World Journal of Environmental Biosciences

Available Online at: **www.environmentaljournals.org**

Volume 6, Supplementary: 37-42

ISSN 2277- 8047

A Comparative Study of Sustainable Urban Development Indicators (Case Study: Municipal District 1 and 3 of Zahedan, Iran)

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ABSTRACT

This comparative study aimed to compare the sustainable development criteria in two municipal districts of Zahedan, Iran using four main criteria (Sociocultural, Economic, Environmental, and Physical) through 20 indicators. The statistical population consisted of Municipal District 1 and 3. A sample size of 150 was selected for each district. This is a descriptive-analytical study based on field and desk studies. The data are collected by a questionnaire (reliability= 0.91) in the field. The data were analyzed using one-sample t-test, Friedman test and T-test for two independent groups in SPSS in order to evaluate the utility of indicators, rank the effective criteria, and compare them in Municipal District 1 and 3. Out of 20 indicators in Municipal District 1, the results showed that 6 are optimal and 14 are below the optimal level using one-sample t-test. In Municipal District 3, all indicators are below the optimal level. T-test for two independent groups showed that a significant relationship is found among all sustainable urban development indicators in Municipal District 1 and 3 Zahedan, Iran.

Keywords: *Sustainable Development, Comparative Study, Municipal District 1 and 3.*

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INTRODUCTION

Sustainable Development is a new term in the literature of development. This concept is based on the fact that the level of the human's basic standards is increased without interfering with and overburdening in the original natural resources and the destruction and degradation of the environment that belongs to all human beings (Latifi, 2003: 141). Development is an ideal goal for most countries. All underdeveloped countries tend to add to their material, human and spiritual potential and have a strong economic potential by the evolution of capabilities. Having healthy, expert, resourceful and hard-working people along with a wide range of infrastructure, communication, and health and education facilities is also a desirable goal for all developing countries (Motavaseli, 2004: 9). According to Michael Toddar, development must be considered a multi-dimensional process that requires major changes in social construction, public attitude, the national institutions, economic growth the acceleration, the reduction of inequality, and absolute poverty the eradication (Jamshidzehi, 2015: 52). In fact, the emergence of sustainable development as the main slogan of the third millennium is due to the effects of cities on the biosphere and the various dimensions of human life (Maleki and Daman Bagh, 2013: 30). Today's urbanization uses an urban development pattern that not only has created instability in cities, but also caused the instability of the surrounding areas (Rahnama and Ababszadeh, 2008: 63). Promoting balanced social and economic development, improving citizens' quality of life, and recognizing deprivations for distributing services are the key principles of sustainable development. Each level of city's physical division must have different services according to the needs. Various services must be distributed in districts according to the population threshold (Dahani, 2013: 3).

This comparative study aimed to compare the sustainable development criteria in two municipal districts of Zahedan, Iran using four main criteria (Sociocultural, Economic, Environmental, and Physical) through 20 indicators. The data were analyzed using one-sample t-test, Friedman test and T-test for two independent groups in SPSS in order to evaluate the utility of indicators, rank the effective criteria, and compare them in Municipal District 1 and 3.

Problem Statement

The emergence of the industrial revolution, public economic and welfare improvement, the invention of automobiles, and progress in transportation sector were responsible for the unprecedented growth of the urban population and the rapid expansion of cities after the Second World War. Since the urban growth is based on automobile, cities occupied major parts of

