

DECOMPOSED ANALYSIS OF NET TURNOVER USING THE LOG MEAN DIVISION INDEX METHOD: TEXTILE, CLOTHING, LEATHER AND FOOTWEAR INDUSTRIES IN ROMANIA

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Abstract:

Net turnover is a fundamental indicator in assessing the commercial performance of an economic activity. Analysis of this indicator highlights the level and dynamics of economic activity, both at company and industry level. At the microeconomic level, the analysis allows not only the assessment of commercial performance, but also the substantiation of managerial decisions and the assessment of market position. At the mesoeconomic level, it highlights the size, structure, and trends of the sector; providing a basis for inter-company comparisons, the establishment of sectoral policies, and the importance of the industry in the structure of the national economy.

The main purpose of the paper is to monitor the dynamics of commercial performance at the industry level, namely in the textile, clothing, leather, and footwear (TCLF) industries. In this context, a decomposed analysis of net turnover was performed using the Log Mean Division Index (LMDI) method, taking into account three influencing factors: the total number of people employed in the TCLF industries, the structure of the workforce, and labor productivity at the level of each sub-branch. The LMDI method allowed the quantification of each factor's contribution to the change in the analyzed indicator.

The analysis was carried out for the period 2021-2024, using EUROSTAT statistical data. The LMDI method was applied in two variants: additive and multiplicative. The results showed a positive trend for the indicator in 2022 and a negative trend for 2023 and 2024. The contributions of the factors varied: favorable for labor productivity, unfavorable for the total number of employees, and fluctuating for the structure of the workforce.

Key words: decomposition, LMDI, net turnover, influencing factors, contributions

JEL classification: E25, L25, L67

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1. INTRODUCTION

Net turnover consists of revenues generated by a company's current activity, resulting from the sale of products and the provision of services, adjusted for trade discounts and VAT, and including operating subsidies (Căruntu, 2011). Along with other financial and non-financial indicators, turnover is part of the set of economic performance indicators known in the literature as Key Performance Indicators (Teau & Protopopescu, 2015). These indicators are essential because they allow: monitoring progress/deviations from set objectives, identifying problems and opportunities, measuring the degree of resource utilization and results achieved, thus supporting the decision-making process.

Increasing turnover is an important objective at both the microeconomic and mesoeconomic levels. This indicator allows commercial performance to be measured, reflecting both the situation of a company and the evolution of a sector/industry. At company level, turnover shows its position in the market, competitiveness, and ability to generate profits, with the aim of maximizing revenues or ensuring predictable profits. Analyzing the sources and structure of a company's revenues, including the diversification of the range of products and services offered on the market, facilitates risk assessment and the identification of segments with growth potential. Analyzing the dynamics and structural changes in turnover provides conclusive information on the factors that influence the company's commercial performance and supports the adoption of strategic measures to optimize activity and increase sales (Anghel, 2019).

However, at the mesoeconomic level, turnover reflects aggregate performance, production and sales dynamics, and the efficiency of resource utilization in a given industry. It is closely linked

to the national economy through income generation, employment, inter-sectoral linkages, and aggregate demand. A structural and dynamic examination of an industry's revenues provides relevant information for drawing up economic strategies and policies that are beneficial to the sustainable development of the industry. In this way, turnover analysis allows the performance of individual firms to be correlated with the evolution of the industry as a whole, facilitating coherent growth and optimization measures.

This paper aims to extend the applicability of the LMDI method beyond its traditional areas of use by applying it to the analysis of an economic indicator, namely net turnover in the textile, clothing, leather, and footwear industries (TCLF). The use of this method allows for the analysis of the indicator's dynamics, as well as the evaluation of the contribution of the three determining factors of its variation: the total number of employed persons, the structure of the labor force, and labor productivity at the sub-sector level. Although we would have liked to conduct an analysis over a longer period of time, this was only possible for the 2021–2024 interval, the only one for which we found the necessary information published. The source of the statistical data used was EUROSTAT. Both variants of the LMDI method were applied in the analysis, which differ in the way the variation of the analyzed indicator is expressed: in absolute values in the case of the additive form and in relative values/indices in the case of the multiplicative form.

The choice of net turnover as an indicator for analysis, rather than gross turnover, is justified by the fact that it more accurately reflects the ability of a company or industry to generate real income from sales, by eliminating distortions caused by temporary price reductions. Therefore, we believe that net turnover provides a more accurate picture of commercial performance.

2. LOG MEAN DIVISIA INDEX – A BRIEF REVIEW OF THE LITERATURE

Through decomposition, the evolution of an economic indicator can be explained by the contribution of its influencing factors. Decomposition therefore allows for a causal explanation of the level and variation of an economic indicator, providing valuable information for managerial and economic decision-making.

One of the methods that can be used to perform a decomposed analysis of turnover is the Log Mean Divisia Index (LMDI) method, considered the most commonly used variant for Index Decomposition Analysis (IDA) (Ang, Zhang, & Choi, 1998; Meng & Niu, 2012).

IDA is a quantitative method that allows the decomposition of a change (variation) in an aggregate indicator into the contributions of the determining factors. It uses mathematical index methods to perform this decomposition, choosing appropriate indices to obtain consistent and interpretable results. Index decomposition is the basic framework of index number theory (Choi & Wankeun, 2014) and underlies any IDA analysis.

Initially, IDA was based on the Laspeyres index and then on the Divisia index, the latter being presented in 1987 by Boyd and his collaborators and also known as the arithmetic mean of the Divisia index (AMDI) method. Subsequently, however, the logarithmic mean Divisia index (LMDI) method was introduced and used in the literature, with its two forms: additive and multiplicative.

