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Assessing the Impact of the Emergency Programme for Shadow Areas on Achieving Local Development (2020–2023): A Statistical Approach Using Principal Component Analysis (PCA) — The Case of Sidi Abdelghani Municipality, Tiaret Province.

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Abstract: This study evaluates the impact of the emergency programme on financing development projects in underserved areas of the Sidi Abdelghani municipality and its effectiveness in improving local living standards. Using principal component analysis (PCA), the findings reveal that the programme funded 33% of the total registered projects. However, 13 of the 23 underserved areas did not receive any development support, mainly due to insufficient financial resources and the high cost or limited feasibility of certain projects. Despite these limitations, the programme succeeded in lifting four areas out of the "shadow zone" by addressing most of their proposed needs and reducing key development gaps. The study concludes that although the programme achieved partial success, significant disparities remain. It recommends that local authorities adopt alternative and sustainable funding mechanisms to ensure comprehensive implementation of all registered projects and promote more balanced and inclusive local development.
Keywords: Emergency Programme, Shadow Zones, Local Development, Sidi Abdelghani Municipality

Introduction:

Like many countries around the world, especially newly independent ones, Algeria strives to ensure a dignified life for its citizens and reduce social and developmental disparities between different regions. Since regaining its independence more than sixty years ago, the Algerian state has implemented various development programmes and

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policies aimed at improving the standard of living and providing basic needs throughout the country, whether in major cities or rural and remote areas.

Among these policies is the emergency program for marginalized areas, launched to address the accumulated developmental and social inequalities in areas on the outskirts of urban centers and rural regions. These areas suffer from multiple forms of poverty and deprivation, including a lack of basic services such as electricity, gas, and potable water; the absence of paved roads; and limited public facilities such as schools and health clinics.

The Algerian state, under the leadership of President Abdelmadjid Tebboune, has allocated significant financial resources to meet the basic needs of the inhabitants of these areas, thereby promoting social and developmental justice and reducing the gap between marginalised areas and the rest of the country. This emergency program comes as a practical framework for assessing the effectiveness of development interventions in improving the living conditions of the population and helping them to fully integrate into local development.

1. Problem Statement

Based on the above, the following problem statement can be posed:

- To what extent has the emergency programme impacted the development of underserved areas within the municipality of Sidi Abdelghani, Tiaret Province?

To address this main problem, the following sub-questions are proposed:

- What is meant by “underserved areas,” and what are the key measures adopted to address their developmental challenges?
- What is the nature of the emergency program, and what impact has it had on financing development projects in the underserved areas of Sidi Abdelghani Municipality?

2. Study Hypothesis

The study is based on the following hypothesis:

- The emergency programme has financed a large proportion of the development projects implemented within the municipality of Sidi Abdelghani.

3. Importance of the Study

* This study holds significant scientific and practical value because it addresses a contemporary and sensitive development issue directly linked to the efforts of the Algerian state to reduce regional disparities and promote spatial and social justice. This is pursued through the emergency program for shadow areas, launched in 2020, which aims to improve living conditions and support balanced local development across disadvantaged territories.

3.1. Scientific Significance

* This study contributes to enriching academic literature on rural and marginalised area development by employing a modern quantitative methodology—Principal Component

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Analysis (PCA)—to measure and analyse the programme's impact on local development indicators.

* It is among the few studies that combine applied statistical analysis with development evaluation in a local Algerian context, giving it both cognitive and methodological value.

* It supports the development of quantitative tools for assessing the effectiveness of public policies in achieving the Sustainable Development Goals (SDGs), particularly in regions characterised by specific local and spatial conditions.

3.2. Practical Significance

* The study's findings help determine the effectiveness of the emergency programme in improving local development indicators—such as infrastructure, basic services, and living standards—in the municipality of Sidi Abdelghani.

* It provides a scientific decision-making tool that guides local authorities in directing future investments and programmes toward sectors that have shown weak performance or limited impact.

* It contributes to enhancing the local development planning process by clarifying the relationship between completed projects and actual development outcomes.

* The study presents a model that can be applied to other municipalities facing similar developmental challenges, thereby contributing to building a national knowledge base for evaluating shadow-area programmes.

4. Study Objectives

This study aims to identify the study variables by defining the concepts related to the term "shadow areas" and understanding the emergency program for these areas. It also seeks to determine the impact of this program on the development of shadow areas, particularly in the municipality of Sidi Abed Alghani.

5. Study Timeframe and Spatial Scope

• This study covers the period 2020-2023, which coincided with the implementation of the first phases of the emergency program, making it suitable for evaluating short-term results.

• The selection of the municipality of Sidi Abed Alghani (Tiaret Province) reflects the reality on the ground in isolated and marginalized rural areas that were the focus of state interventions, thus giving the study representative value for shadow areas in Algeria.

6. Study Methodology

In this study, we adopted the Principal Component Analysis (PCA) approach, which allows us to transform a large set of development indicators into principal components. This facilitates the interpretation of phenomena and the identification of the most influential factors in achieving development. This study also aims to analyze and describe the development projects introduced by the emergency program for disadvantaged areas and their impact on local development from 2020 to 2023, using the municipality of Sidi Abed Alghani in the province of Tiaret as a case study. The methodology employed enhances transparency and accuracy in evaluating development performance compared to traditional descriptive or qualitative approaches.

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7. Previous Studies:

The empirical literature addressing the relationship between the Emergency Programme and local development in marginalised areas of Algeria is relatively scarce. Even where available, most studies are limited to theoretical frameworks, merely analyzing available data on variables. Therefore, we have divided previous studies into local and international categories as follows:

In this regard, we focused on two local studies that addressed the topic of the Emergency Programme for marginalised areas. The first, by Warda Haddouch (Haddouch, 2021), entitled "The Nature of Marginalised Areas and an Analysis of the Emergency Programme for Marginalised Areas," focused on a descriptive and analytical reading of the development situation in the Tebessa province during 2021 and the impact of the Emergency Programme on financing development projects in the identified marginalised areas within the province. The results of this study concluded that a large number of development projects face obstacles in their implementation, necessitating the adoption of new management models for these areas, with mechanisms that allow for the smooth and effective implementation of development programmes. The efforts made by the Algerian state through the emergency programme, which funded a large number of development projects registered in the disadvantaged areas of Tebessa province, were also commended.

