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**RELATIONS BETWEEN MONGOLIA'S
TRANSPORTATION AND WAREHOUSING
SECTORS**

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RELATIONS BETWEEN MONGOLIA'S TRANSPORTATION AND WAREHOUSING SECTORS

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Abstract- Intensive support for SMEs and policy development remains a priority for the global economy. SME development can increase GDP, reduce poverty and unemployment, and play an important role in economic growth. Determining the interdependence of small and medium-sized enterprises and their impact on GDP can help new entrepreneurs anticipate which sectors have room to start a business and prevent financial losses and risks. The study selected the Transport and Warehousing sector to determine its share in GDP and developed a model and conducted sensitivity analysis to predict 2022 sales revenue. Data analysis was performed using SPSS and Datagraphs based on key transport sector indicators. In this research, we will select and analyze the transport warehouse industry, which is one of the large SMEs in Mongolia.

Key words- SMEs, Transportation, Warehousing Sector, GDP, Revenue, Economy

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1. INTRODUCTION

The development of SMEs makes an important contribution to reducing the unequal distribution of income, ensuring social stability, and developing the activities of individual entrepreneurs. Small and medium enterprises are productive, flexible, and competitive businesses in terms of labor and production scale.

The SME sector employs the largest number of people and contributes to the country's economy. Therefore, what products and services small and medium enterprises produce, what technologies they use, and how productive they are will affect the country's economy. The development of a country's transport network and infrastructure is a resource for economic growth. Mongolia's economy is highly dependent on foreign trade and investment with its two largest neighbors, Russia and China, and the development of a land transport network has become a priority for the landlocked country. Improved transport networks, such as roads, railways, and air transport infrastructure, have the advantage of increasing vehicle speeds, boosting economic activity and citizen traffic, thereby reducing obstacles to the economic growth, decreasing poverty, and reducing vehicle operating costs.

The Transport and Warehousing sector plays an important role in the Mongolian economy. This is because the increase in the number of small and medium enterprises has a positive impact on the key indicators of the sector.

Mongolia began transporting goods by truck in 1925, and created the first freight document to record the name, size, and distance of freight transported. In 1956, the Naushka-Ulaanbaatar railway was put into operation, and in 1956, the Ulaanbaatar-Zamiin-Uud railway started service. In 1945, civil aviation was established between Moscow and Ulaanbaatar to transport passengers, and aircraft was used to provide ambulance services to the provinces.

The purpose of the study, Determining the average annual income of the SME sector in Mongolia and which sectors are included in the list of micro, small and medium enterprises. The mining and agricultural sectors have the largest impact on Mongolia's SME sector. GDP reached MNT 37.4 trillion in 2020, of which MNT 1.4 trillion or 3.8% was accounted for by the transport sector, which is preceded only by agriculture, industry and trade. From this, select the transport sector and determine the share of the transport and warehousing sector in GDP, determine the relationship between them, conduct a regression correlation analysis on the income of the transport and warehousing sector, and determine the

sensitivity. In the case of small and medium enterprises, it is possible to obtain the type of business, period of operation, number of employees, and annual sales revenue and expenditure from the consolidated annual report. As a result, determining the interdependence of other sectors and their share in GDP can be used to show new entrepreneurs where there is room to start a business, and how to expand and prevent risks.

2. THE SHARE OF THE TRANSPORT AND WAREHOUSING SECTOR IN GDP

The National Statistics Office calculates the share of the transport sector in GDP annually by the formal and informal sectors, while the number of enterprises and organizations, the number of employees, and transportation revenue are included in the official sector registered in the committee's business register. Private minibusses, trucks, and passenger and freight carriers are included in the informal sector as private carriers. There are 3905 enterprises and organizations in Mongolia in 4 main types of transportation: road, railway, air, and water, and 41.8% of them are operating regularly.

