# Preliminary Identification of Quantitative Factors Determining the Duration of Court Proceedings in Commercial Cases

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*Abstract:*

*Purpose: The aim of the article was to identify factors that are linear combinations of the variables under scrutiny that affect the duration of court proceedings.*

*Design/Methodology/Approach: This research was conducted on commercial cases, based on the Principal Components Analysis (PCA). The original variables were grouped into factors that are correlated with each other. The Kaiser Criterion (own value >1) was chosen as the main criterion determining the number of factors. The conducted research was subordinated to six phases, largely linked to the data mining scheme (CRISP-DM). Seven variables of a strict numerical nature marked as (vn) were distinguished from the features describing court proceedings.*

*Findings: Based on the analysis, two main quantitative factors characterising the examined cases were identified. The first factor groups the variables:(v4) Number of hearings in the first instance/second instance, (v5) The number of days from the first hearing to the case being settled, (v6) The judgement in the first instance (number of pages), (v7) Volume of files (number of volumes),and the second one:(v1) The court fee paid, (v2) The value of the subject matter of the dispute, (v3) The number of days to the first hearing. Further research will be conducted into the development of relations between the variables in different areas of their variability, particularly with respect to the value of the matter in dispute.*

*Practical Implications: The identified factors can be used at the micro level, in case management by a judge, at the meso level in case management in court, as well as at the macro level the entire justice system.*

*Originality/Value: The study identified factors that affect the efficiency of court proceedings.*

*Keywords: Common court, commercial cases, excessive length of court proceedings, PCA.*

*JEL classification: K4, K41.*
*Paper Type: Research study.*

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## 1. Introduction

According to the Montesquieu's idea, the judiciary is one of the most important institutions in the country due to the execution of substantial social tasks, and the economic development of each country depends largely on an efficient judicial system. Such an approach is far from being innovative, but it should be stressed that theoretical and empirical research on the state of the judiciary has been carried out in fact only for fifteen years, (Botero, La Porta and Lopez-de-Silanes, 2003), and has been intensifying for the last seven years (Christensen and Szmer, 2012; Dimitrova-Grajzl *et al*., 2012; De Shazo and Vargas, 2006; Eisenberg and Huang, 2012; Marciano and Khalil, 2012; Ramello, 2012; Ramello and Voigt, 2012; Ramseyer, 2012; Voigt, 2012).

In legal and economic literature, there is also a limited number of studies that model and analyse the efficiency of courts, judges, and other judicial staff. Studies conducted have generally been based on the analysis of demand side of justice service (Rosales-Lopez, 2008). The supply side of justice service is composed of not only the budget allocated for courts, the number of courts, attorneys general and office staff but also factors such as their working hours and technology (Buscaglia and Ulen, 1997). In most developing countries, justice system makes inconsequent decisions and carries a lot of cases from the previous year (Dakolias, 1999).

The judiciary of Poland — as in other European countries — has been under enormous reform pressure for many years. On the one hand, the burden of cases, their complexity and the number of all procedural requirements are constantly increasing, while at the same time there are no practical proposals to solve these problems. As a result, judicial authorities are being forced to increase efficiency, without identifying which factors have a significant impact on delays. Inefficient court management and fragmented implementation of past reforms in the absence of a uniform vision, plan and consistency is the biggest issue of the Polish judiciary. The Polish judiciary system suffers from a lack of established labour standards and the image of the general judiciary is negatively affected by an inadequate allocation of human resources, resulting in an uneven workload and excessive length of court proceedings.

The efficiency of the courts is subject to criticism from both the public and the business community, and the costs of the system are multiplied by the adopted incorrect institutional solutions. The need for Polish courts to adapt to the standards of the European Union, which after Poland's accession to the EU structures have become an essential link of the European judicial system, has become a challenge in seeking ways to reduce the considerable protraction that courts are criticised for. Facing the challenge requires changes and improvement of operational activities, and social and economic needs in this area have been recognised in the development of the research sphere which includes the necessity to model solutions in this area.

Determining factors that affect the excessive duration of court proceedings is a crucial element of research. Since no quantitative research has been conducted in Polish courts in this area — there is a cognitive gap that needs to be filled.

Given the problem identified in this way, the aim of the article was to identify factors which are linear combinations of the variables under scrutiny that affect the duration of court proceedings. Commercial cases were examined, using the Principal Component Analysis (PCA).

