MEASURING THE HARMONIZATION DISTANCE WITHIN THE LEGAL SPACE OF THE EUROPEAN UNION AS A TOPOLOGICAL SPACE

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Abstract
The present study starts from the general concept of legal space, viewed from a topological perspective, as a set of legal norms and judicial decisions, on which a structure is built upon: the legal order. Within the legal space, phenomena characteristic of orderly pluralism occurs, among which is one of the utmost importance - legal harmonisation. Of different amplitudes, the harmonisation could be confined to the adoption of common minimum rules or, on the contrary, it could reach the proximity of the unification.

Treating the legal space of the European Union or any of its legal sub-spaces, for example, the space of justice or the space of substantive criminal law of the Union, can be useful for many purposes, including that of concrete, numerical measurement of the harmonisation distance, that is, the distance between the norm of a Member State transposing a directive and the harmonisation rule established by that directive.

The application we developed uses the "chi-square distance", as a mathematical method of measuring the harmonisation distance.

Such methods, resulting from the topological vision of the European Union's legal space, can be useful as tools for establishing of good practices, for self-evaluation of the Member States in their transposition practices or for evaluating by the European Commission of the transposition into national law of the harmonisation rules established by directives.

Keywords: legal space, justice space, topological space, legal order, orderly pluralism, harmonisation, harmonisation distance, chi-square distance.

Space is a set of entities on which a certain structure is defined. Depending on the nature of the structure, the space bears a specific name (for example: metric space, normed space, Hilbert space etc.). All these spaces are encompassed by the concept of topological spaces. The legal spaces can therefore be topological spaces1, insofar as they are sets of entities subject to an order. There is also a strong connection between legal spaces

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1 S. Müller-Mall, Legal Spaces. Towards a Topological Thinking of Law, Springer Verlag, Berlin Heidelberg, 2013, p. 118 – "(...) a topological approach might be fruitful in this context, because it might be able to integrate the notion of constant transformation (which stems from a spatial thinking of law) and the
and geographical spatiality (territoriality), which has been theorised by representatives of the school of legal geography, notably Henry Lefebvre and Edward Soja.

Returning to the legal space, the structure we are considering is represented by the legal order, as an order built on the respective space and which has at least two main components: the normative order (all the legal norms applicable to the space, with their structures and hierarchies) and the judicial order (all judgments and judicial decisions made in the respective space). Within the legal space we can also identify other sets of legal, non-judicial decisions, such as, for example, administrative ones, and in the case of certain states, those regarding the constitutionality of norms and decisions. Both the legal norms and the decision-making system, especially the justice system, of the legal space, have a connection of abstraction-concretisation, of applying, through interpretation, the factual reality. However, a permanent interrelation exists between all the elements of the legal spaces in the context of the Sein und Sollen problem.

We can isolate, within the legal space, the relationship between the territory and that part of the space with a judicial telos (grouping of factual elements, legal norms, their interpretations, court judgments and other judicial decisions). This results in a new legal space, or a subspace of the legal space, which we call judicial space or, more precisely, justice space.

If the territory is that of the European Union and the factual elements, the legal norms and the judicial decisions we consider represent offenses, norms of substantial criminal law and criminal procedure, respectively, judgments and other judicial decisions of criminal nature, we obtain the criminal dimension of the European Union’s justice space.

The need for legal spaces and justice spaces results from the normative-judicial interaction, and this relation is marked at present by the legal pluralism. Mireille Delmas-Marty operates in this context with several notions, including "separation pluralism", which lacks the vertical component of a possible integration, that of "reciprocity", which we observe within the Union's justice space in the form of the principle of mutual recognition of judgments and judicial decision (article 81

technique of locating places in law by constructing and applying frames of reference. The strategy in doing so would be build a meta-perspective on a series of concrete perspectives in law that presupposes the constant transformation of legal spaces”.


4 This is the case of those systems of law where the control of constitutionality is not entrusted to the courts, as is the case with the French Republic (Conseil Constitutionnel).


TFEU, for judicial cooperation in civil matters, respectively, article 82 TFEU, for judicial cooperation in criminal matters) and that of "harmonisation" or "approximation of legislations", with its absolute form: "unification". Thus, the author identifies as forms of legal pluralism: "cross-coordination", "harmonization by approximation" and "unification by hybridization".

The spectrum of the phenomena of legal pluralism is extremely diverse, so that "between pure-horizontal and pure-vertical actions, in fact, countless intermediate forms are interspersed, so that harmonisation could become the predominant phenomenon and, to a certain extent, the emblem of orderly pluralism". One of the main features of harmonisation is that it leaves the Member States with a national margin of appreciation. Legal unification eliminates the national margin.

From the thought of the cited author we notice how the main methods of orderly pluralism are distinguished: reciprocity and harmonisation, with an obvious preference for harmonisation.

