STUDY OF CRITICAL FACTORS OF SOCIAL TENSION IN REGIONAL SYSTEMS

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Abstract. *Purpose.* The purpose of the study is to identify and study critical factors of social tension in different economic regions of Ukraine using a modern set of models for analysis and assessment of the level of social tension in conditions of transformation of the structure of modern society for timely prevention and avoidance of social disparities and uneven development. The main stages of measuring the level of social tension are highlighted: analysis and determination of a set of parameters for assessing social tension, their classification according to their impact on society, formation of a set of initial data, calculation of group integral indicators, construction of a general integral indicator of social tension. The main stages of the study of regions by the level of social tension are defined: a graphic representation of the levels of tension in the regions, the study of the dynamics of the formation of the levels of social tension, the establishment of the main factors of its formation in the regional dimension, the classification of objects by the level of social tension. *Value/originality.* Theoretical analysis of the content and role of social tension in the economic system was conducted, the main indicators and criteria of social tension were considered, a set of models for analysis and evaluation of social tension in various economic regions of the world and in Ukraine in particular was proposed and implemented. The thesis proposes a conceptual research model divided into two main modules: Module 1 – Assessment and analysis of social tensions; Module 2 – Building a regional development programme. Within the first module, assumptions about the criteria and indicators of social tensions are made, the boundaries of the system are determined, the external environment is described, its essential elements are highlighted and described. The selection of the criteria of social tension was carried out according to the following groups of factors: economic, demographic, political and social, the demarcation of substitutes and those that were included in the model and those that were not analysed by the researcher was carried out. *Results.* Multiple regression models have been constructed and the most significant variables that have the strongest influence on the resulting criterion have been selected. The second module defines the directions of development of the regions, based on all the data and models obtained previously. The main factors that are indicators of social tensions are identified, namely: the number of people with at least a school education; gross domestic product; total population; average length of study. *Practical implications.* With the help of economic and mathematical tools, the most important indicators of social tension were formed and determined for each region of Ukraine and the country as a whole, among which the level of income and education are the most critical. The results of the study can be put into practice to normalise the social balance in the country, to overcome the disparities in the development of different segments of the population.

Key words: social tension, population development disparity, social balance, human development index, model, analysis, assessment.

JEL Classification: B55, P23, J24

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1. Introduction

In the conditions of global political and economic crises, social tension is the most important characteristic of the diagnosis of the socio-economic system. The phenomenon of social tension can be of short or long duration. In any case, the consequence of social tension is the emergence of social conflicts, which can lead to the violation of social and national security as a whole. Permanent control over the factors of social tension, timely reaction to them and minimisation of threats arising from their occurrence are the main components of effective provision of national security.

The comprehensive and complete understanding of the nature of the phenomenon of social tension requires the definition and assessment of the parameters of its formation according to certain spheres of influence: the level of material security, tension in the sphere of employment, medical and demographic situation, living conditions.

Therefore, the relevance of the conducted research is conditioned by the need to: clarify theoretical and methodological principles of sociological analysis of social tension; identify factors, criteria and indicators of social tension in modern society; determine the nature of the impact of transformation of the social structure on the level of social tension; develop measures for comprehensive state regulation of the level of social tension.

The aim of the research is to identify critical factors of social tension in different economic regions in order to prevent social inequalities and uneven development.

2. Literature Review

A complete socio-psychological analysis of the phenomenon of social tension is provided in the monograph (Sidelnykova, Novosolova, Dmytriv, 2019), the authors of which conducted a comprehensive study of social tension that characterises a society in crisis, identified its key elements, reflected the image of social tension in public consciousness, and determined the connection between social tension and the potential of social protest.

In his research, O.V. Kredentser makes a theoretical analysis of the concept of "social tension" in the context of interdisciplinary research. The concept of "social tension" is analysed in relation to sociology, sociology of work, economics, management, social philosophy, political science and psychology, social psychology and personality psychology. The results show that this topic has been developed mainly in sociology and psychology. The study of "social tension" in terms of psychological knowledge has its own characteristics and is studied at the level of society, organisations or individuals (Kredentser, Lahodzinska, Kovalchuk 2016). A similar study of the peculiarities of the emergence of social tension at the macro, meso and micro levels of the economy was conducted by O. Rudachenko (Rudachenko, 2019). The author also proposed an improved methodological approach to the study of the phenomenon of social tension, based on the use of mathematical modelling methods. Ye. Siryi also devoted his research to the development of tools for the study of social tension in Ukraine (Siryi, Nakhabich, 2018).

O. Dymnich in his research (Dymnich, 2018) proves that overcoming the economic crisis consists in the implementation of complex long-term economic reforms, which require the support of the whole society, and reliable social protection of the population becomes one of the main factors of Ukraine's national security. The author proves the necessity of reforming the pension system of Ukraine as an effective way to reduce the level of social tension.

The author of the study (Bryl, 2018) considered the main indicators of imbalances in the economy of Ukraine and other countries of the world, developed a simulation model for detection of macroeconomic imbalances in the economy of Ukraine, on the basis of which the dynamic properties of formation of social tensions in society were studied and the probability of their occurrence in the future was assessed.