lands and expanded (Rahnama and Abbaszadeh, 2008: 63). According to the statistics, almost half of the world population is residing in cities. An increase in urban population is expected in future decades. In general, such growth is associated with the public efforts to satisfy their needs and enjoy the urban facilities (Baskha et al., 2008: 96). Accordingly, high urbanization rate in the last two centuries and the increase in urban areas worldwide have attracted urban planners to the quality of life and urban affairs (Hall, 2002: 21). In Iran, the quality-of-life crisis was followed from the population growth and, consequently, rapid urbanization growth (Ahmadi and Naderi, 2013: 72). According to the 2011 Iran Census, urban population has increased to 71% (Iran Statistical Center, 2011). In the last century, only 10% of the population used to live in cities (Rezvani et al., 2009: 89). Cities are of great importance in planning process due to the large volume of population residing in. In this regard, citizens' quality of life and the promotion of sustainable urban development indicators are top priorities for urban management officials and planners. The problems in cities indicate lack of sustainability so that urban geography finds new realm and dimensions. In addition to evaluating and analyzing the physical and ecological features of cities, investigating important affairs of the Third World's countries, social justice, and the quality of access to basic needs and social spheres helps provide an appropriate urban environment for the citizens (Maleki and Daman Bagh, 2013: 31).

Zahedan has experienced, over a short term, high population growth and uneven physical development. Rapid urbanization due to urban rural immigration has adversely influenced the quality of life and sustainable urban development indicators, creating frequent social, economic, environmental, and physical problems. These problems have created a multi-dimensional face city. This comparative study aimed to compare the sustainable development criteria in two municipal districts of Zahedan, Iran using four main criteria (Sociocultural, Economic, Environmental, and Physical). The results can be used in urban planning to fulfill the social justice in the Municipal District 1 and 3. The main questions outlined here are as follows:

1. Are sustainable urban development indicators optimal in the Municipal District 1 and 3 of Zahedan, Iran?
2. Is there a significant relationship among the sustainable urban development indicators in the Municipal District 1 and 3 of Zahedan, Iran?

METHOD

This is an applied, descriptive-analytical study. The statistical population consisted of Municipal District 1 and 3. A sample size of 150 was selected for each district. The data are collected by a questionnaire (reliability= 0.91) in the field. The data were analyzed using one-sample t-test, Friedman test and T-test for two independent groups in SPSS in order to evaluate the utility of indicators, rank the effective criteria, and compare them in Municipal District 1 and 3 through 20 indicators within four main criteria **[Table 1]**.

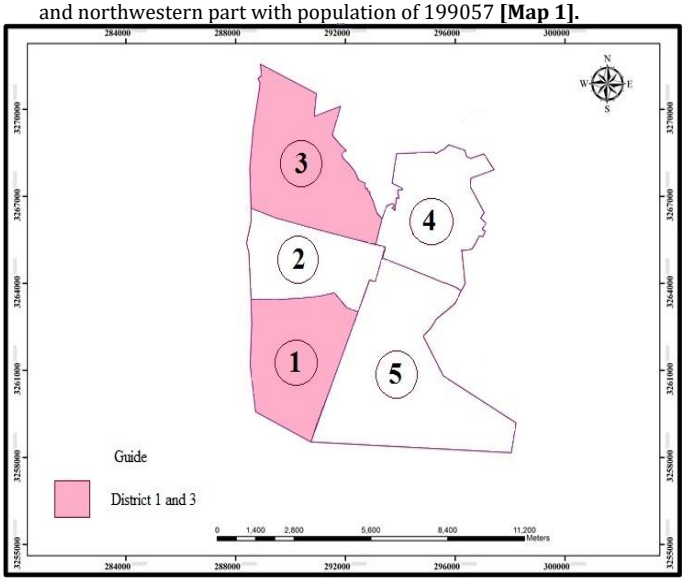
Table 1: Sustainable Urban Development Criteria and Indicators in Municipal District 1 and 3, Zahedan, Iran

Criteria	Sociocultural	Economic
Indicator	-The Number of Educational Centers in the Area - The Number of Medical Centers in the Area -The Number of Cultural Centers in the Area -Citizens' Social Participation in the Area -Public Safety and Security	-Citizens' Income Sustainability -Citizens' Saving - Availability of Banking and Credit Facilities -Utility Bills (Water, Telephone, Electricity, etc.) compared to Services -Job Security
Criteria	**Environmental**	**Physical**
Indicator	-Air, Noise Pollution -Waste Collection Method - Beatification - Green Space - Street Lighting	-Access to Educational Centers in the Area -Access to Medical Centers in the Area -Access to Regional Shopping Centers - Access to Public Transportation -City View (Order of Buildings, etc.)