Although they are not specific only to European Union law, respectively to its area of justice, but to the whole global legal system, we observe how establishing minimum common rules (harmonisation) and the principle of mutual recognition of judgments and judicial decisions have become the methods of integration (to achieve orderly pluralism) in the criminal dimension of the justice space of the European Union (art. 82, 83 TFEU).

In order to simplify the problem for the purpose of carrying out a practical application, the criminal justice space of the European Union, having as entities the legal norms of substantial criminal law and criminal procedure that apply within the EU territory, as unified territories of the Member States, as well as the judicial decisions made in the same territory, is regarded as a topological space. We can treat this space as having in its structure three subspaces: the space of the legal norms of substantial criminal law, the one of the legal norms of criminal procedure and that of the criminal judgments and judicial decisions.

In order to understand how we treat a legal space as a topological space, we choose the legal space of substantive criminal law of the European Union, respectively, both the criminal law rules of the Member States and the minimum common rules in this matter, adopted by the Union under art. 83 TFEU. We can regard the latter category as representing "approximation rules" of the Member States legal norms.

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7 Ibid., pp. 36, 37.
8 Ibid. p. 37.
9 Ibid., p. 36.
10 S. Müller-Mall, Legal Spaces. Towards a Topological Thinking of Law, Springer Verlag, Berlin Heidelberg, 2013, p. 118, p. 97 – the author considers the law (in the largest meaning, latissimo sensu) as "a set of interconnected events of legal performative generation", having three subspaces: the space of legal norms, the space of judicial decisions and the space of legal thought, the last one being conceived as a "passive structure of law's generation".
In any topological space, we can refer to the notion of near between the entities of space. The most widely used means of measuring the near between two entities is the distance (or metric).

The fact that we have a distance on set $X$ means that, for any $x, y \in X$, means that we have associated a non-negative number, $d(x, y)$, which satisfies the following axioms:

(i) $d(x, y) = 0 \iff x = y$;
(ii) $d(x, y) = d(y, x)$ (symmetry);
(iii) $d(x, y) \leq d(x, z) + d(z, y)$ (the triangle inequality).

In such a space, the measure of near between entities $x$ and $y$ is described by the distance $d(x, y)$, the order in which $x$ and $y$ are written being indifferent (symmetry axiom).

We notice that the axiom (i) expresses the essential fact that the distance distinguishes the points, that is, two points $x$ and $y$ are distinct if and only if the distance between them is strictly positive, that is (i) is equivalent with:

$$x \neq y \iff d(x, y) > 0$$

Example: In the physical space $\mathbb{R}^4$, the entities are the points, characterized by four coordinates, and the specific is represented by the calculation of the distance between two entities. Thus, for the points:

$x = (5, 5, 3, 2)$
$y = (5, 5, 1, 2)$

the Euclidean distance is calculated according to the formula:

$$d(x, y) = \sqrt{(5-5)^2 + (5-5)^2 + (3-1)^2 + (2-2)^2} = 2$$

We define the legal space of the norms of substantive criminal law applicable in the European Union. In this area, we introduce a notion of association, through the Lisbon Treaty there was a merger between the internal market of the Union and the area of freedom, security and justice (AFSJ), a reality that allows all the principles used in the internal market to be used, post-Lisbon, within the AFSJ. Therefore, starting from the conclusion of A. Klip, we can consider that the adoption of common minimum rules regarding the definition and sanction of crimes can be considered as a method of approximation of laws, concept used in the internal market, in art. 114-118 TFEU. Indeed, both concepts fall into the broader notion of harmonisation. Establishing common minimum norms in the concept used within the AFSJ is a form of "indirect harmonisation", in the author's view.
describing the degree of association between the legal norms of the Member States and those establishing minimum common rules (harmonization / approximation) for a certain criminal typology. We will take as a concrete example the market abuse offence. For this criminal typology, there are common minimum rules established by Directive 2014/57/EU\textsuperscript{12}. The norm for establishing common minimum rules for insider dealing is set out by art. 3 paragraph (1) of the Directive. Leaving aside the inclusion in the harmonisation rule of the instigation to perpetration of the offence, insider dealing is defined by four criteria, as follows: misuse of privileged information (detailed in article 3 (2) of the Market Abuse Directive) is a crime at least in serious cases and when acts are committed intentionally. Thus, the criteria, which largely correspond to the constituent elements of the objective and subjective side of the offence are: misuse, privileged information, seriousness of the crime and subjective side (intention). Each criterion, when interpreting the norm of criminalisation, is associated with a score (or weight), from 1 to 5, depending on its importance in the definition of the crime, 5 being the maximum score and 1, the minimum. The score 0 cannot be assigned because it has the significance of an absolute statistical impossibility to have met a certain criterion of the four identified.

Therefore, we will follow this methodology in relation to the common minimum rules in art. 3 paragraph (1) of Directive 2014/57/EU and we will weigh the criteria of criminalisation as follows:

- Criterion 1 - misuse - 5;
- Criterion 2 - inside information - 5;
- Criterion 3 - seriousness of the offense - 3;
- Criterion 4 - subjective side - 2.

