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HOW STICKY IS THE PER CAPITA INCOME?

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ABSTRACT

In our settlement-level study using the Markov chain method and dynamic regression panel models, we found that in the period 2011-2021, income in the previous year strongly affects income status, i.e., income shows high persistence. Despite the steady increase in per capita income over the period under study, the spatial structure of the income distribution shows a fixed state, with a high degree of stability: poor municipalities remain poor, while rich municipalities remain rich. Only in the Central and Western Transdanubian regions is there a greater chance of a municipality's population moving into a higher income category. The results of the regression models show that, in addition to the income level of previous years, the higher number of self-employed, the greater distance of settlements from cities and Budapest, the employment structure and the higher share of job seekers have a significant impact on the income of the population.
Keywords: income persistence, income distribution, factors affecting income, Markov chain, dynamic panel model

INTRODUCTION

In our study, we seek to answer two interrelated questions. By exploring the spatial structure of income in Hungary between 2011 and 2021, we want to investigate the stability of the spatial pattern of income (income persistence) and to shed light on the extent to which the income level of previous years affects the current income level, i.e. to get a picture of income „inertia". If income inertia (ϱ) is significant, then factors specific to the geographical unit are less important.

Researchers in the field of income studies have repeatedly demonstrated spatial autocorrelation, i.e. that the income position of spatial units strongly influences the income level of neighbouring areas. This time, in addition to the spatial dimension, we incorporate the time dimension in our research and investigate whether the impact of past incomes and other variables on the income level of the population of Hungarian municipalities in 10 years can be statistically detected. These results may help to better understand why some regions cannot escape from the income trap.

Literature review

In the international literature, the issue of income distribution is closely linked to the convergence process. Related to this, the main question is whether per capita income

in poor countries/regions increases faster than in rich countries/regions during periods of economic development (beta convergence). Another strand of convergence studies investigates whether the dispersion of per capita income of different groups decreases over time (sigma convergence) (*Barro & Sala-i-Martin*, 1992; *Caselli et al.*, 1996; *Glaeser et al.*, 1995; *Islam*, 1995; *Mankiw et al.*, 1992). The process of convergence can also be studied within the framework of club convergence (*Baumol,* 1996, cited in *Dusek-Kotosz,* 2017). According to this approach, each territorial unit converges to its group- or club-specific equilibrium state (e.g. the EU Member States converge to the EU average). According to club convergence theory, it is the initial conditions for each group of countries that determine the convergence processes.

Empirical research on income distribution has been conducted for many countries around the world at different levels of aggregation. What their results have in common is that they generally conclude that the spatial units under study fall into convergence clusters with stable income status, be it Turkey (*Ursavaş & Mendez,* 2022), China (*Luo et al.*, 2021; *Cheong & Wu*, 2013), India (*Mishra & Kumar*, 2018) or Europe (*Cosci & Sabato*, 2007; *Hierro & Maza*, 2009). *Dall'erba* (2005) explains the non-random, distinctive patterns of income levels by geographical spillover effects. He points out, when examining the spatial distribution of income, that rich (poor) regions tend to cluster near other rich (poor) regions.

A large number of foreign studies focus on China, examining whether there has been a change in the relative income patterns of regions and counties in the course of economic development since 1978. The results show that there is a high probability that the studied spatial units will remain in the current income group, convergence is excluded for some spatial groups, and the persistence of income levels is very high. (*Villaverde et al.*, 2010; *Cheong & Wu*, 2013).

According to research on Europe, there are past examples of territorial units changing their income positions. *Hierro & Maza* (2009), looking at the 15 Member States of the European Union, conclude that income polarisation rates declined sharply between 1980 and 1993 (i.e. there were significant shifts in income distribution), but that between 1993 and 2005, they found stable polarisation levels and a declining probability of shifts. *Cosci & Sabato* (2007) studied differences in the distribution of per capita income in 99 regions of 12 European countries. They also found that regional income disparities persist, with the probability of a region remaining in the same income bracket ranging from 55% to 85%.

Among the studies on Hungary, *Győri & Mikle* (2017) showed that over more than 100 years (their data are from 1910, 1970, 2001 and 2011), the development maps of the Austro-Hungarian Empire, the period of socialism and the decades after the regime change are very similar. By examining the values of a composite index of development (of which income is one component), the authors conclude that the differences in the West-East division of the country have not changed in a century and that the marked separation of centre-periphery, developed and underdeveloped areas, has persisted. Spatial development interventions have been ineffective, failing to address some of the difficult-to-remedy handicaps, such as geographical location. Their results show that strong spatial stability means that there is little chance for individual spatial units to change their development status upwards or downwards.

Spatial structural stability of income is also observed over shorter periods and at lower territorial units. *Egri* (2022a), in his study at the municipal level, finds that between 2012 and 2019, the spatial position of centres and peripheries (regardless of income business cycles) can be considered mostly stable. In our country, spatial clubbing of incomes also appears at lower territorial levels. The income distribution can be considered stable, with an overall share of immobile municipalities of 85.1% over the period under study. The stability and immobility are most pronounced in municipalities at the two ends of the income scale. Both the lowest and the highest income groups have a probability of more than 90% that they will not be able to change their income situation. For the less well-off municipalities, this reflects the poverty trap phenomenon (*Egri*, 2023).

In another work, *Egri* (2022b) points out that absolute convergence is not observed in the 2010s, and that the catching-up of less developed districts is not typical. What is typical, however, is the convergence clustering of districts, which *Quah* (1996) shows is a pattern typical of countries around the world, i.e. polarising income inequalities. Inequality is particularly pronounced in the most income-poor areas, while a more emptying catching-up process is observed in the richest districts.

MATERIALS AND METHODS

In our research, the outcome variable of the regression models is the total domestic income per working-age resident (aged 15-64). This is income subject to personal income tax, so it excludes social and other income. The data were obtained from the TEIR database.

The explanatory variables of the regression models include the lagged variable of income, economic (presence of sole proprietorships and partnerships, EU subsidies, employment structure by FEOR) and social (population, proportion of job seekers), and geographical (distance from Budapest and cities with at least 20,000 inhabitants) variables.

The income data and the explanatory variable for the EU subsidy have been adjusted by the consumer price index and are presented in 2021 real prices. EU subsidies include subsidies paid out under the operational programmes of the New Hungary Development Plan and the New Hungary Rural Development Programme during 2011 and 2016, and subsidies paid out under the Széchenyi 2020 and Széchenyi Plan Plus programmes during 2015-2021. The aid data are available in include all aid paid, regardless of the type of beneficiary organisation, by place of implementation. Descriptive statistics for the variables are presented in *Table 1*.

In our database, variables are available for 3155 municipalities for 11 consecutive years (2011-2021), resulting in a balanced panel database.

For the analysis, we used Arellano-Bond and Blundell-Bond dynamic panel models, which work well when we have many observations and the time parameter is finite (large N, small T sample). The model defined by *Arellano & Bond* (1991) uses the GMM estimator, which is the fdf ferential, which allow for the elimination time-dependent settlement-specific (η_i) feet (*Hirsch & Gschwandtner*, 2013). The model used in r analysis can be expressed as follows:

$$Pi\pi_{i,t} = \Sigma_j \alpha_j\left(X_{j,i,t}\right) + \lambda\pi'_{i,t-1} + \varepsilon_{i,t}, \text{were } \varepsilon_{i,t} = \eta_i + \nu_{i,t} \quad (1)$$

Table 1: Descriptive statistics

Variable	Mean	p50	SD	Min	Max
Income per capita aged 15-64 (HUF/persons)	1 432 391	1 345 065	580 726.800	73 986.450	6 863 752
Population (15-64 years) (persons)	2310.576	613	22 426.729	6	1 240 407
Sole proprietorships per 1000 persons aged 15-64 (number/1000 persons)	47.702	44.321	25.981	0	546.667
Partnership business per 1000 persons aged 15-64 (number/1000 persons)	39.843	28.112	112.680	0	7925.000
Jobseekers per 1000 persons aged 15-64 (number/ 1000 persons)	67.968	54.387	51.725	0	444.444
EU subsidies per 1000 persons aged 15-64 (HUF/1000 persons)	241 566 556	76 279 000	142 658 949	-671 535 826	111 060 492 121
Distance to a city of at least 20 thousand inhabitants (km)	30.509	27.570	17.194	0	110.420
Distance to Budapest (km)	170.854	180.070	66.174	0	332.130
Employed in FEOR-08-0 per 1000 employees (persons/1000 persons)	6.657	4.975	7.921	0	200.000
Employed in FEOR-08-1 (employees/1000 employees)	45.036	38.828	32.779	0	666.667
Employed in FEOR-08-2 (employees/1000 employees)	70.739	64.643	44.267	0	1000.000
Employed in FEOR-08-3 (employees/1000 employees)	111.400	111.111	41.793	0	500.000
Employed in FEOR-08-4 (employees/1000 employees)	52.763	52.326	25.725	0	1000.000
Employed in FEOR-08-5 (employees/1000 employees)	111.072	110.345	38.888	0	500.000
Employed in FEOR-08-6 (employees/1000 employees)	16.895	10.000	23.990	0	1000.000
Employed in FEOR-08-7 (employees/1000 employees)	111.364	109.106	43.950	0	581.921
Employed in FEOR-08-8 (employees/1000 employees)	144.735	135.514	66.856	0	666.667
Employed in FEOR-08-9 (employees/1000 employees)	328.647	300.885	141.604	0	1000.000

The FEOR codes cover the following: FEOR-08-0: Employed in the occupations of the armed forces; FEOR-08-1: Economic, administrative and lobbyist managers, legislators; FEOR-08-2: Employed in occupations requiring the independent use of tertiary education; FEOR-08-3: Employed in occupations requiring other tertiary or secondary education; FEOR-08-4: Clerical and administrative (customer relations) occupations; FEOR-08-5: Trade and service occupations; FEOR-08-6: Agricultural and forestry occupations; FEOR-08-7: Industrial and construction occupations; FEOR-08-8: Machine operators, assemblers, drivers; FEOR-08-9: Employed in unskilled (elementary) occupations.

The GMM estimate is considered consistent if there is no second-order autocorrelation in the error factors and the instruments are appropriate. Hansen and Sargan tests were performed to test the instruments.

The *Blundell-Bond* (1998) model assumes that there is no autocorrelation between the individual error factors, and to work properly, the panel effect must be independent of the first difference of the first observation of the dependent variable.

The coefficient of the lagged variable of income is the most important variable to observe in the regression models. The higher this number is, the closer it is to 1, the more determinant the income of the previous years is for the income of the current year. The result is a picture of income persistence, which shows how much past income changes over the years, and how stable income values are over time. We also observe the effect of other variables on income.

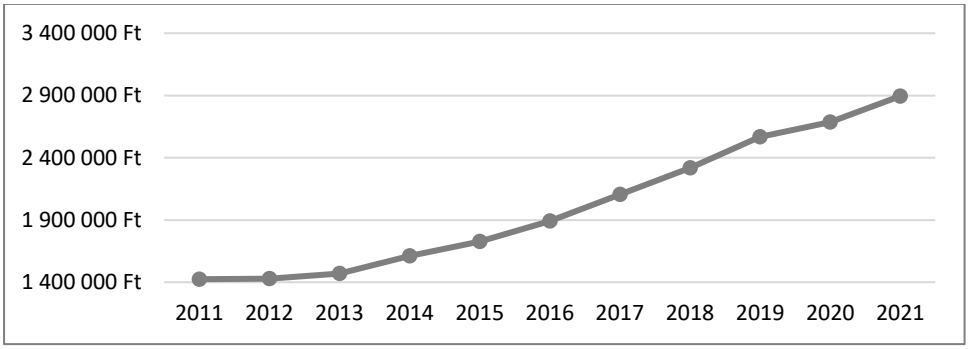
Markov chains allow us to study the dynamics and the population distribution of income (*Major*, 2008). We are looking for explanations for the temporal variation of the population distribution observed at different points in time. To do this, we have to divide our population of interest, in our case the total domestic income per working-age resident, into categories by discretisation. In this case, we have divided the municipalities into 5 categories each year so that the same number of municipalities are placed in each category. The analysis yields a stochastic transition probability matrix. Its values indicate the conditional probability that an item in a given category at the current time will be in a different category at the next time. The closer the main diagonal of the matrix is to 1, the greater the probability that an item will remain in its original category at each observation time, so the main diagonal gives the probability of 'non-movement' (*Major*, 2008; *Stokey & Lucas*, 1989).

STATA 18.0 was used for the statistical analysis and GeoDa 1.20 for the map representation.

RESULTS AND DISCUSSION

Figure 1 shows that incomes in Hungary have grown dynamically over the past 10 years. Growth started in 2013 and wages nearly doubled by 2021. A similar increase is also shown by the change in gross monthly income, in this case, the increase from 2013 to 2021 is 1.87 times (*KSH*, 2024). It can be said that incomes have increased steadily over this period, at an almost unchanged rate (*Figure 1*).

Figure 1: Total domestic income per resident of working age (2011-2021)



Source: Based on *KSH* (2024)

General statements about incomes always bring with them the question of whether they are average incomes and whether the average masks or embellishes reality. The dynamic growth in wages is not equally true for developed and more developed regions, for physical and mental employment, etc. Figure 2 shows incomes by indicating the income at the level of the municipality in different colours. A darker colour indicates a higher income. In 2011, it is clear that incomes were higher in the north and north-west of the country, essentially in the capital Budapest, its surrounding area and the road segment to Austria. In the rest of the country, higher income levels are mainly scattered in the larger cities. Looking at the 2021 map, we do not see any significant change compared to 2011. As shown in *Figure 1*, wages have risen significantly, but *Figure 2* suggests that the „status quo" has not been broken, that there has been no significant improvement in the wages of the municipalities, i.e. no area has been a major winner from this intensive income growth.

Tables 2-4 confirm this observation. In these tables are the transition probability matrices, which show the probability that a municipality will move from its current income situation to another (better or worse) income situation. The municipalities have been divided into 5 income categories, as in *Figure 2*, so that each category contains the same.

Figure 2: Distribution of total domestic income per working-age resident (2011 and 2021)

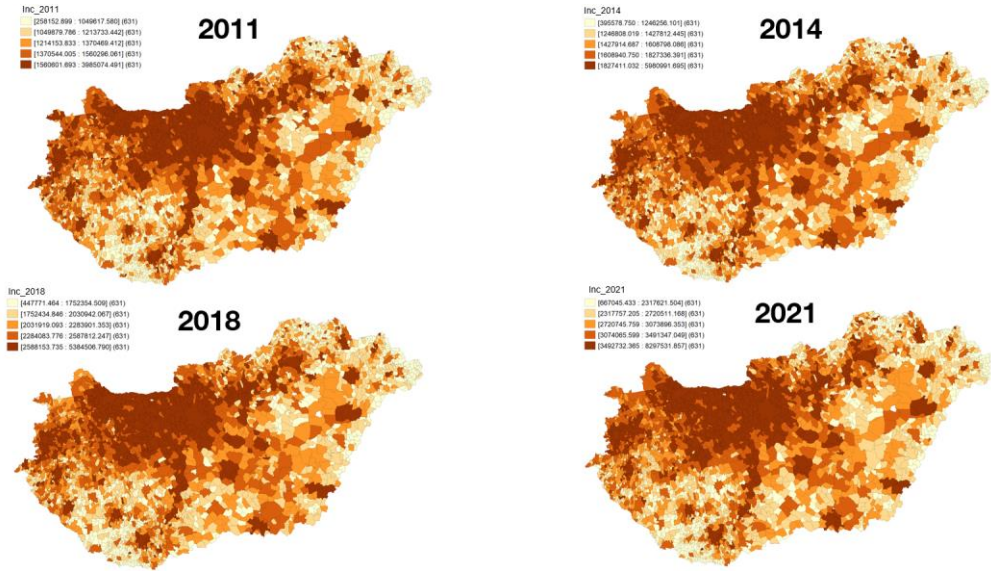


Table 2 includes all settlements in Hungary, with no geographical delimitation. One of the most important parts of the transition probability matrices is the diagonal, which shows the probability that a municipality in a given income category in 2011 will be in the same income category in 2021. Municipalities in the lowest and highest income

categories have a probability of more than 90% of remaining in their current category. So, 9 out of 10 of the most affluent and poorest municipalities will not change their income position. For the middle-income categories (2-3-4), there is an 80% probability of no change in income ranking. For the middle-income category (3), the probability of moving up (10.84%) or down (10.38%) is almost the same. In contrast, category 2 is slightly more likely to move up than to move down (10.71% vs 8.42%), and the opposite is true for category 4, where the probability of moving up to category 3 is slightly higher than for moving down to category 5 (8.94% vs 10.49%).