In the work (Semenets, Tiurina, Kuzkin, Yarmak, 2021) the level of economic backwardness is considered as the cause of social tension in society, which causes a number of socio-economic problems and reduces the effectiveness of functioning of social institutions of the country as a whole.

This view is shared by the authors (Kozyrieva, Bielikova, Krasnonosova, Kriachko, 2022), who see the main cause of social tension in economic backwardness. The root cause is the lack of financial and resource support for socio-economic growth. This is a global problem that requires in-depth research in order to find an effective way of creating financial and resource support for sustainable development of regions. In order to create financial and resource support for regions to get out of the socio-economic trap of backwardness, the authors proposed the method of using a fuzzy cognitive model, which is characterised by the possibility of determining the relationship and mutual influence between regions. According to O.M. Luhovska, the basis of social tension is the unsatisfied needs of mankind, or their untimely, inadequate satisfaction (Luhovska, 2014).

Serhiienko O.A., Mashchenko M.A., Baranova V.V. (Serhiienko, Mashchenko, Baranova, 2021) in their study analysed the dynamics of the behaviour of indicators of development of complex hierarchical systems and their relationship. At the same time, the authors conducted a thorough analysis using modern tools of dynamic analysis methods – the theory of phase, cointegration and bifurcation analysis. Let's assume that the methodology of the proposed

toolkit allows building process models available for review, taking into account pre-crisis and crisis phenomena. Serhiienko O., Baranova V., Yakymenko-Tereshchenko N., Volosnikova N. (Serhiienko, Baranova, Yakymenko-Tereshchenko, Volosnikova, 2021) study the problems of the influence of subjective factors in the process of individual and group decision-making. The authors consider the subjective factor from the point of view of the influence of emotional intelligence on the decision-making process. The research was conducted using methods of analysis and influence of emotional intelligence on the decision-making process. The result of the research is that a hypothesis has been proposed and proved through the implementation of the Emotional Intelligence Test.

The measurement of perceived interpersonal conflict is included in many studies, including the International Social Research Programme (ISSP) (see http://www.issp.org/), the European Quality of Life Survey (EQLS) (see https://www.eurofound.europa.eu/), the German General Social Survey ALLBUS (see https://www.gesis.org/allbus), the Polish Panel Survey (see http://polpan.org/). However, not enough research has been done on perceived conflict. Therefore, researchers (Yaël van Drunen, Bram Spruyt & Filip Van Droogenbroeck, 2021) assessed the extent to which people perceive conflict between different social groups in their country. The authors called it an expression of social conflict.

The research (Samborskyi, Samiilenko, Mykhailiuk, Melnyk, 2022) is devoted to the issue of the emergence of social tension in society using the example of employees with different socio-demographic characteristics (women and men, persons with or without parental responsibilities), according to the data of energy companies of Ukraine. The authors obtained a comparative description of the career opportunities created by the energy companies for women and men, people with and without parental responsibilities, and studied the influence of these characteristics on the level of social tension. Such scientists as M. Karlin, N. Prots and V. Prots (Karlin, Prots, Prots, 2020) considered the influence of the level of wages on the level of social justice and reduction of tensions in the Ukrainian society.

Despite the diversity of studies, the issue of social tensions in society is not losing its relevance, and the development of crisis phenomena associated with the pandemic requires the improvement of approaches to assessing the level of social tensions.

The analysis of literature revealed a rather important problem – the selection of factors and indicators of social tension, which differ from author to author. The existing scientific studies on social tension in society allowed to identify the main stages of measuring the level of social tension: analysis and determination of a set of parameters for assessing social tension, their classification according to their impact on society, formation of a set of initial data, calculation of group integral indicators, construction of a general integral indicator of social tension. Based on this, the main stages of the study of objects (for example, regions) according to the level of social tension should be the following: a graphic representation of the levels of tension in regions, the study of the dynamics of the formation of social tension levels by regions, the establishment of the main factors of its formation in the regional dimension, the classification of objects according to the level of social tension.

Various indicators are used to measure the effectiveness of social policies. For example, the most important international indicator – quality of life – is measured by the Human Development Index, which is calculated on the basis of three indicators: life expectancy, educational attainment and standard of living, measured by GDP per capita.

The greatest attention in the research is paid to the detailed analysis and assessment of the socio-economic state of Ukrainian society. At the same time, however, it must be remembered that the problem of social tensions needs to be solved comprehensively.

The Human Development Index (HDI) is a composite indicator that characterises human development in countries and regions of the world. It is calculated annually by experts from the United Nations Development Programme (UNDP), together with a group of independent international experts, using statistical data from national institutes and international organisations and analytical developments.

According to the United Nations Development Programme (UNDP) Human Development Report ranking, Ukraine was ranked 74th on the Human Development Index in 2020. According to the data, Ukraine's Human Development Index was 0.779 (out of a maximum of 1.000). At the same time, the values of its components were equal: the expected life expectancy in Ukraine is 72.1 years, the education index, which analyses the average duration of education of citizens, is 11.4 years, and the expected duration of education of the population is 15.1 years (Zlobina, Shulha, Bevzenko, 2019).