LMDI is currently considered a benchmark methodological tool in index decomposition. The method is one of the most reliable approaches within IDA, due to its mathematical properties that guarantee a perfect decomposition, free of residuals (Drastichová, 2016), and stable results regardless of the sign of the variations of the factors considered. In fact, Chen et al. (2017) note that, unlike the AMDI method, LMDI has the advantage of not generating residual terms in quantifying the contribution of the factors analyzed. Therefore, LMDI is currently considered the methodological standard in index decomposition due to its accuracy and clarity in interpreting results. The method uses the logarithmic mean to accurately attribute the contribution of each factor to the total change and is widely applied in areas such as carbon emissions analysis, energy efficiency, economic impact, waste management, and material consumption.

To demonstrate the popularity of the LMDI method among researchers, we performed a standard search in the Web of Science Core Collection using the following keywords: "LMDI", "LMDI approach", "LMDI method", "LMDI Decomposition Model", "Logarithmic Mean Divisia

Index", and "Logarithmic Mean Divisia Index Method", combined using the Boolean operator "OR".

At the time of writing this paper, the search yielded 2,165 articles. According to Figure no. 1, 1,151 papers (over 53%) were published in the field of "Environmental Sciences," 603 in the field of "Green and Sustainable Science Technology", 542 in the field of "Fuels Energy," and only 197 in the field of „Economics”.

In general, the papers identified in the Web of Science Core Collection database contain case studies involving the use of the LMDI method to decompose CO₂ emissions or carbon productivity, particularly in the industrial, urban, and transport sectors. These studies offer relevant insights into how policies and practices can influence energy efficiency and carbon emissions. The research focuses on issues such as reducing carbon emissions in correlation with economic growth, the sectoral impact on carbon emissions, or identifying methods to reduce them in certain sectors.

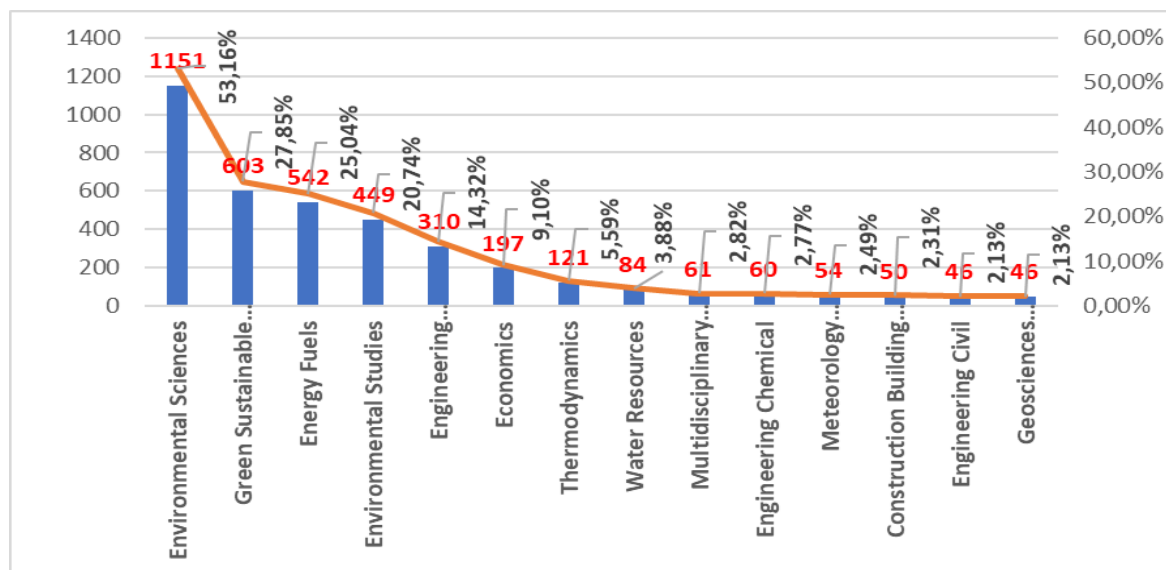


Figure no. 1. Works published in Web of Science Core Collection with reference to LMDI, by category – over 2% in total

Source: Own elaboration based on the Analysis results – Web of Science

At the same time, in order to quantify the number of citations of the 2,165 papers, we used the Citation Report tool. According to this tool, the total number is 51,682 without self-citations (Figure no. 2).

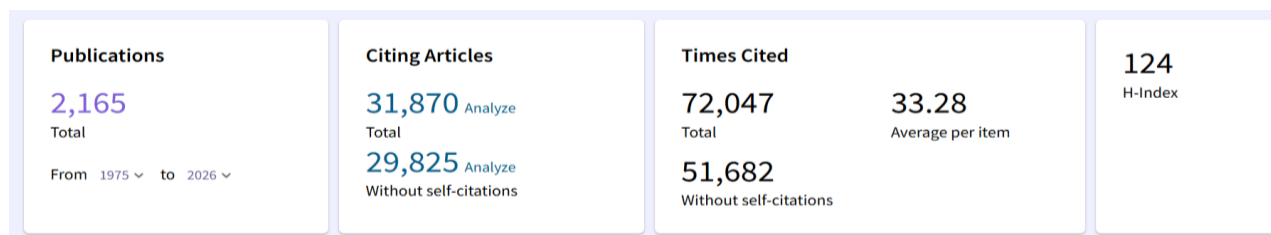


Figure no. 2. Total citations of papers published in Web of Science Core Collection with reference to LMDI

Source: screenshot: <https://2t10qhelz-y-https-www-webofscience-com.z.e-nformation.ro/wos/woscc/citation-report/33623b26-c4cf-4625-b58d-f2fe5533b7b5-019ca25f7e?page=1>

According to Table no. 1, most citations belong to papers published in 2005 and 2015 by B.W. Ang (2,177 cumulative citations). In fact, the author has a total of 2,787 citations for the three articles in the top 10 most cited papers.