Table 2: Transition probability matrices for Hungary (N=3155)

		2021					
		1	2	3	4	5	Total
2011	1	91.24	8.46	0.19	0.06	0.05	100.00
	2	8.42	80.48	10.71	0.30	0.10	100.00
	3	0.30	10.38	78.18	10.84	0.30	100.00
	4	0.03	0.59	10.49	79.95	8.94	100.00
	5	0.02	0.10	0.43	8.84	90.62	100.00
	Total	20.00	20.00	20.00	20.00	20.00	100.00

The transition probability matrix shown in *Table 3* is for the Central Transdanubian region, which includes a high proportion of the highest-income municipalities (*Figure 2*). In this case, the interpretation of the income categories 1 to 5 is different. 1 continues to denote the lowest-income municipalities, but whereas in *Table 2* we observe a national situation, here the municipalities with the highest incomes are included in the analysis. In other words, category 1 is the group of the least high-income municipalities among the high-income municipalities. The probabilities in *Table 3* are slightly lower than those in *Table 2*, but the proportions are similar. Here again, the high and low categories have the largest „stickiness", i.e. the probability of changing category is lowest here. The dynamics between municipalities in the highest income categories are almost identical to the national trends, except for the middle categories where the probabilities of persistence are about 10 percentage points lower.

Table 3: Transition probability matrices for Central Transdanubia (N=401)

		2021					
		1	2	3	4	5	Total
2011	1	86.38	12.50	0.75	0.25	0.12	100.00
	2	12.00	70.50	15.62	1.50	0.38	100.00
	3	1.12	15.00	69.62	14.00	0.25	100.00
	4	0.38	1.75	13.50	74.38	10.00	100.00
	5	0.12	0.25	0.49	9.75	89.38	100.00
	Total	19.95	19.95	19.95	19.95	20.20	100.00

The transition probability matrix for Western Transdanubia is shown in *Table 4*. The municipalities in this area also belong to the higher income groups (*Figure 2*), but there are also municipalities with slightly lower incomes compared to Central Transdanubia. In national terms, however, this is an outstanding area. The results here are almost identical to the results in *Table 3*, with very similar dynamics.

Table 4: Transition probability matrices for Western Transdanubia (N=657)

		2021					
		1	2	3	4	5	Total
2011	1	85.65	12.75	1.22	0.38	0.00	100.00
	2	12.44	70.38	15.73	1.22	0.23	100.00
	3	1.60	15.34	65.95	15.95	1.15	100.00
	4	0.15	1.15	16.11	70.53	12.06	100.00
	5	0.15	0.38	0.98	11.73	86.77	100.00
	Total	19.94	19.94	19.94	19.94	20.24	100.00

If we look at the transition probabilities in the poorest region, South Transdanubia, after the two richer regions mentioned above (*Table 5*), we see that the main diagonal values are closer to the national values. We see higher probability values than in the two richer regions (Central and Southern Transdanubia). Thus, in line with the literature (*Egri*, 2022b), poorer regions have a higher probability of no change in the income situation.

It can also be observed that in Central and Western Transdanubia (*Table 3 and Table 4*), the probability of the population improving their income situation by one category (diagonal above the main diagonal) is higher than in the data without geographical delimitation (*Table 2*) and in the data for the Southern Transdanubia (*Table 5*). The chances of a municipality's population moving up by more than one category are about the same in any region.

Table 5: Transition probability matrices for Southern Transdanubia (N=656)

		2021					
		1	2	3	4	5	Total
2011	1	88.63	10.84	0.31	0.23	0.00	100.00
	2	10.46	73.89	15.11	0.38	0.15	100.00
	3	0.69	14.65	72.23	12.36	0.08	100.00
	4	0.23	0.53	11.83	79.24	8.17	100.00
	5	0.00	0.08	0.53	7.73	91.66	100.00
	Total	19.97	19.97	19.98	19.97	20.11	100.00

The Markov matrices show that there is poor mobility between municipalities in each income category. Over the past decades, a state of affairs has emerged where municipalities are characterised by high incomes and low incomes. Moving out of

these categories is very difficult if there is also a shift then the results suggest that there is an equal probability of getting better or worse.

If we want to interpret our results more deeply, we need to uncover the underlying causes of income stickiness. While it is not the purpose of this paper to explore these deeper relationships due to restrictions on the length (in this section we have only explored the dynamics of income distribution), it is important to note that the present spatial distribution of income and development is based on enduring, cumulative benefits and drawbacks. This fixed spatial structure is the result of variables that do not change over time (e.g. geographical location) or change only very slowly (educational attainment, presence of business companies, infrastructure provision). To change this fixed situation, long-term development policies would be needed, spanning several decades, to give priority support to disadvantaged areas, even in the event of economic recession or shocks. These measures have not been implemented or have not been sufficiently implemented.

Table 2-5 show that incomes are sticky. *Table 6* shows the results of the dynamic panel models. While the Markov matrices work with probabilities, the dynamic panel results also show the stickiness of incomes with concrete numbers, the effect of the diagonal of the transition probability matrices. The following results are for the whole country, with no regional delimitation.

In *Table 6*, the results are obtained using two different estimation procedures, one is the Arellano-Bond estimation and the other is the Blundell-Bond estimation. In presenting the results, the Arellano-Bond procedure is used as a basis, the Blundell-Bond estimation is used to provide robustness of the results. We indicate if there is a difference between the results of the two estimation procedures.

The income persistence variable (*income* (*lagged*)) is positive and significant, approaching 1 (0.952) for Arellano-Bond and 0.754 for Blundell-Bond, suggesting that incomes are highly sticky. The income situation of a municipality depends almost entirely on the income situation of the previous year. In such a situation, it is very difficult to make active decisions to improve or worsen the income situation of a municipality from one year to the next. It is less of a problem if the municipality is in a high-income category, it is more problematic that the break-out of municipalities in a difficult situation is subject to serious obstacles. These results are consistent with the high probabilities in the main diagonal of the Markov matrix.

The research extended to include additional control variables. One important determinant of income may be the working-age population (*population* (*15-64 years*)). The results suggest that an increase in the working-age population increases the income field, while the other model suggests that it decreases the income field, but in neither case is there a significant effect ($p<0.1$). A significant determinant of income is a municipal economic indicator. *Sole proprietorships* and *partnerships* show different dynamics. While the increasing presence of sole proprietors increases the income of the municipality, the effect is the opposite for partnerships. Based on the Blundell-Bond model, the variable of joint ventures is not significant and this estimation procedure does not confirm this effect. The increase in the number of *job seekers* reduces the income situation of the municipalities, this is natural, the unemployment benefit is always lower than the previous income, and after a certain

period, the benefit is no longer paid. The geographical location of the municipality may also be important. The capital city is of major economic importance in all countries, and this is particularly true in Hungary. The *distance to Budapest is a* negative and significant variable, i.e. the further a municipality is located from the capital, the lower the income of the municipality.

Table 6: Results of the dynamic panel model

Variable	Arellano–Bond	Blundell–Bond
Income (lagged)	0.952***	0.754***
	(0.009)	(0.034)
Population (15-64 years)	0.760	-11.419
	(1.311)	(8.240)
Sole proprietorships	2419.476***	6560.646***
	(744.131)	(90.286)
Partnership business	-82.680**	-97.958
	(33.600)	(91.783)
Jobseekers	-949.832***	-1605.247***
	(228.973)	(69.585)
EU subsidies	0.000	0.000
	(0.000)	(0.000)
Distance to a city of at least 20 thousand inhabitants	-2115.598***	3155.077***
	(791.693)	(603.727)
Distance to Budapest	-377.811***	-1279.090**
	(107.024)	(516.937)
Employed in FEOR-08-0	107105.810*	-651.128
	(63876.747)	(432.634)
Employed in FEOR-08-1	107695.952*	443.841**
	(64276.241)	(192.886)
Employed in FEOR-08-2	108123.314*	1016.987***
	(64179.627)	(330.077)
Employed in FEOR-08-3	107478.497*	477.462***
	(64090.706)	(175.812)
Employed in FEOR-08-4	106925.221*	467.469**
	(64.506.177)	(184.353)
Employed in FEOR-08-5	107143.720*	-119.621
	(64142.868)	(161.505)
Employed in FEOR-08-6	106194.695*	18.454
	(64428.504)	(328.003)
Employed in FEOR-08-7	107260.584*	-485.110***
	(64.090.115)	(153.505)
Employed in FEOR-08-8	107725.104*	555.357***
	(64.219.824)	(144.569)
Employed in FEOR-08-9	108615.274*	312.846**
	(64.308.337)	(131.913)
Intercept	-1.076e+08*	95656.429
	(64232949)	(151124)
Observations	31550	31500
AR(2)	0.373	0.100
Sargan test	0.082	
Hansen test	0.086	

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$ (In parentheses the standard errors)

The variable distance from a city of *at least 20,000 inhabitants* is also negative and significant, with a higher coefficient on this variable than distance from Budapest. In other words, not only is Budapest important, but the proximity of a large city has a positive effect on the income of municipalities. This effect of a city distance of 20,000 is not confirmed by the results of the Blundell-Bond model.

Another important characteristic of settlement incomes is the occupation of the people living in the settlement. This effect is captured by the different FEOR-08 (Standard Classification of Occupations) variables. According to both estimation procedures, almost all of these occupational categories are significant, i.e. they have an impact on municipal incomes.

The stickiness of per capita incomes is the central issue of the research and is best captured by the first leg of the dynamic panel models, as shown in *Table 5*. *Table 6* provides a regional analysis, the models in *Table 5* are calculated at the regional level. Two of the Arellano-Bond models and four of the Blundell-Bond models pass the specification tests. The income stickiness is 0.952 for the Arellano-Bond model and 0.754 for the Blundell-Bond model (*Table 6*). In *Table 7*, the income stickiness of the Arellano-Bond regional models is close to the national average in all regions, with the only exception being the Pest region (with Budapest), where the capital is located, where the value is slightly lower (0.879). For Blundell-Bond, the regional values are similar to the national average, with the Pest region being significantly lower, and with other effects, not only income stickiness, being strong for the municipalities located here. (However, only in the bold regions do the models meet the specification tests.)

In *Table 8*, we have tested the robustness of the model for all municipalities in the country. The model in *Table 5* was patched with additional lags. For the Arellano-Bond model, the inclusion of lag 2 reduced the income stickiness to 0.866, and the inclusion of additional lags (models 3 and 4) no longer significantly affects it. The strongest effect is still the carry-over effect from the previous year. For the Blundell-Bond model, the inclusion of the second lag reduces the persistence of income more, and the inclusion of the third and fourth lags further reduces the coefficient. Under the Blundell-Bond model, earnings not only depend on previous years, but also the previous 2-3 years have an impact on the present.

Table 7: Values of the lagged variable in each region

	Arellano–Bond						
	Southern Great Plain	Southern Transdanubia	Northern Great Plain	Northern Hungary	Central Transdanubia	Western Transdanubia	Pest (with Budapest)
income (lagged)	0.984*** (0.008)	1.025*** (0.010)	**0.966*** (0.019)**	**0.930*** (0.022)**	0.982*** (0.010)	0.982*** (0.011)	0.879*** (0.107)
Obs.	2540	6560	**3890**	**6100**	4010	6570	1880
AR(2)	0.974	0.601	**0.710**	**0.095**	0.038	0.707	0.321
Sargan test	0.000	0.000	**0.635**	**0.939**	0.000	0.007	0.000
Hansen test	0.000	0.000	**0.055**	**0.815**	0.000	0.008	0.000
	Blundell–Bond						
income (lagged)	**0.814*** (0.020)**	**0.765*** (0.062)**	0.871*** (0.012)	**0.737*** (0.057)**	0.799*** (0.027)	**0.785*** (0.023)**	0.414 (0.293)
Obs.	**2540**	**6560**	3890	**6100**	4010	**6570**	1880
AR(2)	**0.242**	**0.676**	0.030	**0.061**	0.023	**0.147**	0.007

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$ (In parentheses the standard errors)

Table 8: Additional lagged variable values in each region

	Arellano–Bond			
	Model 1	Model 2	Model 3	Model 4
income (lagged_1)	0.952***	0.866***	0.858***	0.865***
	(0.009)	(0.043)	(0.037)	(0.034)
income (lagged_2)		0.103**	0.123**	0.138**
		(0.043)	(0.053)	(0.078)
income (lagged_3)			-0.058	0.001
			(0.055)	(0.087)
income (lagged_4)				-0.137
				(0.092)
Observations	31550	28395	25240	22085
AR(2)	0.373	0.089	0.817	0.694
Sargan test	0.082	0.102	0.001	0.000
Hansen test	0.086	0.277	0.360	0.083
	Blundell–Bond			
income (lagged_1)	0.754***	0.576***	0.506***	0.427***
	(0.034)	(0.054)	(0.067)	(0.066)
income (lagged_2)		0.221***	0.192***	0.208***
		(0.042)	(0.055)	(0.038)
income (lagged_3)			0.105***	0.134***
			(0.028)	(0.023)
income (lagged_4)				0.027
				(0.044)
Observations	31550	28395	25240	22085
AR(2)	0.100	0.057	0.874	0.201

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$ (In parentheses the standard errors)

CONCLUSIONS

The research examines the dynamics of incomes in Hungary over ten years, with a particular focus on differences at the settlement level. The results show that between 2013 and 2021, wages have increased steadily and significantly, but this is not applied equally in different regions of the country. The analysis shows that income gaps between the most and poorest municipalities have remained stable and income mobility between municipalities is low. Both the dynamic panel models and Markov matrices used in the research confirm the stickiness of incomes, i.e. that the income position of municipalities is largely dependent on the income position in previous years. Although income has increased significantly at the national level, regional differences persist. The capital and the western regions continue to have higher incomes, while the rest of the country has seen less of an increase. Analysis shows that income mobility between municipalities is low. Municipalities in the low and high-income categories are more likely to maintain their position, suggesting that regional economic disparities are persistent. The results of the dynamic panel models suggest that municipal incomes are highly sticky, implying that the income position of a municipality depends almost entirely on the income position in previous years. This can be particularly problematic for low-income municipalities, as it is difficult for them to break out of this situation. Research has shown that proximity to the

capital and large cities has a positive effect on the incomes of municipalities. Increasing distance from Budapest and other large cities reduces the income level of municipalities. The presence of sole proprietorships increases, while the presence of partnerships decreases the income of municipalities. An increase in the number of job seekers naturally reduces income levels, while changes in the working-age population do not show a significant effect.

To reduce income inequalities, targeted support should be provided to low-income municipalities, including infrastructure improvements, and education and business development programmes. It is important to launch labour market and entrepreneurial training, as well as transport and digital infrastructure development to improve access to economic centres. Support for research and development and agricultural modernisation can also help to diversify and grow the local economy. Social measures such as affordable housing programmes and strengthening social safety nets, as well as tourism development, are also important for the economic development of regions. These actions can increase municipal income mobility and regional development.

Among the limitations of the present research, it is important to note that our models are subject to the possibility of omitted variable bias. All relevant variables that are available at the municipal level for each year have been included in the models, however, there may be other relevant factors that affect income persistence (e.g. informal economic activities, regional policies and specific local economic shocks), for which statistical data are not available. Therefore, other possible dynamic relationships and causal links may remain hidden. A further problem is that data on a very important variable, educational attainment at the level of the municipality, are only available at 10-year periods (from the census data) instead of annual data, which does not allow us to include this variable in our panel models.

Based on the results of the research, it would be important to further investigate the development of regional economic policies and strategies to reduce income inequalities between municipalities and increase economic mobility.

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MAPPING THE SCHOLARLY LANDSCAPE: A BIBLIOMETRIC ANALYSIS OF RESEARCH ON KENYA'S DAIRY SECTOR AND ITS ALIGNMENT WITH SUSTAINABLE DEVELOPMENT GOAL

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ABSTRACT

Kenya is an agriculture-based economy and dairy farming is a major contributor to the national revenue. As production intensifies, the negative effect on the climate becomes more evident. Therefore, there is a need to align production with sustainable development goals. This study conducts a comprehensive bibliometric analysis to map the scholarly research landscape on Kenya's dairy sector and its alignment with the Sustainable Development Goals (SDGs). The 33 studies published from 2015 were obtained from the SCOPUS and analysed using R (Bibliometrix package) and VoS Viewer (1.6.19). The research established that since the enactment and ratification of the SDGs, there has been a marked increase in research on dairy farming sustainability in Kenya, though with significant yearly variations. Further, the study noted the predominance of small-scale dairy farming in Kenya, where the focus has traditionally been on increasing milk production, often at the expense of sustainable practices. Agriculture and sustainable intensification are the central themes reflecting efforts to balance increased food production and long-term sustainability, particularly in the face of climate change impacts such as droughts and heavy rainfall. The study underscores the critical role of both global and local collaborations in advancing research and addressing the sustainability challenges in Kenya's dairy sector. The findings advocate for a multidisciplinary research approach to achieve a balanced emphasis on productivity and environmental sustainability, ensuring the sector's alignment with the SDGs for long-term growth and resilience.