Source: Author

Study Area

Zahedan is the administrative-political center of Sistan and Baluchistan Province of Iran. It lies in the Baluchistan Region on a relatively flat, wide plain. Zahedan is located in latitude of 29°30' N and longitude of 60°51' E. It is 1370 meters above sea level. Zahedan consists of five municipal districts. Municipal District 1 is located in south and southwestern part with population of 147528 Municipal District 3 is located in north and northwestern part with population of 199057 **[Map 1].**



Map 1: Municipal District 1 and 3 in Zahedan

RESULTS AND DISCUSSION

Comparative Evaluation of Sustainable Development Indicators of Municipal District 1 and 3, Zahedan, Iran

Four criteria were taken into account to examine the sustainable development in the Municipal District 1 and 3 of Zahedan, Iran: Sociocultural, Economic, Environmental, and Physical. A questionnaire was used to collect the data. The items are scored on a 1-to-5 Likert scale. The score 1 shows the lowest, while 5 is the greatest score. As a result, the score 3 is the theoretical median (≥3). One-sample t-test was used to investigate the utility of indicators.

Table 2: One-Sample T-Test for Sociocultural Indicators, Municipal District 1, Zahedan, Iran

Sociocultural Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
The Number of Educational Centers in the Area	1.157	149	.250	.084	-.06	.23
The Number of Medical Centers in the Area	-2.423	149	.017	-.189	-.34	-.03
The Number of Cultural Centers in the Area	-5.330	149	.000	-.442	-.61	-.28
Citizens' Social Participation in the Area	-2.306	149	.023	-.200	-.37	-.03
Public Safety and Security	1.393	149	.167	-.116	-.28	.05

According to one-sample t-test results, shown in **[Table 2]**, t statistic is positive for 1- The Number of Educational Centers in the Area and 2- Public Safety and Security, indicating that they are optimal in the Municipal District 1. T-statistic is negative for 1- The Number of Medical Centers in the Area, 2- The Number of Cultural Centers in the Area, and 3- Citizens' Social Participation in the Area, indicating that they are below the optimal level (<3) in the Municipal District 1.

Table 3: One-Sample T-Test for Sociocultural Indicators, Municipal District 3, Zahedan, Iran

Sociocultural Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
The Number of Educational Centers in the Area	-2.271	149	.026	-.220	-.41	-.03
The Number of Medical Centers in the Area	-8.631	149	.000	-.671	-.83	-.52
The Number of Cultural Centers in the Area	-9.850	149	.000	-.878	-1.06	-.70
Citizens' Social Participation in the Area	-9.723	149	.000	-.902	-1.09	-.72
Public Safety and Security	-7.253	149	.000	-.646	-.82	-.47

According to one-sample t-test results, shown in **[Table 3]**, t statistic is negative for 1- The Number of Educational Centers in the Area, 2- The Number of Medical Centers in the Area, 3- The Number of Cultural Centers in the Area, 4- Citizens' Social Participation in the Area, and 5- Public Safety and Security, indicating that they are below the optimal level (<3) in the Municipal District 3.

The comparison of sociocultural indicators shows that in the Municipal District 1, 2 indicators are optimal and 3 are below the optimal level; however, all indicators are below the optimal level in the Municipal District 3.

