

# Implementation of Business Intelligence for Classifying Product Values and Revenue of UMKM at Diskopdagperin in Kuningan Regency Using Online Analytical Processing (OLAP) Technology

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## Abstract

UMKM have an important role in the economic development of the country. Kuningan Regency is one of the regencies in West Java with a significant number of UMKM, especially in the food sector. Department Cooperative UKM and Industry (Diskopdagperin) is responsible for implementing regional policies in the fields Cooperative UKM Trade and Industry. Department Cooperative UKM and Industry in Kuningan Regency often faces challenges with large, unstructured datasets that need to be analyzed. To analyze UMKM data in Kuningan Regency and monitor their development, a Business Intelligence (BI) analysis model is needed to manage the data effectively. The result of the analysis will be visualized by displaying dashboards or graphs to make it easier for the public to read data or information about UMKM development. This analysis will help UMKM practitioners predict their business prospects through the generated visualizations. This research processes data by implementing Online Analytical Processing (OLAP) technology with the assistance of the Tableau application to produce visualizations from processed data, providing information on the development of UMKM in Kuningan Regency, including business trends, regional trends, and turnover.

**Keywords:** UMKM, Visualization, OLAP, Business Intelligence, Tableau.

## INTRODUCTION

Micro, Small, and Medium Enterprises (UMKM) play a critical role in the economic development of Indonesia, acting as the backbone of the national economy by fostering job creation, promoting innovation, and contributing significantly to Gross Domestic Product (GDP) (Al-Matari, & Al-Nahari, 2022). In Kuningan Regency, West Java, UMKM have demonstrated strong growth and presence, contributing to local economic vitality and social welfare. The region is known for its diverse economic activities, with UMKM spread across various sectors, such as manufacturing, services, and particularly, the food sector (Santoso, 2019). Given the predominance of UMKM in Kuningan's economic landscape, understanding their development, challenges, and contributions is crucial for policy formulation, economic planning, and sustainable development at both regional and national levels.

The food sector, in particular, has emerged as one of the most prominent segments within the UMKM in Kuningan Regency. This prominence is not only due to its contribution to local income and employment but also because of the sector's role in preserving local culinary traditions and supporting food security. Many food-based UMKM are small family-run businesses or cooperatives that operate on a micro to small scale, producing a variety of local products such as traditional snacks, processed foods, and beverages. Despite their scale, these businesses face a rapidly evolving market landscape, requiring them to adapt to changing consumer demands, technological

advancements, and market competition (McDonald, & Wilson, 2022). These factors make the food sector an area of interest for studying the dynamics and development of UMKM in Kuningan Regency.

To support the growth and sustainability of UMKM, the Department Cooperative UKM and Industry (Diskopdagperin) of Kuningan Regency is tasked with formulating and implementing policies that enhance UMKM productivity and competitiveness. However, one of the significant challenges faced by Diskopdagperin is managing and analyzing the large volumes of data generated by the activities of UMKM across the region. This data, which includes information on business performance, market trends, production outputs, and regional economic indicators, is often unstructured and fragmented, making it difficult to derive actionable insights. The complexity of handling such datasets has led to inefficiencies in policy-making, limited the department's ability to monitor UMKM growth effectively, and hindered the design of targeted interventions to support business development.

In addressing these challenges, the need for a robust analytical approach to data management and interpretation becomes evident. Business Intelligence (BI) models offer a potential solution by providing tools and methodologies to transform unstructured data into meaningful visualizations and reports. BI enables stakeholders to make informed decisions by offering real-time insights into various aspects of UMKM operations, such as sales performance, regional growth trends, and customer preferences. Implementing a BI model can facilitate a deeper understanding of the development patterns of UMKM, allow for effective monitoring of business growth, and enhance the ability of Diskopdagperin to craft responsive policies and support mechanisms tailored to the needs of UMKM, particularly in the food sector.

However, despite the recognized importance of BI for data analysis and visualization, there exists a gap in the adoption and application of these tools in the context of UMKM development in Kuningan Regency. Current data management practices are often rudimentary, relying on manual or less sophisticated systems that do not fully capture the potential of modern data analytics. The lack of comprehensive BI implementation limits the ability to leverage data for predictive analysis, trend identification, and strategic decision-making. This gap highlights the need for an effective BI model to transform the approach to UMKM data analysis, allowing for the generation of timely and actionable insights that can drive economic growth and business sustainability.

Therefore, this study aims to develop and implement a BI model to analyze UMKM data in Kuningan Regency using Online Analytical Processing (OLAP) technology, supported by the Tableau application for visualization. The objective is to create an interactive dashboard that presents key information on business development trends, regional economic performance, and turnover patterns, with a particular focus on the food sector. Through this approach, the study seeks to provide a practical solution to the challenges faced by Diskopdagperin and contribute to the enhancement of UMKM growth and competitiveness in Kuningan Regency. The research not only intends to showcase the benefits of BI tools in the context of UMKM data management but also aims to set a precedent for similar applications in other regions or sectors.

