Statistical Surveys, Knowledge Economy in the Agri-Food Sector: A Lever for a Competitive Economy in Algeria

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ABSTRACT

In the context of economic diversification in resource-dependent economies, statistical surveys play a strategic role in transforming dispersed information into structured knowledge that supports competitive development. This study examines the contribution of statistical surveys to the knowledge economy within Algeria's agri-food sector, using a field survey of 110 SMEs in the province of Blida. Beyond descriptive analysis, the study applies inferential statistical methods, including Chi-square tests and logistic regression modeling, to identify structural relationships between managerial human capital, territorial knowledge infrastructure, and sectoral specialization. The findings reveal a statistically significant association between education level and participation in technologically intensive agri-food activities. Logistic regression results further confirm that higher education, accumulated sectoral experience, and proximity to research laboratories significantly increase the likelihood of technological upgrading. These results demonstrate that statistical surveys function not merely as data collection instruments but as institutional mechanisms enabling rational decision-making, territorial intelligence, and competitive positioning. The study contributes to the literature on knowledge-based development by empirically linking micro-level firm characteristics to broader structural transformation processes in Algeria's agri-food economy.

Keywords: Statistical surveys; Knowledge economy; Agri-food SMEs; Human capital; Competititive upgrading; Algeria. Classification JEL: O31, O32, O14, C83, L66.

INTRODUCTION

In the era of the global economy, knowledge has become a crucial pillar for a country's development. Investing qualitatively in human resources is now essential to ensure performance and competitiveness on an international scale (Hamdani, 2017). The demand for statistical information is critical for competitiveness, both for the sustainability of businesses and for the development of a state's or region's territories. With economic expansion and diversification, these ever-increasing information needs are becoming more varied. Consequently, statistical methods continue to improve and evolve, especially in developed countries (Hamdani & Ferdj, 2014). The timely availability of statistical information enables companies and governments to avoid navigating blindly, making it a vital tool for the rational management and allocation of human and material resources (Gurgand, 2000). The continuous improvement of statistical processes has led to constant progress in governance models, whether for a state or a company. The primary objective of the statistical tool is to facilitate strategic decision-making for economic development actors, both for businesses and the state, particularly in an open and globalized economy. In short, the goal is to direct all structures, in terms of both supply and demand for statistical information, toward a renewed approach.

In Algeria, one of the sectors that has experienced remarkable dynamism in recent years is the agri-food industry. This sector stands out for its significant contribution to value creation, ranking among the top industries contributing to the Gross Domestic Product (GDP) with satisfactory rates. It is also a major source of job creation (Akkarene & Bouda, 2021). The diversity of the industries within it makes it a promising factor

for the diversification and competitiveness of the national economy, which has struggled to assert itself (Abedou & Djouab, 2018).

Moreover, agri-food activities play a crucial role in the Algerian productive system. They are often regarded as a driver of development and an essential lever for generating wealth. Through the implementation of various development plans, the agri-food sector in Algeria has gained increasing importance in the national economy. It has become a truly dynamic hub of creation. With more than 962,000 jobs annually and a total production value of approximately 523 billion DZD (4 billion US dollars) (ONS, 2019), the agri-food sector is increasingly confirming its role as a major job provider, wealth creator, and a key element of economic integration (Ferdj, 2024).

This work aims to clarify several concepts related to statistical surveys, as well as economic and social development, focusing on the agri-food sector, which is a crucial lever for a competitive economy. More specifically, the Blida province, located in the fertile Mitidja plain, has a natural agricultural vocation that promotes its development in the agri-food sector (Ferdj, 2022). The agri-food businesses in this province represent 15% of the local industry (i.e., 763 companies) and employ 11,027 workers, or 27% of industrial employment (Activity Report, DIM-2019).

We will test the core of our theme in the field, namely the role of statistical surveys in economic and social development, using the agri-food sector as a practical case study (Ferdj & Djeflat, 2024). To this end, we have developed a questionnaire addressed to SMEs in the agri-food sector located in the Blida province. Our main question is: How do statistical surveys contribute to economic and social development? What is their involvement and mobilization in support of the knowledge economy within the agri-food sector, a driving force for a competitive economy in Algeria?

This work is divided into five main sections, allowing for exploratory and explanatory statistical analyses to address our research question. Section two will focus on the presentation of statistical survey techniques and methods, including the various stages of a survey, which are deemed necessary for our analytical work. Particular attention will be given to the concept of the food chain, providing an overview of the agri-food industry's activities. Section three will examine the different industrial policies of Algeria over the past two decades and the development programs for agri-food industries, aiming at making them competitive on the international scene. Section four will be dedicated to the processing and interpretation of the data collected in the field of agri-food. In section five we will discuss the key specific features of statistical surveys, using the agri-food sector as a lever for a competitive economy in Algeria.