Table 1. Transport sector share in GDP

Specifications	2015	2016	2017	2018	2019	2020
GDP, at current prices, million MNT	23,150,385.6	23,942,866.4	27,876,297.2	32,411,224.1	37,280,841.4	37,453,275.3
Growth rate,%	4.2	3.4	16.4	16.3	15.0	1.0
Transport and warehousing sector, million MNT	1,210,594.9	1,239,442.6	1,370,368.1	1,516,685.7	1,732,633.3	1,411,794.3
Growth rate,%	9.1	2.4	10.6	10.7	14.2	-0.185
Share of transport and warehousing in GDP	5.23%	5.18%	4.92%	4.68%	4.65%	3.77%

The share of the transport and warehousing sector in GDP rose from 4.2 percent in 2015 to 15 percent in 2019 and has been steadily declining since 2010, reaching a record low of 1 percent in 2020. The share of value-added in GDP in the transport and warehousing sector in 2020 is 1.46 points lower than in 2015.

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Table 2. Average GDP and Transport Growth

	2015-2020 average	Covid 2020 is not calculated
Average GDP growth	9.38%	11.06%
The average growth of the transport and warehousing sector	4.75%	9.40%

The country's main economic growth depends on GDP growth. The transport and warehousing sector accounts for a small percentage of GDP. Average GDP growth was 9.38% over 6 years, of which average transport growth increased by 4.75%. Excluding the period with COVID in 2020, the average GDP growth in 2015-2019 was 11.06% and the average growth in the transport and warehousing sector was 9.40%.

Number of employees in the transport sector: In 2020, it reached 66.5 thousand people, an increase of 5.4 thousand people from the previous year. In the transport sector, 52.6 thousand men and 14 thousand women were employed in 2020. The number of male employees decreased by 0.5 percent compared to the previous year, and the number of female employees increased by 69 percent.

Table 3. The share of the transport sector in the total number of employees

Specifications	2015	2016	2017	2018	2019	2020
Total employees, State amount	1,151,223	1,147,843	1,238,333	1,253,023	1,146,161	1,162,912
Man	604,677	603,885	652,673	669,643	606,814	611,807
Female	546,546	543,959	585,661	583,380	539,347	551,105
Total employees, Ulaanbaatar	30,473	465,092	512,189	513,054	470,996	517,427
Man	15,394	248,412	269,659	276,128	250,101	278,468
Female	15,080	216,679	242,530	236,926	220,895	238,959
In the field of transportation and warehousing / State amount /	72,680	65,932	72,702	73,567	61,123	66,500
Man	60,743	53,120	61,442	62,296	52,848	52,574
Female	11,936	12,812	11,261	11,270	8,275	13,967
In the field of transportation and warehousing / Ulaanbaatar /	485	40,215	41,581	38,054	33,363	41,578
Man	385	30,998	34,438	31,968	28,836	32,091
Female	99.2	9,217.1	7,143.5	6,086.3	4,527.0	9,487.2
Percentage of the country	6.31%	5.74%	5.87%	5.87%	5.33%	5.72%
Percentage of Ulaanbaatar	1.59%	8.65%	8.12%	7.42%	7.08%	8.04%

Revenue from the transport sector: Total revenue of the transportation sector reached 1498.6 billion MNT in 2020, decreased by 504.9 billion MNT or 25.2 percent from the previous year, increased by 307.1 billion MNT or 25.8 percent from 2016, and increased by 905.0 billion MNT or 2.5 times from 2010. Total revenue of the road transport sector reached 564.4 billion MNT in 2020, decreased by 231.7 billion MNT or 29.1 percent from the previous year, and total revenue of the railway transport sector reached 770.1 billion MNT in 2020, increasing by 61.5 billion MNT or 8.7 percent from the previous year.