Table no. 1. Top 10 most cited works in Web of Science Core Collection with reference to LMDI

Title	Authors	Source Title	Publication Year	Total Citations
The LMDI approach to decomposition analysis: a practical guide	Ang, B.W.	Energy Policy	2005	1285
LMDI decomposition approach: A guide for implementation	Ang, B.W.	Energy Policy	2015	892
The decomposition of energy-related carbon emission and its decoupling with economic growth in China	Zhang, Y.J.; Da, Y.B.	Renewable & Sustainable Energy Reviews	2015	649
A new energy decomposition method: perfect in decomposition and consistent in aggregation	Ang, B.W.; Liu, Fl.	Energy	2001	610
China's changing energy intensity trend: A decomposition analysis	Ma, C.; Stern, D.I.	Energy Economics	2008	532
Factors that influence carbon emissions due to energy consumption in China: Decomposition analysis using LMDI	Xu, S.C.; He, Z.X.; Long, R.Y.	Applied Energy	2014	486
Decomposition of energy-related CO ₂ emission in China: 1957-2000	Wang, C.; Chen, J.N.; Zou, J.	Energy	2005	435
Using LMDI method to analyzed the change of China's industrial CO ₂ emissions from final fuel use: An empirical analysis	Liu, L.C.; Fan, Y.; Wu, G.; Wei, Y.M.	Energy Policy	2007	398
Carbon emissions from energy consumption in China: Its measurement and driving factors	Ma, X.; Wang, C.; Dong, B.; Gu, G.; Chen, R.; Li, Y.; Zou, H.; Zhang, W.; Li, Q.	Science Of The Total Environment	2019	366
Regional development and carbon emissions in China	Zheng, J.; Mi, Z.; Coffman, D'Maris; Milcheva, S.; Shan, Y.; Guan, D.; Wang, S.	Energy Economics	2019	357

Source: Citation Report – Web of Science

3. METHODOLOGY AND DATA

3.1. GENERAL RELATIONSHIPS OF THE LMDI METHOD

Let us assume an indicator "X", which is decomposed into "j" segments and influenced by "Yi" factors. In this case, based on the relationships presented by Ang, Zhang & Choi (1998), Ang (2005), Yang & Chen (2011) and Mussini (2020), indicator "X" can be decomposed as follows:

$X = \sum_{j=1}^n X_j = \sum_{j=1}^n Y_{1j} * Y_{2j} * ... * Y_{ij} * ... * Y_{kj} \quad (1)$, under the following conditions: $j = \overline{1, n}$ și $i = \overline{1, k}$

According to the LMDI method, the change in the indicator and the contributions of the factors are determined as follows:

a) *in the case of the additive model:*

$$\Delta X = X_1 - X_0 = \sum_{j=1}^n X_{j1} - \sum_{j=1}^n X_{j0} = \sum_{i=1}^k \Delta X(Y_i) = \Delta X(Y_1) + \dots + \Delta X(Y_i) + \dots + \Delta X(Y_k), \quad (2)$$

where: 0, 1 represents the period 0 and 1

$\Delta X(Y_i) = \sum_{j=1}^n w_j * \ln \left(\frac{Y_{ij1}}{Y_{ij0}} \right)$ = contribution of factor "Yi" to the change in indicator "X"

$w_j = \frac{X_{j1} - X_{j0}}{\ln X_{j1} - \ln X_{j0}}$ = logarithmic mean representing the share of segment "j" in terms of indicator "X"

b) *in the case of the multiplicative model:*

$$DX = \frac{X_1}{X_0} = \frac{\sum_{j=1}^n X_{j1}}{\sum_{j=1}^n X_{j0}} = \prod_{i=1}^k DX(Y_i) = DX(Y_1) * \dots * DX(Y_i) * \dots * DX(Y_k), (3)$$

where: $DX(Y_i) = \exp(\sum_{j=1}^n \bar{w}_j * \ln(\frac{Y_{ij1}}{Y_{ij0}}))$ = contribution of factor "Yi" to the change in indicator "X"

exp = exponential function

$\bar{w}_j = \frac{(X_{j1} - X_{j0}) / (\ln X_{j1} - \ln X_{j0})}{(X_1 - X_0) / (\ln X_1 - \ln X_0)}$ = the relative share of the logarithmic mean value of segment "j"

with respect to indicator "X"

3.2. LMDI METHOD RELATIONSHIPS APPLIED TO NET TURNOVER

The relationships presented above have been adapted to the net turnover in light industry, known at European Union level as the TCLF industries. In this regard, its three sub-branches "j" were taken into account: textiles (T), clothing (C), leather and footwear (LF), resulting in the following basic relationship:

$$CA = \sum_{j=1}^3 CA_j = \sum_{j=1}^3 L \cdot \frac{L_j}{L} \cdot \frac{CA_j}{L_j} = \sum_{j=1}^3 L \cdot s_j \cdot \bar{w}_j \quad (4)$$

According to relation (4), net turnover was therefore decomposed into three sub-sectors and influenced by three factors. The first factor is quantitative (volume) and is represented by the total number of people employed in TCLF industries. It measures the aggregate change in the indicator in terms of total labor force. The second is the structural factor, which concerns the share of persons employed in sub-sectors, and the last factor is efficiency, which represents the labor productivity of each sub-sector.

The notations and relationships used in the decomposed analysis are presented in Tables no. 2 and 3.