LITERATURE REVIEW

Statistical Surveys, Economic and Social Development and knowledge Economy Prospects Statistical Surveys,

According to H. Hamdani (2017), "*a statistical survey is a tool for collecting, investigating, explaining, interpreting, and analyzing economic and social phenomena. It allows one to understand their environment in order to act and resolve a situational problem."* Therefore, a statistical survey is a tool for gathering information through a statistical methodology based on a sequence of operations connecting the surveyor and the respondent via a questionnaire, which constitutes the support for the requested information. This information is then processed, analyzed, and produced in the form of tables, ratios, and other predefined indicators (Toumache, 2002).

Statistical surveys are crucial tools for understanding and fostering economic and social development. They provide essential data that help guide public policies, business strategies, and social initiatives. This literature review examines various aspects of the impact of statistical surveys on knowledge and economic and social development. Statistical surveys collect precise data on various economic and social aspects, such as unemployment rates, income levels, living conditions, public health, and education (OECD, 2013). This data is crucial for understanding the internal dynamics of societies and guiding public policies (Groves et al., 2009). Surveys provide information on long-term trends, allowing policymakers to anticipate future developments and

plan accordingly (Smith, 2011). They are essential for tracking the evolution of economic and social indicators, detecting structural changes, and adjusting strategies (Stiglitz, Sen, & Fitoussi, 2009). Data from statistical surveys are used to develop effective economic plans. They assist governments and institutions in managing budgets, investing in infrastructure, and developing key sectors of the economy (World Bank, 2018).

Investors use reliable statistical data to make investment decisions (UNCTAD, 2019). Countries and regions that offer transparent and positive statistics attract more foreign investment, stimulating economic growth (Eberhardt & Teal, 2011). Businesses use statistical surveys to understand the market, identify growth opportunities, and innovate (Schwab, 2018). This information allows them to adapt their strategies and remain competitive in the global market (Porter, 1990).

From Statistical Information to Knowledge-Based Competitiveness: A Conceptual Mechanism

Statistical surveys do not merely produce raw data; they generate structured information that becomes actionable knowledge when interpreted and integrated into decision-making processes. Within a knowledge economy framework, data on market potential, labor qualification, supply-chain density, and territorial resources reduce informational asymmetries and uncertainty (Porter, 1990). At the firm level, survey-based knowledge allows entrepreneurs to optimize investment decisions, anticipate demand, and align production structures with market signals. At the territorial level, aggregated survey results inform public policies targeting cluster development, skills formation, and infrastructure planning. Therefore, statistical surveys operate as an institutional infrastructure of the knowledge economy, transforming dispersed information into coordinated economic intelligence.

The advent of new technologies, such as artificial intelligence, offers opportunities to enhance the collection and analysis of statistical data (Mayer-Schönberger & Cukier, 2013). Integrating these technologies can increase the accuracy and speed of surveys (Brynjolfsson & McAfee, 2014). International collaboration is crucial for standardizing statistical methods and practices. International organizations play a key role in providing guidelines and facilitating cooperation among countries (Eurostat, 2019). One of the main challenges is the quality and availability of data. Poorly designed or poorly implemented surveys can produce biased or unrepresentative results (Deaton, 2010). Statistical surveys are essential for economic and social development. They provide reliable and relevant data that help guide political and economic decisions, improve quality of life, and promote inclusive and sustainable growth. However, challenges remain regarding data quality and adaptation to new technologies, requiring ongoing international collaboration.

From a social development perspective, surveys on living conditions, health, and education help target social interventions to improve citizens' quality of life (Sen, 1999). They provide crucial data for social programs and development initiatives (UNDP, 2020). Thus, statistical data highlight social and economic inequalities. They enable governments to implement policies to reduce these disparities and promote inclusive growth (Piketty, 2014). Monitoring the Sustainable Development Goals (SDGs) heavily relies on statistical surveys, which are essential for measuring progress towards the UN-defined SDGs. These surveys track advancements and adjust actions necessary to achieve these goals (United Nations, 2015).

Knowledge economy in the agri-food sector

In general terms, knowledge economy refers to an economic system in which the generation, dissemination, and application of knowledge and information play a central role in driving growth, innovation, and competitiveness within the agri-food industry. In this context, knowledge is not limited to scientific research but also encompasses practical expertise, technology adoption, and organizational learning throughout the entire value chain—from agricultural production to food processing, distribution, and marketing. Knowledge economy in the agri-food sector leverages data from statistical surveys, research, and technological advancements to enhance productivity, improve product quality, and foster sustainable practices (Groves et al., 2009; OECD, 2013). For example, the integration of big data and artificial intelligence enables better decision-making in crop management, supply chain optimization, and consumer trend analysis (Mayer-Schönberger & Cukier, 2013; Brynjolfsson & McAfee, 2014). This approach supports the development of more resilient and competitive agri-food systems, encourages innovation, and helps address challenges such as food security, resource management, and market fluctuations. By focusing on knowledge and information, the agri-food sector can adapt more effectively to changing

economic and social conditions, ultimately contributing to sustainable economic and social development (World Bank, 2018; United Nations, 2015).