The main reasons for the low standard of living of the population in Ukraine are: the lack of paid work for a part of the working population, low wages for working citizens, the existence of certain wage disparities, difficult working conditions, unemployment. The reasons for the high mortality rate of the population are: deterioration of health, unhealthy lifestyle, concomitant diseases, irrational nutrition, worsened environmental conditions, stress, worsened working conditions, frequent death from external causes, high number of domestic and industrial

accidents, etc. These and other negative trends associated with demographic processes are the causes of premature ageing of the population and increasing economic burden on the working population. Such crises of demographic processes provoke real and potential losses of labour force and, as a result, deformations of its sex-age structure.

The analysis of individual parameters of social tension indicates the existence of serious problems in the sphere of socio-economic development of the regions. However, a general understanding of the current situation allows for a comprehensive assessment. That is why it is necessary to bear in mind that the solution to the problem of social tensions must be systemic.

The analysis made it possible to draw conclusions about the need to use economic-mathematical methods and models to study such a problem as social tensions in society.

3. Materials and Methods

Solving such a complex and multilevel task as analysing and assessing the level of social tension requires a comprehensive and systematic approach. The conceptual model of the study consists of two fundamental modules (Figure 1).

The main objective of the first module is the analysis of research on the problem and its aggregation. On the basis of this block assumptions about the optimal and the most important criteria and indicators of social tension are made. During the formation of the mass media sphere, the system boundaries are determined, the external environment is described, the essential elements are distinguished and their description is given. It is at this stage that all further steps of the research are formed, so it is very important that this block reveals the essence of the problem to be solved as broadly as possible. Block of selection of
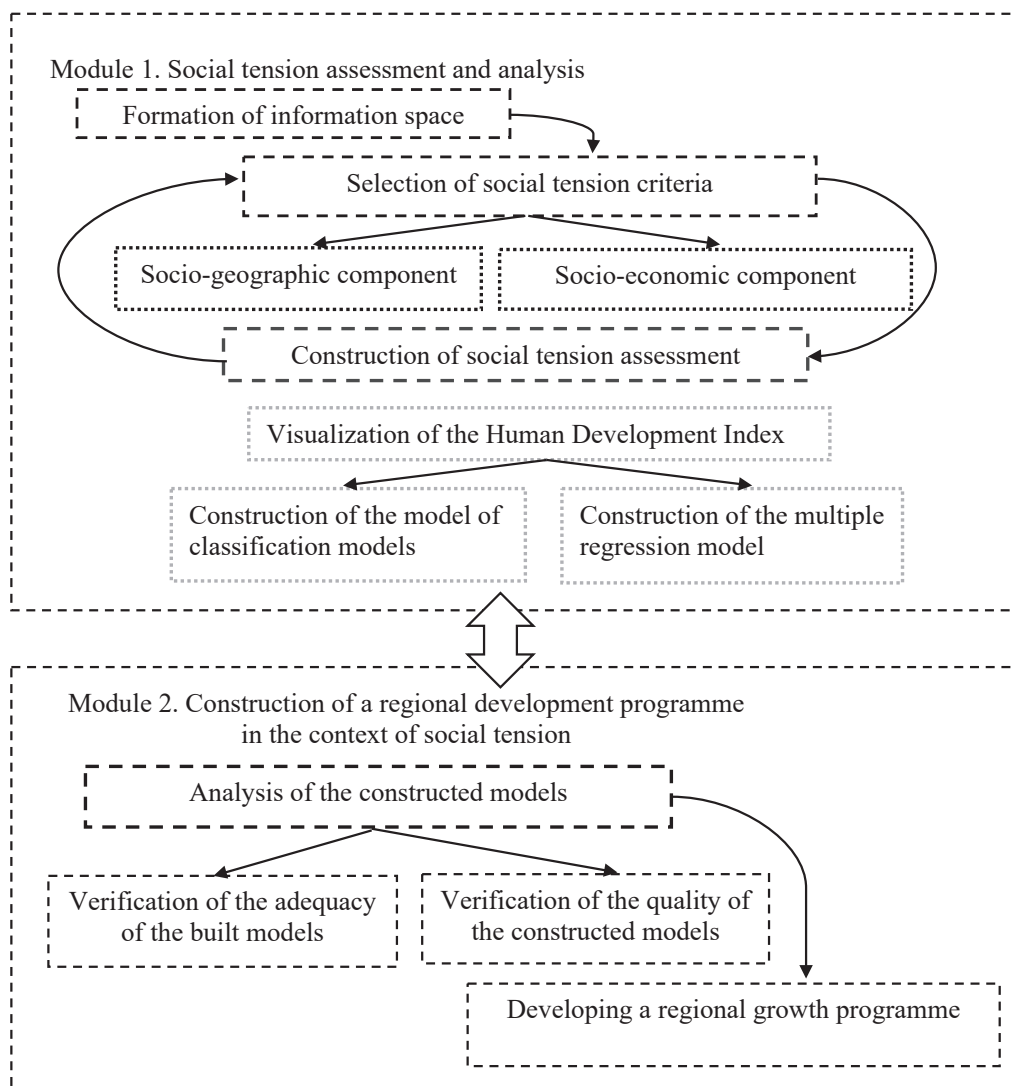