## 2. Literature Review in the Field of Efficiency of Court Proceedings

Efficiency and effectiveness were originally industrial engineering concepts that came of age in the early twentieth century. Efficiency is an ambiguous notion and is interpreted in a variety of ways. There are many concepts of understanding, expressing and analysing efficiency in the literature. The terms such as effectiveness, efficiency, productivity, profitability are used. Management efficiency is closely related to the assessment of the effectiveness of planned and implemented activities in an organisation — both from the perspective of its internal environment as well as from the perspective of the organisation's interaction with the external environment. Each country is conducting more or less extensive testing of basic indicators of the functioning of the judiciary, including elements that allow for the assessment of its efficiency and effectiveness. Using the example of Poland, it can be concluded that the statistical analyses of the judiciary prepared by the Ministry of Justice focus on the following areas:

a. the number of cases coming into the courts and their structure (criminal, civil, family cases, etc.)
b. the number of cases examined and overdue (http://www.ms.gov.pl/statystyki/).

Global research is focused, among other things, on identifying factors that may affect judicial performance. Thus, the impact of voluntary and forced rotation of judges between court districts on performance has been examined (Guerra and Tagliapietra, 2017), the degree of formality of court procedures (Di Vita 2010; Djankov, La Porta, Lopez-de Silanes and Shleifer, 2003), the number or organisational structure of courts (Antonelli and Grembi, 2013), incentive systems for judges and lawyers (e.g. remuneration system, career path: Choi, Gulati and Posner, 2009; Lim 2013, Melcarne and Ramello 2015), judges' productivity (Christensen and Szmer, 2012; Marciano and Khalil 2012), knowledge, expertise— judge's seniority (Ramseyer 2012), accountability (Goelzhauser, 2012), individual task-scheduling method adopted by the judge (Coviello, Ichino and Persico, 2014a, 2014b), caseload— the relationship between judicial staff and court performance (Dimitrova-Grajzl *et al*., 2012; Lienhard, Kettiger, 2010).

The judiciary, in particular the courts, has a negative opinion of over 40% of Poles. It is mainly described as underfunded and understaffed (insufficient number of judges and auxiliary staff) and delays in court proceedings all over Poland. Meanwhile, data collected in international surveys indicate that in 2006 Poland was ranked 6th among the countries belonging to the Council of Europe in terms of the share of total public expenditure on the judiciary in the Gross Domestic Product *per capita*, ahead of such countries as Germany (11th place) or Spain (20th place). The employment level in Polish courts is also relatively high, but this does not result in efficiency and effectiveness — mainly due to an overabundance of functional positions and the lack of a system for managing the overload imposed on judges, both nationwide and in a single court (Odlanicka-Poczobutt, 2016).

The excessive length of court proceedings has been one of the most serious problems of the Polish judiciary for years. However, it does not affect all courts equally (at least as far as commercial courts are concerned). The duration of proceedings in different court districts varies significantly. This may mean that the network of courts and the distribution of employment is not adjusted to the workload measured by the number and complexity of incoming cases (Bełdowski, Ciżkowicz and Sześciło, 2010). The authors' research was focused on commercial cases, so the following section is devoted to them.

### 3. Description of Proceedings in Commercial Cases - Definition and Importance

The notion of commercial case until 3 May 2012 (Journal of Laws No. 233, item 1381) was defined in the Code of Civil Procedure in Article 479[1], according to which commercial cases were considered in separate commercial proceedings by specialised commercial courts. The commercial case involved civil cases between entrepreneurs in the scope of their business activities (definition of a commercial case *in the strict sense*). The Polish legislator also considered (commercial cases *in the broad sense*):

1) cases arising from the company's relationship,
2) cases against entrepreneurs for abandonment of the environmental infringement and restoring to its previous state or redressing the damage related thereto and for prohibition or restriction of activities threatening the environment,
3) cases belonging to the jurisdiction of courts under competition law, energy law, telecommunications law, postal law, and rail transport regulations,
4) cases against entrepreneurs for finding the provisions of the standard form contract impermissible,
5) cases between authorities of a state-owned enterprise,
6) cases between a state-owned enterprise or its organs and its founding organ or supervisory authority,

7) cases concerning proceedings to improve the functioning of a state-owned enterprise as well as cases of its bankruptcy,

8) cases in the field of bankruptcy and reorganisation law,

9) cases for the enforcement clause to be given to enforceable titles, which are a final or immediately enforceable judgement of a commercial court or a settlement concluded before that court.