Table no. 2. Notations in the decomposed analysis of net turnover

Notations / Calculation method	Explanations
0, 1	Period 0 (previous) and 1 (current)
CA	Net turnover in TCLF industries
CA _j	Net turnover of sub-branch "j"
CA _T	Net turnover from textile manufacturing
CA _C	Net turnover from the manufacture of clothing
CA _{LF}	Net turnover from leather and footwear manufacturing
L	Total number of persons employed in TCLF industries
L _j	Number of persons employed in sub-branch "j"
$\frac{L_j}{L} = s_j$	Share of persons employed in sub-sector "j"
s _{j1} , s _{j0}	Current structure, previous structure of persons employed in sub-branches "j"
$\frac{CA_j}{L_j} = \bar{w}_j$	Labor productivity of sub-branch "j"
$p_j = \frac{CA_{j1} - CA_{j0}}{\ln CA_{j1} - \ln CA_{j0}}$	Logarithmic mean of net turnover corresponding to sub-branch "j" (share of a sub-branch in terms of net turnover)
$\bar{p}_j = \frac{(CA_{j1} - CA_{j0}) / (\ln CA_{j1} - \ln CA_{j0})}{(CA_1 - CA_0) / (\ln CA_1 - \ln CA_0)}$	Relative share of the logarithmic mean value of net turnover of sub-branch "j"
exp	Exponential function

Source: own elaboration

Table no. 3. Relationships used – LMDI method, additive and multiplicative form

Meaning	Relationship
ADDITIVE MODEL	
Change in net turnover - ΔCA	$\Delta CA = CA_1 - CA_0 = \Delta CA(L) + \Delta CA(s_j) + \Delta CA(\bar{w}_j)$
Contribution of total number of persons employed (activity effect) - $\Delta CA(L)$	$\Delta CA(L) = \sum_{i=1}^3 p_j \cdot \ln\left(\frac{L_1}{L_0}\right)$

Contribution of the labor force structure (structural effect) - $\Delta CA(s_j)$	$\Delta CA(s_j) = \sum_{j=1}^3 p_j \cdot \ln \left(\frac{s_{j1}}{s_{j0}} \right)$
Contribution of labor productivity to sub-branches "j" (efficiency effect) - $\Delta CA(\bar{W}_j)$	$\Delta CA(\bar{W}_j) = \sum_{j=1}^3 p_j \cdot \ln \left(\frac{\bar{W}_{j1}}{\bar{W}_{j0}} \right)$
MULTIPLICATIVE MODEL	
Change in net turnover - D	$D = \frac{CA_1}{CA_0} = D(L) \cdot D(s_j) \cdot D(\bar{W}_j)$
Contribution of total number of persons employed (activity effect) - $D(L)$	$D(L) = \exp \left(\sum_{j=1}^3 \bar{p}_j \cdot \ln \left(\frac{L}{L_0} \right) \right)$
Contribution of the labor force structure (structural effect) - $D(s_j)$	$D(s_j) = \exp \left(\sum_{j=1}^3 \bar{p}_j \cdot \ln \left(\frac{s_{j1}}{s_{j0}} \right) \right)$
Contribution of labor productivity to sub-branches "j" (efficiency effect) - $D(\bar{W}_j)$	$D(\bar{W}_j) = \exp \left(\sum_{j=1}^3 \bar{p}_j \cdot \ln \left(\frac{\bar{W}_{j1}}{\bar{W}_{j0}} \right) \right)$

Source: own elaboration

3.3. DATA USED

The main statistical data used in the analysis are presented in Table no. 4.

Table no. 4. Indicators: TCLF industries, Romania (2021–2024)

Indicators	2021	2022	2023	2024
1. Employees – total TCLF industries, of which:	145,622	141,939	133,936	114,671
- textile manufacturing	27,804	27,188	25,498	23,624
- clothing manufacturing	85,265	82,125	78,419	67,586
- manufacture of leather and related products	32,553	32,626	30,019	23,461
2. Share of persons employed – textile manufacturing*	19.10%	19.15%	19.04%	20.60%
3. Share of persons employed – manufacture of clothing*	58.55%	57.86%	58.55%	58.94%
4. Share of persons employed – leather and footwear manufacturing*	22.35%	22.99%	22.41%	20.46%
5. Net turnover - total TCLF industries of which from:	4,252.97	5,015.16	4,982.90	4,423.69
- textile manufacturing (million euros)	1,647.94	1,901.61	1,886.07	1,746.42
- clothing manufacturing (million euros)	1,698.88	2,006.51	2,053.65	1,818.95
- manufacture of leather and related products (million euros)	906.15	1,107.04	1,043.18	858.32
6. Labor productivity – textile manufacturing (Euro)*	59,269.8 9	69,942.99	73,969.3 3	73,925.6 7
7. Labor productivity – clothing manufacturing (Euro)*	19,924.7 1	24,432.39	26,188.1 7	26,913.1 2
8. Labor productivity – leather and footwear manufacturing (Euro)*	27,836.1 4	33,931.22	34,750.6 6	36,584.9 7

Note: * - calculated by the author based on EUROSTAT data

Source: EUROSTAT data

4. GENERAL INFORMATION ON TCLF INDUSTRIES: THE EU AND ROMANIA

At EU level, TCLF industries are considered to be among the most productive and innovative sectors (European Commission, f.a.). The latest data published by EUROSTAT show that, in 2024, there were over 226,000 companies in the EU with a total net turnover of over €220,151 million and over 1.6 million employees in 2023. At the same time, in terms of foreign trade, the EU ranked second in the world in 2019, after China, playing an important role both from the point of view of producers and consumers, especially in the field of clothing (Sulisz, 2022). However, EURATEX notes that, recently, the EU's light industry has been facing a decline in turnover, driven by weaker demand, competition from cheap products from Asia, and high production costs (EURATEX, f.a.). In this context, the future of this industry is not optimistic, with a reduction of 293,000 jobs expected by 2030 (Dinu, 2025).