Figure 1. Conceptual model of the study "Modelling indicators of social tension"

Source: developed by the authors

social tension criteria: groups of factors can be divided as follows: economic, demographic, political and social. At this stage, a distinction is made between substitutes included in the model and those not analysed by the researcher. The choice of factors is subjective and may depend either on the researcher's point of view or on the statistical information available. This block is also devoted to the construction of multiple regression models to select the most significant substitutes that have the strongest influence on the resulting criterion.

The second module is the development of a regional development programme based on all the data and models previously obtained. This block is a simulation and an answer to the questions, tasks and purpose of the research.

4. Research Results

Consider the results of implementing the proposed model using the Python programming language and regression analysis methods.

Based on the assumptions about the most important criteria and indicators of social tension, a model for assessing and analysing the human development index of countries will be built. The Human Development Index (HDI) will be the initial variable. The following indicators provided by the United Nations (Human Development Report, 2022) will be used as exogenous factors:

X_0 – number of elderly people (65 years and older) per 100 people (aged 15 to 64 years);

X_1 – population aged 15-64 years (million people);

X_2 – population older than 65 years (million people);

X_3 – total population (thousands of people);

X_4 – population with at least school certificate (%, aged 25 and older);

X_5 – average duration of education (years);

X_6 – gender development index;

X_7 – life expectancy index at birth (years);

X_8 – gross domestic product (billion US dollars).

The factors that have the greatest impact on the performance indicator were selected. First, an exploratory data analysis was carried out. It includes:

1) Checking the data for the presence of all values, the absence of empty rows and columns that provide information about indices (in this case, countries), the number of observations in the data frame, the presence of empty values, and the type of data used;

2) determination of descriptive statistics (number of observations, mean, standard deviation, minimum and maximum values, as well as information by quartiles), which is clearly seen in Figure 2.

The factors that have the greatest impact on the performance indicator were selected. The most important factors were selected by building a tree, which helped to assess the importance of each factor. The result is shown in Figure 3.

Figure 3 shows that the most important factors are X_4 – population with at least school education; X_8 – gross domestic product; X_3 – total population; X_5 – average years of schooling.

Therefore, the new model was built with only these factors. The analysis of the impact of each factor on the dependent variable is presented in the form of graphs in Figure 4.

```
regr_ua.describe()
```

	HDI	Old age dependency ratio (old age (65 and older) per 100 people (ages 15-64))	Population, ages 15–64 (millions)	Population, ages 65 and older (millions)	Population, total (millions)	Mean years of schooling (years)	Population with at least some secondary education (% ages 25 and older)	Gender Development Index (GDI)	Life expectancy at birth (years)
count	28.000000	28.000000	28.000000	28.000000	28.000000	28.000000	28.000000	28.000000	28.000000
mean	0.706607	21.060714	29.750000	6.925000	48.957143	10.660714	89.221429	0.997004	68.857143
std	0.031455	1.723979	2.953404	0.278388	2.547828	0.695136	5.132565	0.003784	1.656956
min	0.661000	18.000000	23.900000	6.200000	44.200000	9.100000	77.500000	0.987000	67.300000
25%	0.678500	20.225000	27.650000	6.800000	46.575000	10.275000	86.550000	0.995000	67.375000
50%	0.705500	21.150000	30.550000	6.900000	50.250000	10.700000	89.650000	0.997000	68.250000
75%	0.734250	22.425000	31.750000	7.100000	50.800000	11.300000	93.600000	0.999000	69.875000
max	0.751000	24.200000	34.400000	7.500000	51.500000	11.300000	95.500000	1.008000	72.100000

Figure 2. Descriptive statistics of the model

Source: calculated by the authors using the Python programming language and regression analysis methods

```
from sklearn.ensemble import RandomForestRegressor
from numpy.random import *
X = regr_ua.drop('HDI',axis=1)
y = regr_ua['HDI']
rf = RandomForestRegressor()
rf.fit (X,y)
print("Features sorted by their score:")
print(sorted(zip(map(lambda x: round (x,4),rf.feature_importances_),X.columns), reverse = True))
```

```
Features sorted by their score:
[(0.3651, 'Population with at least some secondary education (% ages 25 and older)'), (0.2246, 'Gross domestic produc
t (GDP), total (2011 PPP $ billions)'), (0.1927, 'Population, total (millions)'), (0.1716, 'Mean years of schooling
(years)'), (0.0139, 'Population, ages 15-64 (millions)'), (0.0094, 'Population, ages 65 and older (millions)'), (0.00
91, 'Gender Development Index (GDI)'), (0.008, 'Old age dependency ratio (old age (65 and older) per 100 people (ages
15-64)'), (0.0056, 'Life expectancy at birth (years)')]
```