Table 4. Key indicators of the transport sector

Specifications	2015	2016	2017	2018	2019	2020
Carried cargo, thousands of tons	32,197.3	40,400.2	53,983.4	67,802.88	68,997.51	60297.7
Railway	19,150.8	19,989.1	22,765.1	25,763.3	28,143.0	29840.1
Auto	13,043.7	20,406.2	31,212.9	42,033.78	40,848.75	30454.9
Aerial	2.8	4.9	5.37	5.75	5.76	2.7
Freight turnover, million tons per kilometer	13,844.3	16,619.4	19,167.8	21,969.51	23,601.78	23.861.1
Railway	11,462.6	12,371.0	13,493.3	15,315.3	17,384.1	19.167.6
Auto	2,374.	4,236.2	5,661.3	6,640.61	6,203.78	4.685.3
Aerial	7.7	12.2	13.2	13.6	13.9	8.1
Number of passengers, million people	260.3	264.4	216.1	197.01	173.02	126.52
Railway	2.8	2.7	2.63	2.68	2.95	1.97
Auto	256.5	260.7	212.2	193.25	168.44	124.1
Aerial	1.23	1.24	1.25	1.4	1.62	0.45
Waterway	0.1	0.01	0.02	0.01	0.01	0
Passenger turnover, million people kilometers	4,931.6	4,988.5	5,434.69	6,598.08	7,146.18	3416.87
Railway	996.7	955.5	973.2	993.7	1,111.5	579.3
Auto	1,940.5	1,959.9	2,040.9	2,919.9	2,925.09	2178
Aerial	1,993.5	2,072.4	2,420.2	2,684.2	3,109.4	659.57
Waterway	0.9	0.7	0.39	0.28	0.19	0
Total transportation revenue, billion MNT	987.9	1,191.5	1,422.2	1,754.4	2,003.52	1,498.58
Railway	387.9	436.9	530.	616.02	708.62	770.1
Auto	345.1	467.2	506.4	695.86	796.06	564.38
Aerial	254.3	287.3	385.5	442.3	498.68	164.1
Waterway	0.6	0.2	0.3	0.2	0.16	0

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ANNUAL INCOME OF SMALL AND MEDIUM ENTERPRISES: The following methodology was used to select the main SME sectors in Mongolia and analyze whether they are SMEs. The analysis selected agriculture, telecommunications, education, real estate, health, hotels, catering, processing industries, and transportation warehouses.

Table 5. Average annual income of the sector enterprises

Average annual income of the sector enterprises	2020	2019	2018	Average
Agriculture	539,862,479.16	510,815,522.07	456,093,128.37	502,257,043.20
Information communication	132,794,885.10	137,499,587.12	134,426,028.69	134,906,833.63
Education	232,101,199.04	219,157,391.43	186,183,419.45	212,480,669.97
Real estate activities	930,569,245.11	1,000,171,560.57	1,038,992,011.17	989,910,938.95
Special scientific and technological activities	49,798,229.00	51,115,064.41	43,035,212.45	47,982,835.29
Health	228,020,403.16	204,587,326.29	166,342,936.53	199,650,221.99
Hotel	61,696,276.39	87,355,147.54	80,196,298.88	76,415,907.61
Processing factory	215,403,952.25	218,230,143.58	206,202,207.27	213,278,767.70
Transportation warehousing sector	314,500,779.68	428,908,466.82	449,002,918.00	397,470,721.50

Source. National Statistical Office, SME Database, Government Economic Review, Annual Sectoral Report

To calculate the average annual income per unit of the economic sector of Mongolia: Arithmetic mean for 2018-2020.

$$\text{Average annual income of enterprises in the sector} = \frac{\text{Total revenue of the sector}}{\text{Total number of enterprises in the sector}}$$

(1)

According to the Law of Mongolia on Supporting Small and Medium Enterprises 4.1.1. Small enterprise and service provider means an enterprise operating in the field of production, trade, and services, with annual sales of 300.0 million to 1.0 billion MNT and 10-50 employees.

Years	Total transportation revenue, billion USD	Road transport USD	Railway transport USD	Water transport. USD
2015	329,300,000.00	115,033,333.33	129,300,000.00	200,000.00
2016	397,166,666.67	155,733,333.33	145,633,333.33	66,666.67
2017	474,066,666.67	168,800,000.00	176,666,666.67	100,000.00
2018	584,800,000.00	231,953,333.33	205,340,000.00	66,666.67
2019	667,840,000.00	265,353,333.33	236,206,666.67	53,333.33
2020	499,526,666.67	188,126,666.67	256,700,000.00	0.00
	Correlation	0.99	0.79	-0.61

The analysis also confirmed that SMEs are involved in agriculture, telecommunications, education, health, hotels, catering, processing, and transportation. The income of the real estate sector is MNT 989,910,938.95 and may not be related to small and medium enterprises.