According to the same EUROSTAT data, Romania was well positioned in 2024 in terms of the number of companies (7th place after countries such as Italy, France, the Czech Republic, Poland, Spain, and Portugal). In terms of net turnover, our country managed to rank at the top of the list in 2022 and 2023, in 6th place, and in 7th place in 2024. However, as part of the single market, Romania's light industry is currently facing similar difficulties to those encountered across the European Union.

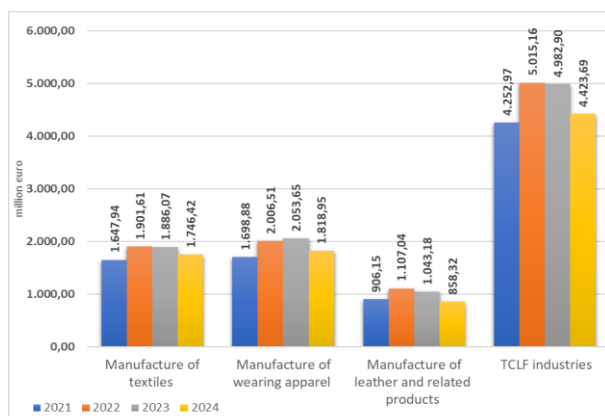
5. PRELIMINARY ANALYSIS

The evolution of net turnover and the three influencing factors is shown in Figure no. 3(a-d). According to this, total net turnover increased in 2022 - Figure no. 3(a). The increase recorded in 2022 compared to the previous year resulted from the positive correlation in the net turnover of the three sub-branches. In 2023 compared to 2022, however, the change in the indicator was negative. Although sales in the clothing industry were €47.14 million higher, this failed to offset the negative trend in the other two sub-sectors (-€15.54 million in the textile industry and -€63.86 million in the leather and footwear industry). In the last year, all three sub-sectors recorded declines in the indicator (-€139.65 million in the textile industry, -€234.7 million in the clothing industry, and -€184.86 million in the leather and footwear industry). Thus, overall, the indicator analyzed decreased in 2024 compared to 2023 by €559.21 million.

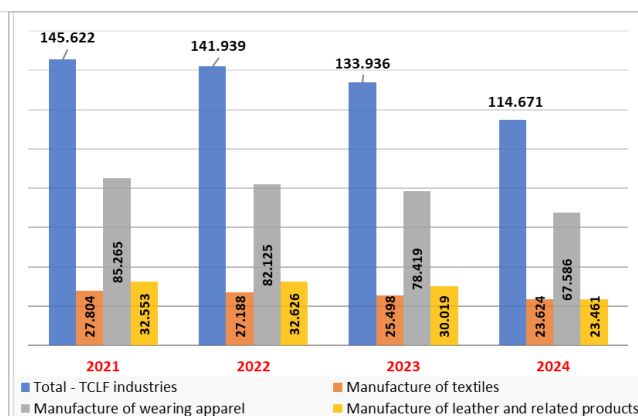
According to Figure no. 3(b), the total number of people employed has been on a downward trend. It has fallen steadily from over 145,000 to over 114,000, resulting in a decrease of approximately 31,000 in 2024 compared to 2021. Obviously, this development had a negative impact on net turnover. By sub-sector, the most significant staff reductions were recorded in clothing, with over 10,000 fewer employees in 2024 compared to 2023, and in leather goods and footwear, with over 6,500 fewer employees. In the latter sub-sector, however, there was an insignificant increase in the number of employees, with 73 people in 2022 compared to 2021, representing the only increase recorded during this period.

Most of the employees, about 58%, worked in the clothing industry, followed by those in the leather and footwear industry and the textile industry. During the period studied, there were no significant structural changes. However, we can note that these changes occurred in favor of the sub-sectors with the highest levels of labor productivity (textiles and leather) in 2022 and 2024, and in favor of clothing (the sub-sector with the lowest labor productivity) in 2023 - Figure no. 3(c).

In terms of labor productivity, with fewer employees but higher turnover, the textile industry leads the light industry with values of €59,269.89 per employee in 2021 and €73,925.67 per employee in 2024. Consequently, unlike other sub-sectors, the textile industry recorded a significantly higher level of labor efficiency. At the opposite end of the spectrum was the clothing industry, with values ranging from €19,924.71 per employee in 2021 to €26,913.12 per employee in 2024. It is also noteworthy that labor productivity recorded a steady annual increase across all sub-sectors, which meant a continuous improvement in labor efficiency - Figure no. 3(d).



(a)



(b)

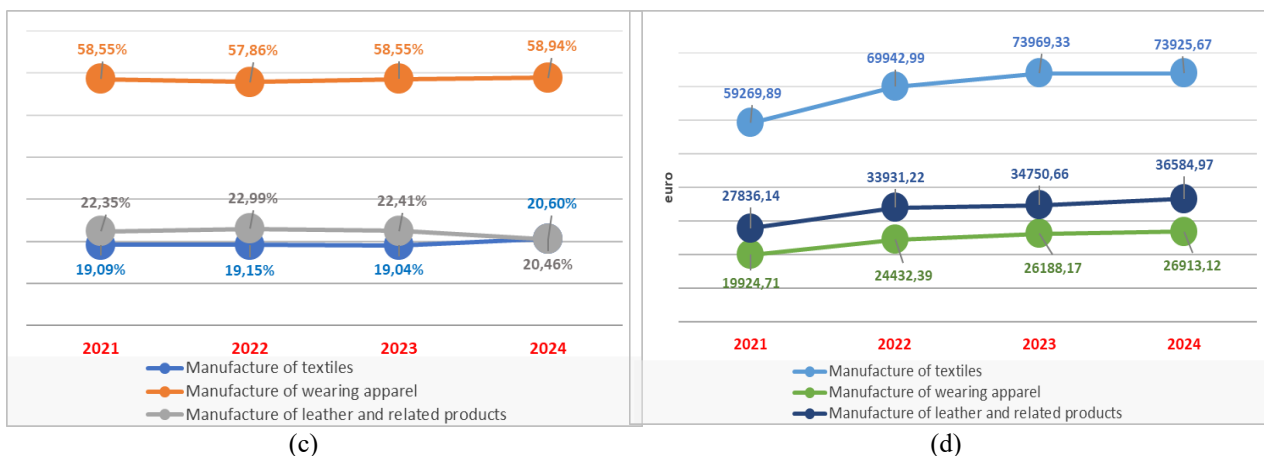


Figure no. 3. Evolution of the indicator and driving factors: net turnover (a); total number of employees (b); structure of employees (c); labor productivity (d)