Meanwhile, a study by Laroussi Ghrine Zahra et al. (Zahra, Farhat, and Bougra, 2022), entitled "The Effectiveness of Government Emergency Funding (Spending) Operations for Development Projects in Disadvantaged Areas," aimed to analyse the reality of development in disadvantaged areas in Algeria and the extent to which balanced and equitable development between rural and urban areas has been achieved. A descriptive analytical study was conducted on the reality of funding development projects in the municipality of M'Sila during the period 2019-2022. The study concluded that government funding operations for development projects within the emergency programme are progressing well, and the completed projects directly impact citizens' lives, while some projects were not completed due to their lack of feasibility. As for foreign studies, we find that they focused on the local development variable for marginalised areas, which came with synonymous terms such as the development of marginalised areas, the elimination of vulnerability and social exclusion, as well as rural development or the development of rural areas.... These can be mentioned as follows:

A 2022 study by Tomasz Kusio et al. (Kusio et al.) was conducted on the topic "Are there any differences in rural development challenges within European countries? Social and economic contexts from an EU rural leader." It aimed to examine the social and economic challenges and innovative solutions in five European rural regions: Croatia (Slovakia), Germany (Münsterland, Saxony-Anhalt), Poland (Małopolska), and Portugal (Alto Minho). Comparative analyses revealed that the most important activities for mitigating development problems in rural areas include educating local communities, improving economic and digital infrastructure, supporting the production and marketing of

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local products, strengthening cooperation between local communities and producers, and directing local policies more towards providing financial support to productive enterprises and farms. The study's findings also lead to recommendations for rural policies within the framework of developing entrepreneurship strategies in rural areas.

Another study, conducted by Mzwandile Refuge Xaba et al. (2024), is titled "Evaluating the Effectiveness of Local Economic Development Strategies within Umhlathuze Local Municipality." This research paper focused primarily on evaluating the effectiveness of local economic development strategies in the Umhlathuze Local Municipality located in Empangeni. The researchers developed this study and its research problem in response to the high unemployment rates in South Africa, which particularly affect young people, especially at the municipal level. The study's findings revealed a weakness in communication between the community and the municipality, hindering the community's ability to benefit from available economic development opportunities. Therefore, the paper recommends that the municipality work on developing and improving its communication methods to ensure that the community is fully aware of the development opportunities available and offered by the municipality.

Meanwhile, researcher Petr Hlaváček et al. (2023) (Hlaváček) wrote a research paper titled "Barriers for and Standpoints of Key Actors in the Implementation of Smart Village Projects as a Tool for the Development of Rural Areas," which focused on studying key stakeholders in village development and their views on implementing smart projects, which represent a modern approach to rural development. These smart projects encompass areas such as the environment, energy engineering, and the social sphere, addressing current challenges faced by rural municipalities in preventing a widening technological and competitive gap with urban areas. The research aimed to determine the extent to which local stakeholders adopt "smart village" ideas and projects, identify the areas where smart solutions are most desirable for implementation, and pinpoint the obstacles hindering the application of these projects. The findings concluded that smart projects often contribute to building resilient communities and environments. The results also showed that mayors are more cautious than experts in implementing smart projects, approaching them with a critical stance due to a lack of financial resources and unclear positions stemming from limited information. The study found that mayors welcome better institutional and advisory support from the state and regional authorities, which help them make more effective decisions about choosing appropriate smart solutions and contributes to increasing the use of these solutions in rural municipal development.

In the same vein, there has been increasing discussion about how populations in traditional mining areas of Central and Eastern Europe cope with precarious conditions and social marginalisation. Alexandru Drăgan et al. (2024) conducted a study entitled “Neglected and Peripheral Spaces: Challenges of Socioeconomic Marginalisation in a South Carpathian Area.” The study relied on available statistical data from the South Carpathian region (specifically Gorj County). The results show that many rural

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communities in this area suffer from technological, economic, and social underdevelopment. Residents often face limited financial resources and a lack of employment opportunities, which has led to the migration of young people to major Romanian cities or abroad. The researchers conclude that, in order to prevent further social and spatial marginalization, it is essential to adopt an integrated strategy that supports economic and social development, invests in infrastructure and public services, promotes employment and vocational training opportunities, and incorporates local culture and traditions into tourism activities to foster sustainable regional development.

Researchers Angela Barbanente and Laura Grassini also presented a study in 2024 (Barbanente & Grassini, 2024) addressing landscape regeneration and place-based development in marginal areas: learning from an integrated project in Southern Salento. They aimed to contribute to the ongoing discussion on how to enhance the capacity of place-based policies to stimulate sustainable development strategies in marginalized rural areas. The study discusses a participatory, field-based research experience conducted by the researchers on an integrated landscape rehabilitation and local development project in the Southern Salento region of Italy. This rural area exemplifies peripheral regions whose suffering has been exacerbated by Olive Quick Decline Syndrome (OQDS), caused by an epidemic of the bacterium Xylella. This syndrome has transformed vast areas of traditional olive groves into desolate landscapes, further contributing to land abandonment and socioeconomic marginalization. The study concludes that reflecting on the results of this experiment can offer important insights and recommendations for future public policies aimed at supporting spatial development in marginalised areas.

Based on the above, our research aims to fill a gap in the empirical literature, particularly local literature, by focusing on measuring the impact of the emergency program on the development of the underserved areas of Sidi Abed Alghani municipality in Tiaret province. Tiaret province is among the Algerian provinces classified as having relatively weak development indicators, with many of its municipalities suffering from a lack of infrastructure and basic services, resulting in a significant number of underserved areas.

Local development reports issued by government agencies have shown that the province faces a clear spatial disparity between urban and semi-urban areas on the one hand and rural and isolated areas on the other, particularly with regard to access to drinking water, sanitation networks, roads, education, and healthcare.

This reality makes the study of the Sidi Abdelghani municipality in Tiaret province a model case study for examining the impact of emergency development programs, particularly the programme for underserved areas launched in 2020 with the aim of reducing spatial disparities and improving the living standards of residents in marginalised regions. Therefore, studying the underserved areas of the Sidi Abdelghani municipality in Tiaret province presents a scientific opportunity to evaluate the effectiveness of public policies in promoting local development and achieving spatial equity in Algeria.

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Accordingly, this study seeks to answer the following research question: To what extent has the emergency programme impacted the development of the underserved areas of the Sidi Abdelghani municipality in Tiaret province?

To address this issue, the theoretical section of the study will first examine the concept and characteristics of underserved areas, their classification indicators, and the measures taken to address them. The second section will focus on the applied aspect (methodology and tools), including the study model, the study variables, and finally, the presentation and discussion of the results. The study concludes with a summary highlighting the most important conclusions and recommendations.

