can be classified into two main types: quantitative and qualitative analysis. The methodology chosen should be able to produce a quantitative statement about the impact of the risk, together with some qualitative statements describing the significance and the appropriate security measures for minimizing these risks. [Schmittling and Munns 2010]

Therefore, an analysis of risk management has been presented, which includes extended elements introduced in the model proposed by WEL-MEC for the EU countries, which can be used to plan state organs control over the market of weights use.

1. Legal aspects of the control over weights brought onto market and put into use

Measuring instruments used in the area regulated by law (e.g. in marketing, health care, environment protection), as well as whenever a consumer is involved, are subject to legal metrological control or conformity assessment, respectively. Legal metrological control is performed by:

- approval of the type of measuring instruments on the basis of type analysis prior to marketing authorization of the type, i.e. initial or unit verification prior to placing an item on the market and putting into use, whereas unit verification applies to measuring instruments built for a specified, particular purpose;
- further verification with respect to instruments already placed on the market and put into use.

Conformity assessment determines that the specified requirements of a measuring instrument specified in particular regulations of directives are met: NAWI Directive (Non-Automatic Weighing Instruments) for weights and for the other measuring instruments MID Directive (Measuring Instruments Directive).

Conduct procedures as well as evidence to confirm these activities are varied; therefore, instruments producers, their representatives, distributors and users are requested to choose and comply with the law respective to a specific kind of measuring instrument. Apart from measuring instruments that comply with law regulations, there are available on the market instruments of the same kind (usually cheaper) which did not undergo any

kind of the above-mentioned form of metrological control. The user is responsible for an adequate choice of equipment during the purchase. The use of instruments that do not comply with law is subject to criminal sanctions.

Every non-automatic weigh placed on the market or put into use after 01 May 2014 and used to determine weight, i.e. in trade, to compose prescribed drugs in drugstores, during research done in medical and pharmaceutical laboratories or while packing goods, should undergo conformity assessment with the requirements specified in NAWI or MID Directive for automatic packing. Since 30 October 2006, new types of these kinds of measuring instruments can only be placed on the market or put into use after conformity assessment has been performed.

Conformity assessment system has replaced – with respect to specific kinds of measuring instruments – the formerly used legal metrological control system when it comes to type verification and initial verification.

As far as measuring instruments placed on the market on the basis of conformity assessment are concerned, a producer or its authorized representative may choose a specific procedure, so called module. Conformity assessment procedures for measuring instruments specified by MID directive are described by eight basic modules (A, B, C, D, E, F, G, H).

Before non-automatic weights are given marketing authorization, they are subject to EC type-examination and, according to the choice of their producer or his authorized representative, to EC declaration of type conformity and a guarantee of quality production or EC verification performed by a notified unit.

Risk analysis has been calculated with reference to the group of instruments often used on the weights market, which could encourage the use of procedures suggested by WELMEC to a proper control planning by control units. Recommended procedures of risk assessment with respect to the Polish market of popular measuring instruments; i.e., weights have been adapted and practically verified.

2. General principles of risk assessment

In order to be sure that different organizations and European Member States understand each other's risk assessment, all parties should use the same terminology with the same definitions.

A target was to introduce a unified and transparent way of conduct in this respect in all EU member countries, while also fulfilling the requirements of control over measuring instruments.

Risk assessment related to weighing and measuring instruments is one part of market surveillance; this is to understand the impact the instrument will have on the end user/consumer. The other part is using risk assessment as tool for the market surveillance authority to define priorities and to determine the choice of strategies to achieve their goals. Following the risk assessment, market surveillance authorities are expected to take action to deal with risks that are not acceptable. Deciding on the proportionate action is part of the risk management process, not of risk assessment [European Commission 2015].

The way market surveillance is performed, as with conducting a risk assessment, is heavily influenced by a set of underlying assumptions and the role, the functions it performs.

Risk assessment, with respect to Market Surveillance activities, is concerned with the likelihood that a piece of weighing and measuring equipment may be incorrectly placed on the market as a result of a failure to meet the essential requirements of the MID and NAWI Directives, and the effect that a noncompliance has on the end user.