We structure the criteria in the form of columns and the weights in the form of a line and we will thus obtain a table, that we call the expected table:

\[
\begin{pmatrix}
1 & 2 & 3 & 4 \\
5 & 5 & 3 & 2
\end{pmatrix}
\]

Next, we follow the process of transposition of the Directive into the criminal law of the Member States and thus we can (virtually) identify a Member State, MS 1, which transposed the harmonisation norm into its criminal law by the definition: the misuse of privileged information, committed with intent, constitutes a crime.

Measuring the harmonization distance within the legal space of the EU...

We note that the criminalising norm does not impose conditions regarding the seriousness of the crime. Using the above methodology, we will assign weights to the four criteria identified in the EU norm of establishing minimum rules as they result from the transposition norm of MS 1. It results:

- Criterion 1 - misuse - 5;
- Criterion 2 - inside information - 5;
- Criterion 3 - seriousness of the offense - 1;
- Criterion 4 - subjective side - 2.

Table MS 1 standards (observed table 1)

\begin{tabular}{cccc}
1 & 2 & 3 & 4 \\
5 & 5 & 1 & 2
\end{tabular}

A second EU Member State, MS 2, transposed the approximation rule of the Directive as follows: the misuse of inside information, in particularly serious cases and when the perpetrator pursued the acquisition of an unjust benefit for himself is punished. We note that the weight of criterion 3, by qualifying the seriousness of the crime (particularly serious) should be close to the maximum value, therefore it will be assigned the score of 4, and the weight of criterion 4, by the requirement of the direct intention qualified by scope, should be also 4.

Thus, the table is obtained:

Table MS 2 standards (observed table 2)

\begin{tabular}{cccc}
1 & 2 & 3 & 4 \\
5 & 5 & 4 & 4
\end{tabular}

We notice that the three tables are not identical, differing by the weights assigned to the criteria. Comparing through the tables the transposition norm with the one of harmonisation (approximation) by direct examination of the tables is difficult and, therefore, it is necessary to characterize it by a number. There are several ways of associating numbers to these tables, each of which is appropriate to a specific typology of situations.

One method we could use is that of the Euclidean distance, which starts from the observation that the tables differ only by the second line, so, by identifying the table with it, the Euclidean distance between the first two tables is calculated by the formula (in $\mathbb{R}^4$) indicated above, for the calculation of $d(x, y) = 2$. This number represents the Euclidean distance between the expected table and the observed table 1.
However, the use of a distance must be appropriate to the nature of the entities of the space. Thus, the Euclidean distance is suitable for spaces whose entities are numerical in nature, although it depends on the unit of measure.

In the case above, the entities are not of a numerical nature and, therefore, the Euclidean distance is not desirable to be used. We must take into account that the nature of the entities is qualitative, not numerical, and we must keep in mind the fact that each criterion, in its turn, is qualitative in nature.

For such a situation there is the distance "chi-square", calculated by the formula

\[ \chi^2 = \sum \frac{(f_o - f_e)^2}{f_e} \]

where \( f_o \) and \( f_e \) are the weights in the tables.

Although it is not a true distance, it satisfies the fundamental axiom (i), to distinguish the entities of the space and thus is widely used to measure the approximation between two tables by a number.

We calculate "chi-square" for the distance between the transposition norm of MS 1 from the harmonization norm of the EU (the one in art. 3 paragraph (1) Market Abuse Directive):

\[
\chi^2(\text{Table EU, Table MS1}) = \frac{(5 - 5)^2}{5} + \frac{(5 - 5)^2}{5} + \frac{(3 - 1)^2}{3} + \frac{(2 - 2)^2}{2} = 1.33(3)
\]

We notice that the Euclidean distance is different to the "chi-square" distance. This is a rule.

According to the same method, we calculate "chi-square" for the distance between the transposition norm of MS 2 from the harmonization norm of the European Union:

\[
\chi^2(\text{Table EU, Table MS 2}) = \frac{(5 - 5)^2}{5} + \frac{(5 - 5)^2}{5} + \frac{(3 - 4)^2}{3} + \frac{(2 - 4)^2}{2} = 2.33(3)
\]

The result obtained by the "chi-square" distance shows us clearly that the transposition norm of MS 1 is closer to the harmonisation norm, set out by art. 3 paragraph (1) of the EU Market Abuse Directive, other than the rule of the MS 2.

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The "chi-square" distance does not, in itself, allow us to determine whether a certain norm represents a transposition of a harmonisation norm. This is to be done through the legal contextualization, supplemented by the establishment by the transposition evaluator of a standard chi-square distance, which we call critical distance. A "chi-square" distance greater than the critical harmonisation distance indicates that the norm adopted by a Member State under the rule set out in the harmonisation directive does not represent a transposition of the harmonisation rule. In the example above, it is to be expected that Member State 2 did not, in fact, transposed the harmonisation rule.

**Bibliography**