Figure 3. Weight of each exogenous factor

Source: calculated by the authors using the Python programming language and regression analysis methods

```
sns.pairplot(data=df3)
```

```
<seaborn.axisgrid.PairGrid at 0x1a16be0828>
```
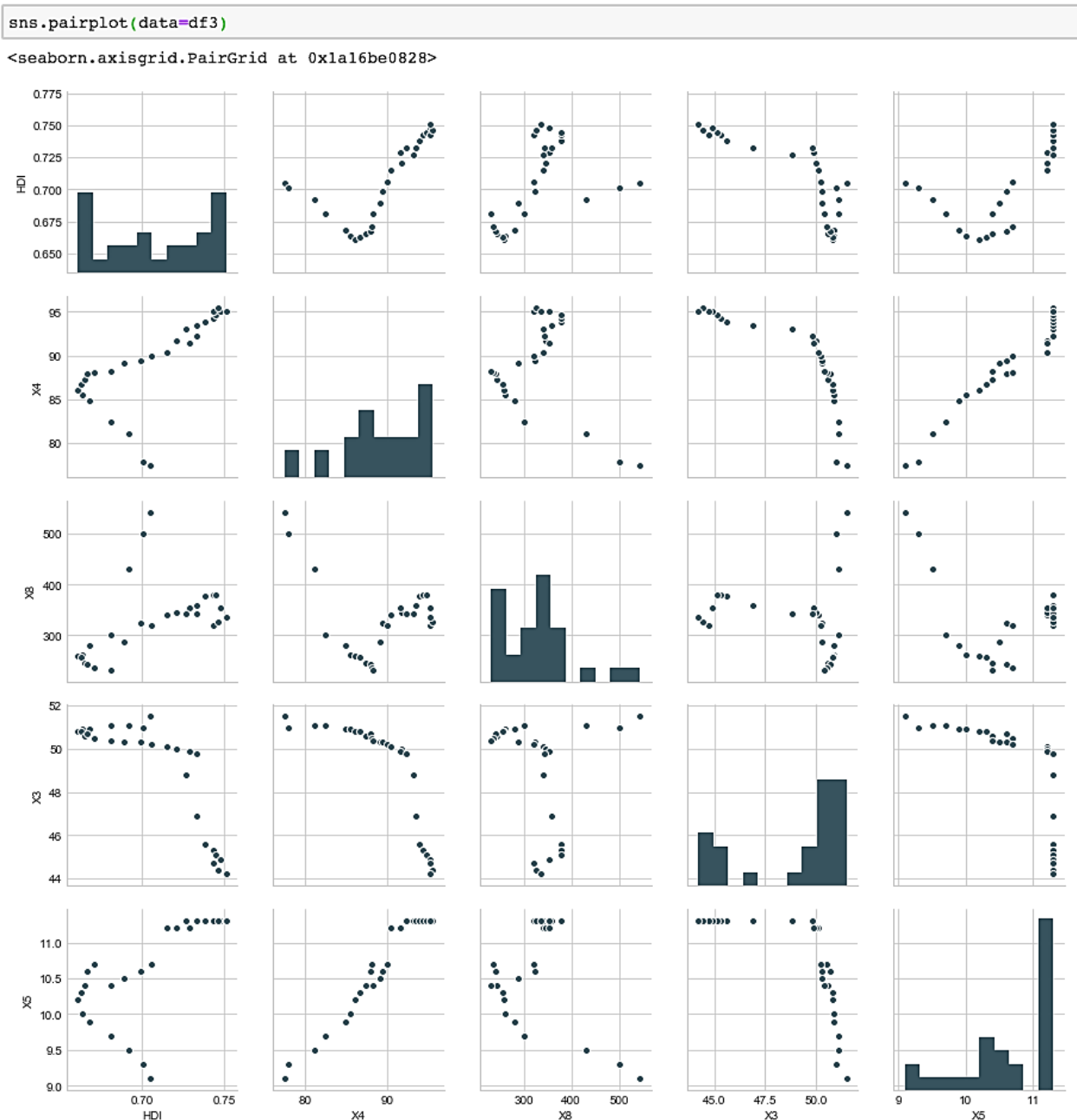

Figure 4. Graphical representation of the relationship between factors

Source: calculated by the authors using the Python programming language and regression analysis methods

Figure 4 shows that there is a link between the influencing factors and the performance indicator. Let's analyse the data in the form of a box-and-whisker plot. This type of chart conveniently shows the median, lower and upper quartiles, minimum and maximum sample values, and outliers. Such squares are displayed side by side to visually compare one distribution with another. The distances between different parts of the field make it possible to determine the degree of scattering (dispersion) and asymmetry of the data.

Figures 5 to 8 show the box-and-whiskers diagrams for each indicator.

The following is a multivariate linear regression model based on these factors (Figure 9).

The built model has the form (1):

$$Y = 0,447 + 0,0028\,X_4 + 0,0003\,X_8 - 0,003\,X_3 + 0,008\,X_5 \qquad (1)$$

Next, the obtained model values of Y will be compared with the real ones using a distribution graph (Figure 10).