If the authority finds non-conformity in an instrument, then the authority may wish to use the methods from this guide to conduct their own risk assessment to decide the risk level associated with the specific non-conformity.

In order to be sure that different organizations understand each other's risk assessment, all should use the same terminology with the same definitions. For this document, risk is defined as the probability something may occur versus its impact [WELMEC, 2011]:

$$R = P \times W$$

where:

R – RISK – Combination of the probability of unwanted occurrence and the severity of that unwanted occurrence

P – Probability: degree to which the unwanted occurrence has happened.

W – Impact: impact of the unwanted occurrence on the legal interest.

Legal interest is defined as protection of the consumer, fair play for the manufacturer, confidence in the CE mark indirect confidence of the con-

sumer, producer (manufacturer of the product, the manufacturer's representative, the importer into the EU or other professionals in the supply chain whose activities may select the safety properties of the product).

Tolerable risk: Risk, which is accepted in a given context, based on the current values of society. In general, the level of risks that society accepts is determined amongst others by culture, risk perception and technical development.

The surveillance program preferably contributes maximally to consumer protection and fair competition for one group of measurement instruments, but may be done for characteristics of different instruments or more groups of measuring instruments.

Risk assessment always focuses on three basic questions:

- 1) What can go wrong?
- 2) If it does happen what are the consequences? (Impact)
- 3) How likely is this to happen? (Probability)

A seven-stage model of risk assessment based on the WELMEC guide was analyzed and updated and presented earlier in other paper [Maleszka i Wiśniewska 2014]. There were presented indispensable sequencing activities with respect to identified threats and risk, in the form of PDCA (Plan-Do-Check-Act) cycle reflected by Deming circle as a sequence of coordinated acts itemized on particular stages of implementation.

A properly carried out risk management process is based on sources of information, including historic data, experience, feedback from all interested parties, observations, prognoses and experts' opinions with all their varieties and limitations. It also contributes to the gathering of information from many sources and includes an explicit notice on their uncertainty [Szomański 2012, s. 5–9].

3. The analysis of risk in practice

For the sake of risk analysis, an analysis of information found and obtained on automatic and non-automatic weights has been made:

- an assessment of the control over measuring instruments in Poland (within the instruments placed on the market and used) – own studies among the control units, a questionnaire among weight user,
- a report on 2004/22/WE directive implementation on measuring instruments [EC, Report 2004].

The analysis was made in the years 2007–2013 and concerned the acts and conduct of the entities who put measuring instruments on the market

or use them, the results from the control over measuring instruments, and the degree of transparency of legal regulations on measuring instruments for their users.

Nonconformities found during the market control over producers, importers and distributors of measuring instruments have been included. Their main cause was insufficient knowledge of the applicable legal regulations, i.e. improper marking of measuring instruments or improper manuals and guarantees (84.6% of nonconformities). Lack of or improper declaration of conformity was also a frequent problem (53.8% of nonconformities), as well as the lack of the remaining documents to confirm conformity assessment process (20.5% of nonconformities) or a lack of conformity markings of any kind (2.6%).

The situation looks similar in the EU. The report on the implementation of 2004/22/WE directive on measuring instruments carried out, among others, on the basis of an open debate among entrepreneurs of the EU member countries, represented in 55% by producers, installers, importers and distributors of measuring instruments and in 45% by users, recommends that the level of awareness of the directive on measuring instruments among producers and importers be increased by means of information campaigns. A survey showed that 60% of the respondents claimed that there is a great number of measuring instruments on the market without conformity markings (CE+M). At the same time, 1/3 of the respondents did not perceive such instruments to be an unfair competition against the instruments put on the market after the conformity assessment process. 2/3 of the respondents did not share this opinion. Differences in answers between the producers and users were not significant; however, a greater part of users claimed measuring instruments without conformity markings as unfair competition. To sum up, it could be said that 2/3 of the entities who place instruments on the market or use them do not accept the idea of placing on the market instruments against legal regulations.