Djeflat, applying the knowledge economy (KBE) concept to Algeria's agricultural describes knowledge economy as "economy *capable of harnessing in an efficient and competitive way all its sources of knowledge both the codified and the tacit one in order to achieve sustainable and inclusive development*" (2006a, 2006b). He highlights agriculture as Algeria's pioneering sector for knowledge economy adoption, by linking rural renewal policy to KBE policies for inclusive growth (Djeflat 2019), countering, thus, the views that it suits only high-tech areas.

In agriculture, he emphasizes the importance of operationalizing the four pillars of knowledge (education, innovation, ICTs and institutions) via concrete programs like PPDRI (Proximity Programme for Integrated Rural Development (PPDRI) implemented in the country during the 2009-2013 period. In this program, policy instruments included ICT enabled information systems and decision aids, combined modern and traditional knowledge for innovations (e.g., adapted microfinance like Rfig), and participatory governance fostering synergies between researchers, farmers, and policymakers.

The Agri-Food Industry Sector: A lever for a Competitive Economy in Algeria

After the end of the colonial period and the acquisition of independence, the authorities focused on ensuring food security for the population and combating poverty by improving the quality of life for citizens in all areas. In this context, an economic development plan was implemented, particularly emphasizing so-called "industrializing" industries (Boukella, 1996). This allowed the national economy to make significant advances in terms of production and employment. Consequently, the Agri-Food Industry (AFI) was not left behind and has been subject to numerous reforms and strategies aimed at promoting its development.

Over the past two decades, this sector has gained increasing importance in the national economy, even becoming a pillar of the national industry. For example, in 2019, according to the Business France office in Algiers (2019), this sector led non-hydrocarbon exports and contributed 50% to national industrial production. This underscores the sector's importance for wealth creation and the competitiveness needed for industrial dynamism, especially after the opening of the national market to foreign competition. The potential for development in this sector is considerable, given the attention it receives from public authorities and the demographic growth, which reached nearly 44 million inhabitants in 2020 according to the National Statistics Office (ONS). This makes the domestic market attractive for businesses operating in this sector. However, the sector's ambitions must not obscure the various obstacles it faces, starting with its high dependence on imports for raw materials in almost all its industries, despite reforms aimed at developing the primary sector, which is a key supplier of raw materials for this sector (Lounaci & Souam, 2022).

Agri-food industries are distinguished by their great diversity in terms of activities, products, supply chains, production structures, exchanges, and adopted techniques. As Boukella (1996, p. 19) notes it, a thorough analysis requires organizing these various elements to account for the real economic dynamics of the agri-food industries in Algeria. This considerable diversity justifies the need to establish a classification system for the activities and products of this sector.

According to a study conducted by the technical department responsible for business statistics and economic monitoring (ONS), covering the period from 2011 to 2020, the Agri-Food Industries (AFI) contribute 40.4% to the value added of the industrial sector in Algeria (ONS, 2021), highlighting the importance of their role in wealth creation. The Agri-Food Industry (AFI) ranks second in terms of exports, after hydrocarbons (Senouci Bereksi & Zenasno, 2022), demonstrating the sector's vigor. In Algeria, the agri-food sector is experiencing growing dynamism, contributing significantly to wealth creation and ranking as the second sector in terms of GDP after hydrocarbons. This dynamism is also reflected in job creation, contributing to a reduction in the unemployment rate. Additionally, a significant number of companies, even small ones, are developing in this sector. It is evident that the intense competition among these companies stimulates product quality, which benefits consumers positively.

It is important to note that this sector is increasingly central to the economic policy of public authorities, as evidenced by the multitude of initiatives and actions undertaken to strengthen the competitiveness of companies operating in the agri-food industry.