Source: own elaboration using Eurostat data

6. RESULTS AND DISCUSSIONS

As a result of applying the relationships listed in Table no. 3, the following results were obtained:

Table no. 5. LMDI results - Additive and Multiplicative Model

ADDITIVE MODEL (million euro)			
I. Contribution:	2021-2022	2022-2023	2023-2024
a. Total number of persons employed - $\Delta CA(L)$	-118,4	-290,10	-729,42
b. Workforce structure - $\Delta CA(s_j)$	11,6	-14,69	69,73
c. Labor productivity by sub-sector - $\Delta CA(\bar{W}_j)$	869,0	272,52	100,49
II. Change in net turnover - ΔCA	762,2	-32,26	-559,21
MULTIPLICATIVE MODEL* (indices)			
I. Contribution:	2021-2022	2022-2023	2023-2024
a. Total number of persons employed - $D(L)$	0,975	0,944	0,856
b. Workforce structure - $D(s_j)$	1,003	0,997	1,015
c. Labor productivity by sub-sector - $D(\bar{W}_j)$	1,207	1,056	1,022
II. Change in net turnover - D	1,179	0,994	0,888

Note: *values above unity indicate increases, while those below unity indicate decreases.
Source: own elaboration using EUROSTAT data.

For an overview, the results are presented graphically in Figure no. 4(a-b).

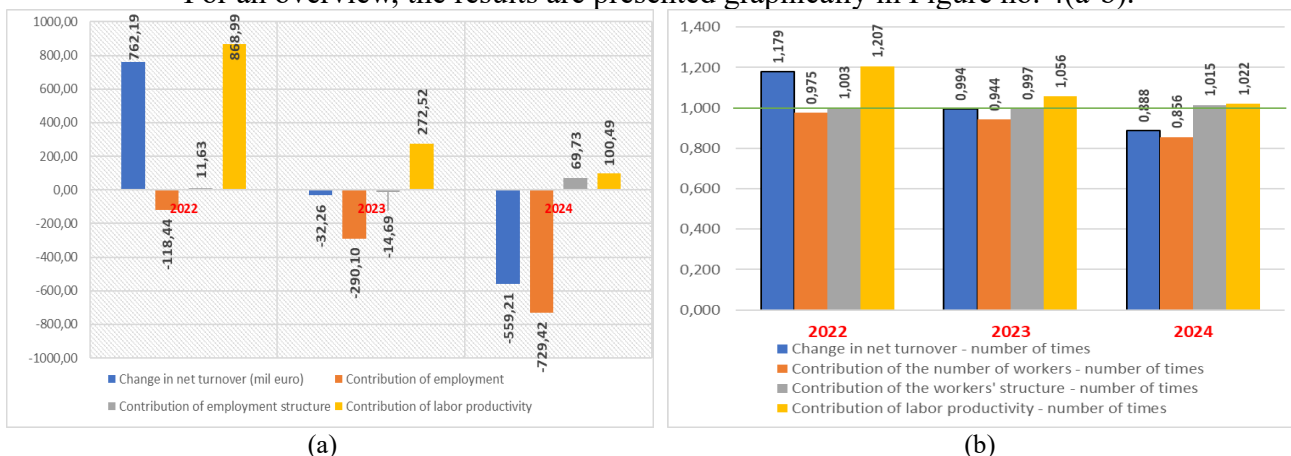


Figure no. 4. Change in net turnover and factor contributions – LMDI, additive model (a) and multiplicative model (b)

Source: own elaboration

Interpreting results - the additive model

Analysis of the data presented in Table no. 5 and Figure no. 4(a) shows that 2022 was the only year in which net turnover increased, by €762.2 million. The favorable evolution of this indicator was mainly determined by the increase in labor productivity in the three sub-sectors (see Table no. 4 and Figure no. 3(d)). As such, the efficiency factor had a favorable impact on the commercial performance of the light industry.

The structure of the workforce by sub-sector also had a positive contribution to turnover dynamics, as a result of the increase in the share of workers in sub-sectors characterized by higher levels of labor productivity. In this context, the share of workers increased from 19.1% to 19.15% in the textiles sub-sector (the sub-sector with the highest labor productivity, over EUR 59 thousand per employee) and from 22.35% to 22.99% in the leather and footwear sub-sector.

Unlike the positive influences mentioned above, the total number of employees in the light industry had a negative impact on the evolution of the analyzed indicator, contributing to its decrease by over €118 million. The negative contribution of the labor factor was determined by the reduction from 145,622 employees in 2021 to 141,939 in 2022 (i.e., a decrease of 2.53%). This was the result of the contraction of economic activity in the TCLF industries following the reduction in the total number of companies (from 10,987 in 2021 to 10,487 in 2022). However, the significant increase in labor productivity had a much stronger impact, offsetting the unfavorable influence of the workforce and leading to an overall positive development in turnover.