The situation among the users of measuring instruments in Poland looks bad as well. Half of those questioned were unfamiliar with legal regulations on measuring the instruments they use. This may cause problems during the control of an inspection unit. The majority of users see no need for metrological control of measuring instruments between verifications in order to maintain the accuracy of measurements – an opinion shared by 70% of the tested people – while only 12% see such necessity.

Consumers' reactions towards nonconformities of measuring instruments are, to a large extent, limited. It may be a result of poor awareness of

their own expectations in regards to accuracy of measurements, which stand as a basis for financial settlements. On the basis of data obtained from market control, it can be said that the claims on nonconformities observed on the market are very rare; e.g., there was 1 claim in 2013 and 1 claim in 2011.

Because the controls of the entities that place measuring instruments on the market or use them are infrequent in comparison to the amount of instruments on the market, especially as the controls are of a formal character, it is unlikely to detect nonconformities.

Risk assessment process was carried out with the presence of a group of experts from inspection units, i.e. the Regional Inspectorates of Trade Inspection (Wielkopolski Inspektorat Inspekcji Handlowej w Poznaniu) and the Regional Standard Agency in Poznan (Okręgowy Urząd Miar w Poznaniu). Prior to risk assessment, the methodology had been elaborated on and all doubts and remarks had been explained [WELMEC 2011; Wiśniewska i Maleszka 2014]. Some elements of the method could, therefore, be made more precise. Additionally, with respect to market control, the assessment was made in reference to the results of the control (detected nonconformities) of non-automatic weights carried out in 2014.

3.1. Risk assessment regarding non-automatic weights used in commercial establishment – risk in a supply chain

The influence of threats/irregularities identified in a supply chain of non-automatic weights in Wielkopolska region (i.e., in reference to producers, importers or distributors of measuring instruments) on legal interest according to a seven-stage procedure has been described [Wiśniewska i Maleszka 2014].

The following threats and irregularities were found:

- the maximum permissible error was exceeded (1/3 of detected irregularities),
- scales similar to the scales used in shops were sold without conformity assessment marks (1/3 of detected irregularities),
- a risk of nonconformity referring safety requirements included in other directives e.g. Low Voltage Directive LVD (1/3 of detected irregularities).

An average impact of an irregularity has been determined as the mean average of the results of the specific impacts 3.6 (4).

The probability that an irregularity occurs has been determined on the basis of the data from market control (frequency of controls of inspection

units, frequency of nonconformity to requirements among supply chain participants, the fact that an instrument comes from mass production) and marked on a probability scale as “3”. Consequently, (step 5) risk assessment could be described as presented below:

Table 1. The influence of risk in a supply chain for non-automatic weights used in commercial establishment

Type of effects	Type of threat/irregularity		Mean
	maximum permissible error was exceeded	lack of conformity assessment regarding the NAWI directive and other directives	
Economical effects	significant, on the national level, elimination of effects can be time-consuming – 3	significant, on the national level, elimination of effects can be time-consuming – 3	3
Health care and safety protection	–	health and safety risks of people handling scales, in the form of serious injuries and disorders – 4	4
Consumer confidence	unfavorable opinion on the national level – 3	misleading the consumers and users of scales placed on the market involving consumers – 4	3.5
Legal effects	the infringement – concerns the elementary requirements for the product concerned, i.e. product characteristics requirements, its design or production, defined in the new approach directive – 4	the infringement – concerns the elementary requirements for the product concerned, i.e. product characteristics requirements, its design or production, defined in the new approach directive – 4	4
Mean			3.6 (4)

Final risk is a sum of the risk after conversion, perception level and cost level. Maximum risk value is 15; however, in order to establish the hierarchy of actions, risk level is described as low 0–5, average 6–10 and high 11–15. High risk requires immediate actions and attention from domestic control organs. Average risk requires monitoring, in some circumstances control organs may take actions in further perspective. Low risk is the lowest risk to consumers (acceptable). Therefore, final risk determined on level

9 for non-automatic weights in supply chain requires monitoring; in some circumstances, control organs may take adequate actions.