Since 3 May 2012, cases in which the parties are entrepreneurs are dealt with on a general basis, in ordinary proceedings, i.e. the proceedings are the same for all, regardless of whether the parties are entrepreneurs or consumers. However, specialised commercial courts are still remaining, which are separated as departments in common courts. Cases involving entrepreneurs are generally dealt with by Regional Courts. In a situation where the value of the subject matter of the dispute exceeds PLN 75,000 the case is heard by the District Court. A commercial case is dealt with in ordinary and separate proceedings. Separate proceedings include proceedings by writ of payment based on documents and proceedings by writ of payment based on the plaintiff's statements where the statement of claim is heard in camera in a single-member adjudicating panel, and in the proceedings by writ of payment based on the plaintiff's statements, and in the proceedings by writ of payment, both the adversarial principle and the principle of hearing the case at the proceedings are limited. The proceedings by writ of payment may take the form of electronic proceedings by writ of payment (EPU).

For the purposes of this study, in the absence of a legal definition of a commercial case, it has been assumed that a case is a commercial case if it fulfils cumulatively three conditions, i.e. the case concerns civil relations, its parties are entrepreneurs, and the civil relation remains within the scope of business activity conducted by the parties. The notion of civil relationships should be understood as civil law relationships, which are characterised by the equivalence of their subjects. As a rule, civil relationships are shaped by decisions of the entities themselves. The creation of a civil-law relationship depends on the existence of the facts of the case with which the civil law norm links such relationship. The business activity is a profit-making manufacturing, construction, trade, service and exploration, recognition, and extraction of minerals from deposits, as well as professional activity conducted in an organised and continuous manner.

The activity of a given business can be called 'running a business activity' in a situation where it is characterised by specific features, which include: professional character (permanent and not occasional activity), compliance with the rules of profitability and profit, repetitiveness of undertaken activities (it cannot be, for example, a one-time commercial transaction — in this case, one can possibly talk about an activity of a business nature and not a business activity), participation in economic turnover (the

entity must be present on the market). All these features must occur together in order for a specific operation to be considered as running a business activity.

## 4. Survey Methods

The conducted research was subordinated to six phases, largely linked to the data mining scheme (CRISP-DM). A modular phased procedure was therefore chosen:

- ▪ **Phase 1:** Detailed investigation at the District Court — gathering empirical data – analysis of 210 files of business cases;

The research was conducted in the District Court in Gdańsk — one of *374 courts (318 Regional, 45 District and 11 Appeal Courts)*. The District Court in Gdańsk is one of the three largest courts in Poland, next to the District Court in Warsaw and the District Court in Katowice. There were 210 commercial cases files examined (electronic proceedings by writ of payment based on the plaintiff's statements — EPU, proceeding by writ of payment, proceeding by writ of payment based on documents, commercial case — GC). The research was of a qualitative nature and the selection of cases for analysis was purposeful. In order to represent the most up-to-date legal status as well as commercial and judicial practice, the last 210 cases settled in 2012 in the first instance with a judgement, in which the parties appealed to a Superior Court, were selected for examination.

- ▪ **Phase 2:** Extracting variables of a strictly numerical nature
- ▪ **Phase 3:** Analysis of variable value distributions

The main analytical method used in the research was PCA (Abdi & Williams, 2010; Krzanowski, 2000).This method allows to reduce the dimensionality of the problem under scrutiny by extracting factors which are linear combinations of the variables under consideration. The original variables are therefore grouped into factors that are correlated with each other.

- ▪ **Phase 4:** Determining the value of correlation coefficient between pairs of tested variables together with their boundary significance level;
- ▪ **Phase 5:** Reduction of the variables under scrutiny by extracting the superior factors grouping highly interdependent variables — the Kaiser Criterion was chosen as the main criterion determining the number of factors (own value > 1);
- ▪ **Phase 6:** Validation of the results of Phase 3-5;

The arguments in favour of the replicability of the findings to the other courts may include:

1. Each court, regardless of its size and place within the structure of the judiciary, operates on the same basis and principles; it also has a similar internal structure, consisting of departments and divisions.
2. Each court has the same staffing structure: judges, court registrars, assistant judges, clerks, and service staff.
3. Each court has the same or similar training (but also access to training and knowledge) and staff selection methods (as for judges and court registrars).
4. Each court has the same access to material and financial resources, and the difference in amount is solely due to the size of the court (excluding Appeal Courts, which redistribute these resources).