Table 4: One-Sample T-Test for Economic Indicators, Municipal District 1, Zahedan, Iran

Economic Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Citizens' Income Sustainability	-9.413	149	.000	-.926	-1.12	-.73
Citizens' Saving	-10.796	149	.000	-.874	-1.03	-.71
Availability of Banking and Credit Facilities	-8.945	149	.000	-.653	-.80	-.51
Utility Bills (Water, Telephone, Electricity, etc.) compared to Services	-5.543	149	.000	-.411	-.56	-.26
Job Security	-2.873	149	.005	-.242	-.41	-.07

According to one-sample t-test results, shown in **[Table 4]**, t statistic is negative for 1- Citizens' Income Sustainability, 2- Citizens' Saving, 3- Availability of Banking and Credit Facilities, 4- Utility Bills (Water, Telephone, Electricity, etc.) compared to Services and 5- Job Security, indicating that they are below the optimal level (<3) in the Municipal District 1.

Table 5: One-Sample T-Test for Economic Indicators, Municipal District 3, Zahedan, Iran

Economic Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Citizens' Income Sustainability	-11.728	149	.000	-1.122	-1.31	-.93
Citizens' Saving	-14.705	149	.000	-1.232	-1.40	-1.07
Availability of Banking and Credit Facilities	-13.564	149	.000	-1.012	-1.16	-.86
Utility Bills (Water, Telephone, Electricity, etc.) compared to Services	-8.109	149	.000	-.793	-.99	-.60
Job Security	-8.180	149	.000	-.768	-.96	-.58

According to one-sample t-test results, shown in **[Table 5]**, t statistic is negative for 1- Citizens' Income Sustainability, 2- Citizens' Saving, 3- Availability of Banking and Credit Facilities, 4- Utility Bills (Water, Telephone, Electricity, etc.) compared to

Services and 5- Job Security, indicating that they are below the optimal level (<3) in the Municipal District 3.
In general, Economic Indicators are below the optimal level (<3) in the Municipal District 1 and 3.

Table 6: One-Sample T-Test for Environmental Indicators, Municipal District 1, Zahedan, Iran

Environmental Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Air, Noise Pollution	3.009	149	.003	.232	.08	.38
Waste Collection Method	2.901	149	.005	.232	.07	.39
Beatification	-7.979	149	.000	-.642	-.80	-.48
Green Space	-6.547	149	.000	-.621	-.81	-.43
Street Lighting	-1.709	149	.091	-.137	-.30	.02

According to one-sample t-test results, shown in **[Table 6]**, t statistic is positive for 1- Air, Noise Pollution and 2- Waste Collection Method, indicating that they are above the optimal level in the Municipal District 1. T-statistic is negative for 1- Beatification, 2- Green Spaces, and 3- Street Lighting, indicating that they are below the optimal level (<3) in the Municipal District 1.

Table 7: One-Sample T-Test for Environmental Indicators, Municipal District 3, Zahedan, Iran

Environmental Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Air, Noise Pollution	-3.773	149	.000	-.305	-.47	-.14
Waste Collection Method	-3.300	149	.001	-.329	-.53	-.13
Beatification	-9.897	149	.000	-.902	-1.08	-.72
Green Space	-7.537	149	.000	-.793	-1.00	-.58
Street Lighting	-9.446	149	.000	-.854	-1.03	-.67

According to one-sample t-test results, shown in **[Table 7]**, t statistic is negative for 1- Air, Noise Pollution, 2- Waste Collection Method, 3- Beatification, 4- Green Spaces, and 5- Street Lighting, indicating that they are below the optimal level (<3) in the Municipal District 3.
The comparison of sociocultural indicators shows that in the Municipal District 1, 2 indicators are optimal and 3 are below the optimal level; however, all indicators are below the optimal level in the Municipal District 3.