Keywords: Kenya, Dairy farming, Sustainable Development Goals (SDGs), Agricultural intensification, Climate change.

INTRODUCTION

Kenya's dairy sector is pivotal in the country's economy, contributing significantly to livelihoods and food security. It employs a substantial portion of the population, particularly in rural areas, and provides an essential source of nutrition through the production of milk and dairy products (*Otieno*, 2021). However, the dairy industry in Kenya faces numerous challenges, including low productivity, limited access to

markets, and environmental concerns, which hinder its potential for sustainable development (*Otieno et al.*, 2020). The United Nations Sustainable Development Goals (SDGs) provide a comprehensive framework for addressing these challenges and promoting sustainable practices within the dairy sector.

Significance of the Dairy Sector in Kenya

The dairy sector is a vital component of Kenya's economy- contributes approximately 14% to the agricultural gross domestic product (GDP) and 6% to the overall GDP (*Otieno et al.*, 2020). It employs over 1.8 million people directly and supports the livelihoods of numerous households through milk production, processing, and marketing activities (*Kenya Dairy Board*, 2024). Additionally, dairy products are a crucial source of protein and essential nutrients, playing a significant role in addressing food and nutritional security in the country (*Augustin et al.*, 2016). However, the sector faces various challenges, including low productivity, limited access to markets, and environmental concerns (*Tricarico et al.*, 2020). Besides, low milk yields, poor animal husbandry practices, and inadequate access to quality inputs and extension services contribute to low productivity (*Maindi et al.*, 2020). Limited infrastructure and inefficient marketing channels hinder farmers' ability to access lucrative markets, resulting in low returns and potential wastage of dairy products (*Nyokabi et al.*, 2021). Environmental concerns, such as greenhouse gas emissions, water pollution, and land degradation, also pose threats to the sustainability of dairy farming (*Munidasa et al.*, 2021).

The SDGs and Sustainable Dairy Development

The SDGs, adopted by the United Nations in 2015, provide a comprehensive framework for addressing the challenges faced by the dairy sector in Kenya and promoting sustainable development practices. By aligning efforts with the relevant SDGs, stakeholders can work towards poverty reduction, improved food security, gender equality, decent work opportunities, and environmental conservation (*United Nations*, 2015). On SDG 1: No poverty, dairy farming has the potential to contribute to poverty reduction in Kenya by providing a reliable source of income for smallholder farmers and rural communities (*Basu & Galiè*, 2021). Efforts to improve productivity, market access, and value addition can increase the profitability of dairy enterprises, thereby enabling farmers to escape the poverty trap (*Eldridge et al.*, 2022). SDG 2: Zero hunger, dairy products are a valuable source of protein and essential nutrients, contributing to food and nutritional security (*Górska-Warsewicz et al.*, 2019). Enhancing the availability and affordability of dairy products can play a crucial role in combating hunger and malnutrition, particularly among vulnerable populations (*Makoni et al.*, 2014). SDG 3: Good health and well-being. The consumption of dairy products has been linked to improved health outcomes, such as reduced risk of chronic diseases and better nutritional status (*Wangu et al.*, 2021). However, ensuring food safety and quality control throughout the dairy value chain is essential to prevent foodborne illnesses and promote good health (*Rozenberg et al.*, 2016). SDG 4:

Gender Equality. Women play a significant role in dairy farming activities, but often face gender-based discrimination and limited access to resources and decision-making processes (*Bullock & Crane*, 2021). Promoting gender equality in the dairy sector by empowering women through education, access to credit, and leadership roles can contribute to improved livelihoods and sustainable development.

Achieving sustainable development in Kenya's dairy sector requires a collaborative effort among various stakeholders, including policymakers, farmers, processors, researchers, and civil society organizations. The dairy industry contributes largely to the sustainable development of Kenya and improvement of livelihoods of those involved in the sector (*Lelea et al*., 2023). This study maps the intellectual structure of the dairy sector in Kenya and its alignment to the sustainable development goals by addressing the following research questions:

RQ1: What are the publication trends in Kenya's dairy sector and its alignment with the sustainable development goals?

RQ2: What are the most prolific scholars, articles, journals, and countries contributing to Kenya's dairy sector and its alignment with the sustainable development goals?

RQ3: What are the future research directions?

This study is organized into five sections to address the aforementioned research questions. The first section provides a background to Kenya's dairy sector and its alignment with the sustainable development goal. The second section explains the materials and methods used in the study, the third section presents the findings, the fourth section discusses the findings, and the fifth section draws conclusions from the findings and provides recommendations for further studies.

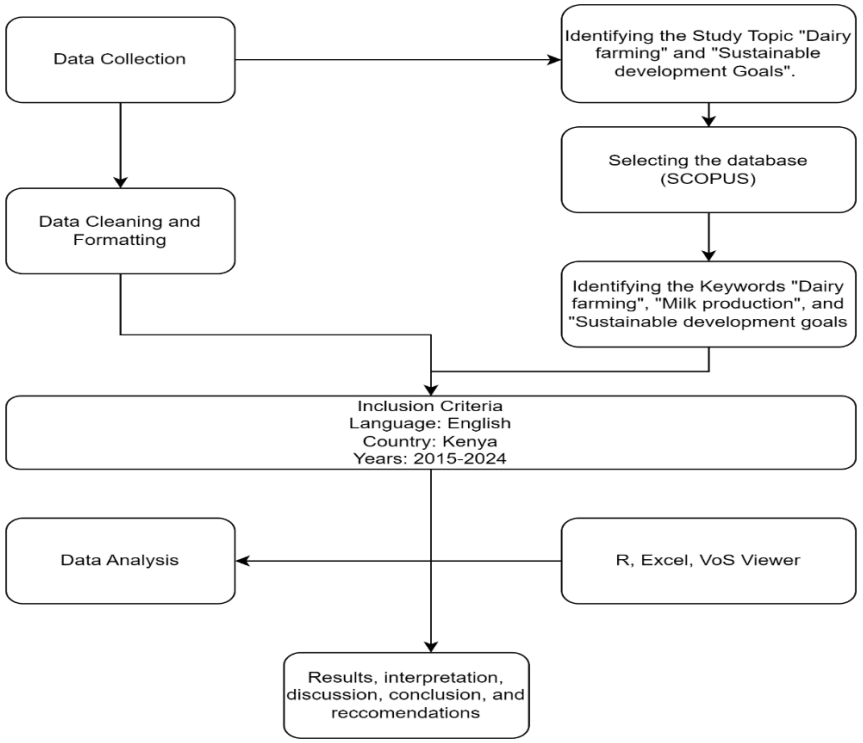
MATERIALS AND METHODS

The studies were drawn from SCOPUS, which is the most widely used and reliable source of scientific information in social and economic science. The R, MS Excel, and VoS Viewer were used to analyse the data. The search string combining multiple keywords was used as shown below.

```
( TITLE-ABS-KEY ( ( "dairy sector" OR "dairy industry" OR "milk
production" OR "livestock farming" ) ) AND TITLE-ABS-KEY ( (
"sustainability" OR "sustainable development goals" OR "SDGs" ) ) )
AND PUBYEAR > 2015 AND PUBYEAR > 2015 AND PUBYEAR < 2025 AND ( LIMIT-
TO ( SRCTYPE , "j" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) AND
( LIMIT-TO ( AFFILCOUNTRY , "Kenya" ) ).
```

The articles were limited to Kenya and between 2015 and 2024 since only studies published post 2014 when the sustainable development goals were ratified have been considered. Besides, only articles written in English were analysed. The search methodology is shown in *Figure 1*.

Figure 1. The Search Methodology



Following the search methodology in *Figure 1*, the results are shown in *Table 1*.

Table 1. The Search Results

Article	28
Reviews	4
Editorials	1
Total	33
Exclude Editorials (Total)	32

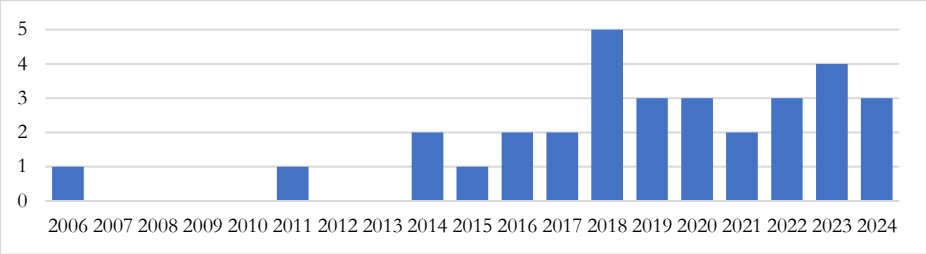
RESULTS AND DISCUSSIONS

This section highlights the findings from the analysis. It shows the publication trends, most prolific sources, articles, authors, and countries. Besides, it contains the bibliometric coupling of key words, authors, and countries.

Annual Scientific Production

The research sought to examine the annual scientific production in dairy farming sustainability in Kenya. The results are shown in *Figure 2*.

Figure 2. Annual Scientific Production (number)

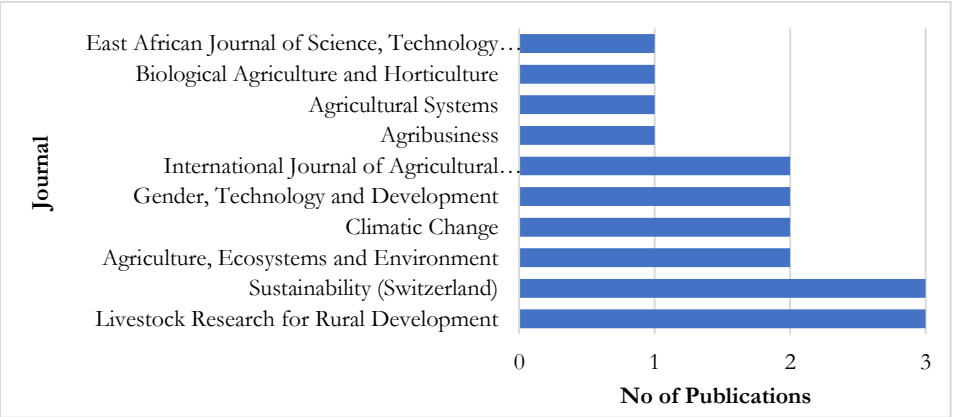


Since the enactment and ratification of the sustainable development goals, the number of studies on dairy farming sustainability in Kenya has increased over time. Nonetheless, there is variation over time. From 2006 to 2017, the number of studies ranged from 0 to 2. No study was undertaken in half of the years between the period. Nonetheless, there was a rapid rise in studies from 2018. In 2018, five studies were recorded, which is the largest number of publications in a single year recorded during the period under study. The publications reduced in the subsequent years, for instance 2019, 2020, 2022, and 2024, there were 3 publications, while in 2021 and 2023, 2 studies and 4 respectively. The findings demonstrate a rise in interest in sustainability in the dairy sector in Kenya. Nonetheless, there have been constant variations, which show that more studies are required to be done in the dairy sector and its alignment with sustainable development goals. Kenya's dairy sector is largely small scale where individual households own few animals for milk production. Therefore, less focus is given to sustainable development in the sector.

Most Relevant Sources

The study further examined the most relevant sources based on the number of articles published per annum. The results are shown in *Figure 3*.

Figure 3. Most Relevant Sources



The most relevant sources were examined to identify journals with the most publications in Kenya's dairy sector sustainability. The Livestock Research for Rural Development and Sustainability Journal had the most publication with three articles each. On the other hand, Agriculture, Ecosystems, and Environment, Climate Change, Gender Technology and Development, and International Journal of Agricultural Sustainability had the second greatest number of articles with two publications each. Lastly, the Agribusiness, Agricultural Systems, Biological Agriculture and Horticulture, and East African Journal of Science Technology had the least number of articles, one. These findings show that the sustainable development goals in Kenya's dairy sector have been studied across different scholarly areas and disciplines. However, agriculture and sustainability journals are the most predominant sources exploring sustainability development in Kenya's dairy sector.

Sources Local Impact

The study further explored the local impact of journals using H index. The H index is a widely used measure of scientific output of a research journal or author. The *table 2* shows the H index of the top ten journals that have published studies on Kenya's dairy sector and sustainable development goals.

Table 2. Sources Local Impact

Element	H_Index
Livestock Research for Rural Development	3
Agriculture, Ecosystems and Environment	2
Climatic Change	2
Gender, Technology and Development	2
International Journal of Agricultural Sustainability	2
Sustainability (Switzerland)	2
Agribusiness	1
Agricultural Systems	1
Biological Agriculture and Horticulture	1

The journal of Livestock Research for Rural development has the highest H index (3). Moreover, the Agriculture, Ecosystems and Environment, Climate Change, Gender, Technology and Development, International Journal of Agricultural Sustainability, and Sustainability Journal have the second largest H index (2). The rest have an H index of 1. These findings imply that the articles on sustainable development of the dairy sector in Kenya that are published in the top ten sources have at least a single citation. It is worth noting that sources that appeared among the top 10 in *Figure 3* have not appeared in the similar rank in sources local impact. Therefore, the impact of a research journal in each area of study is effectively measured by the H index, as it measures both the impact and quantity of a scientific output.

Author Impact

The study further examined the impact of the author relative to their citations and H index. The results are shown in *Table 3* and *Table 4*.

Table 3. Author Impact

Element	H_Index
Rufino Mc	4
Baltenweck I	3
Brandt P	2
De Neergaard A	2
Franzel S	2
Herold M	2
Kiptot E	2
Montcho M	2
Oelofse M	2
Omondi I	2

Rufino has the highest H index score,4, followed by Baltenweck with an index of 3. The rest have an H index of 2. The scores imply that the top ten authors on sustainable development goals and the dairy sector in Kenya have an H index that is more than 2. This infers that 2 of their papers have at least two citations. A further review of their publications shows that they are drawn from different research specializations, such as climate change, livestock production, agricultural economics, and sustainability. Therefore, exploring sustainable development goals in Kenya's dairy sector requires a multidisciplinary approach and collaboration between scholars from varying areas of study.

Most Cited Sources

Table 4 shows the most cited sources, total citations, and total citation per year. Herrero (2014) has the most total citations, 95 and total citation per year of 8.64. Alvarez (2014) has 46 total citations and 4.18 total citations per year followed by Ranjitkar (2020) with 35 total citations and 7.00 total citations per year. The top three most cited sources have more than 35 total citations. However, the total citations per year vary because it is the average number of citations computed by dividing total citations by the number of years the author has been publishing papers. Authors with more years may have lesser total citations per year, while those with less years but have more citations have a high total citation per year. The high citation shows that sustainability in Kenya's dairy sector is under consideration, and it is drawing scholarly interest as the world grapples with the effect of climate change, which has largely impacted sub-Saharan Africa.

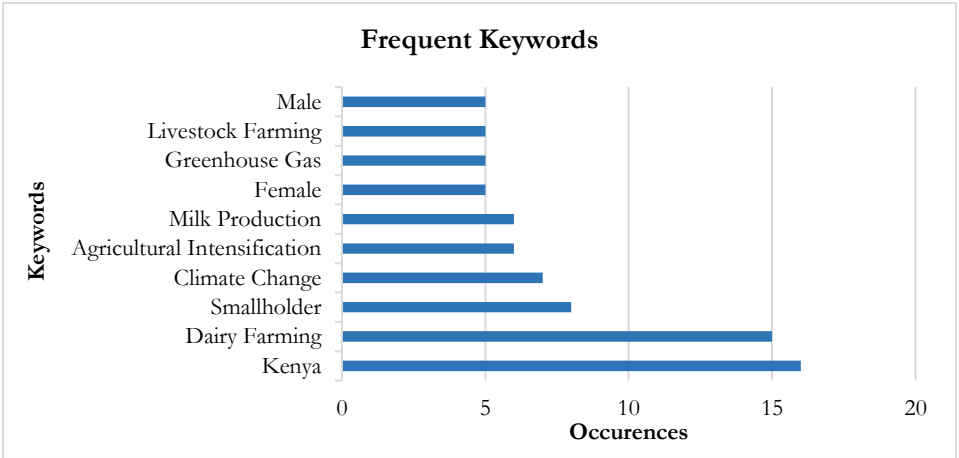
Table 4. Most Cited Sources

Paper	TC	Tc/Year	Findings
Herrero M, 2014, Global Environ Change	95	8.64	Dairy expansion in Kenya is viable when land is abundant
Alvarez S, 2014, Agric Syst	46	4.18	Dairy productivity can be enhanced by use of concentrate feeds and improving manure management practices.
Ranjitkar S, 2020, Clim Change	35	7.00	Heat stress induced by climate change affects milk production
Ortiz-Gonzalo D, 2017, Agric Ecosyst Environ	31	3.88	Diversification and better commercialization can improve the productivity of small dairy farms.
Wetende E, 2018, Environ Dev	28	4.00	Facilitating easy access to technology on climate change can enhance dairy productivity and climate adaptation.
Brandt P, 2018, Agric Ecosyst Environ	25	3.57	Intensifying small holder dairy farming sustainably reduces forest disturbance.
Kiptot E, 2016, Int J Agric Sustainability	23	2.56	Adopting volunteer farmer trainer approach helps in disseminating livestock feed innovations
Omondi I, 2017, Agribusiness	23	2.88	Incorporating technology cuts cost, enhances innovativeness, and creates a broader competitors' line.
Ortiz-Gonzalo D, 2018, Sci Total Environ	22	3.14	Greenhouse gases emission remained low despite intensification in zero grazing.
Brandt P, 2020, Global Change Biol	20	4.00	Improving the quality of dairy feeds can have climate change mitigation

Most Relevant Keyword

The study examined the keywords to identify scholars' areas of interest and trends in sustainable development and dairy sector in Kenya. The results are shown in *Figure 4*.