## 5. The Research Process and Results

The data obtained as a result of Phase1 were collected in a worksheet and tested. Variables not interesting from the point of view of the assumed purpose of the research were not taken into consideration. The focus was on quantitative aspects and the duration of proceedings. Cases for which data were incomplete, erroneous, with multiple dates or with calculated duration <0 were removed. One hundred and seventy-five cases (195 with complete data) were examined.

Among the features describing court proceedings as a result of Phase 2, seven variables of a strict numerical nature were identified as *(vn)* and these were:

*(v1) The court fee paid,*
*(v2) The value of the subject matter of the dispute,*
*(v3) The number of days before the first hearing,*
*(v4) The number of hearings in the first instance/second instance,*
*(v5) The number of days from the first hearing to the case being settled,*
*(v6) The judgement at first instance (number of pages),*
*(v7) The file volume (number of volumes).*

Variable *(v1) The court fee paid* indicates the amount of the fee to be paid. The amount of fees ranges from PLN 250 to PLN 120,000 in the cases under examination. Variable *(v2) The value of the subject matter of the dispute* is the amount which the parties are litigating for. Depending on its amount, the case is brought before the Regional or District Court. Variable *(v3) The number of days before the first hearing* is the period from the registration of the case at the court until the first hearing is scheduled. Variable *(v4) The number of hearings in the first instance/second instance* indicates the number of hearings before both the first and the second instance courts appointed by the judge conducting the case which are necessary to conclude the proceedings. Variable *(v5) The number of days from the first hearing to the case being settled* indicates the number of days from the first hearing to the judgement. Variable *(v6) The judgement at first instance (number of pages)* includes the number of pages of

the judgement with reasons. The reasons for the judgement shall be drawn up if a party requests a judgement with reasons within 7 days. Variable*(v7) The file volume (number of volumes)* indicates the number of volumes collected during the proceedings by the judge conducting the proceedings. The basic numerical characteristics describing the variables are presented in Table 1.

**Table 1.** *Descriptive statistics*

**Descriptive statistics**

| | N | Minimum | Maximum | Mean | Stand dev (coefficient of variation) | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| The court fee paid (v1) | 197 | 250 | 120000 | 15742 | 23282 (148%) | 2,85 | 7,82 |
| The value of the subject matter of the dispute (v2) | 197 | 0 | 10700041 | 499573 | 1312126 (263%) | 5,29 | 30,57 |
| The number of days before the first hearing(v3) | 197 | 26 | 908 | 241,65 | 134,55 (56%) | 2,13 | 6,44 |
| The number of hearings in the first instance/second instance (v4) | 197 | 1 | 16 | 4,40 | 2,61 (59%) | 1,34 | 2,48 |
| The number of days from the first hearing to the case being settled (v5) | 197 | 0 | 2460 | 401,66 | 432,22 (108%) | 1,91 | 4,53 |
| The judgement at first instance (number of pages) (v6) | 196 | 0 | 71 | 15,52 | 9,92 (64%) | 1,57 | 5,69 |
| The file volume (number of volumes) (v7) | 196 | 1 | 11 | 3,56 | 1,97 (55%) | 1,14 | 1,12 |
| N valid (exclusion by observations) | 195 | | | | | | |

**Source:** *Own research*

From the data presented in Table 1, it appears that all the variables under consideration are characterised by relatively high volatility. In each case, the standard deviation is more than 50% of the average value. *The value of the subject matter of the dispute (v2)*, then *the court fee paid (v1)*, and then the variables *(v5)* and *(v6)* differentiate the most significantly. The remaining variables are characterised by a similar degree of

differentiation. All distributions are skewed right (the skewing coefficients are positive) — this means that for most cases the values of selected variables are below the average (mean). The distributions of variable values are presented in Figure 1. The mean value is marked with a dashed line.