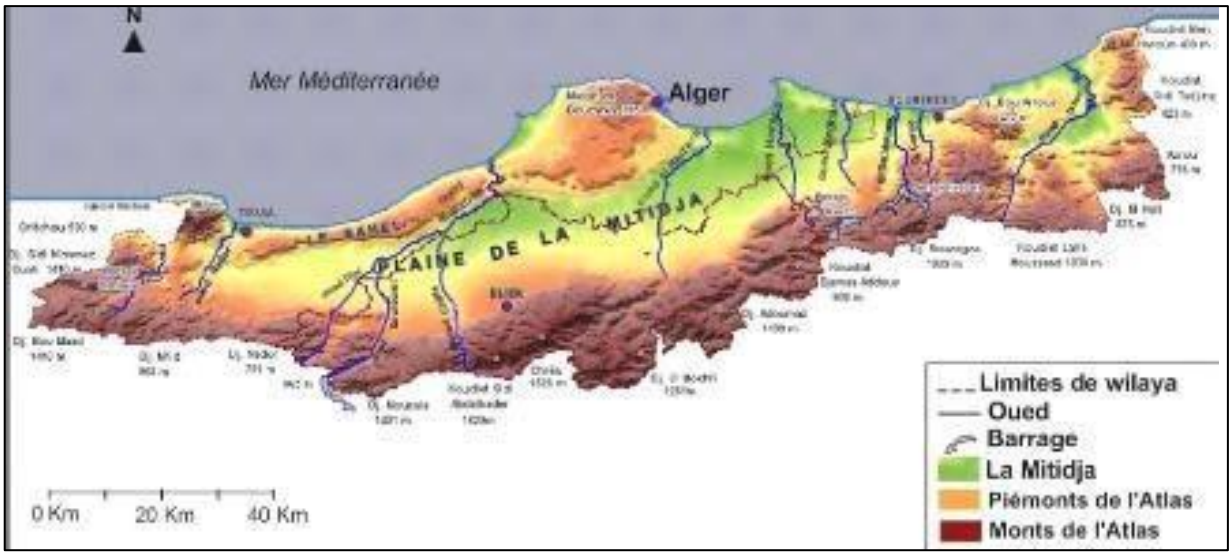
Algeria's agrifood sector is undergoing digital transformation as part of its knowledge economy push, focusing on innovation to boost food security and productivity (Bessaid & Saidi, 2025).

Precision agriculture and AI tools have expanded coverage to millions of hectares, raising self-sufficiency from 52% to 79% between 2015-2024. E-commerce platforms connect thousands of farmers to buyers, handling hundreds of millions in transactions while cutting post-harvest losses. The National Food Security Council coordinates ministries, with regional innovation centers training farmers and incubating local tech firms. Initiatives include subsidies for smallholders, digital literacy programs, and agri-tech clusters for value chain integration (Ferdj, 2025).

Challenges include programs target skills gaps, rural infrastructure, and market access through cooperatives, mobile support units, and standardized certifications. Family farming platforms emphasize training institutes and credit access to build technical knowledge.

Agricultural Characteristics of the Blida province The topography of the province of Blida primarily consists of a significant plain (the Mitidja) and a mountain range to the south of the wilaya (the Atlas Blidéen and Piedmont region). The Mitidja plain is a large area of very fertile, gently sloping land. The western part of this plain has an altitude that decreases from south to north (from 150 meters to 50 meters) (Ferdj, 2019 ; 2020; 2021). The Atlas Blidéen and Piedmont region: the central part of the Atlas reaches an altitude of 1600 meters. The very steep slopes (over 30%) are prone to intense erosion, particularly where forest cover is lacking. Only the Piedmont, with an altitude ranging from 200 to 600 meters, offers favorable conditions for agricultural development (Ferdj, 2019).

Figure 1: The Topography of the province of Blida



Source: ANDI Statistical Document, 2013.

The location of the wilaya of Blida in the fertile Mitidja plain is the basis for its agricultural vocation and, consequently, its development in the agri-food sector. Investments made by this sector have significantly contributed to creating a balance and complementarity in agro-industry within Mitidja, resulting in the coverage of all local population needs with various products, with a future potential to meet national needs (Bouabdellah, 2012). Indeed, this wilaya is an agriculturally rich region, with the economic core being the private industrial sector, represented by 5,136 companies, most of which operate in the agri-food sector and provide over 40,810 jobs (Ferdj, 2021). Several well-known large companies in this wilaya include: Groupe SIM, Semoulerie Amour, SOSEMIE, and Couscous MAMA, which specialize in the production of semolina and pasta; Okids,

Trefl, Président, and Optima, which are involved in dairy products; and Hamoud Boualem, Orangina, and Vita Ju…, which are prominent in the beverage sector.

METHODOLOGY

This study is based on a quantitative survey conducted among 110 small and medium-sized enterprises (SMEs) operating in the agri-food sector in the province of Blida. The questionnaire collected data on: Sector of activity, Education level of managers, Years of professional experience, Investment motivations and Perceived territorial advantages. Data were processed using SPSS 24. The empirical strategy combines: Descriptive statistics (frequencies and percentages), Cross-tabulation analysis, Pearson Chi-square tests of independence and Binary logistic regression modeling.

The dependent variable in the regression model is the technological intensity of the firm's sector (1 = technologically intensive processing; 0 = traditional processing). Independent variables include education level, years of experience, availability of qualified labor, and presence of research laboratories. This methodological framework allows the study to move beyond descriptive observation toward explanatory interpretation.

The data collection and statistical analysis in this study were characterized by several key features:

- Systematic Quality Control**:** To ensure the accuracy and reliability of the data, all questionnaires underwent a thorough, systematic check. This step was implemented to verify completeness, maintain consistency in responses throughout the sample, and prevent missing data.