The first axis: Theoretical framework of the study variables

This axis will explore the concept and characteristics of marginalised areas and the indicators used to identify them in Algeria, as well as the measures taken to address these areas through the emergency programme established by the Ministry of the Interior under the supervision of the President of the Republic in 2020.

1- The Concept and Characteristics of Shadow Zones

The term "shadow zones"—as a synonym for marginalised, fragile, neglected, remote, or isolated areas—emerged prominently in media and political discourse following the meeting held by the President of the Republic with the governors on February 16-17, 2020. During this meeting, President Abdelmadjid Tebboune presented a detailed report on development in marginalised, neglected, and remote areas deprived of the most basic requirements for a decent life in Algeria. To galvanise the Walis and, by extension, local officials, the term "shadow zones" was introduced, aiming to emphasise the magnitude of their responsibility to address the needs of these areas and eliminate developmental disparities within society. Consequently, numerous researchers have endeavored to provide suitable definitions for shadow zones, each according to their own perspective. One such definition states that "shadow zones are those areas isolated from urban centers, lacking public facilities and infrastructure. Their inhabitants live in harsh conditions as a result of the unequal distribution of local resources" (Rahali, Boultif, and Bouafia, 2022).

[Note: The phrase "shadow zones" appears to be a separate, unrelated statement and has been omitted from the translation.] Another definition describes shadow areas as “areas that repel people due to the lack of infrastructure such as road networks, gas and electricity networks, and the lack of potable water, in addition to the lack of educational schools and health facilities. “All of this reflects the local authorities’ lack of interest in these areas and their failure to address the developmental shortcomings affecting them.” (Hadouch and Bessa, 2021).

Based on the preceding definitions, it can be said that ***shadow areas are regions that have not benefited from the fruits of development, such as educational and health facilities and infrastructure, like other urban areas.*** Consequently, there is an imbalance in living standards between urban residents and residents of these shadow areas. They live

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in deplorable and disastrous conditions because these areas were overlooked by planners and developers when development programs were formulated.

In the same vein, and based on the previous definitions that highlighted aspects of geographical isolation, lack of infrastructure, and developmental marginalization, a set of distinctive characteristics of shadow areas can be deduced. These characteristics illustrate the extent of deprivation and the developmental gap that these areas suffer compared to urban areas. They also highlight the fundamental factors that force their residents to live in difficult and deplorable conditions and help to understand the nature of the developmental challenges facing this segment of communities. The most important characteristics can be summarized as follows:

Geographical isolation: These areas are situated far from urban centres, making them difficult to access and limiting their integration into wider economic and social activities.

* **Lack of infrastructure and public facilities:** They suffer from inadequate road networks, limited access to electricity, gas, and potable water, and a scarcity—if not complete absence—of educational and healthcare facilities.

* **Developmental marginalisation:** These localities do not benefit from development programmes and government projects to the same extent as urban areas, with local resources and capacities being unevenly distributed.

* **Migration and population displacement:** Due to insufficient services and limited opportunities, these areas frequently experience out-migration, with residents moving to cities or more developed regions.

* **Poor living conditions:** Residents often face deplorable living standards across multiple dimensions, including education, health, housing conditions, and access to basic services.

* **Lack of administrative attention:** Minimal intervention by local authorities in addressing developmental shortcomings further exacerbates marginalisation and widens the gap between urban and underserved areas.

2- Indicators for Identifying and Classifying Shadow Areas

The Ministry of the Interior and Local Authorities in Algeria has developed a set of indicators to help it accurately identify and classify shadow areas, including:

Table (1): Local classification indicators for shadow areas in Algeria

Sector	Index	Calculation Formula
Public Works	- Average length of paved roads - Road density relative to population	- (Total length of paved roads / Total length of road network) 100 - Total population / Total length of road network

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Education	- Primary, middle, and secondary school enrollment rates - Primary school class occupancy rates - Primary school gas connection rates - Total number of school buses	- (Number of students in primary, middle, and secondary schools / Number of teachers in primary, middle, and secondary schools) - (Number of pupils in primary school/Number of classrooms in primary schools). - Number of primary schools connected to the gas network / Total number of primary schools) 100. - (Number of parties owned by the municipality + Number of buses rented for school transport).
Health	- One general practitioner per 1000 people. - One specialist per 1000 people. - Number of paramedics per 1,000 inhabitants. - Number of beds in polyclinics. - Number of treatment rooms. - Number of maternity wards. - Number of pharmacies.	- Total number of general practitioners / Total population. - Total number of specialists / Total population. - Number of paramedics / Total population.
Water Resources	- Connection rate to the drinking water network. - Connection rate to the sewage network. - Number of daily hours of drinking water distribution.	- (Number of dwellings connected to drinking water / Total number of dwellings) 100. - (Number of dwellings connected to the sewage network / Total number of dwellings) 100.

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Energy	- Gas grid connection rate. - Electricity grid connection rate.	- (Number of dwellings connected to the gas network / Total number of dwellings) 100. - (Number of dwellings connected to the electricity network / Total number of dwellings) 100.
Postal Services and Communications	- Telephone density. - Internet connectivity density. -	(Number of telephone lines/population) 1000. - (Number of internet subscribers/population) 1000.
Employment	- Percentage of workers per sector	- (Working population per sector / Total working population) 100.
Youth and Sports	- Number of sports halls. - Number of municipal and neighborhood sports fields. - Number of indoor swimming pools. - Youth hostel.	

Source: Prepared by researchers using the Geographic Information System for Social and Economic Indicators

Key Measures Taken to Address the Needs of Underserved Areas

Underserved areas represent one of the most significant development challenges facing many Algerian provinces, owing to weak infrastructure and a lack of basic services that directly affect residents' quality of life. In response, the Algerian government has adopted a series of measures aimed at improving living conditions in these areas by identifying their actual needs and implementing urgent development programmes. The following outlines the most important measures adopted at both the national and local levels to ensure effective support for underserved areas (see Figure 1):

* Issuance of Instruction No. 853 (26 February 2020): Issued by the Minister of the Interior, Local Authorities, and Urban Planning, this instruction established a joint ministerial committee tasked with developing the necessary criteria for surveying underserved areas and identifying their needs (Tayoub & Houchine, 2023).