**Figure 1.** *Distribution of the variables examined*
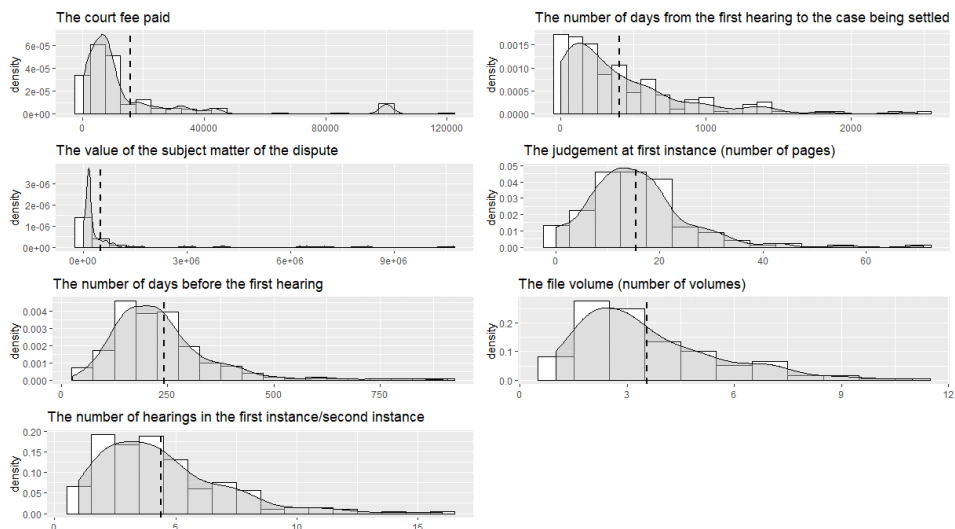
Selected variables significantly differentiate the examined group of cases, and then (Phase 4) their covariance was examined. The results of correlation analysis are presented in Table 2.

**Table 2.** *Correlation coefficient values between pairs of examined variables with their boundary significance level*

|    | v1 | v2 | v3 | v4 | v5 | v6 | v7 |
|----|----|----|----|----|----|----|----|
| v1 | 1,00 | **,83** | **,17** | -,10 | ,01 | **,15** | **,37** |
|    | p= --- | **p=0,001** | **p=,015** | p=,153 | p=,960 | **p=,032** | **p=,001** |
| v2 | **,83** | 1,00 | ,08 | **-,15** | -,03 | ,01 | **,24** |
|    | **p=0,001** | p= --- | p=,265 | **p=,034** | p=,714 | p=,858 | **p=,001** |
| v3 | **,17** | ,08 | 1,00 | -,04 | -,03 | -,05 | ,06 |
|    | **p=,015** | p=,265 | p= --- | p=,612 | p=,662 | p=,531 | p=,408 |
| v4 | -,10 | **-,15** | -,04 | 1,00 | **,70** | **,29** | **,38** |
|    | p=,153 | **p=,034** | p=,612 | p= --- | **p=0,001** | **p=,001** | **p=,001** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| v5 | ,01 | -,03 | -,03 | **,70** | 1,00 | ,14 | **,43** |
| | p=,960 | p=,714 | p=,662 | **p=0,001** | p= --- | p=,058 | **p=,001** |
| v6 | **,15** | ,01 | -,05 | **,29** | ,14 | 1,00 | **,45** |
| | **p=,032** | p=,858 | p=,531 | **p=,000** | p=,058 | p= --- | **p=,001** |
| v7 | **,37** | **,24** | ,06 | **,38** | **,43** | **,45** | 1,00 |
| | **p=,001** | **p=,001** | p=,408 | **p=,001** | **p=,001** | **p=,001** | p= --- |

*Note: * assumed to be significant for p<0,05.*
*Source: Own research.*

It can be observed that the variable *The file volume (v7)* is significantly positively correlated with all variables except the variable *The number of days before the first hearing (v3)*. The variable *(v3)* is significantly positively correlated only with *The court fee paid (v1)*.

It should be observed that, in general, each of the variables is correlated significantly with at least one other variable. The occurrence of numerous interdependencies was a premiss for the implementation of Phase 5 of the study aimed at the reduction of the variables under consideration by distinguishing the superior factors grouping the strongly interdependent variables. The results of the analysis of the main components in the examined matter are presented in Table 3 and Table 4. The main criterion used in the study was the Kaiser Criterion (own value > 1). On this basis, two factors (two components) were distinguished, and the results are presented in Table 4 and Figure 2.