- Descriptive and Exploratory Analysis: The research utilized both descriptive and exploratory data analysis methods. SPSS 24 software was employed to perform these analyses, highlighting the use of robust, standardized statistical tools.

- Survey-Based Data Collection: Data was gathered through a survey administered to a sample of 110 small and medium-sized enterprises (SMEs). This approach enabled the collection of firsthand information relevant to the study's objectives.

- Variable Cross-Tabulation: The descriptive analysis focused on cross-tabulating the main variables using frequency distributions and cross-tabulation techniques. This allowed the researchers to systematically describe the data and explore relationships between variables.

- Presentation of Results: The findings were presented in terms of frequencies and percentages, providing a clear and interpretable summary of the main characteristics of the SMEs in the sample. Through multiple relevant cross-tabulations, the analysis aimed to identify and highlight the primary features of the SMEs studied.

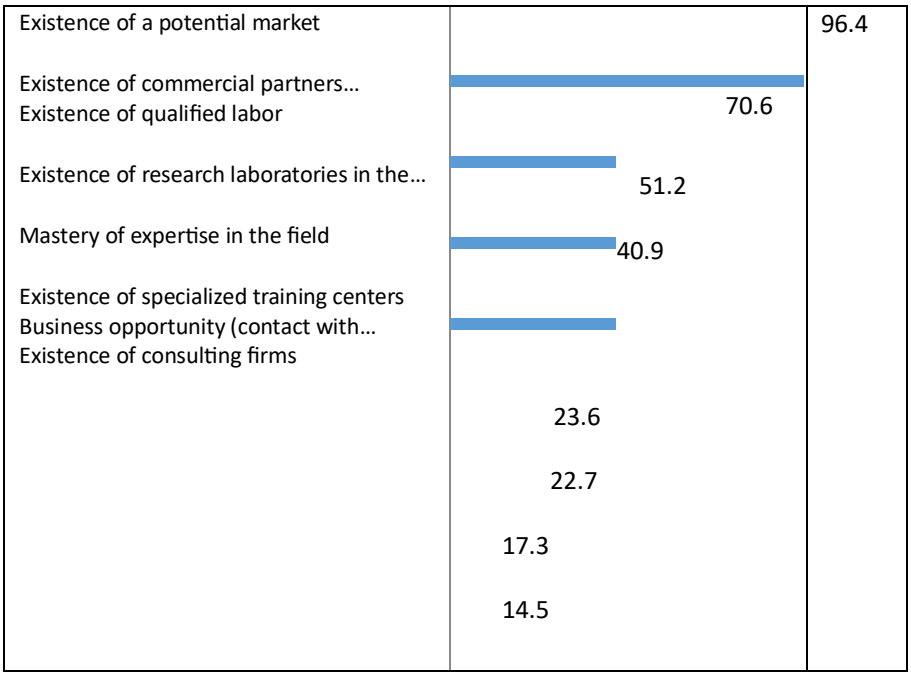
Overall, the approach ensured data integrity, leveraged proven statistical software, and provided comprehensive insights through descriptive statistics and cross-tabulation, focusing on the core characteristics of the surveyed SMEs.

Interpretation of results

The rational for choosing the Agri-Food Sector by Companies

According to interviews with business leaders, the specialization of companies in the agri-food sector is due to the historical presence in the Blida and a market specialized in these products, as well as the entrepreneurs' desire to integrate upstream into the traditional activity of trading these products. The presence of subcontractors, specialized distributors, suppliers, etc., in this region provides an advantage to established companies and attracts new investors. If the public authorities provide sufficient space for these activities, it will contribute to the development of the entire region (Ferdj, 2019 ; 2021).

Graph. 1: Factors Motivating Investment in the Agri-Food Sector



Source: Created from field survey data.

According to these results, the choice of the agri-food sector in the Blida region is primarily explained by the presence of a potential market (clients) and commercial partners (suppliers), accounting for 96.4% and 70.6% respectively. These two markets (upstream and downstream) allow companies to benefit from financial externalities and reduce transportation costs and logistics networks.

This highlights the importance of geographical proximity in determining sector choice. Furthermore, the existence of a potential market is a cultural factor for this region, rooted in its historical agricultural nature. In second place are two factors: the availability of qualified labor at 51.2%, and the presence of research laboratories in the agricultural field at 40.9%.

It should be noted that the University of Blida offers specializations in agronomy and veterinary sciences, which explains why qualified labor and specialized laboratories are significant factors motivating investors in this region (the effect of organizational proximity).