Table 8: One-Sample T-Test for Physical Indicators, Municipal District 1, Zahedan, Iran

Physical Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Access to Educational Centers in the Area	3.920	149	.000	.305	.15	.46
Access to Medical Centers in the Area	3.472	149	.001	.242	.10	.38
Access to Regional Shopping Centers	-.554	149	.581	-.053	-.24	.14
Access to Public Transportation	-.118	149	.906	-.011	-.19	.17
City View (Order of Buildings, etc.)	-.881	149	.381	-.074	-.24	.09

According to one-sample t-test results, shown in **[Table 8]**, t statistic is positive for 1- Access to Educational Centers in the Area and 2- Access to Medical Centers in the Area, indicating that these indicators are above the optimal level in the Municipal District 1. T-statistic is negative for 1- Access to Regional Shopping Centers, 2- Access to Public Transportation and 3- City View (Order of Buildings, etc.), indicating that they are below the optimal level (<3) in the Municipal District 1.

Table 9: One-Sample T-Test for Physical Indicators, Municipal District 3, Zahedan, Iran

Physical Indicators	Test Value = 3					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Access to Educational Centers in the Area	-3.288	149	.001	-.317	-.51	-.13
Access to Medical Centers in the Area	-2.323	149	.023	-.195	-.36	-.03
Access to Regional Shopping Centers	-3.817	149	.000	-.366	-.56	-.18
Access to Public Transportation	-4.951	149	.000	-.488	-.68	-.29
City View (Order of Buildings, etc.)	-6.328	149	.000	-.561	-.74	-.38

According to one-sample t-test results, shown in **[Table 9]**, t statistic is negative for all indicators, indicating that they are below the optimal level in the Municipal District 3.
The comparison of sociocultural indicators shows that in the Municipal District 1, 2 indicators are optimal and 3 are below the optimal level; however, all indicators are below the optimal level in the Municipal District 3.

Ranking Effective Urban Sustainable Development Criteria in the Municipal District 1 and 3

Friedman test is used to rank the effective criteria in Municipal District 1 and 3 from the perspective of the participants **[Table 10]**.

Table 10: Ranking Sustainable Development Criteria in the Municipal District 1 and 3

District	Chi-Square	Df	Asymp. Sig.
1	87.094	3	.000
3	90.035	3	.000

According to **[Table 10]**, significance level is 0.000 for both Municipal District 1 and 3. Therefore, sustainability is not equal and the criteria can be prioritized from the perspective of the respondents **[Table 11]**.

Table 11: Prioritizing Urban Sustainable Development Criteria in the Municipal District 1 and 3

District 1			District 3		
Criteria	Mean Rank	Rank	Criteria	Mean Rank	Rank
Sociocultural	2.70	3	Sociocultural	2.69	2
Economic	1.49	4	Economic	1.45	4
Environmental	2.76	2	Environmental	2.62	3
Physical	3.05	1	Physical	3.24	1

According to **[Table 11]**, Physical Criteria were the most important in the Municipal District 1 and 3 with average rank of 3.05 and 3.24, respectively. Economic Criteria were the least important in the Municipal District 1 and 3 with average rank of 1.49 and 1.45, respectively.

Comparing Sustainable Development Criteria in the Municipal District 1 and 3

T-Test was used to study the significance of sustainable development criteria in the Municipal District 1 and 3 for two independent groups **[Tables 12-15]**:

Table 12: Significance Test for Mean Sociocultural Criteria in the Municipal District 1 and 3

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.797	.373	10.149	298	.000	.83897	.08266	.67583	1.0021
Equal variances not assumed			10.250	294.97	.000	.83897	.08185	.67744	1.0005

In Levene's test, f static is reported 0.797. The significance level is 0.373. Since it is greater than 0.05, the assumption of the equality of variances is verified. According to **[Table 12]**, t-statistic is 10.149 for the Inequality of Variances. Significance level is 0.000 (<0.05). Therefore, at 95% confidence, a significant difference is found between Municipal District 1 and 3 in terms of the Sociocultural Criteria.