**Table 3.** *Total variance explained by possible components*

**Total Variance Explained**

| Component | Initial Eigen values | | | Extraction sums of squared loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of var | cumulative % | Total | % of var | cumulative % |
| 1 | 2,30 | 32,87 | 32,87 | 2,30 | 32,87 | 32,87 |
| 2 | 1,96 | 28,02 | 60,88 | 1,96 | 28,02 | 60,88 |
| 3 | ,99 | 14,17 | 75,05 | | | |
| 4 | ,90 | 12,84 | 87,89 | | | |
| 5 | ,44 | 6,24 | 94,13 | | | |
| 6 | ,26 | 3,69 | 97,82 | | | |
| 7 | ,15 | 2,18 | 100,00 | | | |

*Note: Extraction Method – Principal Component Analysis.*
*Source: Own research.*

**Table 4.** *Component matrix (the values represent factor loadings)*

**Component matrix[a]**

| | Component | |
|---|---|---|
| | 1 | 2 |
| The file volume (number of volumes) (v7) | **,83** | ,01 |
| The number of days from the first hearing to the case being settled (v5) | **,67** | -,48 |
| The number of hearings in the first instance/second instance(v4) | **,64** | -,61 |
| The judgement at first instance (number of pages) (v6) | **,56** | -,12 |
| The value of the subject matter of the dispute (v2) | ,41 | **,81** |
| The court fee paid (v1) | ,52 | **,79** |
| The number of days before the first hearing (v3) | ,08 | **,26** |

**Note:** *Extraction Method – Principal Component Analysis. a 2 – the number of extracted components.*
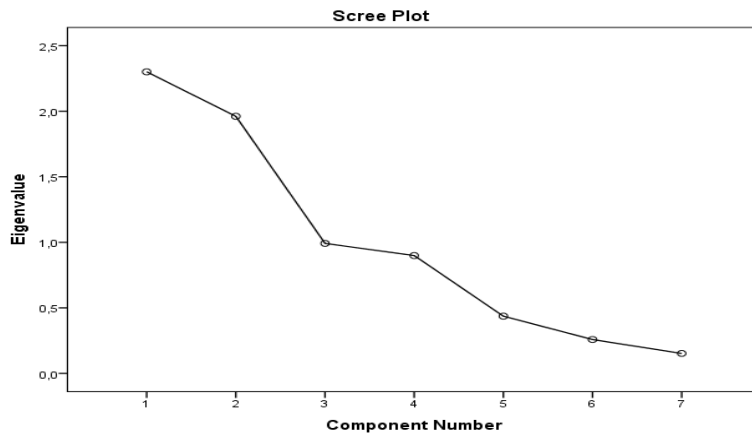**Source:** *Own research*

**Figure 2.** *Factor loading graph*
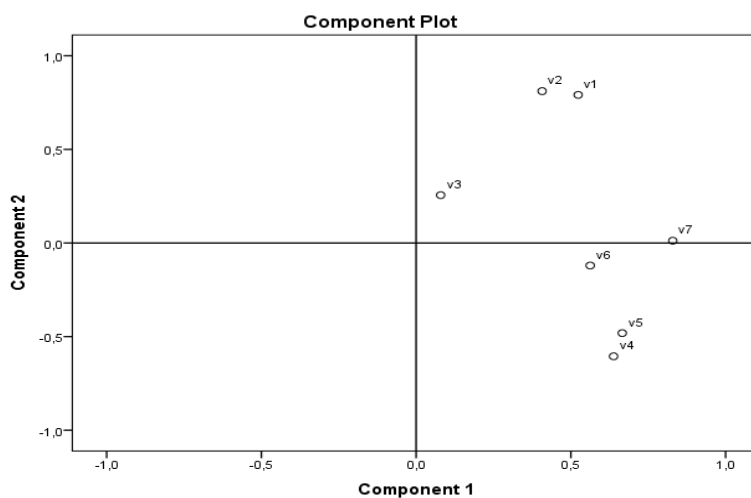


**Source:** *Own research.*

The analysis of the main components presented in Table 3 allowed to create a scree plot (Figure 3).

**Figure 3**. *Scree plot in the analysis of the main components of the variables*



*Source: Own research.*

## 6. Discussion and findings

Factor loadings represent correlations between variables and extracted components. Thus, on the basis of the analysis, two main quantitative factors characterising the examined cases can be identified. The first factor groups the variables *(v4), (v5), (v6), (v7)*, and the second one *(v1), (v2), (v3)*. Therefore, the duration of court proceedings in commercial cases is influenced by a factor grouping the interdependent components such as: *(v4) The number of hearings in the first instance/second instance, (v5) The number of days from the first hearing to the case being settled, (v6) The judgement at first instance (number of pages)* and *(v7) The file volume (number of volumes)*.