* Directive No. 854 (26 February 2020): Also issued by the Minister of the Interior, Local Authorities, and Urban Planning, this directive instructed local authorities—particularly provincial governors—to redirect stalled development projects to address the actual needs of underserved areas. This was to be achieved by allocating funds within the 2020

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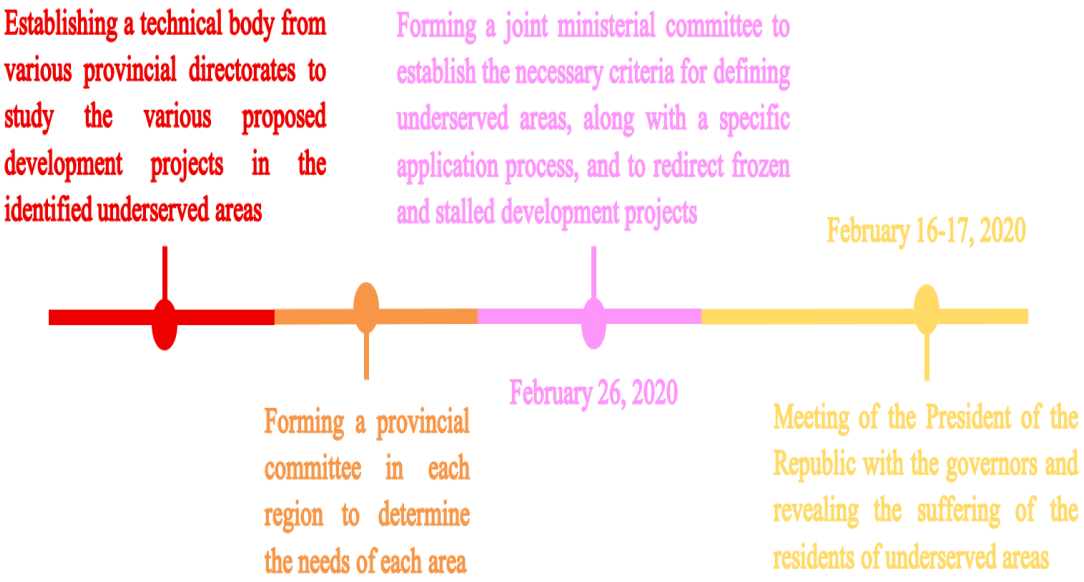
Municipal Development Plans to support projects with a direct and immediate impact on residents (Tayoub & Houchine, 2023).

* Launch of a digital application (26 February 2020): A specialised application was introduced to identify underserved areas and develop an emergency programme targeting the basic needs of their populations (Tayoub & Houchine, 2023).

* Creation of provincial committees: Each province established a committee responsible for identifying underserved areas and determining their specific needs and priorities. These committees coordinate with the joint ministerial committee to ensure effective implementation of the emergency programme (Mahi & Nadi, 2023).

* Establishment of a technical unit: A technical cell composed of specialists from various state bodies and directorates was formed to examine proposed development projects and assess their feasibility (Ben Harkou, 2024).

Figure (1): The most important decisions taken during 2020 for the benefit of marginalized areas



Source: Prepared by researchers

The Concept of the Emergency Programme:

The Emergency Programme is an urgent development initiative that emerged from meetings held between the government and provincial governors in February and August 2020. The programme aims to reduce developmental disparities across all provinces of the country. Its objectives include meeting the population's needs for potable water, expanding access to energy sources such as gas and electricity, and improving educational conditions for students at all levels—particularly through enhanced school transport and meal

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provision. The programme also encompasses the construction of essential public facilities to reduce the isolation of remote and mountainous regions, commonly referred to as "shadow areas" (Hadouch & Bessa, 2021).

The Ministry of the Interior, Local Authorities, and Urban Development allocated a budget of 188.42 billion Algerian dinars (DZD) to finance approximately 12,841 development projects. These projects target the majority of the 13,587 identified underserved areas nationwide, which collectively have a population of around 8 million (Ministry of the Interior, Local Authorities, and Urban Development, Activity Report on the Development of Underserved Areas, 2020–2021).

The Minister of the Interior, Local Authorities, and Urban Development, Mr Ibrahim Mourad, confirmed in an interview with the Algerian Press Agency (APS) that the Emergency Programme implemented by the end of 2022 resulted in the completion of 30,277 development projects in record time. These projects benefited approximately 5.9 million people across 10,917 underserved areas, with a total budget of roughly 359 billion DZD. This initiative forms part of the broader efforts undertaken by the Algerian state to eliminate underserved areas, achievements made possible through the political will of the President of the Republic (2022).

Second Axis: Applied Study – Methodology and Tools

In the applied component of this study, we focus on assessing the impact of the Emergency Programme on the development of the underserved areas within the municipality of Sidi Abed Alghani, located in Tiaret Province. The analysis relies on available data covering the period 2020–2023, which corresponds to the data collected by public authorities in the context of their announcements regarding the eradication of underserved areas beginning in 2020 through the implementation of emergency development programmes.

1. Introduction to the Study Data:

The study was carried out in the underserved areas of the municipality of Sidi Abedlghani, situated to the east of Tiaret Province, approximately 34 km away (see Figure 2). This municipality, with a population of around 9,300 inhabitants, contains 23 underserved areas identified in 2020 by joint municipal and provincial authorities. These areas were recognised as having a range of essential needs, which were consolidated into 60 development projects included within the Emergency Programme.

The study dataset consists of 24 observations: the number of underserved areas within the municipality of Sidi Abed Alghani, Tiaret Province, and four quantitative variables representing (1) the population of each area, (2) the completed development projects, (3) their associated costs, and (4) the number of projects registered but not yet implemented.

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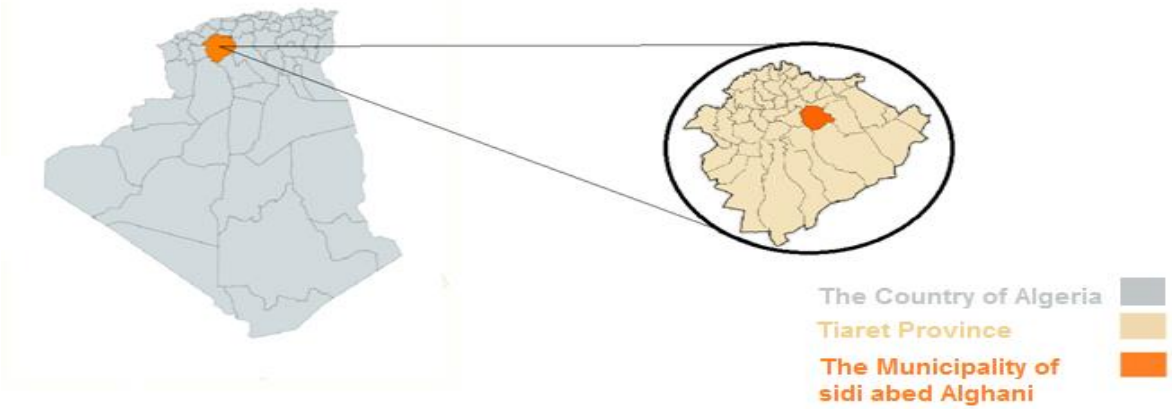
Figure (2): The geographical location of the Municipality of Sidi Abdelghani



Source: Prepared by researchers based on:
MapChart. (n.d.). *Africa detailed map [Web page]. Retrieved October 15, 2025, from: https://www.mapchart.net/africa-detailed.html*

Principal Component Analysis (PCA) was used for projects registered in the emergency programme of the Sidi Abed Alghani municipality.