3. CORRELATION BETWEEN THE GDP AND THE TRANSPORT AND WAREHOUSING SECTOR

Table 6. GDP and annual income of transport and warehousing sector

Specifications	2015	2016	2017	2018	2019	2020
GDP, at current prices, million USD	7,716.80	7,980.96	9,292.10	10,803.74	12,426.95	12,484.43
Transport and warehousing sector, million USD	403.53	413.15	456.79	505.56	577.54	470.60

This table shows the GDP and Transportation Warehousing industry averages from 2015 to 2020. Looking at the 6-year average, the GDP and average indicators of transport and storage have a steady upward trend.

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Table 7. Key indicators of the transport sector

Specifications	2015	2016	2017	2018	2019	2020	Avarage
Total transportation revenue, billion USD	263.3	361.06	430.9	607.1	707.5	658.2	632.8
Railway	387.9	436.9	530	616.02	708.62	770.1	574.92
	39%	37%	37%	35%	35%	51%	39.18%
Auto	345.1	467.2	506.4	695.86	796.06	564.38	562.50
	35%	39%	36%	40%	40%	38%	37.80%
Aerial	254.3	287.3	385.5	442.3	498.68	164.1	338.70
	26%	24%	27%	25%	25%	11%	23.00%
Waterway	0.6	0.2	0.3	0.2	0.16	0	0.24
	0.06%	0.02%	0.02%	0.01%	0.01%	0.00%	0.02%

For the main indicators of the transport and storage sector, the 6-year average of the total revenue of auto, railways, air and waterway is shown. According to the figures, the revenue of the transport warehousing sector is generated by railways, auto, and air transport. Because Mongolia is a landlocked country, it can be seen that waterways are not used much. In 2015-2020, a correlation analysis was made comparing the revenue of the transport and warehousing sector with the revenue of the road transportation sub sector. The analysis shows that 0.99 is a direct correlation.

According to the analysis of Mongolia's transport and warehousing sector revenue for 2015-2020 compared to railway revenue, the return is 0.79. It is strongly related. The correlation analysis of Mongolia's transport and warehousing sector revenue for 2015-2020 with waterway revenue was -0.61. As a result, an increase in road and rail revenue is inversely related to a decrease in waterway revenue. Because Mongolia is a landlocked country, transportation is mainly provided by road and rail.

SUMMARY OUTPUT		
<i>Regression Statistics</i>		
Multiple R	0.995	
R Square	0.99	
Adjusted R Square	0.976	
Standard Error	5627	
Observations	6	
<i>ANOVA</i>		
	<i>df</i>	<i>SS</i>
Regression	3	6.721
Residual	2	6.334
Total	5	6.786
	<i>Coefficients</i>	<i>Standard Error</i>
Intercept	211.034	2.160
Auto 1	2.115	0.239
Railway 2	0.417	0.350
Waterway 3	208.50	219.396

MS	<i>F</i>	<i>Significance F</i>				
2.246	70.745	0.013				
3.171						
<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>	
-0.021	0.984	-9.340	211.034	2.160	-0.021	
8.824	0.126	1.084	2.115	0.239	8.824	
1.193	0.354	-1.088	0.417	0.350	1.193	
0.95	0.442	-735.486	208.50	219.396	0.95	

Taken as a variable depending on the total revenue of the Mongolian transport and warehousing sector. Instead, a multi-factor regression model was developed using variables to explain road, rail, and water revenue. Thus, Adjusted R Square is 0.97, which is high in the interpretation of the model.

Significance F is 0.013. $0.05 >$ low Significance may indicate good.

The A value of the multi-factor regression model is Intercept 211.034

P-value is 0.984. It means that it is a real number from 0 and 1. Auto 0.125, Railway 0.354, Waterway 0.442 value is $0.05 >$ low which confirms that the hypothesis is true.

$$\text{Transportation revenue} = 211.034 + 2.11\text{Auto} + 0.417\text{Railway} + 208.5 \text{ GDP}$$