This factor indicates *the degree of complexity of the case* which results from the number of processes conducted in specific time intervals, generating a large volume of documents. The second factor groups the interdependent components such as *(v1) The court fee paid, (v2) The value of the subject matter of the dispute, (v3) The number of days before the first hearing*, indicates, in a way, the financial dimension of the case, and can be described as *the value of the case*. A variable *(v3)*, which is correlated with other variables weakly, may also create a separate factor. In the examined set of cases there are 29 cases with extremely high dispute value in relation to the remaining ones.

As these cases account for almost 15% of all cases examined, they were included in the analyses. It was considered that they represent a significant part of proceedings shaping the relations between the variables examined. The in-depth research will address the development of relations between the variables in different areas of their variability, in particular due to the value of the subject matter of the dispute. The conducted research is hereby a part of general research. The results of the conducted analyses led to the identification of key factors affecting the duration of court proceedings.

## 7. Conclusions

The process of estimating the length of court proceedings is a complex task, which consists of many independent factors. Attempts to increase the efficiency of courts by means of random tools used in business activity, but not adapted to their specifics, are now being made in Polish practice — without establishing which factors have a significant and real impact on delays. This study is part of the global research on the efficiency of courts on an individual level in terms of litigation.

The intention of the authors was to initially identify factors, which are linear combinations of the variables under consideration that affect the duration of court proceedings. In the study, commercial cases were analysed, using Principal Component Analysis (PCA).The analysis conducted resulted in the identification of two main quantitative factors characterising the examined cases: *the degree of complexity of the case* — grouping the variables (*v4*), (*v5*), (*v6*), (*v7*) and *the value of the case* —grouping the variables (*v1*), (*v2*), (*v3*), calculated according to the strength of the impact on the duration of proceedings. The factor that most significantly affects the duration of commercial proceedings is *the degree of complexity of the case*, followed by *the value of the case.*

The variable *(v3)* has the weakest impact, which can also be considered as a separate factor, for example as a *delay in the commencing of proceedings.* It should also be observed that the relatively high value of the subject matter of dispute *(v2)* generates outlier observations and may constitute a significant qualitative change, which may also cause a distortion of quantitative relations between the studied quantities. An essential aspect of further research should therefore be to determine the relationship between variables in different ranges of their variability, particularly in view of the value of the subject matter of the dispute. With regard to the current global research, in which, besides factors affecting productivity at the individual level, there are also factors at the court level (at various levels: the individual one, the court one and even the national one), it would be appropriate to consider in-depth qualitative research of cases of high degree of complexity — identified by *(v4) The number of hearings in the first instance/second instance, (v5) The number of days from the first hearing to the case being settled, (v6) The judgement at first instance (number of pages)* and *(v7) The file volume (number of volumes).* It would be crucial to determine whether the variables affecting this factor are formed on the court side (e.g. faulty summonses of witnesses, single witness summonses) or the side of court stakeholders (e.g. disregard by witnesses of summonses).

**References:**

Abdi, H., Williams, L.J. 2010. Principal component analysis. Wiley Interdisciplinary Reviews: Computational Statistics, 2(4). 433-459. Retrieved from https://doi.org/10.1002/wics.101

Antonelli, M.A., Grembi, W.A. 2013. Microeconomic Model of the Demand of Civil Justice: Is One Institutional Context Better than Another? European Journal of Law and Economics, 36(2), 295-318.

Bełdowski, J., Ciżkowicz, M., Sześciło, D. 2010. Efektywność polskiego sądownictwa w świetle badań międzynarodowych i krajowych. Forum Obywatelskiego Rozwoju: Helsińska Fundacja Praw Człowieka, Warszawa.

Botero, J.C., La Porta, R., Lopez-de-Silanes F. 2003. Judicial Reform. The World Bank Research Observer, 18(1), 61-88.

Buscaglia, E., Ulen, T. 1997. A Quantitative assessment of the efficiency of the judicial sector In Latin America. International Review of Law and Economics, 17, 275-291.

Choi, S.J., Gulati, M.G., Posner, E.A. 2009. Are Judges Overpaid? A Skeptical Response to the Judicial Salary Debate. Journal of Legal Analysis, 1(1), 47-117.