The aim of this method is to analyse the correlations between the study variables. PCA is used when there are a large number of quantitative variables, in order to reduce and prioritise them according to their importance. This ensures the preservation of available information and facilitates its analysis and understanding (Qaddar & Aidoudi, 2019).

When the study data was entered into the PCA application using XLSTAT software, the following results were obtained:

Table (2): Arithmetic means and standard deviations of the variables

standard deviation	arithmetic mean	largest value	smallest value	variables
206,9170	346,5217	785,0000	140,0000	Population
1,3247	0,8696	5,0000	0,0000	Number of completed development projects
0,8643	1,7391	4,0000	1,0000	Number of registered but unrealized projects
13371968,3085	7429965,4783	57351989,0000	0,0000	Cost of completed projects

Source: Prepared by researchers based on 14XLSTAT outputs

The table above shows a marked variation in the mean values, with the highest average recorded for the variable cost of completed projects followed by population and number of registered but incomplete development projects. The variable number of completed development projects had the lowest mean value.

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Regarding standard deviations, the variable number of registered but incomplete development projects exhibited the smallest standard deviation and is therefore the most stable, contributing to data concentration. In contrast, the variable cost of completed projects had the largest standard deviation, indicating that it contributed most to the dataset's dispersion. The relatively small standard deviation of the number of registered but incomplete development projects suggests a degree of consistency in its distribution.

Table (3): Bartlett's test for correlation between variables

Khi² (Valeur observée)	65,1953
Khi² (Valeur critique)	12,5916
DDL	6
p-value	< 0,0001
Alpha	0,05

Source: Prepared by researchers based on 14XLSTAT outputs

Table (4): Meyer-Olkin Sample Adequacy Test

0,5342	Population
0,5601	Number of completed development projects
0,8399	Number of registered but unrealized projects
0,5516	Project budget
0,5891	KMO

Source: Prepared by researchers based on **14XLSTAT** outputs

We note from the table above that the KMO value is 0.5891, which is greater than 0.5, indicating the quality of the data.

Table (5): Correlation Matrix (Pearson (n)

Cost of completed projects.	number of registered but unrealized projects	number of completed development projects	population	variables
0,4370	0,4064	0,5861	1	Population
0,9418	0,5644	1	0,5861	Number of completed development projects
0,5933	1	0,5644	0,4064	Number of registered but unrealized projects
1	0,5933	0,9418	0,4370	Project budget

Source: Prepared by researchers based on **14XLSTAT** outputs

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The correlation matrix shows that all variables are positively associated and move in the same direction. The population variable displays a moderately positive correlation with the number of completed development projects and a weaker yet still positive correlation with both the number of registered but incomplete projects and the cost of completed projects.

Furthermore, the number of completed development projects has a very strong positive correlation with the cost of completed projects and a moderately positive correlation with both the number of registered but incomplete projects and the population. By contrast, the number of registered but incomplete development projects demonstrates a moderate positive correlation with the number of completed projects and the cost of completed projects, whilst its correlation with the population is positive but weaker.

Similarly, the cost of completed projects shows a very strong positive correlation with the number of completed development projects, a moderate positive correlation with the number of registered but incomplete projects, and a weak positive correlation with the population variable. Taken together, these patterns suggest a degree of homogeneity amongst the variables, indicating that they tend to move together consistently.

Table (6): Eigenvalues:

	F1	F2	F3	F4
Eigenvalue	2,7986	0,6359	0,5256	0,0399
Variability (%)	69,9655	15,8963	13,1396	0,9986
% Cumulative	69,9655	85,8618	99,0014	100,0000

Source: Prepared by researchers based on 14XLSTAT outputs

As shown in the table above, axes F1 and F2 account for 85.86% of the total inertia which is a sufficiently high proportion to provide a clear representation of the point cloud on the first two axes. Accordingly, the variables will be projected onto a single, two-dimensional orthonormal plane.

2.1 Graphical Representation of Variables in a Correlation Circle

To examine the relationships between the developmental variables of the populations in the study areas, we applied a two-dimensional orthonormal parameter analysis (PCA). This method is effective for simplifying the representation of multidimensional data and for highlighting underlying structures and correlations between variables (see Figure 3). It enables a graphical depiction of variables within a correlation circle, illustrating both the strength and direction of their correlations with the principal axes that account for the majority of variance in the dataset. This form of representation is a crucial step in understanding the interactions between various developmental indicators and in identifying the variables that exert the greatest influence on the phenomenon under investigation.