Other factors have a minimal influence on sector choice, such as business opportunities (contact with foreign partners) and the presence of consulting firms, at only 17.3% and 14.5% respectively. In more detail, the data collected highlighted several elements:

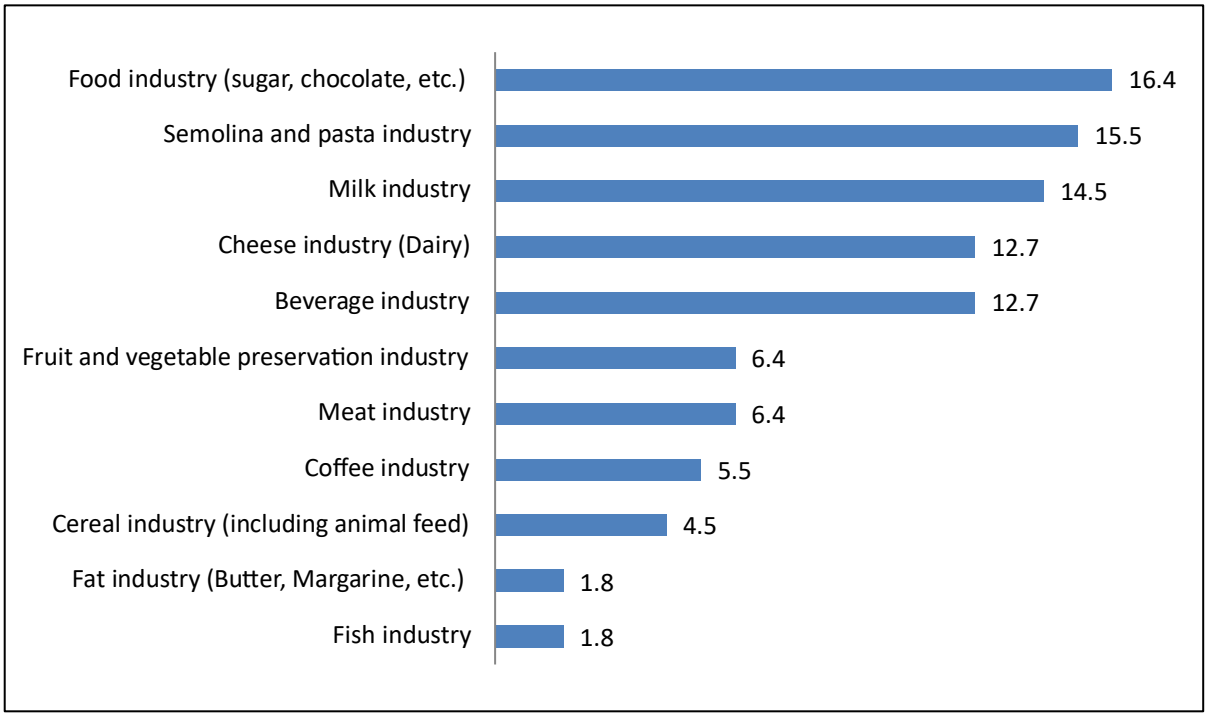
- A key factor for territorial development in Blida is the "market," either through the historical presence of an agri-food market or through commercial partners (specialized distributors and suppliers).
- The presence of qualified labor and specialized laboratories, including those at the university, is a very important factor in territorial development in the agri-food sector.

Main Sectors of Activity of the Company

According to the following graph (2), there is a noticeable variety in the types of activities carried out by the surveyed companies. The most dominant sectors are the food industry at 16% and the semolina and pasta industry at 15.5%, followed by the dairy and cheese industry in third place at 14.5% and 12.5% respectively.

These various sectors of activity reflect the agricultural nature of the Blida region, which spans the fertile lands of Mitidja (Ferdj, 2019).

Graph.2: Distribution of Surveyed Companies by Industry Sector

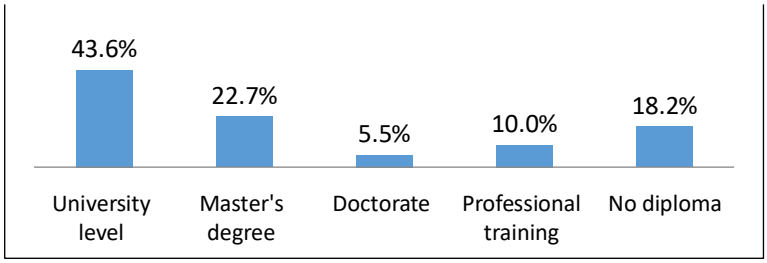


Source: Created from field survey data.

The level of education of the SME leaders in the sample

The leader's level of education positively influences the success of the business (Julien, 1997). Their expertise in the field helps leaders better understand the needs and challenges of their business, as well as the sector's difficulties, allowing them to manage the risks associated with their organization's development more effectively (Djeflat, 2007; 2012).

Graph 3. Education level distribution of SME leaders



Source: Created from field survey data.

The graph (3) reveals that nearly 43.6% of agro-food SME leaders in our sample hold a university degree, with 22.7% having a Master's degree and 5.5% a Doctorate. Additionally, about 10% have vocational training, while over 18.2% have no diploma. These results suggest that most agro-food SME leaders possess a university degree. However, it is important to further analyze the specific type of education in relation to their business activities to identify any potential correlations.