As can be seen in Figure 10 clearly shows the diagonal distribution of the results, which indicates a fairly high quality of the model. To test this hypothesis, the error value, coefficient of determination, and p-value for the parameters of the model are calculated (Figure 11).

The obtained coefficient of determination is very high and equals 0.95, which indicates a very high quality of the model. Also, general indicators of model validity were calculated, the main of which is MAE – the average absolute error, which was 0.005%. As can be seen, the p-value for the model coefficients is very small, which means that all selected factors are statistically significant.

For a more detailed analysis of the most influential factors of social tension in Ukraine, the authors will also conduct a regression analysis by region of the country. As a dependent variable, the gross regional product per capita will be used.

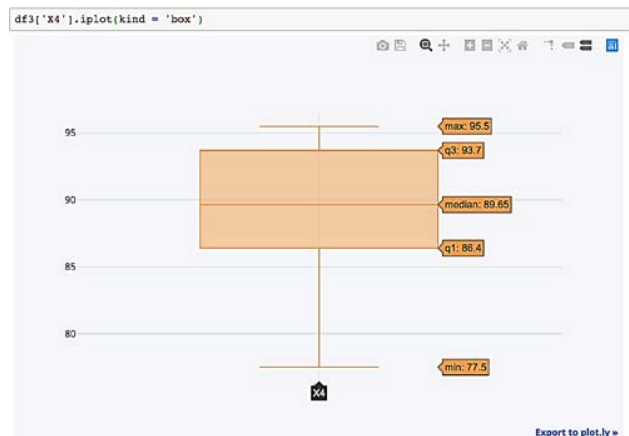The basic data for building the model are statistical information on an annual basis (2008–2019)

Figure 5. Results of the analysis of indicator X₄ – population with at least school education
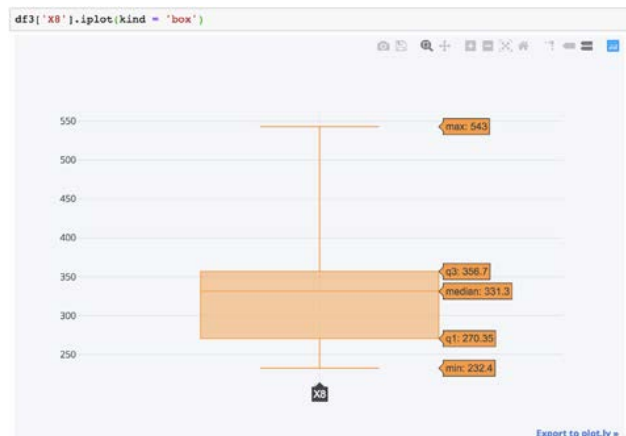

Figure 6. Results of the analysis of indicator X₈ – gross domestic product
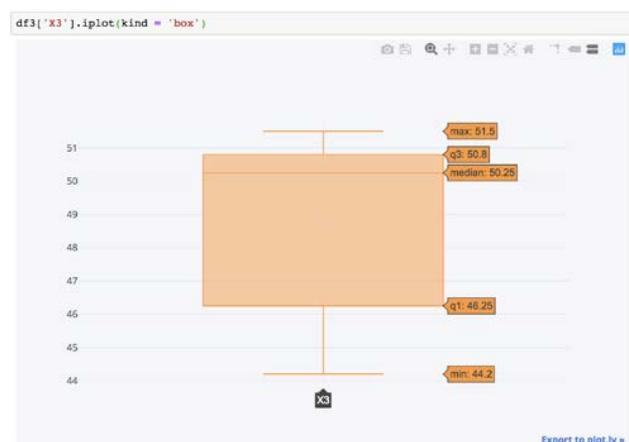

Figure 7. Results of the analysis of indicator X₃ – total population
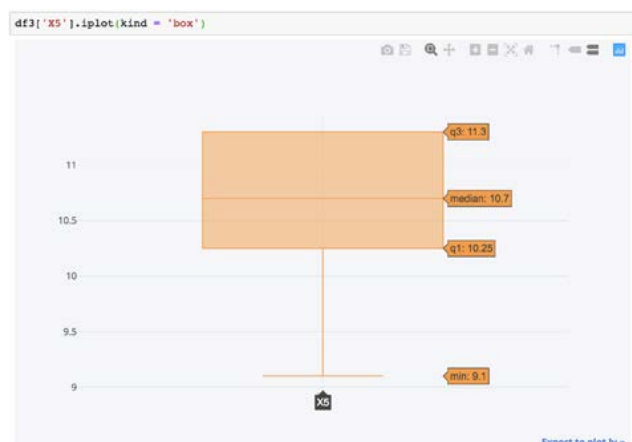