Figure 4. The Most Relevant Keyword



The top ten most relevant keywords from the analysis are Kenya, dairy farming, smallholder, climate change, agricultural production, milk production, female, greenhouse gas, livestock farming, and male. Kenya and dairy farming are predominant because the study focuses on dairy farming in Kenya and its relationship with sustainable development goals. Small holder appears in the list since Kenya's dairy sector is mainly small scale and practiced in the rural region. Moreover, climate change is a critical subject associated with sustainable development goals.

Climate change has adversely impacted sub-Saharan Africa and scientists' interest has been drawn to identify mitigation and adaptation strategies. Agricultural and milk production are related to Kenya's focus to increase agricultural production in rural areas and address poverty as stipulated in the country's Vision 2030. As the production rises, the negative consequences of growth, such as greenhouse gases emission, land dereliction, climate change among others are likely to increase, which explains the appearance of greenhouse gases among the top ten most relevant keywords from the analyzed studies. The ownership of income generating projects at household level in developing countries has been a subject of discussion among scholars. The male and female ownership of key economic resources and its impact on household productivity and poverty is widely examined to identify possible approaches to address poverty. Since milk production is a common source of livelihood in rural areas, which are predominantly poor and patriarchal, the ownership of dairy animals and control of economic benefits varies between women and men in a family set up.

Co-authorship

The study analyzed co-authorship to examine the collaborative relationship between authors who have worked together on research publications, which provides insight into the structure of scientific collaboration, understand the dynamics of research networks in dairy farming and sustainability in Kenya, and identify influential research. *Figure 6* shows co-authorship from the analysis of Kenya's dairy sector relative to sustainable development goals.

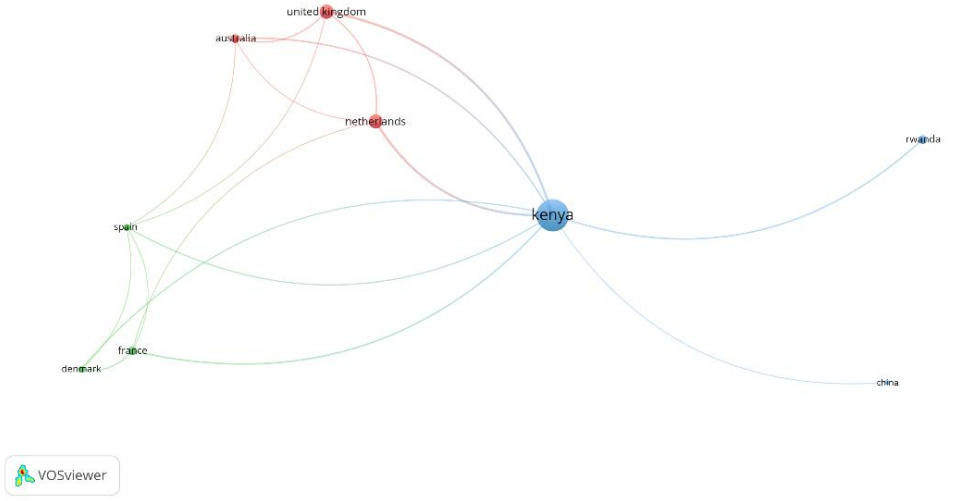
The result shows multiple co-authorship between scholars in dairy sector and sustainable development goals in Kenya. The key researchers are Brandt and Herold, who have co-authored multiple publications in dairy sector and sustainable development in Kenya. Brandt has co-authored numerous publications with Yesuf, Herold, and Hamunyela. Other co-authors are Herrero and Thornton, Ortiz and Vaast, Kiptot and Franz, Alvarez and Rufino, and Omondi and Karimov. Notably, only three scholars are Kenyans, but they have co-authored with scholars from other countries. Therefore, while global research collaboration is essential in a research area, local collaborations are equally important to address sustainable shortcomings in dairy sector in Kenya. The limited scholarly works in dairy sector and local collaboration shows Kenya's lower research output in the sector. Consequently, there is a need to scientifically examine problems and opportunities in the dairy sector in relation to sustainable development goals to achieve sustainable long-term growth in the dairy sector.

Figure 6. Co-authorship

Bibliographic Coupling of Countries

The study further examined the bibliographic coupling of countries to analyze and visualize the relationship between countries based on their citation networks and scholarly publications. The results are shown in *Figure 7*.

Figure 7. Bibliographic Coupling of Countries



The results show that Kenya is central in the network and leading in research on dairy sector and sustainable development goals. Other countries in the network are Netherlands and United Kingdom. They are the leading countries in the research

on Kenya's dairy sector and sustainable development. This is evidenced by long-term collaboration between Kenya, United Kingdom, and the Netherlands. Other countries in the periphery are Spain, France, Denmark, China, and Rwanda. Kenya and Rwanda are within East Africa and the only countries in Africa that authors have collaborated as shown in *Figure 7*.

CONCLUSIONS

Since the enactment and ratification of the Sustainable Development Goals (SDGs), the number of studies on dairy farming sustainability in Kenya has shown a marked increase over time, albeit with significant variations. This trend demonstrates a growing interest in sustainability within Kenya's dairy sector, though the consistent variations indicate a need for more focused and sustained research to align the sector with the SDGs.

Kenya's dairy sector is predominantly small-scale, with individual households typically owning a few animals for milk production. The examination of relevant sources reveals that the SDGs related to Kenya's dairy sector have been explored across various scholarly disciplines, with agriculture and sustainability journals being the predominant sources. Notably, the top researchers in this field, such as Rufino with an H-index of 4, and Baltenweck with an H-index of 3, come from diverse research backgrounds including climate change, livestock production, agricultural economics, and sustainability, highlighting the multidisciplinary nature of research required to address sustainability in Kenya's dairy sector. While there is a rising trend in research focusing on sustainability in Kenya's dairy sector, the variation in the number of studies over the years and the predominant focus on production underscore the need for a more balanced and sustained research effort.

The analysis reveals a close interconnection between dairy farming, smallholder livestock management, and sustainability, indicating their frequent co-occurrence in the literature on Kenya's dairy farming sector. Agricultural intensification, including both traditional and sustainable approaches, emerges as a central theme within the research, reflecting a dual focus on increasing food production and ensuring long-term sustainability.

The co-authorship analysis offers insights into the collaborative dynamics among researchers focusing on Kenya's dairy sector and its alignment with SDGs. Key researchers such as Brandt, Herold, Herrero, Thornton and others have formed significant collaborative networks, indicating a strong foundation of scholarly partnerships. Further analysis of bibliographic coupling illustrates Kenya's central role in the research network on dairy farming and sustainable development goals, with significant contributions from the Netherlands and the United Kingdom. This long-term collaboration underscores the importance of international partnerships in advancing research. These findings highlight the critical role of both global and local collaborations in enhancing the research landscape and addressing the sustainability challenges of Kenya's dairy sector.

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THE IMPACT OF FOREIGN EMPLOYMENT IN SZEKLERLAND IN THE EARLY 2020'S

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ABSTRACT

In the course of the research, the effects of foreign guest work, both in the narrower and broader sense, in Csíkszentkirály and its surroundings are investigated. The subject is very topical and of great importance today, but despite this, little information is available. This phenomenon has grown into a rapidly developing and important industry with a very significant impact on the population, which is why we believe it is important to record, monitor and analyse data on it. The reasons for going abroad are mostly economic, with the main objective being to earn as much income as possible. However, we suspect (and this is confirmed in the paper) that labour migration abroad has a significant and often surprising economic, emotional and social impact on the daily life of an individual, a family or a community. This impact may be direct or even indirect, but it affects the financial, emotional, social and community situation of an individual or community. It was also essential to examine whether working abroad is, in fact, essential to achieving a decent standard of living. After examining the results, it seems that, although not easy and much more challenging, working at home can help achieve these goals, but going abroad offers a much simpler, shorter and more spectacular result.
Keywords: Szeklerland, employment, foreign employment

INTRODUCTION

Foreign guest work is a very common phenomenon these days. It is not just a matter of word of mouth, but is now a reality in our immediate surroundings. The aim of this research is to analyse the narrow and broader topic of foreign employment in the region of Csíkszereda (Miercurea Ciuc). The chosen subject is very topical nowadays, not only at the level of larger geographical areas but also at the level of smaller regions. However, there is very little research and information available regarding its importance. Based on the experience gained so far, outbound labour transport in Romania is slowly becoming a separate industry, which is developing and expanding very rapidly. As a result, its impact on the population of the region is becoming more and more significant, which is why it is essential to monitor, analyse and present data on it to society. Accurate national data on foreign employment in Romania are not available, so a comparative analysis could not be made. In the absence of a national policy on the

repatriation of young people working abroad, Harghita County has launched its own programme, the results of which will be evaluated in the long term.

Working abroad has important financial implications at the personal, family, municipal or even national level. In addition to its economic effects, undertaking guest work plays a very important role in shaping the general life, everyday experiences and emotions of an individual, a family or even a small community. It also has a major impact on how a person, whether emigrating or staying at home, relates to others and on his or her self-image and worldview; thus, it has a very important psychological impact that is not given enough attention. Based on the above, the following hypothesis has been formulated:

The question examined in this study is the extent to which working abroad is useful for achieving a decent standard of living and achieving the goals set.

Description of migration in Romania and Szeklerland

Nearly 45% of the Romanian population lives in rural areas, but we know that this group has a higher proportion of foreign workers, as it is harder to find decent paying jobs in these areas. There are fewer opportunities and often in remote settlements where living conditions are much lower (*Worldometer*, n.d.). Foreign guest workers and migration have become a phenomenon not only in our own country but also in Europe and the world, with a significant impact on the labour market (*Castles*, 2010). Migrant workers can be broadly divided into two distinct categories: skilled and unskilled workers, whose placement poses a challenge to the labour market of the host countries (*Oso et al.*, 2022).

Migration is a form of population movement, which may result from individual or (small) group decision-making and is mainly economic in nature, driven by wage inequalities between countries, as it is more advantageous to receive a higher income for the same work done (*Marques & Góis*, 2017). In the case of seasonal foreign guest workers, expatriates do not want to integrate into the host society; they behave as strangers, treating it as a temporary situation. They typically maintain a low standard of living with a low budget, as their focus is on making a profit and bringing home as much as possible (*Péter*, 2013).

Society is ageing, the active population is declining, but the proportion of pensioners in need of support is rising, creating a very serious economic problem, to which the permanent or temporary emigration of the active population abroad is a major contributory factor. Romania is primarily a labour-supplier country for the European Union, providing a cheap source of labour for more developed host countries, which is advantageous for them. For Romania, however, this is a disadvantage due to the high costs of educating and training the workforce and the lost benefits of guest workers (*Szabó & Barna*, 2023).

The most popular destinations for Romanian residents have changed over time, with Germany, the CEA, Austria and Hungary being the most popular in the early 1990s, followed by Canada and Italy in the early 2000s, and Spain in 2010. In the 2020s, more developed countries in the West (such as Germany, Austria, Switzerland, France, Spain and Italy), the Scandinavian region (Sweden), Canada and the AEOA overseas have become the most popular destinations for Romanian citizens (*Apostoaie et al.*, 2015).

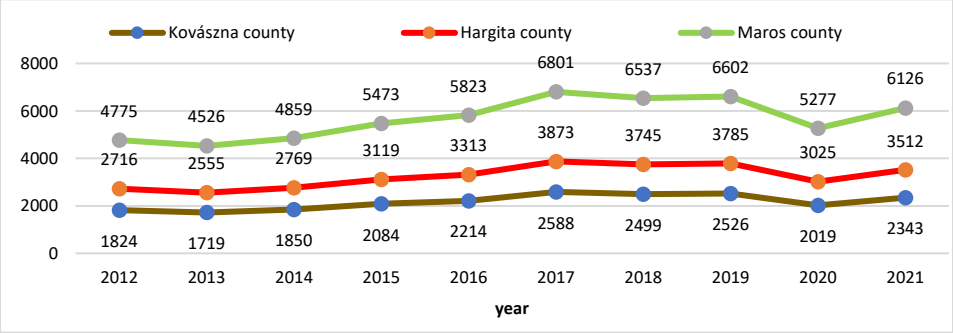
Nowadays, Hungary is not such a popular destination, as its opportunities are not much greater than those of Romania; mostly members of the Hungarian minority prefer to choose this countrydue to their knowledge of the language. (*Szabó & Barna*, 2023). According to the researchers, the emigration wave changes its trend, sometimes intensifying and sometimes slackening. Unsurprisingly, young people who are about to start a family always play the biggest role in the increase, as they are the ones who need the large financial resources and experience to start an independent life (*Castles et al.*, 2015). In the absence of a job, parents also take to the road, leaving children behind, which often results in broken families. For the first time, one parent is solely responsible for the financial security of the family. The resulting situation can sometimes become difficult to manage, leading to a broken family. If the money sent home is not sufficient, the spouse left at home may also go abroad to seek work (*Sandu*, 2010). The children are then left in the care of relatives (*Bulgaru*, 2020).

Foreign guest work has been present in Szeklerland for more than 150 years, meaning that the Szekler society has been an emitting society for a century and a half (*Bálint*, 2017, p. 1), but this is not reflected in the change in population numbers, as natural increase is the cause of emigration. „People leave because the area is poor, there are no jobs, there is nothing to do." This claim is considered by many to be the basis for the migration wave from Szeklerland, which is true but not always verifiable. Nowadays, experimentation also plays a role, pushing our own boundaries and finding the right place for permanent settlement (*Bodó*, 2008, p. 18).

The migration of Szekler migrants is a „floating migration", meaning that the guest worker leaves the question open for a long time as to whether they will settle permanently or return home, often changing their place of residence abroad (*Bálint*, 2017). They constantly weigh up the opportunities offered by the two countries, considering the standard of living and the consequences. Initially, the main objective was not to improve individual and family living standards, but rather to maintain social status and reputation in the community and to acquire the necessary assets. In the last century, families supported themselves through agriculture and had to provide the best conditions for this. However, as time went by, agriculture was replaced by industrialisation, and they had to keep pace with progress in order to make a living. As a result, new goals were formulated, which further increased the amount of guest work in Szeklerland. The region is essentially rural, with most of the population living in the countryside or in small towns, as there are no large cities in Szeklerland. There are many settlements that are isolated from the world and difficult to reach. For the vast majority of those who emigrate from here, the only livelihood is to work abroad as guest workers, as there are no jobs locally.

As shown in *Figure 1*, the number of emigrants (temporary and permanent) in all three counties of Szeklerland has changed in almost the same way over the years. For example, if the number of emigrants increased in Harghita County in a given year, the number of emigrants increased in similar proportions in Covasna and Maros Counties. Fortunately, in all three counties, the number of persons who emigrated only temporarily is much higher than the number of those who settled permanently in the host country.

Figure 1: Trends in the number of temporary emigrants from the three Szekler counties over the years



Source: Based on *Institutul Naţional de Statistică* (n.d.)

The data show that a higher proportion of men from Szeklerland are willing to migrate, while women are more willing to accept and integrate into a foreign environment, often transferring the knowledge and experience they have acquired back to their home country (*Bodó*, 2008, p. 31).

In terms of the type of work undertaken abroad, the vast majority are engaged in physical labour, agriculture, service provision and construction (*Bodó*, 2009, p. 131). In Szeklerland, labour migration is moving towards transnationalisation and has become a new way of life. Unfortunately, the rigidity and underdevelopment of the region cannot be solved by labour migration alone, but it does bring about very significant developments at the family level (*Biró & Bodó*, 2016, p. 52).