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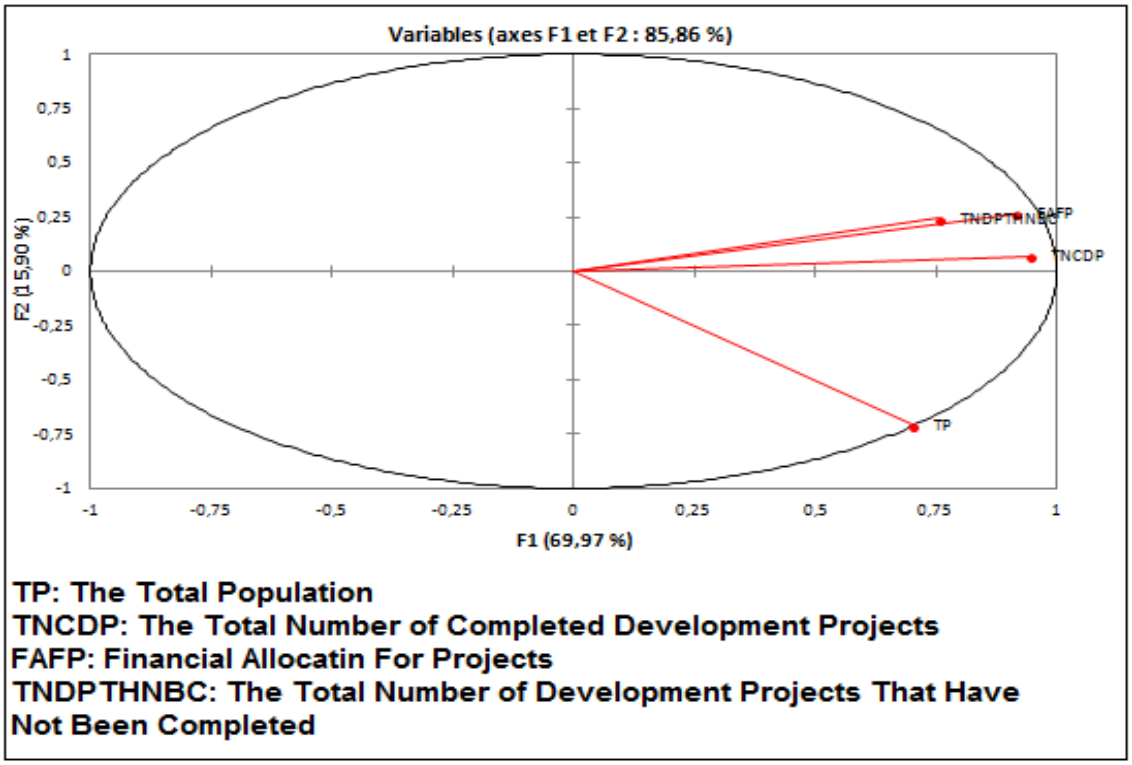
Figure (3): Graphical representation of variables



Source: Prepared by researchers based on 14XLSTAT outputs

Figure 1 shows that all variables have a strong and positive correlation with axis F1, which accounts for its high contribution (69.96%) to the overall inertia of the variables. The variables, representing the number of completed development projects and the cost of completed projects display the strongest correlations with this axis (0.94 and 0.91, respectively), compared with the population variable and the number of registered but incomplete projects (0.70 and 0.75, respectively).

Axis F2, on the other hand, exhibits positive but weak correlations with several variables, including the number of completed development projects, the cost of completed projects, and the number of registered but incomplete development projects. However, it shows a strong negative correlation with the population variable (-0.7075).

2.2 Graphical Representation of Individuals on the Main Axes

In examining the spatial distribution of the study areas, the graphical representation of individuals on the principal axes provides an effective means of visualising similarities and differences between these areas based on their developmental characteristics. This representation enables the identification of groups that share similar profiles and levels of benefit from development projects, while also distinguishing regions that diverge from the general pattern in terms of the scale and quality of projects completed within the emergency programme (see Figure 4).

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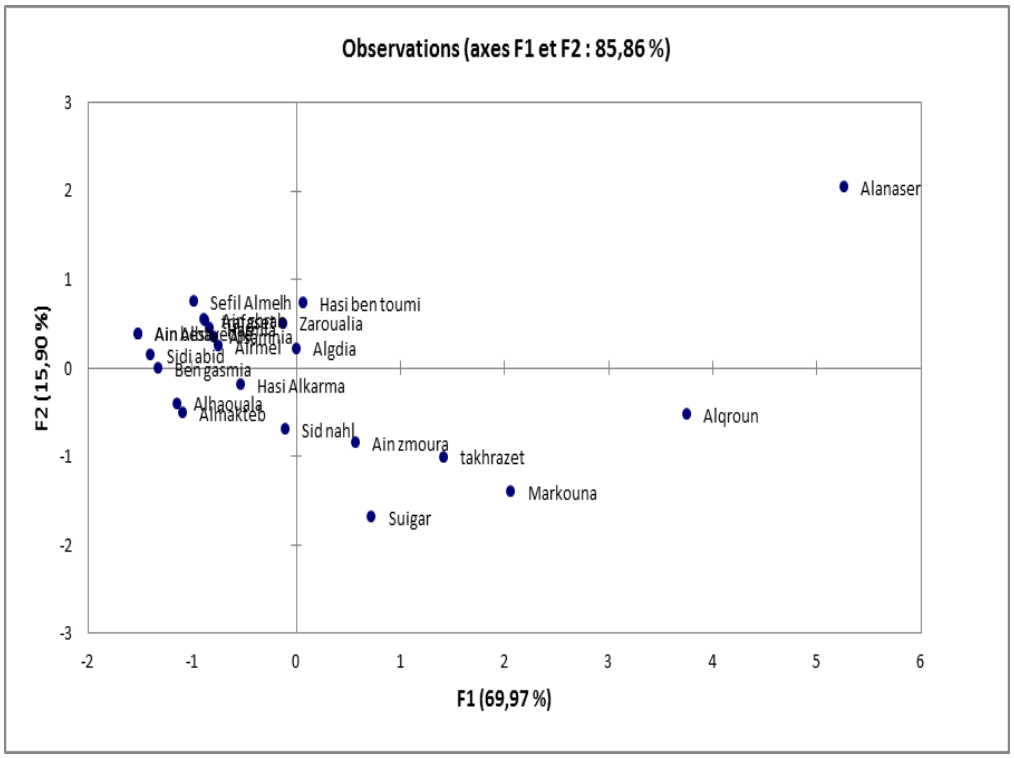
Figure (4): Representation of individuals on the two axes



Source: Prepared by researchers based on 14XLSTAT outputs

Figure 2 indicates a strong correlation among the following areas: Alhaouala, Alrmel, Alsamnia, Trafaset, Hasi Alkarma, Harmla, Sefil Almelh, Ain Ghrab, Ain Besti, Ben Gasmia, Sidi Abid, Ain Albayedha, and Almakteb. This suggests that these areas share similar characteristics, particularly in that none of them benefited from any development projects under the emergency programme. Another group of areas—Ain Zmoura, Sid Nahl, Suigar, Algdia, Markouna, and Zaroualia—also cluster together, as each received at least one development project.

By contrast, the areas of Alqroun and Alanaser stand out from the rest, owing to the comparatively large number of projects they received within the emergency programme. Alanaser benefited from nine development projects, five of which were completed, whereas Alqroun benefited from seven projects, of which only three were completed.

3. Analysis of the Study Results

Figure 5, in its first part, shows that the majority of projects undertaken in the surveyed shadow areas were directed towards the water resources sector, which received nine out of a total of twenty development projects. This is followed by the education sector with six projects, and then the public works and energy sectors with three and two projects, respectively.