Figure 8. Results of the analysis of indicator X₅ – average duration of study

Source: calculated by the authors using the Python programming language and regression analysis methods

```
y = df3['HDI']
```

```
df3.columns
```

```
Index(['HDI', 'X4', 'X8', 'X3', 'X5'], dtype='object')
```

```
X = df3[['X4', 'X8', 'X3', 'X5']]
```

```
from sklearn.linear_model import LinearRegression
```

```
lm = LinearRegression()
```

```
from sklearn.model_selection import train_test_split
```

```
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=101)
```

```
lm.fit(X_train,y_train)
```

```
LinearRegression(copy_X=True, fit_intercept=True, n_jobs=1, normalize=False)
```

```
# The coefficients
print('Coefficients: \n', lm.intercept_,lm.coef_)
```

```
Coefficients:
 0.44666625633214013 [ 0.00275286  0.00025616 -0.00326458  0.00842431]
```

Figure 9. Building a multivariate linear regression

Source: calculated by the authors using the Python programming language and regression analysis methods

according to the following indicators: gross regional product (UAH million); gross regional product per person (UAH); economic activity of the population (thousands of people); employed population (thousands of people); unemployed population (according to ILO methodology) (thousands of people); average monthly wage for the period since the beginning of the year (UAH); income of the population (million hryvnias); disposable income per person (UAH); wage arrears (million hryvnias); employers' need for labour (thousands of persons); consumer price index (%) (Serhiienko, Baranova, Yakymenko-Tereshchenko, Volosnikova, 2021).

To select the most influential factors affecting GDP, the method of stepwise inclusion of factors in the model is used. The essence of the inclusion method is to consistently include variables in the model until the regression model meets the previously established quality criteria. The order of inclusion is determined by private correlation coefficients: variables with a higher private correlation coefficient in relation to the indicator under study are included in the regression equation first. The results of modelling, the most critical factors influencing social tensions and the coefficient of determination (which indicates the quality of the built model) for Ukraine as a whole and by regions are presented in Table 1.

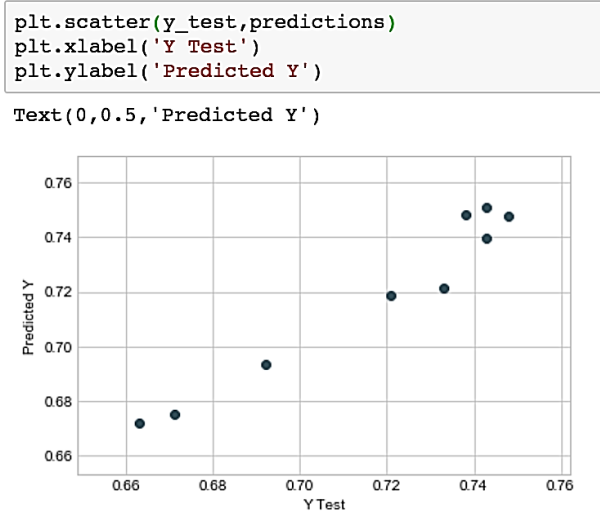Based on the modelling results, the most critical indicators of social tension in Ukraine are those related

```
plt.scatter(y_test,predictions)
plt.xlabel('Y Test')
plt.ylabel('Predicted Y')
```

```
Text(0,0.5,'Predicted Y')
```


Figure 10. Analysis of model comparison with real values of the dependent variable

Source: calculated by the authors using the Python programming language and regression analysis methods

to wages and incomes. That is why it is necessary to start by eliminating the negative effects of these factors.

5. Discussion

The results of the study proved that the main factors in the formation of social tensions in Ukrainian society are the level of wages, the available income per person and the level of unemployment. The situation

```python
from sklearn import metrics
from sklearn.metrics import r2_score

print('MAE:', metrics.mean_absolute_error(y_test, predictions))
print('MSE:', metrics.mean_squared_error(y_test, predictions))
print('RMSE:', np.sqrt(metrics.mean_squared_error(y_test, predictions)))
print('R^2:', r2_score(y_test, predictions))
```

```
MAE: 0.00553650411709498
MSE: 4.682551333120602e-05
RMSE: 0.006842917019167047
R^2: 0.9514643541598075
```

	predictor	coef	pvalue
0	intercept	0.322301	3.229851e-02
1	X4	0.003807	7.847797e-02
2	X8	0.000274	9.643131e-11
3	X3	-0.001998	1.652080e-01
4	X5	0.004840	6.888845e-01

Figure 11. Quality indicators of linear regression and coefficients with exogenous model parameters

Source: calculated by the authors using the Python programming language and regression analysis methods

varies from oblast to oblast. In the industrial regions, the first of the three factors mentioned is the most important – the level of wages; in the oblasts where agriculture and light industry are more developed, for example, the available income and the level of unemployment of the population take the first place in terms of influence. The obtained conclusions are closely connected with the results of the scientists who studied the processes of formation of "social tension" at the level of society, organisation or an individual (Klebanova, Kizim, Guryanova, Nikiforova, Sergienko, 2011).

The research methodology proposed in the article develops and improves the tools for studying social tensions in Ukraine, based on the use of mathematical modelling and programming methods. A detailed analysis of correlations allowed to identify the root cause of social tensions in the regions of Ukraine – dissatisfaction with even the most basic needs of the population. This study confirms the opinion of other scientists that the lack of financial and resource support for normal life is a global problem that requires in-depth study and elaboration in order to find an effective way for the regions to get out of the socio-economic crisis.