MATERIALS AND METHODS

The research was based on an online questionnaire with a total of 46 questions. In the Googe Forms survey, there were self-response questions and multiple-choice questions where one or more options could be selected. Additionally, some questions were formulated using Likert scales. The most important criterion for the research was that it be completed by people who were from or had settled in Csíkszentkirály, or possibly from the surrounding area. It was essential to reach all age groups, so the snowball method was used. We began by targeting people who had already participated in foreign work experiences and were from different age groups. For better readability and accuracy of the questionnaires, local currency is used. Since the start of the research, 1 EUR has been approximately 5 RON (1 EUR ≈ 5 RON).

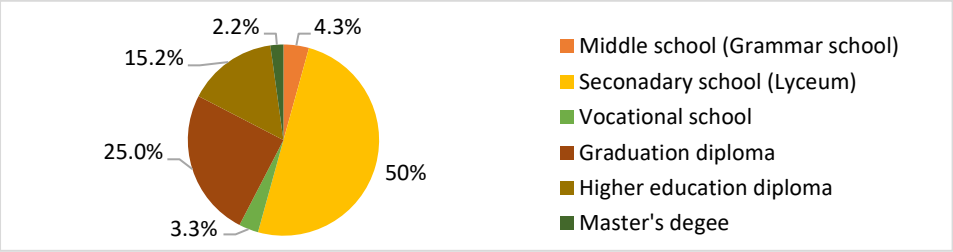
The questionnaire was available between 26 October 2022 and 26 January 2023, during which a total of 92 responses were recorded, forming the basis of the present research. The data sources obtained were processed by using the SPSS (Statistical Package for Social Science) program for quantitative data analysis (*Lázár*, 2022). Correlations, relationships and frequency analyses were carried out using the Frequencies and Crosstabs analysis methods available within the program. The location of the study is Csíkszentkirály, 7 km from Csíkszereda, as described above.

RESULTS AND DISCUSSION

By illustrating the results of the empirical research, the answers to the demographic questions provide a clearer overview of the sample's composition. Of those who completed the questionnaire, 86 persons, i.e. 93.50% of the respondents, indicated Csíkszentkirály as their current place of residence in Romania, while the remaining individuals, though originally from there, had moved away. Thus, all 92 responses collected could be used in the research. In terms of gender breakdown, 46.70% of the respondents were female, while the majority, 53.30%, identified as male.

Exactly half of the respondents had completed 12 grades, plus exactly 25.00% had a baccalaureate degree, with 3 individuals holding a vocational diploma. Only 17.40% of the survey respondents continued their education by completing some form of higher education, possibly a master's degree. The survey showed that only 4 out of 92 persons had not completed the compulsory 10 classes with the highest level of education being grade 8 (*Figure 2*).

Figure 2: Distribution of the sample by education



When asked why they did not find a job in their home country in the profession they had studied, the most frequent answer was that there were few jobs on the labour market, making it difficult to secure employment. If they did find a job by chance, the salary was so low that they could not support themselves or their families. In addition, they often cited the realisation that the profession they had learnt was not suitable for them, that they did not like it, or that the biggest problem was not necessarily the conditions at home but rather the urgent need for more money, which they could only obtain by temporarily moving away from their native land.

The number of those who emigrated at the age of 19-25 is particularly high, with the vast majority choosing to work abroad immediately after finishing their studies. This is further confirmed by the fact that more than 43.50% of respondents indicated that their pre-emigration activity was studying (school, university).

In most cases, family members or friends helped them to emigrate, but nearly 23% asked for the help of an intermediary agency and 11 people said that they did not have any help in finding a job and managed everything on their own. *Figure 3* shows the most frequent periods spent abroad for each age group. The longer the time spent abroad, the lower the proportion of younger age groups.

When examining the differences between the two genders, we found that both the expectations regarding salary and the amount earned were lower for women, i.e.

the proportion of women was higher at lower income levels, but as we moved towards higher amounts, the proportion of men increased in both cases (*Figure 4* and *Figure 5*).

Figure 3: Distribution of different age groups in the sample by time spent abroad

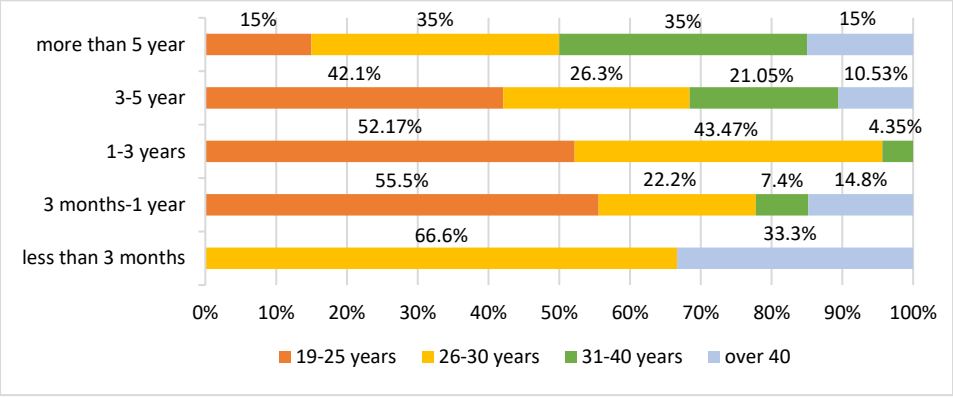


Figure 4: Gender distribution of respondents by desired monthly salary (in RON) before departure (1 EUR ≈ 5 RON)

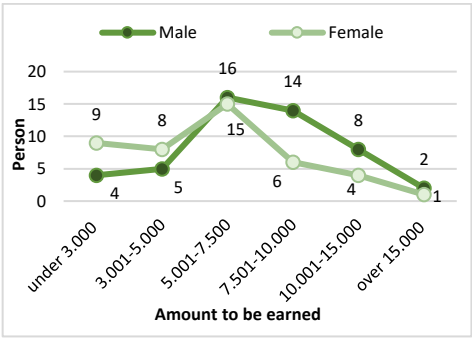
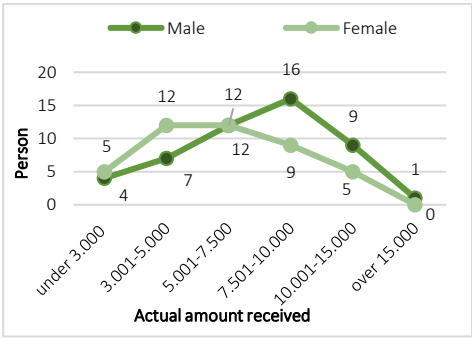


Figure 5: Gender distribution of respondents by the actual monthly salary (in RON) received after the trip (1 EUR ≈ 5 RON)

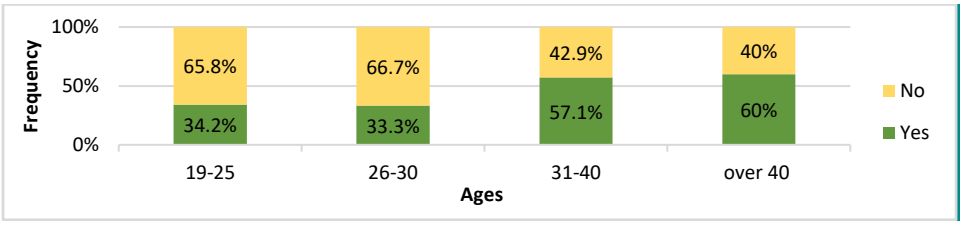


In most cases, the income expected when emigrating abroad was between 5 000 and 7 500 RON in 31 cases, but a large number of respondents also indicated a range of 7 500 to 10 000 RON. Surprisingly, 13 persons would have been satisfied with an amount between 1 000 and 3 000 RON, but there were also 3 persons who had high expectations and wanted to receive an average amount of over 15 000 RON per month. In contrast, only 1 person managed to achieve this amount and 9 persons actually received an average monthly salary of less than 3 000 RON. Most of them received between 5 000 and 7 500 (24 persons) and between 7 500 and 10 000 (25 persons) on average.

Among the jobs abroad, the most popular were jobs in agriculture, industry, services, construction and trade. Some people did intellectual work and worked in the transport industry, but no one engaged in the arts or volunteering during their time abroad. Unfortunately, starting their own business was not often mentioned as a main goal, or perhaps a more important goal, which is not due to a lack of entrepreneurial inclination, ideas or aptitude, but to the Romanian legislation, tax system and regulations. New businesses would be beneficial for the municipality because the taxes paid would increase the municipal budget. Working as a guest worker abroad has a huge impact on the life of a family, whether it involves one or more family members, such as a parent, grandparent, spouse or child. In addition to the emotional life of the family, the financial situation is also greatly affected.

Figure 6 shows that nearly 60.00% of respondents over 40 years old regularly send financial support to their family or close friends back home.

Figure 6: Percentage of different age groups who regularly support their family and close friends financially

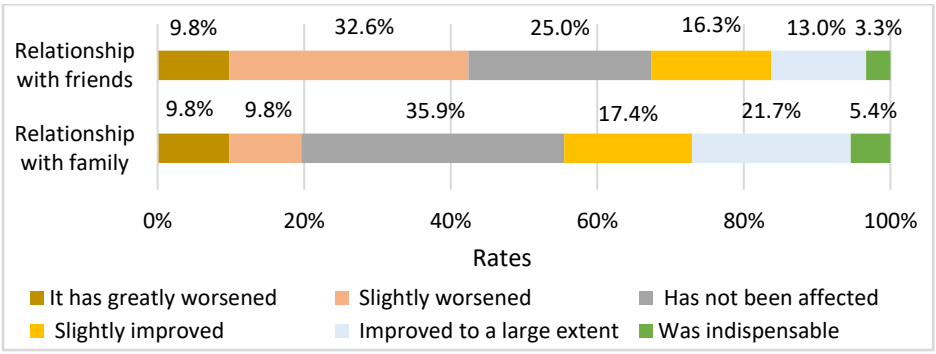


However, when broken down by age group, the higher the average age, the greater the proportion of respondents who regularly send financial support home.

It is not only family life that is affected by working abroad, but also social life. Often, this result is becoming isolated from their circle of friends, weakening their relationship with friends and family, missing out on many events and changing their social role at home. Yet, there are often attempts to reverse or at least slow down this process, and unfortunately, in many cases people use the opportunities offered by material wealth to do so. Some individuals also try to maintain or even elevate their 'position' within the municipality by offering various forms of support. In the present research, 35.90% of foreign migrant worker respondents support and 64.10% do not support their place of residence or religious denomination.

The negative effect rate for contact with family members is lower, but still close to 20%, which is quite high for the item in question (*Figure 7*). Unfortunately, the impact on the relationship with loved ones was not very positive, as it was found that for more than 40% of respondents, their relationship with friends had deteriorated to some extent. A quarter of the respondents felt that working as a foreign guest worker had not improved their relationships, and only in a third of cases did they see an improvement. However, in almost 40% of cases the relationship with the environment did not change, which is considered fortunate, and in over 27% of the sample, working abroad helped to improve the relationships with family members.

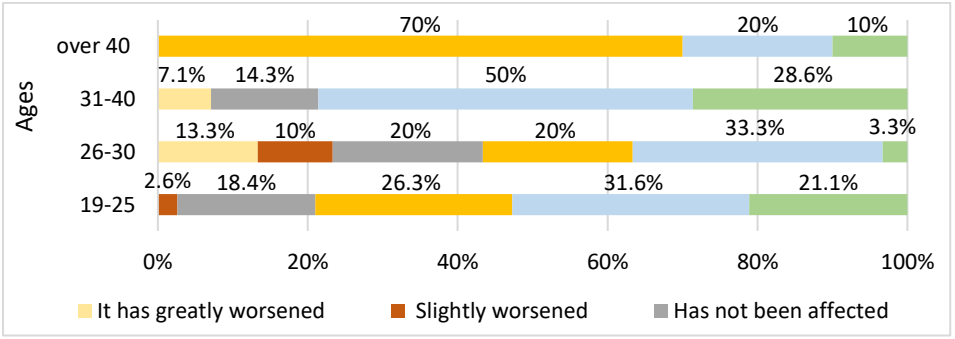
Figure 7: The impact of foreign guest work on the items listed



The negative effect rate for contact with family members is lower, but still close to 20%, which is quite high for the item in question (*Figure 7*). Unfortunately, the impact on the relationship with loved ones was not very positive, as it was found that for more than 40% of respondents, their relationship with friends had deteriorated to some extent. A quarter of the respondents felt that working as a foreign guest worker had not improved their relationships, and only in a third of cases did they see an improvement. However, in almost 40% of cases the relationship with the environment did not change, which is considered fortunate, and in over 27% of the sample, working abroad helped to improve the relationships with family members.

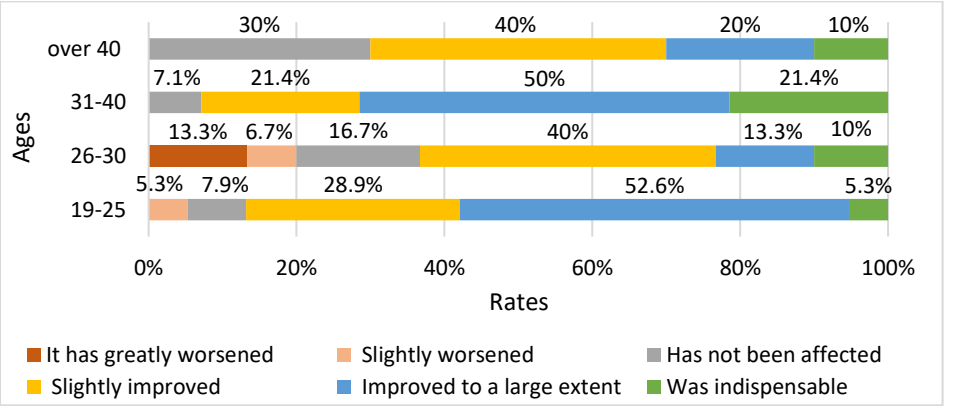
Two thirds of men say that their time abroad has had no or only a negative impact on their outlook on life, but for women, it is a completely different story, with nearly 90.00% saying that working abroad has had a positive impact on their outlook. Only a small proportion of 25-30 year olds were left with negative experiences in this area, while members of the other groups were left with positive memories to a lesser or greater extent and believe that working abroad helped shape their personalities by increasing their self-esteem (*Figure 8*).

Figure 8: To what extent and in what direction did working abroad influence attitudes towards life for different age groups



Looking at the change in wealth as a result of working abroad for different age groups (*Figure 9*), it can be seen that some of the youngest respondents had a decrease in wealth. However, in most cases, wealth increased, especially for those aged 30 and over.

Figure 9: To what extent and in what direction did working abroad affect the size of wealth for different age groups.



We conclude the presentation of the survey results with a description of the positive feedback from respondents. In the context of working abroad, the most frequent response centred on the material aspect, i.e. 'money', the increase in the standard of living achieved, and the creation of financial security. For many, the opportunity to learn a language, gain professional experience and achieve self-development was also a positive factor. However, many respondents simply noted that working abroad made it easier to achieve their goals.

CONCLUSIONS

Unfortunately, today we see that the population of the region has become quite impoverished due to various economic and political factors. Prices have risen but incomes have either remained the same or increased only slightly. As a result, it is becoming increasingly difficult or even impossible to achieve anything new, and even those who are able to maintain their current standard of living under these circumstances are fortunate to do so. However, it is fair to conclude from the responses received that, despite the many disadvantages of working abroad, it is a fruitful option More than 80% of people achieved their pre-departure goals and almost three quarters (73.9%) experienced an increase in their standard of living. While it may not be the best option, it is the only option for most people and families. It is particularly important to underline that this option is still mostly chosen by the younger generation. In most cases, the reason given is still economic, specifically to generate the income needed to start and maintain a family and to provide a decent

standard of living. Many people take a job abroad immediately after completing their studies, as this is the example they see from society.

Although the jobs abroad are often physically demanding, they still offer much better financial and working conditions than those in Romania.

The research showed that very few people spend the money they earn for purposes other than their personal and family needs. Only a small number of people extend their financial suppor to other causes, such as religious denominations or local communities. Another negative factor worth highlighting is the fact that working abroad often weakens or even breaks family and friendship bonds due to the distance. Even technological progress has not been able to eliminate this effect. Despite this, it is gratifying to see that all the hard work and sacrifices are paying off, as in most cases, the goals have been achieved or are closer to being achieved through working abroad.