Table 2. Probability of risk and total impact

Probability	Very likely	5					
	Likely	4					
	Possible	3				x	
	Unlikely	2					
	Very unlikely	1					
			1	2	3	4	5
			Minimal	Limited	Moderate	Increased	Significant
			Impact				

The final risk value (step 6) is presented in a summary given below:

Table 3. Final risk value

Non-automatic scales	Influence	The probability of effect occurrence	Risk = (4) · (3)	Risk conversion ^a	Risk perception ^b	Costs of risk minimisation ^c	Final risk
	4	3	12	3	3	3	9

^a Risk conversion – at risk level 11–15, conversion – 3.

^b Perception – social acceptance of the risk associated with the product concerned – 3.

^c Costs of risk minimization – average costs to be incurred by a domestic supervisor for granting resources needed to take actions – 3.

3.2. Risk assessment regarding non-automatic weights used in commercial establishment

The estimation referring risk assessment for non-automatic weights in use was done on the basis of the number of weights tested in the Wielkopolska region – 2836 tested pieces, including 76 pieces tested metrologically in 2013, and the detection of records that exceeded permissible error during control in 2013 – 2.63%.

The following threats and irregularities were detected among the users of non-automatic weight users in Wielkopolska region, which enabled us to determine so called influence on the legal interest:

- lack of valid verification – 96% of irregularities detected in the Wielkopolska region;

- invalid operating conditions (scales were not tared, levelled, operated beyond their weighing range, used for unit weigh measures) – 3% of detected irregularities in the Wielkopolska region; the irregularities may have an adverse influence on financial settlements with consumers;
- maximum permissible error was exceeded – 1% of detected irregularities in the Wielkopolska region.

The possible categories of influence (potential and detected) of measuring instruments irregularities have been evaluated according to formerly accepted rules and scoring (Table 4) for:

- economic effects (financial loss),
- health care and people safety,
- consumer confidence,
- legal issues (violation of legal regulations).

Table 4. Accepted scoring for possible categories of the influence of measuring instruments nonconformities (step 2)

Scoring	Influence	Categories			
		Economic effects	Human health and safety protection	Consumer confidence	Legal effects
5	very serious	<ul style="list-style-type: none"> – significant economic effects/ on the national and European level – removing the effects might be impossible 	loss of life	<ul style="list-style-type: none"> – unfavourable opinion on the national and European level – lawsuits – serious compensations 	<ul style="list-style-type: none"> – lawsuits – fine up to 5000 PLN
4	serious	<ul style="list-style-type: none"> – significant economic effects/ on the national and European level – removing the effects might be difficult 	serious injuries and diseases, serious and constant disorders	<ul style="list-style-type: none"> – unfavourable opinion on the national and European level – lawsuits – compensations 	<ul style="list-style-type: none"> application to the court – fine up to 5000 PLN
3	significant	<ul style="list-style-type: none"> – significant economic effects/ on the national level – removing the effects might be time-consuming 	serious damages or injuries and diseases, which cause long-lasting disorders	<ul style="list-style-type: none"> – unfavourable opinion on the national level – unfavourable opinion on the local level – a significant number of incidents 	<ul style="list-style-type: none"> – the multiple of two or several offences – a fine up to 5000 PLN

Table 4 – cont.

Scoring	Influence	Categories			
		Economic effects	Human health and safety protection	Consumer confidence	Legal effects
2	small	<ul style="list-style-type: none"> – low financial impact – easy to compensate – several incidents 	damages or injuries and diseases that don't cause long-lasting disorders	<ul style="list-style-type: none"> – unfavourable opinion on the local level – several incidents 	<ul style="list-style-type: none"> – removing the effects is not long-lasting – a fine up to 5000 PLN
1	slender	<ul style="list-style-type: none"> – low financial impact – single incident 	small damages or small injuries and mild diseases that don't cause long-lasting disorders	<ul style="list-style-type: none"> – unfavourable opinion on the local level – single incident 	<ul style="list-style-type: none"> – immediate effect removal – without any financial investment – admonition

The following table (table 5) presents the impact of an undesirable risk on legal interest.