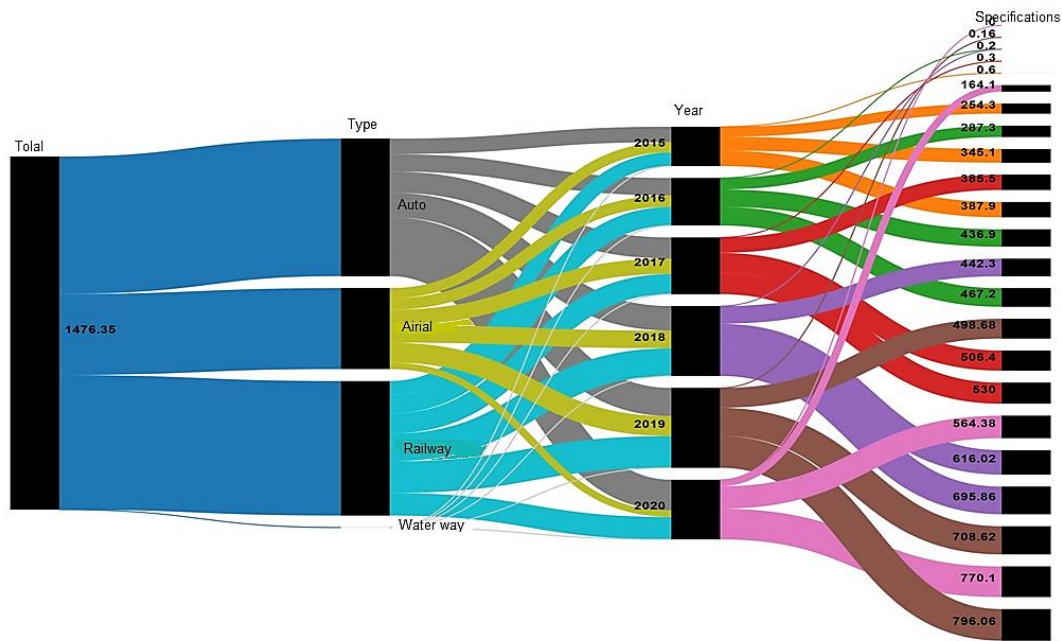


Figure1. Total transportation revenue, billion MNT

4. FORECAST MODEL FOR TRANSPORT AND WAREHOUSING SECTOR REVENUE

In today's world of fiscal deficit control, sound fiscal policy, and a variety of national economic issues, every country pays attention to its budget. Economists make medium-term forecasts for 2-5 years, primarily to predict financial losses or revenue shortfalls.

Regression analysis is used to forecast budget revenues. It uses one or more explanatory variables (called "explanatory variables") to predict the dynamics of the dependent variable, in this case, the amount of budget revenue. A business entity can estimate the financial loss of the previous year and the risk of the following year by making an income forecast. Forecasting the revenue of the transport and warehousing sector in 2022 can predict the share of GDP and everything in the economy.

SUMMARY OUTPUT		
<i>Regression Statistics</i>		
Multiple R	0.83	
R Square	0.69	
Adjusted R Square	0.61	
Standard Error	119522.7	
Observations	6	
ANOVA		
	<i>df</i>	<i>SS</i>
Regression	1	1.29
Residual	4	5714
Total	5	1.86
		<i>Standard Error</i>
<i>Coefficients</i>		
Intercept	647024.9	260031.3
Transport warehouse	0.025	0.008

<i>MS</i>	<i>F</i>	<i>Significance F</i>			
1.29	9.007	0.039			
14285					
<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
2.48	0.06	-74937.77	1368	-74937.8	1368987.6
3.00	0.036	0.001	0.048	0.001	0.04

Transport and warehousing sector revenue was selected as a variable based on Y, and GDP revenue was selected as a variable based on X.

Adjusted R Square 0.61

Significance F 0.03 Statistics 0.05 > significant

GDP is directly related to gross output. A simple linear regression model was calculated.

It is a model for determining the revenue of the transport sector.

P-value is 0.06. It means that it is a real number from 0 and 1. Transport and warehousing

0.036 value is 0.05 > low which confirms that the hypothesis is true.

$$\text{Transport and warehousing sector, million MNT} = 647024.9642 + 0.025 * \text{GDP} \quad (2)$$

5. SENSITIVITY ANALYSIS

Sensitivity analysis belongs to the group of quantitative methods of risk assessment. If this value is significant, it means that SMEs have a good chance to continue production. The risk is higher if the sensitivity test value is changed by more than 5% (in some cases the maximum deviation is allowed up to 10%). If the change is less than 5%, the risk level is low and it is possible to expand the operation in the future.