As such, the change in net turnover in 2022 reflected an improvement in the internal efficiency of the companies remaining on the market, indicating intensive growth focused on more efficient use of resources, possible technological modernization and reorganization of production processes, as well as the achievement of higher value-added products.

Unlike 2022, total net turnover declined in 2023 and 2024, by €32.26 million in 2023 and by over €559 million in 2024. Although labor productivity continued to have a positive influence on turnover, generating increases of €272.52 million in 2023 and €100.49 million in 2024, the negative impact of the reduction in the total number of employees outweighed the favorable influence of this factor.

The labor factor had a negative impact of over €290 million in 2023 and over €729 million in 2024, as the total number of employees fell to 133,936 in 2023 and 114,671 in 2024. For 2023 and 2024, the increase in labor efficiency was not sufficient to offset the decline in activity. This shortfall can also be explained by a number of exogenous factors such as declining demand, competitive pressures, and rising input prices. At the same time, in 2023 there was an increase in the share of workers in the clothing industry, a sub-sector characterized by the lowest level of labor productivity. As a result, the structure of the workforce by sub-sector had a negative impact on the net turnover of the entire industry, causing it to decrease by €14.69 million.

In 2024, compared to 2023, the structure of the workforce continued to change. Although the share of employees in the clothing sector increased, the increase in the share of workers in the textile sub-sector - characterized by the highest labor productivity - generated a positive effect of the labor force structure on the analyzed indicator, quantified by a contribution of +69.73 million euros.

Thus, in the period 2023-2024, both labor productivity and the structure of the workforce had a favorable influence on commercial performance. However, these positive effects were insufficient to counteract the negative impact generated by the reduction in the total number of employees, which ultimately led to a decrease in the indicator of over €559 million.

Interpreting results – the multiplicative model

Applying the LMDI method in its multiplicative form highlights the fact that, in 2022, the net turnover of the light industry increased 1.179 times (by 17.9%) compared to 2021 (Table no. 5 and Figure no. 4(b)). This increase was the result of the combined action of the three factors, whose influences varied in intensity and direction.

Thus, the efficiency factor (labor productivity by sub-sector) was the main factor supporting the growth of the indicator, with a significant positive contribution, allowing it to increase by 1.207 times, or in other words by 20.7%.

The unfavorable evolution of the volume factor (total number of workers) had, on the other hand, a negative influence on the dynamics of the indicator (its contribution of 0.975 times indicating a decrease in the analyzed indicator by 2.5%), partially tempering the positive effects generated by productivity. Changes in the structure of workers by sub-sector (the structure factor) had a limited impact on the evolution of net turnover (an increase of 1.003 times or 0.3%), with this factor playing a rather neutral role.

For the coming years, there will be a decline in net turnover, by 0.6% in 2023 and by 11.2% in 2024. As in the case of the additive form, the influences of the three factors had the same effect. Labor productivity had a positive influence on the evolution of the indicator, causing it to increase 1.056 times (by 5.6%) and 1.022 times (by 2.2%) in the last two years.

The total number of workers had a negative influence in both 2023 (-5.6%) and 2024 (-14.4%).

However, the structure of the workforce had a different contribution. In 2023, the influence was unfavorable, generating a decrease in total net sales of 0.3%, while in 2024 it was positive, leading to an increase in the indicator of 1.015 times (1.5%).

Final remarks

For a long time, the TCLF industries in Romania were an important segment of Romanian exports. At the same time, the light industry employed a significant number of people (486,000 in - https://cnp.ro/wp-content/uploads/2021/08/industria_usoara.pdf). The evolution of wages in this field over time was the main cause of labor migration to other economic activities or abroad (Roșca, 2023).

The years 2021-2024 were marked by a series of changes in Romania's TCFL industries. Some of these are related to the decline in the number of companies and employees. In this regard, there were a number of causes that led to restructuring, market exits, and reduced employment capacity in the sector.

Economic difficulties and reduced orders, the cumulative impact of post-pandemic shocks, the energy crisis, and pre-existing structural vulnerabilities (dependence on the contract manufacturing system, low level of technological development, and labor shortages) were the main causes of the decline in activity.

Added to these are intensified external competition, rising production costs (generated by increased procurement costs and wages), difficulties encountered by employers in attracting and retaining employees, fiscal measures adopted, the attractiveness of the business environment in Asian countries with cheaper labor, and the discontinuation of the export promotion program (Dobre, 2024; The Romania Journal, 2025).

At the same time, with the implementation of new European regulations on traceability, companies are required to comply with EU requirements on tracking products throughout the supply chain, from raw materials to the final product, in accordance with environmental and social standards ([The Romania Journal, 2025](#)). This entails additional investments in data management systems and administrative procedures, putting greater pressure on small companies and contributing to a reduction in the number of active enterprises and, in part, to an increase in labor productivity in the companies remaining on the market, thus resulting in an industrial structure more concentrated around companies with relatively higher productivity.

In practice, a process of structural adjustment of light industry was carried out, with low-productivity companies and jobs leaving the market and economic activity concentrating in the remaining, more efficient enterprises.

This also explains the positive contribution of labor productivity to the growth in net turnover.

7. CONCLUSIONS

Through a breakdown analysis of net turnover, according to the model presented in the paper, three influencing factors were identified: total number of employees, their structure by sub-sector, and labor productivity by sub-sector.

During the period analyzed, with the exception of 2022, net turnover showed an unfavorable trend, mainly due to the decrease in the total number of employees.

The decomposed analysis of the indicator using the LMDI method highlighted the positive and negative influences of the influencing factors. Unlike 2022, when net turnover increased compared to 2021, in 2023 and 2024 it decreased.

Two of the influencing factors maintained their direction of influence on the indicator studied throughout the entire period studied. Thus, labor productivity had a positive influence, while the total number of workers had a negative influence. In contrast, the sub-sector structure of the labor force had an alternating positive and negative influence on the indicator.