Table 5. The assessment of risk influence

Type of effects	Type of threat/irregularity			Mean
	Lack of valid legalization	Incorrect conditions of use	The maximum permissible error was exceeded	
Economical effects	economic effects for the national budget (lack of fee for the legalization) ^a – 3	economic effects for a consumer, which are the consequence of an incorrect product measurement – especially regarding the use of scales over 15kg in an assembly centres, points of fuel scale, in places where car scales are used) ^c – 3	economic effects for consumer (intentional acting by changing metrological parameters, damaging instrument) ^d – 3	3

Table 5 – cont.

Type of effects	Type of threat/irregularity			Mean
	Lack of valid legalization	Incorrect conditions of use	The maximum permissible error was exceeded	
Legal effects	legal effects – 3	legal effects – 3	legal effects – 3	2.7
Consumer confidence	consumer confidence on the local level – 2	consumer confidence on the local level – 2	consumer confidence on the local level – 2	2
Human health and safety protection	incorrect measurement of patient's weight ^b – 3			3
Mean in total				2.7 (3)

Remarks for the assessment of risk influence are presented in the table above:

^a Economic effects for government budget as a result of loss of fees from verification are estimated on the basis of the number of weights and an average number of weights per shop and pharmacy. Assuming that on average 8% weights are questioned per year because of invalid verification (control with notification), the number of weights with invalid verification in the Wielkopolska region may be equal to 5,000 pieces. An average fee for weight verification is about 57 PLN, which gives an income loss of about 290 thousand PLN. If we assume the number of irregularities without notification to be 20% income, the loss may be equal to 680 thousand PLN (annually).

^b Economic effects for consumers resulting from invalid body weight measurement among pregnant women, new-born children and diabetic persons have been calculated. Invalid body mass gain measurement may result in faulty diagnosis, resulting in an invalid medical record. It has been estimated that 40% of weights in the Wielkopolska region operate without type approval and a valid verification, according to data of 2013 from the Wielkopolska region.

^c It is assumed that 3% of weights, i.e. 1800 pieces, are being used in invalid conditions.

^d With an assumption that 1% of weights, i.e. 600 pieces, exceed the maximum permissible error giving readings higher than the actual weight, the risk for consumers in trade has been calculated.

Then, an average influence of an undesirable action/irregularity has been determined as mean average of the results of particular income – 2.7 (3) – step 3.

The following step (step 4) is an assessment of possible undesirable action/irregularity occurrence (score range from 1 – rare, to maximum 5 – almost certain) as given below:

Table 6. Possible undesirable action/irregularity occurrence for scales in use

Frequency of occurrence	Type of irregularity			Mean
	Lack of valid verification	Incorrect conditions of use	Maximum permissible error was exceeded	
Frequency of not meeting the requirements contained for the type of measuring instrument and specific period of time	in health care and in marketing ^a – 4	3	2	3
The possibility to control a measuring instrument during the state organs' control	limited possibility of detecting the irregularity during the control by the Wielkopolska region Standard Agency ^b – 4	limited possibility of detecting the irregularity during the control by the Wielkopolska region standard agency ^b – 4	limited possibility of detecting the irregularity during the control by the Wielkopolska region standard agency ^b – 4	4
Possibility and practice among measuring instrument users to verify them periodically	practice among the users of periodical verification (c. 80% to 90% of users legalize scales) – 3	practice among the users of periodical verification (c. 13% notice the need of their own verification, half of whom uses their own criteria) ^c – 4	practice among the users of periodical verification (c. 13% notice the need of their own verification, half of whom uses their own criteria) ^c – 4	3.7
The fact of implementing management system by a user	88% of scale users do not implement management system ^c – 4	88% of scale users do not implement management system ^c – 3	88% of scale users do not implement management system ^c – 3	3.3
Mean in total				3.5 (4)

^a Around 40% of scales do not comply with requirements in health protection, in marketing it is 8% if notification is used, and 20% in case of controls without any notification.

^b Formal controls cover c. 15% of the estimated number of scales in the Wielkopolska region – control once in three years during the useful life of a scale.

^c Data on the basis of the survey conducted among the measuring instruments users.

The matrix below (step 5) calculates the risk by multiplying the total impact by the probability.