Previous studies, such as those by St-Pierre, Audet, and Mathieu (2003), have demonstrated that leaders with technical training are typically in charge of manufacturing firms. Moreover, these studies indicate that additional training in management and international marketing can significantly enhance a leader's ability to manage and succeed in SMEs, thereby reducing uncertainty through improved managerial and marketing skills (Ferdj, 2019 ; 2024).

Experience of Managers in the Agro-Food Sector

Besides the educational background of the owner-manager, their experience within the specific sector can also help mitigate uncertainty. This is because a deep understanding of the market, the necessary technologies, and potential risk factors can aid in overcoming challenges that might impede the business's development (Woywode & Lessat, 2001).

Table 1: Experience distribution of agri-food sector managers

Experience/Years	Frequencies	Percentage (%)
1-5 years	17	15,5
6-10 years	26	23,6
11-15 years	43	39,1
More than 15 years	24	21,8
Total	110	100,0

Source: Field survey results

Table (1) above illustrates a fairly even distribution of experience among the managers of agro- food companies in our sample. Specifically, 39.1% of these managers have 11 to 15 years of experience in the agro-food sector, 23.6% have 6 to 10 years, and almost 21.8% have more than 15 years of experience (Ferdj, 2024).

Inferential Analysis: Human Capital and Sectoral Orientation

To move beyond descriptive observation, inferential statistical tests were conducted using Chi-square tests of independence. The results indicate a statistically significant association ($p < 0.05$) between the education level of SME managers and their sector of specialization. Managers holding university degrees are disproportionately represented in technologically intensive sub-sectors (dairy, beverages), while firms in traditional processing segments show a higher proportion of managers without formal higher education. Furthermore, a positive and statistically significant relationship was identified between education level and years of experience, suggesting cumulative human capital effects. These results confirm that human capital formal and experiential constitutes a structural determinant of SME positioning and resilience in the agri-food sector.

Table 2. Cross-tabulation between Education Level and Main Sector of Activity (n = 110)

Education Level	**Traditional Processing (%)**	**Technologically Intensive Processing (%)**	**Total (%)**
No diploma	72.5	27.5	100
Vocational training	60.0	40.0	100
University degree	38.2	61.8	100
Master's / Doctorate	29.4	70.6	100

Pearson Chi-square test χ^2 (3) = 9.87 p = 0.019

Source: Field survey (2024), authors' calculations using SPSS 24.

The Pearson Chi-square test indicates a statistically significant association between managers' education level and the technological intensity of the sector ($p < 0.05$). Higher levels of formal education are positively

associated with participation in technologically intensive agri-food activities (dairy, beverages, advanced processing). This result suggests that human capital plays a structural role in shaping sectoral specialization patterns.

Table 3. Cross-tabulation between Education Level and Years of Sectoral Experience

Education Level	1–5 yrs (%)	6–10 yrs (%)	11–15 yrs (%)	>15 yrs (%)	Total
No diploma	28.0	24.0	30.0	18.0	100
University degree	10.5	22.3	41.0	26.2	100
Master's / Doctorate	5.8	17.6	47.1	29.5	100

Pearson Chi-square test χ^2 (6) = 12.41 p = 0.053

Source: Field survey (2024), authors' calculations.

The relationship between education level and years of experience is marginally significant ($p \approx 0.05$). Managers with higher education levels tend to accumulate longer sectoral experience, suggesting cumulative human capital effects. This supports the hypothesis that formal education enhances long-term integration and resilience within the agri-food sector.

Logistic Regression Model – Determinants of Technological Sector Orientation Dependent variable: 1 = Technologically intensive sector 0 = Traditional processing

Independent variables:

- Education level (ordinal)
- Years of experience
- Presence of research laboratories (dummy)
- Availability of qualified labor (dummy)

Table 4. Logistic Regression Results

Variable	Coefficient (β)	Std. Error	Odds Ratio	p-value
Education level	0.72	0.28	2.05	0.011
Years of experience	0.08	0.03	1.08	0.024
Presence of research labs	0.91	0.37	2.48	0.014
Qualified labor availability	0.65	0.31	1.91	0.038
Constant	-2.11	0.74	—	0.004

Pseudo R^2 (Nagelkerke) = 0.32 Model significance: χ^2 (4) = 21.54, $p < 0.001$

The logistic regression confirms that education level significantly increases the probability of operating in technologically intensive agri-food sectors (OR = 2.05, $p < 0.05$). Similarly, sectoral experience and proximity to research laboratories significantly enhance this likelihood. These findings provide robust empirical support for the role of human capital and knowledge infrastructure as drivers of structural upgrading in Algeria's agrifood economy.