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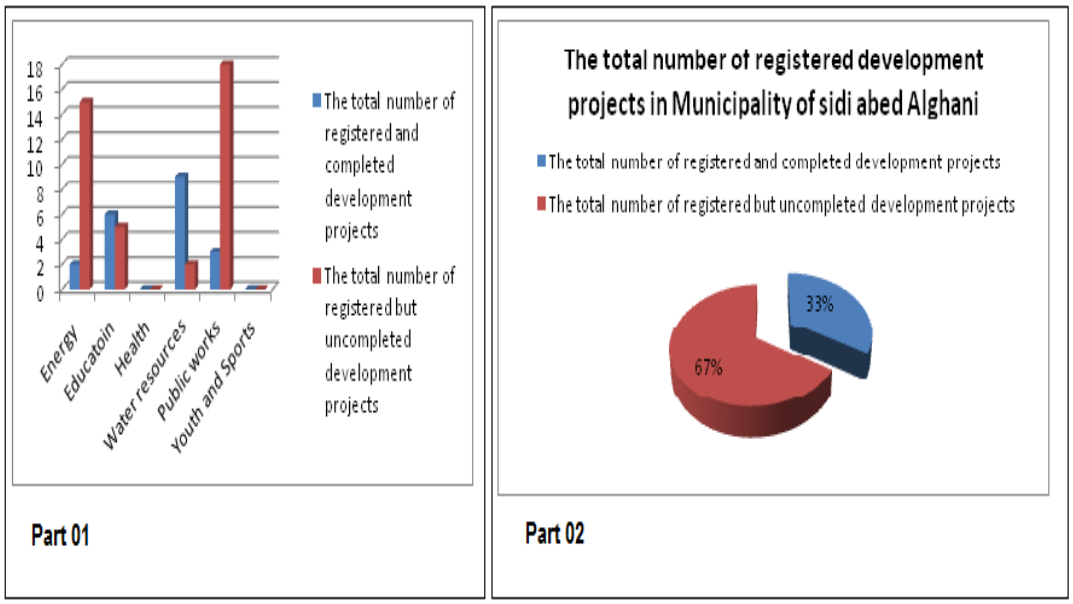
Figure (5): Summary of registered projects by sector at the level of the municipality of Sidi Abdelghani



Source: Prepared by researchers

Despite the commendable efforts undertaken by the Algerian state to reduce social disparities and address the needs of citizens in the underserved areas of the Sidi Abed Alghani municipality, a substantial number of development projects remain unimplemented. This shortfall is particularly evident in the public works sector, where 21 projects were registered under the emergency programme, yet only 3 were completed, leaving 18 unfinished. A similar situation is observed in the energy sector: of the 17 projects included, only 2 were brought to completion, while 15 remain pending. The education sector also recorded 11 development projects, of which only 5 were completed. In marked contrast, the water resources sector achieved a considerably higher implementation rate, with 9 out of 11 projects completed.

As illustrated in the second part of Figure 5, the proportion of completed projects registered under the emergency programme amounts to only 33% of the total 60 development projects planned for the underserved areas of the Sidi Abed Alghani municipality, whereas the proportion of unfunded registered projects stands at 67%.

The principal reason for the non-funding of the remaining projects is the insufficiency of the financial resources required for their completion. Additionally, some projects face technical and engineering constraints that hinder their implementation, while others are characterised by excessively high costs.

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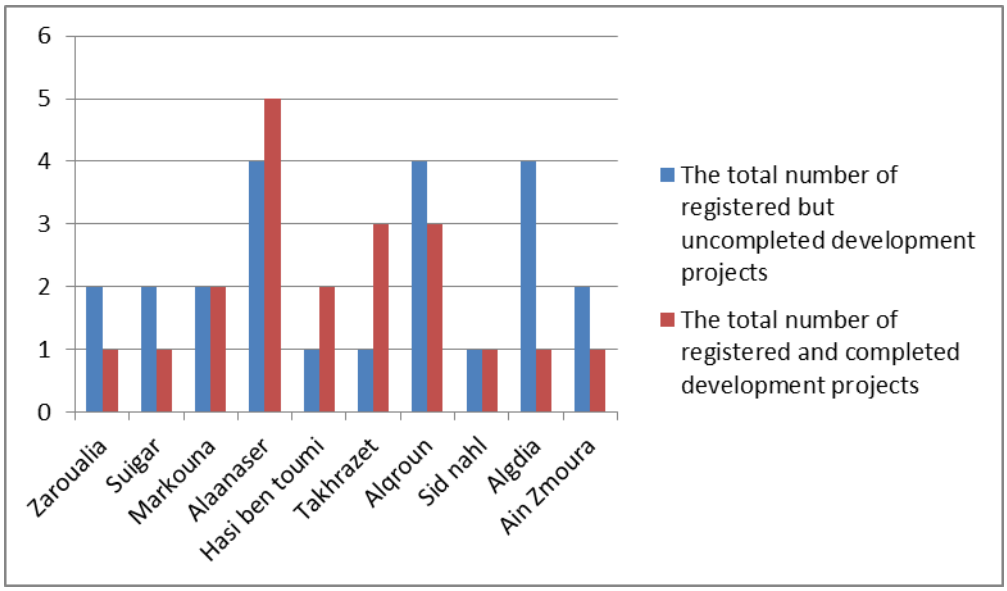
Figure (6): Development projects registered at the level of shadow areas



Source: Prepared by researchers

As shown in the figure above, the Alanaser area benefited from the largest number of development projects—five out of the nine projects registered under the emergency programme—compared with the other areas. These projects included the installation of propane gas tanks, the renovation of the primary school and its connection to solar power, and the construction of staff housing. A 13 km road was also completed, along with the equipping of a drinking water well. However, four projects remain unimplemented.

The Takhrazet and Alqroun areas each benefited from three development projects. In Takhrazet, projects included the construction of a classroom in the primary school, the construction of a 1.4 km road, and the repair of the edges and sides of the road linking the area to the municipal capital, Sidi Abed Alghani. One project in this area remains unimplemented. Alqroun also benefited from three projects, all of which involved drilling and equipping drinking water wells, while four other development projects allocated to the area were not implemented.

The Markouna area received two projects, both related to equipping a drinking water well and installing a drinking water storage tank; however, neither of these projects was implemented. The Hasi Ben Toumi area benefited from the equipping of two drinking water wells, while one additional project was not carried out. The remaining areas—Ain Zmoura, Sidnahl, Suigar, Algdia, and Zaroualia—each benefited from only one project. These projects were primarily focused on constructing classrooms in primary schools to reduce overcrowding, with the exception of Sidnahl, which benefited from a 3.5 km road construction project. Thirteen other underserved areas identified in the study did not benefit from any projects registered under the emergency programme.