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TRANSFORMATION OF SOUTH AFRICA'S TOWNSHIPS: TBL INITIATIVES AND THE FUTURE OF SOCIAL HOUSING

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ABSTRACT

This literature paper examines the dynamics of the „Transformation of South Africa's Townships: TBL Initiatives and the Future of Social Housing." Rooted in the historical echoes of apartheid, the examination extends to post-apartheid social housing activities, notably the Reconstruction Development Programme (RDP) initiated in 2004. At its core lies the incorporation of Triple Bottom Line (TBL) principles, emphasizing environmental, social, and economic sustainability. The study's objectives encompass evaluating TBL integration, measuring its impact on resident well-being, and dissecting associated challenges. Hypotheses suggest positive outcomes on resident quality of life, long-term sustainability, and resilience with TBL incorporation. The review traverses historical complexities, the transformative role of TBL, and a comparative analysis of global social housing initiatives, drawing insights from Singapore, Sweden, Brazil, and localized projects. Theoretical frameworks guiding TBL in social housing, coupled with practical case studies, shed light on the tangible application of these principles. In conclusion, the synthesis advocates for evidence-based policies, urging the holistic development of thriving, resilient communities in South African townships.
Keywords: social housing; Triple Bottom Line (TBL); township communities; spatial planning; sustainability

INTRODUCTION

Background of the study

South Africa's townships, which are a strong reminder of the country's Apartheid-era policies, have for a number of years reflected racial segregation, unjust spatial planning, and systemic inequality across the country. Historically marginalized and underserved, these urban settlements today continue to deal with overcrowding, poor infrastructure, and limited access to essential services (*Monteiro et al.*, 2024). The end of Apartheid in 1994 marked an important moment in South African history, signalling the nation's commitment to fostering a more equitable society.

One of the most pressing challenges faced by post-apartheid South Africa then is the urgent need to address urban housing disparities and provide dignified living conditions for its citizens, particularly those that live in townships.

In response to this challenge, the post-apartheid South African government initiated various social housing programs such as the Reconstruction Development

Programme (RDP) in 2004 which was aimed at transforming townships into vibrant and inclusive communities. This program seeks to bridge the gap between the legacy of apartheid in terms of unjust spatial planning and the vision of a more equitable society. This paper then takes the view that one of the aspects that are critical to the success of the initiative is the incorporation of Triple Bottom Line (TBL), which emphasizes a holistic approach to development by considering environmental, social, and economic sustainability (*Jürgens et al*., 2013).

Introduction to the Triple Bottom Line (TBL)

The Triple Bottom Line (TBL) framework is a concept in the field of sustainable development and business. The TBL approach goes beyond the often-conventional business focus on profits by advocating for a comprehensive evaluation of an organization's impact on three key dimensions: environmental, social, and economic (*Jürgens et al*., 2013). This paradigm shift has profound implications not only for corporate entities but also for governmental and community initiatives (*Massey,* 2020). It can thus be incorporated into the initiative aimed at addressing housing disparities and improving the living conditions of marginalized populations.

In the context of social housing within South African townships, the integration of TBL principles signifies a commitment to a more holistic and sustainable approach to development (*Moon*, 2007). This approach recognizes the connection of environmental health, social equity, and economic viability for residents and contractors, all of which are critical components of improving the lives of township residents.

Research Objectives

The primary objective of this article is to examine the role of Triple Bottom Line (TBL) initiatives in advancing social housing projects within South African townships. Specifically, this research seeks to:

1. Explore the extent to which TBL principles have been integrated into social housing projects.
2. Assess the impact of TBL-focused social housing initiatives on the well-being of township residents.
3. Analyse the challenges and opportunities associated with implementing TBL approaches in the context of social housing in South Africa.

Research Hypotheses

Based on the objectives outlined above, the following hypotheses are proposed:

- H1: Social housing projects that incorporate TBL principles will have a more positive impact on the quality of life for township residents.
- H2: TBL-focused social housing initiatives will demonstrate greater long-term sustainability and resilience.
- H3: Challenges related to policy implementation and resource allocation will be key barriers to the successful integration of TBL in South African social housing projects.

Research Rationale

The rationale behind this research comes from the impact that social housing and TBL initiatives can have on the lives of South Africa's township residents. While significant progress has been made in providing housing since 2004, the quality of housing and the broader living conditions within townships remain matters of concern. Integrating TBL principles into social housing projects therefore could offer a promising solution for addressing these concerns.

The environmental dimension of TBL emphasizes sustainable development and responsible natural resource management. This then aligns with the need to create housing solutions that are environmentally friendly and resilient in the face of climate change (*Moon*, 2007). The social dimension places an emphasis on community development, social inclusion, and empowerment, it fosters a sense of belonging and well-being among township residents (*European Commission*, n.d.). Lastly, the economic aspect underpins the importance of financial viability of projects and long-term economic benefits (*Slaper & Hall*, 2011).

LITERATURE REVIEW

Introduction to Literature Review

South Africa's townships are symbolic of a complex socio-historical narrative deeply rooted in the apartheid era. This literature review navigates the historical context, explores the transformative role of the Triple Bottom Line (TBL) approach in social housing, conducts a comparison of social housing initiatives globally and within South Africa, and also investigates into theories guiding TBL and social housing, and concludes by shaping the direction for future research and policy actions.

It is important to note that the historical context of South African townships reveals the enduring impacts of apartheid policies on spatial planning, socio-economic dynamics, and community well-being across the country (*Monteiro et al.*, 2024). This section will provide a comprehensive overview, integrating key historical events and their repercussions on the development and challenges of townships.

Historical Context of South African Townships

The apartheid era in South Africa, spanning from 1948 to the early 1990s, left a lasting mark on the country's urban landscape. Apartheid policies enforced racial segregation, leading to the establishment of townships as designated areas for non-white populations. These areas were characterized by inadequate infrastructure, limited access to resources, and restricted opportunities for socio-economic advancement (*Mayekiso*, 2023).

One helpful case study is the development of Soweto (Southwestern Townships) near Johannesburg. Established in the 1930s, Soweto became experienced grave racial segregation, with its residents enduring substandard living conditions and limited economic prospects. The Soweto Uprising in 1976, often identified as a fundamental moment in the struggle against apartheid, highlighted the deep-seated socio-economic grievances within these townships.

Post-apartheid, challenges persist within townships, including housing shortages, unemployment, and inadequate infrastructure, this is evident from a statement by (*Nzau & Trillo*, 2020) Where they mention case studies such as the ongoing struggles in Alexandra, a township in towards the north of Johannesburg and the transformation of District Six in Cape Town also still showcase the persistent socio-economic disparities and the need for comprehensive urban development strategies.

The Significance of the TBL Approach in Social Housing

The TBL approach, emphasizing social, economic, and environmental dimensions, has appeared as a transformative framework for addressing these intricate challenges of social housing in South African townships (*Jürgens et al.*, 2013). This section highlights the significance of TBL, providing case studies to illustrate its practical application and impact.

In the scope of social sustainability, the Orlando Ekhaya social housing project in Johannesburg stands out. By incorporating communal spaces, educational programs, and cultural initiatives, this project goes beyond providing shelter, fostering social cohesion and community well-being. This aligns with the TBL principle of recognizing housing as a catalyst for holistic community development (*Haqi,* 2016).

Economically, the Vulindlela Heights Housing Project in Pietermaritzburg demonstrates the TBL's emphasis on stimulating local economies and fostering job creation as labour intensive employment is at its core, employing local residents. This project integrates skills development programs, creating a pathway for residents to actively contribute to the local economy, thereby aligning with economic sustainability principles (*Hamilton & Clemens*, 1999).

Environmental sustainability is exemplified by the Lynedoch EcoVillage near Stellenbosch. This case study showcases how environmental considerations can be seamlessly integrated into social housing initiatives, promoting long-term ecological resilience within the community (*Haqi,* 2016)

In essence, the significance of the TBL approach lies in its ability to address the multifaceted challenges of social housing. By emphasizing the interconnectedness of social, economic, and environmental dimensions, TBL principles pave the way for transformative projects that go beyond conventional housing solutions, creating sustainable and thriving communities. The showcased case studies provide tangible evidence of the practical application and impact of TBL, underscoring its significance in shaping the future of social housing in South African townships and beyond the confines of the country.

Theories on the TBL and Social Housing

The application of TBL principles in social housing initiatives is reinforced by various theories emphasizing the interconnectedness of social, economic, and environmental sustainability. This section will delve into the theories guiding the TBL and their practical implications, citing specific examples.

The theory of social sustainability posits that housing should not only meet basic needs but also contribute to community well-being and social cohesion *(Haqi,* 2016).

The Orlando Ekhaya social housing project in Johannesburg is a practical manifestation of this theory, where housing is designed to be a focal point for community engagement, cultural enrichment, and inclusive development.

Economic theories within the TBL framework highlight the importance of creating housing solutions that stimulate local economies and foster job creation (*Hamilton & Clemens,* 1999). The Vulindlela Heights Housing Project in Pietermaritzburg serves as an exemplar, integrating economic components such as skills development programs to empower residents economically.

The theory of environmental sustainability within TBL emphasizes creating housing solutions that minimize ecological impact and promote long-term environmental resilience (*Haqi,* 2016). The Lynedoch EcoVillage case study where sustainable building methods and materials were employed showcases the practical integration of environmental sustainability, illustrating how social housing can contribute to a more sustainable and resilient urban environment.

Comparison Between Social Housing Initiatives in South Africa and the Global Community

A comparative analysis of social housing initiatives globally and within South Africa provides an understanding of diverse practices, challenges, and the transferability of strategies. This section further goes into more case studies, exploring initiatives in Singapore, Sweden, Brazil, and locally contextualized projects, such as the N2 Gateway Project in Cape Town (*Housing Development Agency*, 2021). The goal is to glean valuable insights that can inform more effective social housing strategies within South African townships and shed light on how the global stage has had an effect on the delivery of social housing, thus increasing this paper's readability by the international community.

1. Singapore's Housing and Development Board (HDB):

Overview: Singapore's HDB stands as a global benchmark for comprehensive urban planning integrated with social housing. Established in 1960, the HDB has played a pivotal role in transforming Singapore from a predominantly slum-ridden society to a nation with a high standard of living and well-designed public housing.

Key Features:

- Meticulous Planning: The success of HDB lies in meticulous planning, where housing is seamlessly integrated with amenities, transportation, and communal spaces.
- Mixed-Use Developments: HDB incorporates mixed-use developments, ensuring that housing estates are self-sufficient with schools, markets, and recreational facilities.
- Community Integration: The design promotes community integration, fostering a sense of belonging and shared responsibility among residents.

Applicability to South Africa:

While the socio-economic contexts differ significantly, key principles from the HDB model are transferable. The emphasis on comprehensive planning, mixed-use developments, and community integration aligns with the goals of sustainable urban development in South African townships.

2. Sweden's Million Homes Programme:

Overview: Sweden's Million Homes Programme, implemented in the 1960s and 1970s, aimed to address a severe housing shortage by constructing one million new homes. The program focused on both quantity and quality, with an emphasis on creating well-designed, functional, and affordable housing.

Key Features:

- Quantity and Quality: The Million Homes Programme prioritized the construction of a large number of homes without compromising on architectural and design quality.
- Social Mix: The program promoted a social mix by integrating different income groups within the same housing projects, fostering social cohesion.
- Inclusivity: Housing was considered a social right, emphasizing inclusivity and accessibility to housing for all citizens.

Applicability to South Africa:

The Million Homes Programme's emphasis on quantity, quality, and social inclusivity provides valuable lessons for South Africa. It highlights the importance of balancing scale with design excellence and fostering inclusivity in housing projects.

3. Brazil's Minha Casa Minha Vida:

Overview: Ministry of cities launched in 2009, is Brazil's largest housing program aimed at reducing the country's housing deficit. It involves partnerships between the government and private sector to provide affordable housing for low-income families.

Key Features:

- Public-Private Partnerships: The program leverages partnerships with private developers to increase the scale and efficiency of housing projects.
- Subsidies and Financing: Minha Casa Minha Vida provides subsidies and favorable financing conditions, making homeownership more accessible to low-income families.
- Urban Planning: The program incorporates urban planning principles, creating well-designed neighborhoods with access to essential services.

Applicability to South Africa:

Minha Casa Minha Vida's emphasis on public-private collaboration, subsidies, and urban planning can inform South Africa's approach to addressing housing challenges. Learning from Brazil's experience can inspire innovative financing models and efficient project implementation.

4. Locally Contextualized Example: N2 Gateway Project, Cape Town.

Overview: The N2 Gateway Project in Cape Town.exemplifies a locally contextualized social housing initiative. Initiated in the mid-2000s, it aimed to address housing shortages, provide basic services, and create sustainable, integrated communities.

Key Features:

- Mixed-Income Housing: The project integrates housing for different income groups, fostering social and economic diversity.
- Infrastructure Development: N2 Gateway emphasizes the importance of concurrent infrastructure development, ensuring that housing projects are supported by adequate amenities and services.
- Community Participation: The project incorporates community participation, allowing residents to have a voice in the planning and development processes.

Applicability to South Africa:

The N2 Gateway Project.illustrates the importance of tailoring social housing initiatives to the unique needs of South African townships. It also emphasis on mixed-income housing, infrastructure development, and community engagement aligns with principles of inclusivity and sustainable urban development.

Comparative Analysis and Lessons Learned:

1. Scale and Quality:
   Singapore's HDB and Sweden's Million Homes Programme demonstrate that achieving scale in housing projects should not compromise on quality. Balancing quantity with well-designed, functional housing is essential for creating sustainable and thriving communities.
2. Social Mix and Inclusivity:
   Sweden's Million Homes Programme and Brazil's Minha Casa Minha Vida underscore the importance of social mix and inclusivity. Integrating different income groups fosters social cohesion and ensures that housing projects benefit a diverse range of residents.
3. Public-Private Collaboration:
   Brazil's Minha Casa Minha Vida showcases the effectiveness of public-private partnerships in addressing housing challenges. South Africa can explore similar collaborations to enhance the efficiency and scale of social housing initiatives and economic development for small and medium contractors and communities at large through employment.
4. Urban Planning and Infrastructure:
   Singapore's HDB, Sweden's Million Homes Programme, and the N2 Gateway Project highlight the significance of urban planning and concurrent infrastructure development. Well-designed neighborhoods with access to essential services contribute to the long-term sustainability of social housing projects.

5. Community Engagement:
   The N2 Gateway Project emphasizes the importance of community participation. Involving residents in the planning and decision-making processes ensures that social housing initiatives are aligned with the specific needs and aspirations of the community.

DISCUSSION

The literature review on the „Transformation of South Africa's Townships: TBL Initiatives and the Future of Social Housing" offers a comprehensive exploration, grounding the discussion in empirical case studies and theoretical frameworks. The examination of the historical context reveals the lasting impact of apartheid policies on South African townships. *Bvuma & Marnewick* (2020) analysis of the spatial legacy of apartheid and *Monama et al.* (2022) insights into spatial planning intricacies provide empirical foundations for understanding the challenges that persist within these communities.

The application of the Triple Bottom Line (TBL) approach in social housing again arises as a transformative paradigm. Through empirical evidence from international case studies, such as the HDP and the Minha Casa Minha Vida , the literature points out the tangible benefits of adopting a holistic perspective. These initiatives demonstrate measurable improvements in social cohesion, economic opportunities, and environmentally sustainable practices, validating the efficacy of the TBL framework.

Global comparisons introduce a scientific lens, drawing lessons from well-documented international housing initiatives. Singapore's Housing and Development Board (HDB), analyzed in studies like *Hall & Viden*, (2005) exploration of Sweden's Million Homes Programme, and insights from Brazil's Minha Casa Minha Vida, all provide rigorous empirical evidence. These studies offer detailed outcomes, shedding light on the successes and challenges of diverse housing models.

The theoretical foundations of the TBL approach are scrutinized in this study. Theoretical frameworks governing social sustainability, economic stimulation, and environmental resilience are illustrated, integrating scholarly discussions from *Haqi* (2016) *and Hamilton & Clemens* (1999). These frameworks, when applied to practical cases like the Orlando Ekhaya social housing project and the Lynedoch EcoVillage, reveal the scientific basis for understanding and measuring the impact of TBL principles on housing initiatives.

Finally, the synthesis of historical insights, global perspectives, theoretical frameworks, and empirical case studies enriches the scientific discourse on urban development within South African townships. The empirical evidence provided by these studies goes beyond subjective observations, but also contributes to a more rigorous understanding of the challenges and opportunities. The literature review not only sets the stage for future research but also underscores the importance of evidence-based policy development in fostering sustainable, inclusive, and resilient communities within South African townships and the globe at large.

CONCLUSION

In conclusion, this paper has unravelled the historical complexities of South African townships, scrutinized the transformative potential of the TBL approach in social housing, conducted a comparative analysis of global social housing initiatives, and explored theories guiding TBL and social housing. Integrating case studies has provided practical insights into the application and impact of these principles.