6. Conclusions

The conducted study of the peculiarities of the formation of the phenomenon of social tension in society allowed to identify the main stages of the measurement of the level of social tension: analysis and determination of a set of parameters for the assessment of social tension, their classification according to the impact on society, formation of a set of initial data, calculation of group integral indicators, construction of a general integral indicator of social tension.

The analysis of individual parameters of social tension indicates the existence of serious problems in the sphere of socio-economic development of the oblasts. However, a general understanding of the actual situation makes it possible to form a comprehensive assessment of it. Therefore, it should be borne in mind that the solution to the problem of social tension should be of a systemic nature. The analysis carried out allowed to draw conclusions about the necessity of using economic-mathematical methods and models for studying such a problem as social tension in society, which requires a complex and systematic approach.

The classification of variables, the construction of multiple regression models, the selection of the most significant variables that have the greatest influence on the resulting criterion were carried out using correlation analysis. On the basis of the selected factors, a multivariate linear regression model was constructed, the coefficient of determination of which is very high, equal to 0.95, which indicates its high quality. General indicators were also calculated to test the model, which proved its adequacy and statistical significance. Thus, with the help of mathematical methods, indicators of social tension were determined for each region and for the country as a whole, among which the levels of income and education are the most critical.

Table 1
Results of building a multiple regression model by regions of Ukraine

Oblast	Coefficient of determination	Critical indicators of social tension
1	2	3
Ukraine	0,9849	average monthly salary by region since the beginning of the year; disposable income per person, UAH
Vinnytsia	0,9939	average monthly salary by region since the beginning of the year; salary arrears (million UAH)
Volyn	0,9982	employed population by region; unemployed population (ILO methodology) by region; average monthly wage by region for the period since the beginning of the year; wage arrears (million UAH)
Dnipro	0,9732	disposable income per person, UAH; employers' need for employees by region (thousand people)
Donetsk	0,8846	employed population by region; disposable income per person, UAH
Zhytomyr	0,99	unemployed population (ILO methodology) by region; average monthly wage by region since the beginning of the year; disposable income per capita, UAH; wage arrears (million UAH)
Transcarpathia	0,99	employed population by region; unemployed population (ILO methodology) by region; average monthly wage by region for the period since the beginning of the year; disposable income per capita, UAH; wage arrears (million UAH); employers' need for employees by region (thousand people)
Zaporizhzhia	0,9851	employed population by region; unemployed population (ILO methodology) by region; average monthly wage by region for the period since the beginning of the year; wage arrears (million UAH)
Ivano-Frankivsk	0,9791	average monthly salary by region since the beginning of the year; disposable income per person, UAH
Kyiv	0,7893	salary arrears (million UAH)
Kirovohrad	0,8356	Unemployed population (ILO methodology) by oblast
Luhansk	0,9498	salary arrears (million UAH)
Lviv	0,9513	disposable income per person, UAH
Mykolaiv	0,9802	average monthly salary by oblast since the beginning of the year
Odesa	0,9529	average monthly salary by oblast since the beginning of the year
Poltava	0,9965	average monthly salary by oblast since the beginning of the year; wage arrears (million UAH); employers' need for employees by region (thousands of people)
Rivne	0,9747	average monthly salary by oblast since the beginning of the year
Sumy	0,9716	average monthly salary by oblast since the beginning of the year
Ternopil	0,9911	average monthly salary by oblast since the beginning of the year; disposable income per person, UAH
Kharkiv	0,9712	average monthly salary by oblast since the beginning of the year
Kherson	0,9782	average monthly salary by oblast since the beginning of the year
Khmelnytskyi	0,9794	average monthly salary by oblast since the beginning of the year
Cherkasy	0,9883	unemployed population (ILO methodology) by region; average monthly wage by oblast for the period since the beginning of the year
Chernivtsi	0,9933	average monthly salary by oblast since the beginning of the year; disposable income per person, UAH; employers' need for employees by region (thousands of people)
Chernihiv	0,9807	average monthly salary by oblast since the beginning of the year
Kyiv (city)	0,996	average monthly salary by oblast since the beginning of the year; disposable income per person, UAH; employers' need for employees by region (thousands of people)

Source: results obtained by the authors in the course of the study, taking into account official statistical information of the Human Development Report (2020), State Statistics Service of Ukraine (2023)

The scientific novelty of the study is the proposed conceptual model of social tension research, which is divided into two modules: the assessment and analysis of social tensions and the construction of the regional development programme.

A promising direction of this research is a more detailed analysis of the causes of the formation of social tensions by regions of Ukraine, for which a regression analysis by regions of the country should be conducted. The dependent variable should be gross regional product per capita. Such an in-depth diagnosis will allow to conduct a study that will point out the most painful points of potential conflict and take the necessary measures in time to prevent social tensions from escalating into a social catastrophe. In the case of a social catastrophe, social processes become uncontrollable and unpredictable, and the consequences are destructive and irreversible.

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