DISCUSSION OF RESULTS

The dominance of the "market factor" (96.4%) confirms the importance of demand density and agglomeration economies, consistent with cluster theory (Porter, 1990). However, the inferential results demonstrate that market proximity alone does not explain structural upgrading. Education level emerges as a decisive determinant of sectoral positioning. The statistically significant association between human capital and technological intensity suggests that knowledge accumulation conditions firm competitiveness. Furthermore, proximity to research laboratories and qualified labor significantly increases the likelihood of technological upgrading. This confirms the existence of localized knowledge spillovers, consistent with the knowledge economy framework (Djeflat, 2006a; OECD, 2013). Statistical surveys thus function as instruments of territorial intelligence: they transform dispersed firm-level information into structured knowledge capable of guiding policy and investment decisions. The findings answer the research question directly: statistical surveys contribute to economic and social development by revealing structural determinants of competitiveness and reducing informational uncertainty.

The importance of qualified labor (51.2%) and research laboratories (40.9%) reflects the emergence of localized knowledge spillovers. In contrast to traditional capital-based models of industrial development, these findings suggest that intangible assets increasingly shape competitiveness in Algeria's agri-food sector. Compared to evidence from other developing economies, where financing constraints dominate SME concerns, the Blida case highlights a territorially embedded growth logic centered on proximity, skills, and supply-chain density. These results directly answer the research question: statistical surveys provide the empirical foundation necessary to identify these structural determinants and transform them into coordinated development strategies.

The approach used to analyze the characteristics of the surveyed SMEs is methodical and data-driven. First, we implemented systematic quality control by thoroughly checking all questionnaires for completeness and consistency, which helps ensure the validity and reliability of the data collected. This step is crucial for minimizing errors and maintaining the integrity of the analysis. Next, the study employed both descriptive and exploratory statistical methods using SPSS 24 software. This combination allows for a comprehensive understanding of the data, revealing both the general trends and deeper patterns among the SMEs. By relying on established statistical tools, the approach maintains a high standard of rigor and objectivity.

Survey-based data collection from a sample of 110 SMEs provides firsthand insights into the population under study, making the findings relevant and representative. The use of cross-tabulation techniques in the descriptive analysis further strengthens the approach by enabling the researchers to examine relationships between key variables, such as company size, sector, or employment figures.

Results are presented in terms of frequencies and percentages, which are clear and easily interpretable. This format helps stakeholders quickly grasp the main characteristics and trends within the SME sample. The final step in the approach involves identifying key features of the SMEs through relevant cross-tabulations, ensuring that the analysis highlights the most significant aspects of the surveyed businesses. Overall, this approach is thorough, transparent, and well-suited for understanding the diverse attributes of SMEs in the agrifood sector, providing a solid foundation for further interpretation and decision-making. The approach used to analyze the characteristics of the surveyed SMEs is methodical and data-driven.

CONCLUSION

This study demonstrates that statistical surveys constitute a strategic pillar of the knowledge economy in Algeria's agri-food sector. Moving beyond descriptive analysis, inferential results confirm that managerial human capital, accumulated experience, and territorial knowledge infrastructure significantly influence technological upgrading. Statistical surveys therefore operate as mechanisms of economic intelligence, enabling rational allocation of resources and supporting competitive transformation. Policy implications include:

- Strengthening regional statistical systems
- Enhancing university–industry collaboration

- Supporting managerial training programs
- Promoting innovation clusters in agri-food territories

Future research should extend this analysis to longitudinal and comparative regional studies to assess dynamic structural change.

Statistical surveys play a crucial role in understanding and developing the agrifood sector in Algeria. As a tool for data collection and analysis, they provide essential information that helps assess performance, needs, and opportunities within this strategic sector. The analysis of collected data reveals that the agrifood sector is a significant lever for the national economy, contributing notably to wealth creation, industrial competitiveness, and employment.

The agrifood sector in Algeria benefits from strong regional specialization, particularly in the wilaya of Blida, which presents geographical and historical advantages favorable to agriculture. Data shows that investments in this sector are driven by the presence of a potential market and commercial partners, as well as the availability of skilled labor and specialized laboratories. These factors highlight the importance of geographic proximity and the quality of human resources in investment decisions.

Statistical surveys highlight that, despite a range of activities, businesses in Algeria's agrifood sector are predominantly focused on food industries, semolina and pasta production, and dairy products. This diversity reflects the agricultural wealth of the region and its potential for economic development.

In summary, the findings underscore the importance of combining formal education with practical, hands-on experience in the agri-food sector. Together, these factors strengthen the ability of SME owner-managers to manage uncertainty, drive growth, and ensure the long-term success of their enterprises. The results underscore the importance of market opportunities, supply chain integration, and access to human and knowledge resources in driving the growth and diversification of the agri-food sector in Blida. These findings point to the need for continued support of local markets, education, and research to sustain and expand the region’s agri-food industry. Integrating statistical data into the agrifood sector not only helps optimize decision-making and investment processes but also supports the development of a competitive economy in Algeria. Public policies and development strategies must continue to rely on reliable data to foster sustainable and inclusive growth in this key sector.

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