In the context of the current situation of the domestic light industry, several measures to increase net turnover can also be mentioned:

- increasing labor productivity through: re-engineering, automation, and digitization; reorganizing production processes; professional training and specialization of employees; innovation and products with higher added value;
- reducing staff turnover (retaining and attracting employees) by offering non-salary benefits (meal vouchers, productivity bonuses, transport or medical subscriptions);
- optimizing the staff structure (in favor of sub-sectors with a higher level of labor productivity);
- diversifying markets and expanding exports;
- creating own brands for value-added products;
- access to government and European funds for modernization, digitization, and export;
- simplification of bureaucracy and tax breaks for SMEs;
- adoption of circular economy models based on: green technologies, sustainable materials, waste reduction.

REFERENCES

1. Ang, B.W., Zhang, F. Q., & Choi, K.H. (1998). *Factorizing changes in energy and environmental indicators through decomposition*. Energy, 23(6), pp. 489–495.
2. Ang, B.W. (2005). *The LMDI approach to decomposition analysis: a practical guide*, Energy Policy, 33(7), pp. 867-871.
3. Anghel, M.G. (2019), *Aspecte teoretice privind conținutul și rolul analizei economico-financiare*, Revista Română de Statistică, Supliment nr. 8, pp. 3-19
4. Boyd, G., McDonald, J.F., Ross, M., Hanson, D.A. (1987), *Separating the changing composition of US manufacturing production from energy efficiency improvements: a Divisia index approach*, The Energy Journal, 8(2), pp. 77-96
5. Căruntu, R.C. (2011), *Aspecte teoretice privind analiza cifrei de afaceri*, Analele Universității “Constantin Brâncuși” din Târgu Jiu, Seria Economie, nr. 3, pp. 177-183
6. Chen, G., Hou, F., & Chang, K. (2017). *Regional decomposition analysis of electric carbon productivity from the perspective of production and consumption in China*, Environmental Science Pollution Research, 25, pp. 1508-1518
7. Choi, K.H. & Wankeun, O. (2014), *Extended Divisia index decomposition of changes in energy intensity: A case of Korean manufacturing industry*, Energy Policy, vol. 65, pp. 275-283
8. Dinu, M. (2025, Noiembrie 20), *Criză masivă în industria modei: România va fi cea mai afectată dintre țările din estul Europei, potrivit presei italiene*, online: <https://www.mediafax.ro/social/criza-masiva-in-industria-modei-romania-va-fi-cea-mai-afectata-dintre-tarile-din-estul-europei-potrivit-presei-italiene-23645293>, [accesat la 02.02.2026]

9. Dobre, A.M. (2024, September 27), *Romania: Iasi's textile industry 'hanging by a thread' as factories shut & reduce activities*, online: <https://www.bhrrc.org/it/latest-news/romania-iasis-textile-industry-hanging-by-a-thread-as-factories-shut-reduce-activities/>, [accesat la 28.01.2026]
10. Drastichová, M. (2016), *Decomposition Analysis of the Material Consumption in the European Union*, Ekonomický časopis, 64, pp. 646 – 665
11. EURATEX (f.a.), *Economic Update*, <https://euratex.eu/economic-update/>, [accesat la 30.01.2026]
12. European Commission, (f.a.), *Sectoarele textile, îmbrăcăminte, piele și încălțăminte din UE*, online: <https://s4tclfbblueprint.eu/wp-content/uploads/2021/02/brochure-romania.pdf>, [accesat la 25.01.2026]
13. Meng, M., & Niu, D. (2012). *Three-dimensional decomposition models for carbon productivity*, Energy, 46(1), pp. 179-187.
14. Mussini, M. (2020), *An index decomposition analysis of tourism demand change*, Annals of Tourism Research, Volume 85, 102902.
15. Roșca, C. (2023, Octombrie 27), *România a devenit prea scumpă pentru a mai fi croitorașul Europei*, Ziarul Financiar, online: <https://www.zf.ro/companii/romania-pierdut-statutul-croitorasul-europei-devenit-prea-scumpa-22169267>, [accesat la 28.01.2026]
16. Sulisz, K. (2022), *Sectoral Skills Strategy for the EU TCLF Industries. Final Report*, Skills 4 Smart TCLF Industries 2030, online: <https://s4tclfbblueprint.eu/wp-content/uploads/2022/06/Sectoral-Skills-Strategy-for-the-EU-TCLF-industries.pdf>, [accesat la 28.01.2026]
17. Teau, A.M., Protopopescu, C.E. (2015), *Key Performance Indicators – Management Tools for Sales Improvement*, Revista Română de Statistică, Supliment nr. 6, pp. 65-71
18. Romania Journal (2025, September 3), *Romania's textile industry loses 40,000 jobs in one year*, online: <https://www.romaniajournal.ro/business/romaniyas-textile-industry-loses-40000-jobs-in-one-year/>, [accesat la 28.01.2026]
19. Yang, J., Chen, B. (2011), *Using LMDI method to analyze the change of industrial CO2 emission from energy use in Chongqing*, Frontiers of Earth Science, 5(1), pp. 103–109
20. https://ec.europa.eu/eurostat/databrowser/view/sbs_ovw_act_custom_19821512/default/table, [accesat la 20.01.2026]
21. https://cnp.ro/wp-content/uploads/2021/08/industria_usoara.pdf, [accesat la 30.01.2026]
22. <https://2t10qhelz-y-https-www-webofscience-com.z.e-nformation.ro/wos/woscc/analyze-results/33623b26-c4cf-4625-b58d-f2fe5533b7b5-019ca25f7e>, [accesat la 01.02.2026]