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An analysis of the study's findings indicates that the emergency programme failed to cover a significant number of the underserved areas within the Sidi Abed Alghani municipality. This shortfall is mainly attributable to insufficient funding, as the financial requirements for completing all registered projects exceed the available resources in the short term.

It can also be observed that some areas have begun to emerge from the shadows, having benefited from development projects identified as priorities within the emergency programme. These areas include Alanaser, Takhrazet, Alqroun, and Hasi Ben Toumi. Conversely, other areas—such as Zaroualia, Suigar, Algdia, Ain Zmoura, and Sidnahl—remain in the shadows despite receiving limited development interventions, as their broader development needs remain unmet and several of their registered projects were not implemented.

Conclusion and Recommendations

Despite the substantial efforts made by the country's highest authorities to reduce developmental disparities between regions and provinces through the implementation of an emergency programme dedicated to funding priority projects in underserved areas, a significant challenge remains in establishing an effective mechanism capable of addressing all the needs of citizens residing in these areas. Although the programme aims to achieve equitable development by ensuring that every individual, regardless of geographic location, has access to essential public facilities and infrastructure, its practical impact has been limited. The findings of this study, focused on the Sidi Abed Alghani municipality in the province of Tiaret, clearly indicate that the emergency programme did not fund all of the development projects registered within it. This undermines the assumption that the majority of projects in the municipality were financed through the emergency programme for underserved areas.

* In light of these findings, both national and local authorities must adopt additional measures to complement the development projects outlined in the emergency programme. Accordingly, the following recommendations may help stimulate development in underserved areas:

* Distribute development projects across areas with moderate population density to enhance their dynamism and reduce disparities in access to public facilities, particularly in municipalities with a large number of underserved communities.

* Establish public facilities in central locations shared by neighbouring areas, ensuring more efficient and equitable access while avoiding the duplication of services and reducing overall implementation costs.

* Strengthen the involvement of the private sector in the development of underserved areas by encouraging investment and making effective use of available local resources.

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* Encourage municipalities to actively seek new sources of funding for their development initiatives through partnerships with private economic and financial institutions.

* Support and incentivise municipalities in mobilising and investing their own local resources, thereby promoting greater self-reliance and sustainable development.

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Appendices:

Appendix (1): Statistical reports issued by the General Secretariat of the Wilaya of Tiaret

Financial Coverage of Projects	Number of Registered but Uncompleted Projects	Number of Completed Development Projects	Population	Region
5000000	2	1	240	**Zaroualia**
1513823	2	1	720	**Suigar**
0	1	0	320	**Alhaouala**
57351989	4	5	425	**Alanaser**
20000000	2	2	780	**Markouna**
14962000	1	2	180	**Hasi ben toumi**
0	2	0	255	**Alrmel**
0	2	0	230	**Alsamnia**

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18000000	1	1	300	**Algdia**
15979394	1	3	600	**takhrazet**
0	2	0	190	**trafaset**
0	2	0	355	**Hasi Alkarma**
0	2	0	210	**Harmla**
0	2	0	140	**Sefil Almelh**
0	2	0	185	**Ain ghrab**
24200000	4	3	785	**Alqroun**
6000000	2	1	555	**Ain zmoura**
0	1	0	140	**Ain besti**
0	1	0	230	**Ben gasmia**
7882000	1	1	450	**Sid nahl**
0	1	0	195	**Sidi abid**
0	1	0	140	**Ain Albayedha**
0	1	0	345	**Almakteb**

Appendix (2): Correlation coordinates between variables on the two main axes

	F1	**F2**	**F3**	**F4**
Population	0,7018	-0,7075	0,0772	-0,0319
Number of completed development projects	0,9457	0,0723	-0,2821	0,1442
Number of registered but unrealized projects	0,7574	0,2424	0,6062	0,0116
Cost of completed development projects	0,9155	0,2671	-0,2693	-0,1341

Appendix (3): Individual coordinates on the two principal axes

Observation	**F1**	**F2**	**F3**	**F4**
Zeroualia	-0,1259	0,5077	0,2318	0,2993
Souiger	0,7232	-1,6860	0,5835	0,0995
Hawala	-1,1412	-0,4007	-0,2729	-0,1329

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Elements	5,2648	2,0366	-0,3806	-0,1677
Markouna	2,0575	-1,4056	-0,2103	-0,3395
Hassi Ben Toumi	0,0674	0,7363	-1,3723	0,3237
Ramel	-0,7403	0,2439	0,6821	-0,0129
Semnia	-0,7922	0,3535	0,6689	0,0068
Qedia	0,0069	0,2180	-1,0950	-0,4838
Takhraza	1,4169	-1,0091	-1,4804	0,4971
Trafast	-0,8751	0,5289	0,6479	0,0384
Hassi El Karma	-0,5330	-0,1945	0,7347	-0,0918
Harmala	-0,8336	0,4412	0,6584	0,0226
Sefil El Melh	-0,9787	0,7481	0,6215	0,0778
Ain Ghrab	-0,8854	0,5508	0,6452	0,0423
El Qoroun	3,7511	-0,5307	1,3512	0,1355
Ain Zemoura	0,5689	-0,8477	0,3693	-0,0005
Ain Basti	-1,5143	0,3885	-0,3677	0,0091
Ben Kasmia	-1,3277	-0,0061	-0,3203	-0,0619
Sidi Nahal	-0,1055	-0,6988	-0,7287	-0,0830
Sidi Abid	-1,4003	0,1473	-0,3387	-0,0343
Ain El Beida	-1,5143	0,3885	-0,3677	0,0091
El Maktab	-1,0893	-0,5103	-0,2598	-0,1527

Appendix (4): Summary of development projects registered by sector at the level of the municipality of Sidi Abdelghani

Uncompleted Registered Projects	**Completed Registered Projects**	**Projects** / **Sector**
15	**2**	Energy
5	**6**	Education
0	**0**	Health
2	**9**	Water Resources
18	**3**	Public Works
0	**0**	Youth and Sports
40	**20**	Total Projects

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Appendix (5): Shadow areas benefiting from development projects

Deprived regions	The total number of registered and completed development projects	The total number of registered but uncompleted development projects	Deprived regions	The total number of registered and completed development projects	The total number of registered but uncompleted development projects
Zaroualia	1	2	Takhrazet	3	1
Suigar	1	2	Alqroun	3	4
Markouna	2	2	Sid nahl	1	1
Alaanaser	5	4	Algdia	1	4
Hasi ben toumi	2	1	Ain Zmoura	1	2