Table 13: Significance Test for Mean Economic Criteria in the Municipal District 1 and 3

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	4.090	.045	8.123	298	.000	.68709	.08459	.52015	.85403
Equal variances not assumed			8.301	291.1	.000	.68709	.08277	.52370	.85047

In Levene's test, f static is reported 4.090. The significance level is 0.045. Since it is smaller than 0.05, the assumption of the equality of variances is not verified. According to **[Table 13]**, t-statistic is 8.301 for the Inequality of Variances. Significance level is 0.000 (<0.05). Therefore, at 95% confidence, a significant difference is found between Municipal District 1 and 3 in terms of the Economic Criteria.

Table 14: Significance Test for Mean Environmental Criteria in the Municipal District 1 and 3

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.043	.836	11.544	298	.000	.88871	.07699	.73678	1.04067
Equal variances not assumed			11.574	292.814	.000	.88873	.07679	.73717	1.04029

In Levene's test, f static is reported 0.043. The significance level is 0.836. Since it is greater than 0.05, the assumption of the equality of variances is verified. According to **[Table 14]**, t-statistic is 11.544 for the Inequality of Variances. Significance level is 0.000 (<0.05). Therefore, at 95% confidence, a significant difference is found between Municipal District 1 and 3 in terms of the Environmental Criteria.

Table 15: Significance Test for Mean Physical Criteria in the Municipal District 1 and 3

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	4.253	.041	7.963	298	.000	.70121	.08806	.52740	.87501
Equal variances not assumed			8.146	290.293	.000	.70121	.08608	.53128	.87113

In Levene's test, f static is reported 4.253. The significance level is 0.041. Since it is smaller than 0.05, the assumption of the equality of variances is not verified. According to **[Table 15]**, -statistic is 8.146 for the Inequality of Variances. Significance level is 0.000 (<0.05). Therefore, at 95% confidence, a significant difference is found between Municipal District 1 and 3 in terms of the Physical Criteria.

CONCLUSION

Sustainable development is a reaction against one-dimensional and merely quantitative planning development and an effort to promote the living conditions and improving the human life's

qualitative and quantitative dimensions. Therefore, this comparative study aimed to compare the sustainable development criteria in two municipal districts of Zahedan, Iran using four main criteria (Sociocultural, Economic, Environmental, and Physical). The results are as follows:

Out of 20 indicators in Municipal District 1, the results showed that 6 are optimal and 14 are below the optimal level using one-sample t-test. In Municipal District 3, all indicators are below the optimal level. According to the results of urban sustainable development, both districts are not at optimal levels; however, Municipal District 1 enjoys better condition than the Municipal District 3 in terms of urban sustainable development indicators.

Friedman test is used to rank the effective criteria in Municipal District 1 and 3. The results showed that *Physical Criteria* is the most important and *Economic Criteria* is the least important in both districts.

T-test was used to compare the urban sustainable development criteria for two independent groups in the Municipal District 1 and 3. The results show that s significant difference is found in terms of all criteria in the Municipal District 1 and 3 so that Municipal District 1 is at better condition than Municipal District 3 in terms of the mean criteria.

Recommendations

Sociocultural Solutions

1- Establishing quality educational, health and cultural centers proportional to population and standard per capita in each region
2- Motivating citizens to participate in activities of the Municipal District 1 and 3
3- Building culture through mass media and security forces in order to create a safe and peaceful environment in the Municipal District 1 and 3 in line with improving the proper spaces for leisure-time activities

Economic Solutions

1- Preparing the ground for the youth to use banking facilities for sustainable employment
2- Encouraging citizens to establish cooperatives in order to create sustainable employment and income

Environmental Solutions

1- Creating a proper and accurate mechanism to have time waste disposal in the Municipal District 1 and 3
2- Improving the beauty and lighting systems especially sidewalks
3- Creating green and public spaces such as parks, etc. in the Municipal District 1 and 3 proportional to the population

Physical Solutions

1- Properly distributing educational, medical, etc. centers for citizens' better access
2- Expanding public transportation in the Municipal District 1 and 3 in order to facilitate commuting
3- Observing the rules for proper installation of signs, building order, density, and height in the Municipal District 1 and 3

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