The economy of each sector may face uncertainty, especially in terms of GDP change, inflation, and foreign trade. Therefore, a risk assessment should be performed, including sensitivity analysis, to assess the costs and benefits of the transport and warehousing sector. This will allow us to determine how it will change depending on the level of risk, the transportation and warehousing sectors, and GDP.

Table 8. GDP and Transport and warehouse sector annual income

Specifications	2015	2016	2017	2018	2019	2020
GDP, million USD	7,716.80	7,980.96	9,292.10	10,803.74	12,426.95	12,484.43
Transport and warehousing sector, thousand USD	403.53	413.15	456.79	505.56	577.54	470.60
Changes in GDP, thousand USD		1264.1602	1311.143	1511.642	1623.205	57.47
Transport sector changes, thousand USD		96.159	43.641	48.77	71.98	-106.94
Sensitivity Transport / GDP USD		0.04	0.03	0.03	0.04	-1.86

$$Sensitivity = \frac{Transport\ and\ warehouse\ sector}{GDP} \left(\begin{array}{l} \text{Coefficient of change in income} \\ \text{of the Transport and warehouse} \\ \text{sector depending on GDP} \end{array} \right) \quad (3)$$

$$Sensitivity = \frac{28.487.70}{792.480.80} = 0.36 \quad (4)$$

Average sensitivity	-0.36
Average sensitivity (2020 is not included in COVID)	0.04

According to this method, the sensitivity coefficient of the transport and warehousing sector is 0.36. This is less than 5%, which means that the risk level is low and there is a good chance for further development. It is also possible to determine the share of the transport and warehousing sector by determining the sensitivity coefficient.

GDP - In determining the share of the transport and warehousing sector:

$$\text{Transport warehouse sector} = \text{Sensitivity} * \text{GDP} = 0,04 * 9,4 = 0,36$$

(5)

6. CONCLUSION

The average income of the transport and warehousing sector, which is the object of this research, is 397.470.721 MNT and is part of the small industry sector. We have established and analyzed the sector GDP and the dependence, and also developed a sector regression model and a sector revenue forecast model.

Total revenue from the transport and warehousing sector is growing at an average annual rate of 4.75 percent. Were it not for the COVID situation, it could have grown at an average rate of 9.4 percent per year. The Bank of Mongolia had projected economic growth of 4 percent in 2021, but in reality, it was 1.4 percent and inflation was 12 percent, but today it is 14.6 percent. This is because, after 2020, the situation during COVID and the war will have a direct and indirect impact on the Mongolian economy.

The arithmetic average of the total transport and warehousing sector of Mongolia for 2015-2022 has been released. In other words, the number of companies operating in this sector is growing by an average of 14 percent per year.

The total revenue of the transport and warehousing sector is based on a variable based on size. Instead, I developed a multi-factor regression model using variables to explain road, rail, and water transport revenue. The adjusted R square is 0.97. It turns out that the ability to interpret is very high. The significance coefficient is 0.013.

To determine the relationship between the GDP and the transport warehousing sector, 0.99 is perfectly correlated with the transport and warehousing sector's 2015-2020 revenue. Rail revenue is 0.79 correlated with a correlation of -0.61 is inversely related to the revenue earned by the waterway. As a result, as waterway revenue increases, so does transportation revenue.

Sensitivity analysis is one way to estimate the risk. The most important thing for SMEs is to work in the future without financial losses, with low risk, and to expand their operations. Sensitivity analysis was performed in the selected transport and warehousing sector. Determining the sensitivity coefficient, the average sensitivity of the transport warehousing sector and GDP was 0.36 ~ 4. This was less than the 5% statistic, indicating that the risk of the transport and warehousing sector is low and could grow from year to year. This suggests that a sensitivity analysis of all SMEs can identify the sectors that are most strongly dependent on GDP.

Research shows that SMEs can prevent financial crises by forecasting and analyzing their business revenues for 3-5 years. This allows new start-ups to predict which plants will grow and expand in the future and potential investors to find the right companies in the right sectors and work profitably.

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