Christensen, R., Szmer J. 2012. Examining the efficiency of the U.S. courts of appeals: Pathologies and prescriptions. International Review of Law and Economics, 32, 30-37.

Coviello, D., Ichino, A., Persico, N. 2014a. The Inefficiency of Worker Time Use. Journal of the European Economic Association, 13(5), 1-54.

Coviello, D., Ichino, A., Persico, N. 2014b. Time Allocation and Task Juggling. American Economic Review, 104(2), 609-623.

Dakolias, M. 1999. Court performance around the world: A comparative perspective. Technical Paper no. 430. The World Bank, Washington, DC.

De Shazo, P., Vargas, J.E. 2006. Judicial reform in Latin America: An Assessment. Policy Papers on the Americas, Volume XVII, Study 2, Center for Strategic and International Studies, Washington.

Vita, G. 2010. Production of Laws and Delays in Court Decisions. International Review of Law and Economics, 30(3), 276-281.

Dimitrova-Grajzl, V., Grajzl, P., Sustersic, J., Zajc, K. 2012. Court output, judicial staffing, and the demand for court services: Evidence from Slovenian Courts of First Instance. International Review of Law and Economics, 32, 19-29.

Djankov, S., La Porta R., Lopez-de Silanes, F., Shleifer A. 2003. Courts. The Quarterly Journal of Economics, 118(2), 453-517.

Eisenberg, T. Huang, K.Ch. 2012. The effect of rules shifting supreme court jurisdiction from mandatory to discretionary - An empirical lesson from Taiwan. International Review of Law and Economics, 32, 3-18.

Goelzhauser, G. 2012. Accountability and Judicial Performance: Evidence from Case Dispositions. Justice System Journal, 33(3), 249-261.

Guerra, A., Tagliapietra, C. 2017. Does Judge Turnover Affect Judicial Performance? Evidence from Italian Court Records. Justice System Journal, 38(1), Retrieved from DOI: 10.1080/0098261X.2016.1209448.

Krzanowski, W.J. 2000. Principles of Multivariate Analysis: A User's Perspective. Oxford Statistical Science Series, Oxford University Press, Oxford.

Lienhard, A. Kettiger, D. 2010. Caseload Management in the Law Courts: Methodology, Experiences and Results of the first Swiss Study of Administrative and Social Insurance Courts. International Journal for Court Administration, November, 1-20.

Lim, C.S. 2013. Preferences and Incentives of Appointed and Elected Public Officials: Evidence from State Trial Court Judges. American Economic Review, 103(4), 1360-1397.

Marciano, A., Khalil, E.L. 2012. Optimization, path dependence and the law: Can judges promote efficiency? International Review of Law and Economics, 32, 72-82

Melcarne, A., Ramello, G. 2015. Judicial Independence, Judges' Incentives and Efficiency. Review of Law and Economics, 11(2), 149-169.

Ministry of Justice, Statistical analysis of court activities by appeal. Ministerstwo Sprawiedliwości, Analiza statystyczna działalności sądów według apelacji Retrieved from http://www.ms.gov.pl/statystyki/analiza_dzial_sadow_.pdf. December 2018

Ministry of Justice. Records of cases in common courts by departments of law and instance and basic statistical indicators) Ministerstwo Sprawiedliwości. Ewidencja spraw w sądach powszechnych według działów prawa i instancyjności oraz podstawowe

wskaźniki statystyczne. Retrieved from http://www.ms.gov.pl/statystyki_wssp.pdf. December 2018.

Odlanicka-Poczobutt, M. 2016. Models of logistic processes in the common judiciary. Modele procesów logistycznych w sądownictwie powszechnym. Gliwice, Silesian University of Technology Publisher, Wydawnictwo Politechniki Śląskiej.

Ramello, G B., Voigt, S. 2012. The economics of efficiency and the judicial system. Introduction. International Review of Law and Economics, 32, 1-2.

Ramello, G.B. 2012. Aggregate litigation and regulatory innovation: Another view of judicial efficiency. International Review of Law and Economics, 32, 63-71.

Ramseyer, J.M. 2012. Talent matters: Judicial productivity and speed in Japan. International Review of Law and Economics, 32, 38-48.

Rosales-Lopez, V. 2008. Economics of court performance: An empirical analysis. European Journal of Law and Economics, 25, 231-251.

Voigt, S. 2012. On the optimal number of courts. International Review of Law and Economics, 32, 49-62.