The historical context, marked by the legacy of apartheid, underscores the enduring socio-economic challenges within South African townships. The significance of the TBL approach in social housing signifies a paradigm shift, recognizing housing as a multifaceted instrument for community well-being and sustainable development.

Comparative studies with global social housing initiatives, incorporating case studies from Singapore, Sweden, Brazil, and locally contextualized projects, emphasize the importance of cross-cultural learning and adaptation in shaping successful social housing models. These case studies offer a rich repository of strategies and lessons that can inform policies tailored to the unique challenges of South African townships.

Theoretical foundations within the TBL framework, including social sustainability, economic stimulation, and environmental resilience, highlight the need for a holistic and integrated approach to social housing. Practical case studies such as Orlando Ekhaya, Vulindlela Heights, and Lynedoch EcoVillage demonstrate the tangible manifestation of these theories, providing a roadmap for creating sustainable and resilient urban environments.

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PRIMARY IMPEDIMENTS TO INVESTING IN AZERBAIJAN'S RENEWABLE ENERGY PROJECTS

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ABSTRACT

This article investigates the primary impediments to investing in Azerbaijan's renewable energy sector, highlighting the challenges and opportunities associated with transitioning to sustainable energy sources. Despite Azerbaijan's significant renewable energy potential, particularly in hydroelectric, wind, and solar power, the sector's development is hindered by financial, institutional, regulatory, technical, and informational barriers. The research underscores the limited impact of renewables on the country's energy mix, driven by inadequate policy implementation and fluctuating investment levels. It calls for comprehensive legislative reforms, strategic foreign investments, and the adoption of new technologies to overcome these obstacles. The article also discusses Azerbaijan's efforts to showcase its renewable energy initiatives at COP29, emphasizing the importance of international cooperation in achieving the country's ambitious energy goals. By addressing the identified challenges, Azerbaijan could accelerate its transition to a sustainable energy future, contributing significantly to global climate objectives.
Keywords: Azerbaijan Renewable Energy, Energy Investments, Foreign Investments, Energy Policy, Financial Barriers
JEL codes: O13, Q42, Q48, G38, L98, R58

INTRODUCTION

A significant increase in energy demand is driven by the globe's population growth in an increasingly interconnected society. A study by the International Energy Agency projects that by 2030, there will be a 50% rise in the world's energy consumption. In response to this growing demand, Azerbaijan, like other countries with abundant energy resources, acts aggressively and decisively to improve resource use efficiency. To meet its domestic energy needs, the nation can use both conventional and alternative energy sources, such as gas and oil. However, high-standard energy infrastructure development is urgently needed to effectively harness and utilize alternative energy resources. Even though it ranks 25th in terms of natural gas reserves and is among the top 20 nations with confirmed crude oil reserves, the nation of Azerbaijan is still striving to develop its alternative energy industry. In this regard, Azerbaijan's energy policies seek to guarantee future diversification and effective utilization of both conventional and alternative energy sources, in addition to lowering dependency on conventional energy supplies.

Azerbaijan has been a dependable energy exporter over the last 20 years thanks to the growth of its oil and gas industry. Lately, the expanding demand has brought prospects for expansion and investment in the non-oil industry. Azerbaijan is stepping up its attempts to draw in private and foreign investments in the alternative energy industry by collaborating closely with global energy corporations and financial institutions in order to take advantage of the nation's renewable energy potential.

Azerbaijan, formerly reliant on its enormous oil and gas reserves, is currently going through a significant energy transition centered on sustainability and diversifying its energy mix. The nation has made significant investments in hydroelectric, solar, and wind power to achieve its aggressive targets for raising the proportion of renewable energy in its energy system. Modernizing hydropower plants, building solar power facilities in areas with abundant sunlight, and creating wind farms in the Caspian Sea are important initiatives. Initiatives to improve energy efficiency and integrate smart grid technologies reinforce these efforts even more. This shift intends to strengthen economic resilience while being consistent with Azerbaijan's international environmental goals by lowering its reliance on the export of fossil fuels. The shift to renewable energy is anticipated to advance science, draw in outside capital, and generate new job opportunities. With these projects, Azerbaijan hopes to lead the area in sustainable growth and long-term energy security (*Zero Carbon Analytics*, 2024).

Using renewable energy sources holds great promise for augmenting Azerbaijan's economic diversification and GDP growth across multiple sectors. Azerbaijan's post-2030 vision calls for maintaining a high social security and human development standard while simultaneously creating a strong and competitive economy powered by cutting-edge technologies and an efficient economic framework.

MATERIAL AND METHODS

The main reason for choosing this topic is the urgent issues of energy and climate change. The research seeks to shed light on the obstacles to investing in renewable energy in Azerbaijan. It also provides a detailed analysis of renewable energy statistics and the impact of foreign investments on renewable energy infrastructure. The extensive use of traditional energy sources in current production sectors greatly exacerbates climate change, leading to severe environmental damage and ongoing pollution. Many countries are now working to revise and improve their energy policies to tackle this global issue.

The study relied on desktop research and secondary data collection. Sources included: Official national databases, such as Stat, Azerbaijan's statistical repository; Publications from international organizations like IRENA and the International Energy Agency (IEA); Reports and analyses from private entities and NGOs, including Mordor Intelligence and Zero Carbon Analytics; News articles and official releases from stakeholders like ACWA Power and SOCAR Green LLC. Following references used: Scholarly journals, such as the International Journal of Energy Economics and Policy and Energies, which were utilized for in-depth technical perspectives; Online databases and press releases provided the latest updates on energy projects, partnerships, and policies in Azerbaijan; Historical data on

Azerbaijan's energy production and renewable energy capacities were derived from studies, including Malikov's 2016 presentation at UNECE and IRENA's 2019 Renewable Readiness Assessment.

This qualitative study employed a desktop research methodology to gather insights from a diverse range of secondary data. The process began with defining the research scope to focus on the obstacles to renewable energy adoption and the role of foreign investments in Azerbaijan. Data was systematically collected from official reports, journal articles, and international and local news agencies. Key sources included: Governmental publications: Ministry of Energy of Azerbaijan; International bodies: International Energy Agency, IRENA; News and private sector updates: AzerNews, Climate Change News, Trend News Agency. Information was evaluated for relevance, credibility, and alignment with the research goals, ensuring a comprehensive representation of the renewable energy landscape. The data was then analyzed to identify the challenges and issues facing Azerbaijan's renewable energy sector. The paper will ultimately outline the major obstacles Azerbaijan faces in implementing its renewable energy policies and the role of foreign investments.

RESULTS AND DISCUSSION

Renewable Energy Statistics and Role of Foreign Investments

It is evident that the climatic conditions and characteristics of each country or region significantly influence the utilization of renewable energy. Azerbaijan's favorable geographical location and climatic conditions facilitate the extensive use of environmentally friendly renewable energy sources. By harnessing the country's natural potential to produce electricity and thermal energy from renewable sources, advancements can be achieved in the future development of the electric power industry.

Currently, renewable energy sources have a minimal impact on Azerbaijan's total final energy consumption despite various policies aimed at improving the renewable energy sector. The share of renewables reached 3.1% in 2010 but fell to 1.7% by 2022. One reason for this fluctuation is the change in hydroelectric power production, which was 3,446 million kWh in 2010, but decreased to 1,746 million kWh in 2022. Renewable energy used in non-energy applications has remained low, making up just 0.4% of the total final energy consumption in 2022 (*Mustafayev et al.*, 2022).

According to *Table 1*, Hydropower has traditionally played a significant role in Azerbaijan's energy balance. With a potential of 1,131 MW, hydropower was the most promising renewable energy source in 2017, compared to thermal energy's potential of 6,750 MW. Hydropower resources are located around irrigation canals, the Caspian Sea, the Araz River, the Kura River and its tributaries. The small hydropower sector, including power plants in Sheki, Mugan, Zeykhur, Gusar, Nügadi, Chinarli, Balakan, Guba, and Zurnabad, is thriving alongside independent electricity producers in Azerbaijan. These producers generate electricity for their own use. The addition of the 1.5 MW Balakan Hydropower Plant in 2017 aimed to

increase output in this small hydropower sector. However, hydropower production is affected by seasonal variations (*Ministry of Energy of Azerbaijan*, 2024a).

Table 1. Installed electricity generation capacity, MW, 2022

State electricity producers /autonomous electricity producers /independent electricity producers	Power plants					
	General	Heat	Water	Sun	Wind	Boycott
„Azerenergy" JSC	6 936	5 881	1 055	-	-	-
Nakhchivan State Energy Agency	237	147	68	22	-	-
Self-producers of electricity (BP, SOCAR, Azersun Holding)	722	722	-	-	-	-
„Clean City" OJSC	37	-	-	-	-	37
„Azerishiq" JSC	52	-	-	-	52	-
„Azalternativenerji" LLC	17	-	-	13	3	1
Private wind and hydropower plants	17	-	9	-	8	-
Total, MV	8 017	6 750	1 132	35	62	38
Share, %	100	84.2	14.1	0.4	0.8	0.5

Source: *IRENA*, 2019

Azerbaijan's total power generation capacity is 8320.8 MW, with 1687.8 MW coming from power plants that use renewable energy sources, including large hydropower plants. It represents 20.3% of the overall capacity (*Ministry of Energy of Azerbaijan*, 2024b).

Azerbaijan has excellent wind resources, especially along the Caspian Sea coastline. According to ABOEMDA's investigation, the wind potential is approximately 3,000 MW. Reflecting this potential, the government set a target of obtaining 350 MW of new wind power by 2020. By the end of 2017, 62.4 MW of wind power had been generated, with Azerishiq OJSC contributing 51.7 MW, Azalternativeenergy LLC 2.7 MW, and the private sector 8 MW. Several projects are still under development, including the recently inaugurated Yeni Yashma Wind Power Plant and the Absheron Wind Project (*Malikov*, 2016).

According to *Table 2*, Azerbaijan's solar energy potential is estimated at 23,040 MW, with annual sunshine hours ranging from 2,400 to 3,200. Most of the region experiences global horizontal radiation between 1,387 kW/m² and 1,534 kW/m², while direct normal radiation ranges from 1,095 kW/m² to 1,534 kW/m². There are four solar photovoltaic plants with a capacity greater than one MW, including the 24 MW Nakhchivan Solar Power Plant. Plans include building five 2.8 MW solar power plants and one 4 MW solar power plant. By the end of 2017, 34.6 MW of solar power had been installed nationwide, including installations on the roofs of various public buildings and social enterprises. One such project is the sports complex in Masalli,

which features a 70 kW photovoltaic system owned by Azalternativenerji Public Legal Entity, with financial and administrative processes managed by ABOEMDA (*IRENA*, 2019).

Table 2. Potential of renewable energy sources

Renewable energy sources	Technical Potential, MVT
Wind	3000
Sun	23 040
Bio/Waste	380
Small SES	520

Source: *IRENA*, 2019

Azerbaijan's capacity to produce electricity from garbage and biomass is estimated at 380 MW. Currently, traditional biomass is the primary bioenergy type utilized for cooking and heating in rural regions. Additionally, the Baku Solid Garbage Plant (Block 4) shows the government's efforts to harness the huge potential for energy production from biodegradable household garbage.

The state budget is the primary funding source for Azerbaijan's renewable energy development. According to ABOEMDA, US$579.1 million (987.4 million AZN) was allocated between 2010 and 2022 for various energy sources, including waste, biomass, wind, small hydropower, solar photovoltaics, and heat pumps. The state contributed 480.9 million US dollars (820 million AZN), which accounts for 83% of the total. However, high interest rates have made lending for renewable energy and energy efficiency projects less attractive. The Central Bank of Azerbaijan increased the interest rate from 4% at the beginning of 2019 to 14% by the end of the year.

The European Investment Bank (EIB) has been working with Azerbaijan since 2014, operating within the framework of the European Neighbourhood Policy, the Eastern Partnership, and other EU agreements. The EIB has invested over €96 million in Azerbaijan, including €25 million in funding for more than 120 local businesses through partnerships with local banks. The EIB supports Azerbaijan's efforts to diversify its economy, with a focus on renewable energy, energy efficiency, and promoting balanced economic development, particularly in rural areas. These efforts are part of the EU4Business initiative and are aimed at strengthening growth, healthcare, digitalisation, and climate action, especially in light of the COVID-19 pandemic (*European Investment Bank*, 2024).

As per the executive agreement between Azerbaijan's Ministry of Energy and Saudi Arabia's ACWA Power, the foundation for the 240 MW Khizi-Absheron Wind Power Plant was laid on January 13, 2022, with an investment of $300 million. The President of Azerbaijan has set a goal to increase the share of renewable energy sources in the country's total energy capacity to 30% by 2030 (*ACWA Power*, 2020). A report by the German company VPC indicates that to meet this target, Azerbaijan needs to install new renewable energy plants with a total capacity of 1,500 MW by 2030. This includes 440 MW to be added between 2020 and 2022, 460 MW between 2023 and 2025, and 600 MW between 2026 and 2030, all in three phases (*International*

Energy Agency, 2021). Preliminary research across 16 regions identified 20 potential sites for solar power plants, covering a total area of 9,218 hectares and providing a capacity of 4,609 MW. Power generation from these sites is projected to be 6.1 billion kWh (*International Energy Agency*, 2021).

With a massive 240 MW wind farm project that is expected to produce one billion kilowatt-hours annually, ACWA Power has had a significant impact on Azerbaijan's renewable energy market. This program demonstrates ACWA Power's dedication to supporting the nation's infrastructure for sustainable energy. (*ACWA Power*, 2023)

The administration of President Ilham Aliyev has formally approved an investment deal, confirming ACWA Power's contribution to the advancement of renewable energy technology in Azerbaijan. The company is working with prestigious partners – Masdar and SOCAR – to construct 500 MW of renewable energy capacity. A significant portion of this capacity – 286 million – will go toward the company's continuing 240 MW wind power project.

These expenditures demonstrate ACWA Power's steadfast commitment to renewable energy initiatives in Azerbaijan and its vital role in furthering the country's sustainable development objectives. ACWA Power maintains its position as a major participant in the sustainable development initiatives of the region and shapes the renewable energy landscape of Azerbaijan through its strategic collaborations and investments (*Abdul*, 2024).

Azerbaijan has launched its first renewable energy auction for a 100 MW solar plant in Garadagh, as part of its effort to boost renewable energy capacity to at least 30% of its total electricity generation by 2030. The Ministry of Energy, with support from the European Bank for Reconstruction and Development (EBRD), has made the application process available on its website. Interested developers can request qualification documentation starting April 30, with submissions due by June 14. The auction aligns with Azerbaijan's green energy goals, encouraging private investment in large-scale renewable projects. The EBRD has helped shape the country's renewable energy framework, contributing to new laws and facilitating competitive procurement. The EBRD has also played a key role in financing key green energy projects, such as the first solar plant in Garadagh and a major wind farm in Absheron and Khizi (*Bitsadze*, 2024).

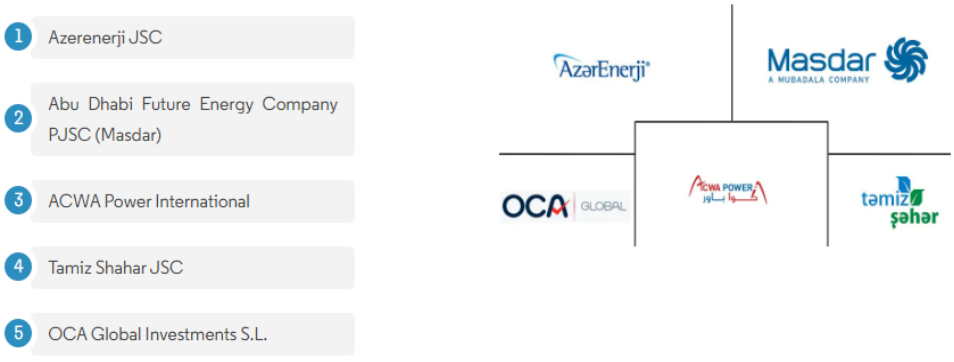
BP and Nobel Energy have significantly invested in Azerbaijan's renewable energy sector through various initiatives. BP, in collaboration with the Azerbaijani Ministry of Education, has funded $2 million to establish a new master's program in renewable energy at a local institution (*BP*, 2021). Meanwhile, Nobel Energy is advancing a 100 MW solar power station in Jabrayil, which is expected to reduce carbon emissions by 1,170,000 tons over 25 years. Additionally, the company has signed a deal with the Ministry of Energy to develop 400 MW of solar power plants in Nakhchivan (*Nobel Energy*, 2018).