Table 7. Probability of risk and total impact

Probability	Very likely	5					
	Likely	4			x		
	Possible	3					
	Unlikely	2					
	Very unlikely	1					
			1	2	3	4	5
			Minimal	Limited	Moderate	Increased	Significant
			Impact				

The final risk value for non-automatic weights in use is presented in the chart below. The final risk score can be further developed to provide an overall score by taking into account the perceptions, e.g. political impact (image), media effect and the cost to address the risk.

Table 8. The final risk value

Effect	Probability of action to occur	Risk = (3) × (4)	Risk conversion ^a	Risk perception ^b	Costs of risk minimisation ^c	Final risk
3	4	12	3	2	4	9

^a Risk conversion – at risk level 11–15, conversion –3.

^b Perception – social acceptance of the risk connected with scales –2.3 (2).

Scoring justification for risk perception:

– claim frequency – 6.6% claims in the Wielkopolska region in the period of 2008 – 2014 out of all claims registered – 2,

– political and media attention in reference to choice category – single cases – 3,

– risk perception in reference to choice resulting from consumer unawareness – 2.

^c Cost of risk minimization – little cost, incurred by control units in the Wielkopolska region to provide resources necessary to take actions – 4.

Scoring justification for costs:

The cost of risk minimization (hiring new employees, providing means of transport) – 4 in reference to GUM budget (circa 0.2%) – standard administration of 98 million PLN from government budget.

There are 60 thousand weights in the Wielkopolska region. Assuming that 10% of weights are not verified, 6 thousand weights should be con-

trolled a year. Standard administration of the Wielkopolska region controls, on average, 3 thousand weights and 1300 entities a year. The number of controls to be carried out (with above mentioned assumptions) is 3000. Assumption: 2 hours per 1 control per 1 employee. Hence, the additional cost to increase the number of controls requires 3 additional job positions is 170 thousand PLN a year; the additional cost to maintain a car per year is 20 thousand PLN. In total, the cost is 190 thousand PLN a year.

Final risk scored a 9 – an average to monitor, which means that state organs may, in order to minimize risk in further perspective, with considerably little financial resources, take actions to increase safety of the consumer who use the weights available on the market.

Conclusions

Two kinds of threats have been identified. First, an external threat for public interest resulting from low awareness of users. The second threat was internal for users themselves. Low awareness of legal requirements influences bad decisions while buying equipment (lack of certificates, declaration, inappropriate usage).

Risk assessment in reference to weights, on the one hand, identifies some serious threats which come from the instruments that do not conform to the requirements applied and used on the Polish market. Under consideration were such matters as:

- technical requirements – scale construction, assembly,
- metrological requirements – measurement error,
- legal requirements – regulation arrangements concerning technical and metrological requirements of the measuring instruments. The most important were: maximum permissible error, lack of conformity assessment regarding the NAWI directive, lack of valid legalization, incorrect conditions of use.

On the other hand, risk assessment might be used as a tool to determine priorities, actions and measures regarding the supervision of the measuring instruments market. Actions and measures should be appropriate to the risk level and its effect on the consumer protection, free flow of goods on a common market, and fair competition among the manufacturers.

The given analysis proves that an increase in funding the controls of measuring instruments will, on one hand, contribute to an increase in the income of the national budget, and on the other hand, reduce an unfair

competition. It will also increase consumer protection in many aspects of life.

The organs which control the market of measuring instruments need to properly allocate their means of control in order to provide the best possible effects in the perspective of the state's interest. Because of limited resources and the impossibility to cover all the products with actions at the same time, it is necessary to set priorities in actions looking at final risk of each measuring instruments in the same way as has been proposed and done for weights placed on the market, as well as those being used. Based on the threat analysis, which complies with EU guidelines, the preferential actions for Wielkopolska supervision can be proposed.

Risk management process can be used to evaluate activities in the context of expenses and threats for society. The results indicate how to create a strategy for measurement devices supervision and will be used to prepare a model for the supervision improvement.

The strategy should involve inspections by the authorities, education of producers, distributors, users and guidelines for metrological legislation.

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