Global energy companies are increasingly relying on renewable energy sources to cut carbon emissions and combat climate change. For this transformation to be effective, large investments must be made in technologies including carbon capture, hydroelectric power, solar, wind, and green hydrogen generation. These projects not only follow environmental regulations, but also aim to establish the benchmark for a more sustainable and dependable energy future.

In the area of renewable energy, SOCAR has made significant strides lately. Approved by the SOCAR Supervisory Board, SOCAR Green LLC is a company entrusted with overseeing renewable energy initiatives and forging partnerships with international organizations. Part of SOCAR Green LLC's mission is to decarbonize the production of oil and gas through initiatives including carbon capture and storage and green hydrogen generation. Additionally, it is developing strategic plans tailored to Azerbaijan's requirements in order to use global best practices and reduce the country's carbon emissions (*Zeynalova*, 2023).

The *Figure 1* indicates the top renewable energy companies which play a great role in implementation of renewable energy projects. A new facility will be built in Azerbaijan in partnership with Baker Hughes, as it has been announced by SOCAR. Current agreements with important partners like Energy China, Masdar, and BP are driving major initiatives. Examples of these projects include a 1 GW wind and solar project with Masdar and a 240-MW solar facility in Jabrayil with BP. With partners like Masdar and ACWA Power, future plans call for extending renewable energy programs in the Nakhichevan Autonomous Republic. Furthermore, an electric submersible pump (ESP) assembly and repair facility has been developed in Azerbaijan by SOCAR and Baker Hughes. With the help of SOCAR's Azneft Production Union and Baker Hughes Services International, this partnership will first supply 50 ESP kits to Azerbaijan with the goal of improving production efficiency through cutting-edge technology and strategic cooperation (*Yevgrashina*, 2024).

Figure 1. Azerbaijan Renewable Energy Top Companies



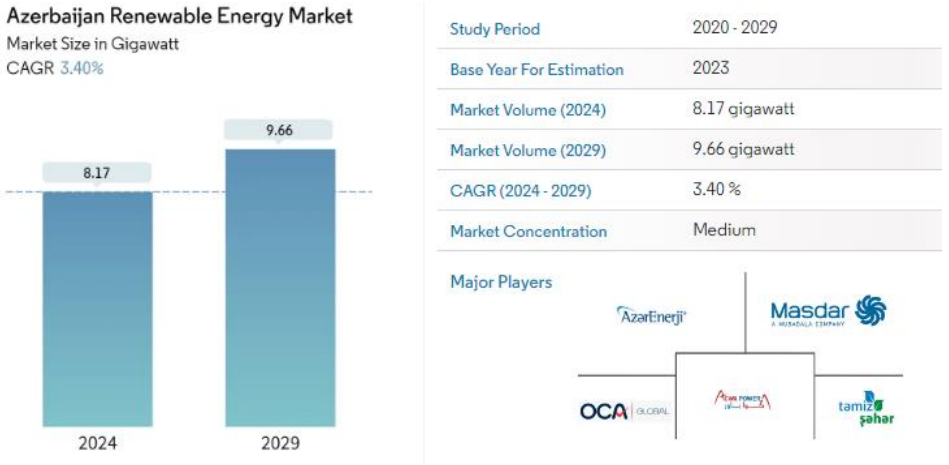
Source: *Mordor Intelligence*, 2024

Smart cities and villages represent a major step forward in Azerbaijan's energy transition endeavors. Aghali is a unique „smart village" in southern Azerbaijan that represents the government's attempts to rebuild the Karabakh region after the 2020 conflict (*Civillini*, 2024). Aghali is a center for renewable energy with innovative „smart agriculture" initiatives, a state-of-the-art hydropower facility, and residential solar panels—all working toward „net zero" emissions. Aghali is the prototype for future smart village developments in Karabakh, the first of about thirty planned smart villages. Eastern Zangezur and Karabakh have been named „green energy zones" by

the administration, which also intends to build a 500 MW solar power plant in Nakhchivan, among other renewable energy initiatives (*Azertag*, 2024a).

The *Figure 2* shows that the Azerbaijani renewable energy market is anticipated to reach 9.66 gigawatts by 2029, growing at a compound annual growth rate (CAGR) of 3.40% from its predicted 8.17 gigawatt capacity in 2024. The COVID-19 epidemic caused delays in both ongoing and planned projects, negatively impacting the market. However, it has since returned to pre-pandemic levels.

Figure 2. Renewable Energy in Azerbaijan Market Size



Source: *Mordor Intelligence*, 2024

As stated in the nation's Strategic Road Map on National Economic Perspectives, attempts to diversify the economy and lessen dependency on the oil and gas sector are major drivers of the renewable energy market in Azerbaijan. Furthermore, diversifying the energy mix is anticipated to positively impact the market by creating jobs and improving energy security, among other things.

However, delays in the actual execution of projects and inadequate investment from foreign businesses could impede the market's expansion. Currently, the oil industry makes up one-third of Azerbaijan's GDP, with crude oil exports being a major contributor. In the upcoming years, the nation hopes to cut back on domestic gas and oil usage in order to raise more money. This change will probably result in a higher proportion of renewable energy in the energy mix, which will open up new opportunities for market players in the near future (*Mordor Intelligence*, 2024).

In November 2024, Baku, Azerbaijan, will host the 29th Conference of the Parties (COP29) to the United Nations Framework Convention on Climate Change (UNFCCC). Azerbaijan is making extensive preparations to host what is anticipated to be the most inclusive COP yet. Azerbaijan has been collaborating closely with several international organizations, such as the International Islamic Educational, Scientific, and Cultural Organization (ISESCO), to guarantee a successful event and improve cooperation. (*Azertag*, 2024b).

Azerbaijan has a fantastic chance to showcase its renewable energy capabilities and green energy export initiatives by hosting COP29 in November 2024. The Caspian-Black Sea-European Green Energy Corridor project is expected to be a major talking point at the summit, highlighting Azerbaijan's commitment to energy security and international climate cooperation. The nation's goals of advancing its energy transition and assisting Europe's decarbonization efforts are congruent with its aspirations for green energy exports, especially through this corridor. Azerbaijan will be able to present its goals for green energy exports and its leadership in renewable energy to a global audience during the summit.

Azerbaijan, the host of COP29 in November, has revealed plans to boost the proportion of renewables in its energy sector to nearly one-third. The country aims to invest $2 billion in green energy, with Energy Minister Parviz Shahbazov stating that by 2027, Azerbaijan will add around 2GW of renewable energy, increasing the renewable share in installed capacity to 33%. Currently, renewables account for 20.86% of the energy mix. Despite the global decline in fossil fuel investments and uncertainty around long-term demand, Shahbazov emphasized Azerbaijan's continued commitment to supplying natural gas to its partners (*World Economic Forum*, 2024).

Major challenges for Renewable energy investments

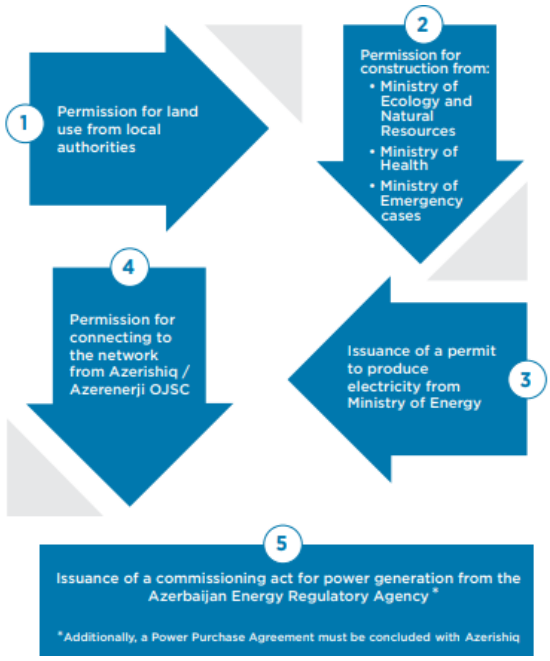
Even while interest in renewable energy is growing, Azerbaijan still has trouble making the most of its plentiful resources. The four main challenges facing the government are informational, institutional/regulatory, technical, and financial. The legal concerns surrounding the generation and usage of renewable energy present the first obstacle. The government is currently drafting legislation to regulate this industry. Furthermore, debates on the relevant bill are still ongoing. Sustainable investments in renewable energy must be undertaken, mainly by the government and international organizations. Moreover, it is believed that the current—technical, legal, and regulatory—infrastructures are insufficient to promote a favorable business climate in the renewable energy industry. These circumstances impede efficiency by making it difficult for private companies to invest. (*Hamidova et al.* 2022).

The legal and regulatory framework has evolved to drive a more competitive power market. *Figure 3* denotes existing renewable energy permitting procedure including permission for land use from local authorities, permission for construction from Ministry of Ecology and Natural Resources, Ministry of Health and Ministry of Emergency Cases, Issuance of a permit to produce electricity from Ministry of Energy, permission for connecting to the network from Azerishiq/Azerenerji OJSC and Issuance of commissioning act for power generation from the Azerbaijan Energy Regulatory Agency.

Since the technologies needed for renewable energy are expensive investments, Azerbaijan is confronted with technical challenges in transferring technology. This presents a second challenge. Technical procedures must be made simpler because Azerbaijan buys these technologies from elsewhere. Oil and natural gas have long dominated the nation's electricity industry, which has led to a higher level of knowledge in conventional energy technologies than in renewable ones. The absence

of funds and excessive loan rates, which provide serious difficulties, make up the third barrier. The economy of Azerbaijan has been severely impacted by the decline in oil prices since mid-2014. The lack of knowledge in the renewable energy industry is the fourth main problem, as local and international organizations need to do more to promote RES education. (*Hamidova et al.* 2022).

Figure 3. Overview of existing renewable energy permitting procedures



Source: *IRENA*, 2019

Therefore, regardless of the ambitious actions the Azerbaijani government might commit to or initiate at this year's COP29, certain issues in Azerbaijan's energy consumption pose a risk to achieving positive outcomes. These issues include:

The corporate climate in the nation is generally unfavorable to the advancement of energy efficiency. Up until now, the main goal of the non-oil sectors has been to create jobs. Energy and economic efficiency have come in second. However, ineffective economic activity does not produce income. Moreover, it makes more expenditures in the national budget necessary. As a result, Azerbaijan has made energy efficiency its main priority in the country's post-oil period, developing RES. Since the public sector now controls the majority of the nation's energy market, the private sector needs to play a more significant role in it. Except for businesses engaged in the production and distribution of electricity, all state-owned businesses ought to be considered for possible privatization. Concurrently, a primary goal for the private sector should be to support the expansion of renewable energy companies. The existing governance structure in the energy sector is largely a holdover from the Soviet era, with only minor adjustments. This outdated governance approach conflicts with the government's

decarbonization priorities, and not enough measures are taken to meet its obligation in line with Paris Agreement The average Azerbaijani has uneconomical energy use behavior. The government needs to refocus its efforts on promoting more economical consumer behavior, even though it has historically seen energy consumption as a producer-centric activity (*Ahmadov*, 2024).

CONCLUSION

At this critical juncture in its energy evolution, Azerbaijan's renewable energy sector has room to grow significantly. The nation's wealth of hydroelectric, wind, and solar energy resources offers significant prospects for the advancement of green energy. Nonetheless, reaching the lofty goals the Azerbaijani government has set, will be challenging.

This report identifies the main obstacles to increase investment in Azerbaijan's renewable energy sector. These consist of financial obstacles, institutional and legal restrictions, informational gaps, and technical limitations. These obstacles hamper the quick deployment and expansion of renewable energy infrastructure, even with Azerbaijan's favorable climate and the continued efforts of foreign companies like BP, Nobel Energy, and ACWA Power.

The results emphasize that extensive legislative changes and calculated investments are required to fully utilize Azerbaijan's renewable resources. Encouraging investments in renewable energy requires improvements in financial incentives, adoption of new technologies, and regulatory frameworks. Furthermore, the advancement of Azerbaijan's energy transition and the removal of current obstacles will depend on foreign investments and collaborations.

Azerbaijan is poised to host COP29, and the international spotlight presents a special chance to highlight its achievements and goals in the field of renewable energy. Through tackling the recognized obstacles and harnessing global assistance, Azerbaijan may expedite its shift towards a sustainable energy future and make a substantial contribution to the worldwide climate objectives.

The path ahead is difficult, but by focusing its efforts and collaborating strategically, Azerbaijan can accomplish its goals in renewable energy and create a model for other countries in the area.

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INTERNATIONAL SCIENCE DAYS IN GYÖNGYÖS

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Introduction

One of the important tasks of science is to respond effectively to the challenges that arise during the ever-accelerating social and economic changes, and to provide appropriate answers to the questions that arise. It is useful to provide guidance for decision-makers at the macro and micro levels. It does this in such a way that there is no salutary „best practice" for the interpretation and explanation of complex phenomena. There are better or worse solutions to problems that fall within the scope of „good practice".

During the regime change in Hungary, and in the years before that, the actors of science had a lot of important tasks. The country has been set on a new course, but the search for a way continues today. Almost three decades ago, almost at the same time as the regime change, the first International Science Days (ISD) linked to the city of Gyöngyös were organized by the Institute of Business and Industrial Engineering of the Gödöllő University of Agricultural Sciences. At the beginning, experts from agriculture and later from other scientific fields gathered for the event. Each time, the event was organized around different scientific fields and current topics, giving researchers and professionals the opportunity to exchange ideas.

History of International Science Days

The Gyöngyös International Science Days (ISD) and its predecessors appeared as a prestigious scientific event, which is currently organized every 2 years by the Heves County Government Office and the Károly Róbert Campus of the Hungarian University of Agriculture and Life Sciences. The event was held for the first time in 1988 under the name Agricultural Economic Science Days. The success of the conference is shown by the fact that in 1998 the list of speakers was expanded and, with its internationalization, it was organized under the name International Agricultural Economics Scientific Days. The conference, which initially had a small number of staff and a professional field, has now become an internationally recognized scientific forum. Since 2008, specialists from various fields of science have shared the results of their research at the International Science Days, while they have the opportunity to build professional relationships and contribute to the development of scientific public life.

Variability of the topic designation

The nature and topics of the International Science Days have undergone significant changes over the years. In the early years, the conference presented more local and regional research, but gradually it encompassed an increasingly wide scientific spectrum (*Table 1*).

Table 1. Topics of International Science Days between 1988 and 2024

Year	Theme
1988	Agricultural Economics
1990	Reform and agriculture
1992	Work in changing agriculture
1994	Modification of the development trajectory of the agricultural economy
1996	Farming-market competition in agriculture
1998	Agriculture and rural development
2000	Rural and agricultural development of the region
2002	The economics of agricultural production and resource utilization
2004	Competitiveness and profitability in multifunctional agriculture
2006	Agricultural adaptation to the changing economy
2008	Economics of enterprises
2010	Sustainable competitiveness in times of crisis
2012	Green economy and competitiveness
2014	Transforming, adaptive agriculture and the countryside
2016	Innovation challenges and opportunities between 2014-2020
2018	Sustainability challenges and answers
2020	Environmental, economic and social challenges after 2020
2022	The „Green Deal" - Challenges and Opportunities
2024	Unity - Action - Performance

The conference targets different fields of science every two years, taking into account current scientific trends and social needs. Thus, it could happen that in some years the focus of the conference was on social sciences, and in other years on technical sciences, economics or health sciences. These diverse topics enabled the event to deal with fresh, current issues every year. This always presented the organizers with new challenges in order to properly reflect the changes in scientific public life and the world. The changing topics ensured that the International Science Days were always attractive to researchers and that more and more international speakers participated. After the initial years, around 200-250 participants - in many cases from 10-15 countries - presented the research results with the help of more than 100 lectures and posters.

Successful results of the conference

The success of the conference is indicated by the fact that the number of participants has continuously increased over the years, and that the event has often provided the

basis for the birth of new research collaborations and scientific publications. The organizers have always placed great emphasis on ensuring that the event is memorable for the participants not only because of the expansion of their knowledge, but also that tangible memories are attached to it (*Figure 1*).

Figure 1. Bronze commemorative plaques

The interdisciplinary nature and the presence of representatives of different disciplines particularly facilitated the spread of new knowledge and contributed to the development of scientific discourse. In addition, the conferences played a prominent role in building bridges connecting scientific public life and the local community. In addition to the research, various professional and cultural programs often helped to strengthen the social impact of the conference, so the event proved to be successful not only from a scientific point of view, but also from the point of view of its community-building role.

We are part of a global economic restructuring. More and more people are interested in sustainability and innovation. The tasks and responsibilities of scientists

and decision-makers have not diminished in recent years, and it is important to find the answer to the question „What kind of world will we live in 5-10-15 years from now?" We organize our conferences in search of answers in the future as well, hoping that science will bring us closer

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