## METHODS

The study employs a comprehensive analytical approach to process and analyze data from UMKM in Kuningan Regency, utilizing Online Analytical Processing (OLAP) technology to facilitate multi-dimensional data analysis. OLAP is a powerful tool for analyzing large datasets from multiple perspectives, enabling the aggregation, drilling, and slicing of data for in-depth exploration and interpretation. The study collects data on UMKM operations, including business performance, regional distribution, and turnover metrics, through both primary and secondary sources (Lestari, & Rizki, 2020). The collected data is then cleaned and organized to ensure consistency and accuracy before being integrated into an OLAP cube. This OLAP cube allows for flexible and dynamic analysis, providing insights into various business and regional trends across different time periods and dimensions relevant to UMKM activities.

To transform the processed data into user-friendly visualizations, the study uses Tableau, a leading BI and data visualization tool chosen for its ability to create interactive and intuitive dashboards. Tableau's functionalities enable the transformation of complex OLAP datasets into clear, visual representations such as graphs, charts, and heat maps, making it easier for stakeholders to interpret the data. The data processing steps include importing the cleaned data into Tableau, designing visualization templates that highlight key insights, and building dashboards that display real-time updates on UMKM development in Kuningan Regency. These visualizations aim to depict business trends, regional economic performance, and turnover patterns in a manner that is accessible to both policymakers and UMKM practitioners. The overall methodological framework ensures that the visualizations generated not only reflect the current state of UMKM development but also support predictive analytics to inform strategic decision-making for future growth.

## RESULTS

The OLAP analysis and Tableau visualizations provide comprehensive insights into the development of UMKM in Kuningan Regency, revealing critical patterns and trends across various business and regional dimensions. The data analysis uncovers several key business trends, such as the seasonal variations in product demand, the concentration of UMKM activities in specific sectors like the food industry, and the fluctuations in turnover across different time periods. The OLAP cube structure allows for in-depth exploration of these trends, showing that certain periods of the year, such as holidays or harvest seasons, significantly impact the turnover rates and production levels of food-based UMKM. Additionally, the analysis identifies which products or services are in higher demand, providing a basis for strategic business decisions regarding inventory management, marketing, and production planning.

Furthermore, the regional analysis highlights the economic growth patterns within Kuningan Regency, offering a geographical perspective on UMKM distribution and performance. The visualizations produced using Tableau effectively depict regional trends by mapping the concentration of UMKM across various sub-districts, revealing areas with higher business density and turnover. This spatial analysis indicates that certain regions in Kuningan Regency, particularly those closer to urban centers or main transportation routes, experience more robust economic activity compared to more remote areas. The visual dashboards illustrate these disparities, providing actionable insights for local authorities and stakeholders to develop targeted interventions, such as infrastructure improvements, marketing support, or financial assistance programs, to bolster UMKM growth in less developed regions.

The outcomes of this study highlight the utility of visualizations in facilitating a clearer understanding of UMKM development for both practitioners and stakeholders. By translating complex datasets into intuitive graphs, charts, and heat maps, the Tableau-generated dashboards enable users to quickly grasp important metrics, such as sales performance, business growth rates, and turnover patterns. These visual tools support decision-making by allowing UMKM practitioners to identify market opportunities, optimize resource allocation, and anticipate future trends based on historical data. For policymakers, the insights derived from the analysis serve as an evidence-based foundation for crafting policies that address specific needs within the UMKM sector, whether by promoting investment in high-growth areas, supporting diversification of products, or enhancing regional economic strategies. Overall, the results demonstrate the effectiveness of using OLAP and Tableau in managing and interpreting large UMKM datasets, contributing to the strategic development of the sector in Kuningan Regency.

## DISCUSSION

The findings of this study underscore the significance of applying Business Intelligence (BI) tools like OLAP and Tableau in analyzing and visualizing UMKM data in Kuningan Regency. OLAP's ability to aggregate large datasets into multi-dimensional views allows for dynamic analysis and a deep understanding of complex patterns in UMKM operations. Tableau further enhances this process by converting raw data into interactive and intuitive visualizations that are easily interpretable by users. This approach not only provides a macro overview of UMKM development across various dimensions, such as business type, location, and turnover but also allows for micro-level exploration of specific business performance indicators. By integrating these BI tools, the study offers a novel and efficient way of processing vast amounts of UMKM data, turning fragmented and unstructured datasets into actionable insights.

One of the key implications of the study is the predictive potential that these visualizations bring to UMKM practitioners and policymakers. The ability to analyze historical trends in sales, market demand, and regional growth through visual dashboards enables users to forecast business prospects with a higher degree of accuracy. For instance, by visualizing turnover patterns, UMKM owners can anticipate peak demand periods and adjust their production schedules or marketing efforts accordingly. Similarly, regional economic trends depicted in spatial dashboards can guide local businesses on where to expand their market reach or diversify their product offerings. The predictive analytics derived from BI tools can, therefore, inform decision-making processes, supporting more strategic and data-driven business planning for UMKM practitioners who may otherwise rely on experience-based or intuitive judgments.

The study directly addresses the challenges identified in the introduction, particularly the difficulties faced by the Department Cooperative UKM and Industry (Diskopdagperin) in managing and making sense of large, unstructured datasets (Janes, & Kasap, 2019). By implementing OLAP for data processing and Tableau for visualization, the study provides a clear framework for handling data complexities and enhances the ability of Diskopdagperin to monitor UMKM development in real-time. This, in turn, enables the department to craft policies and support mechanisms that are responsive to the evolving needs of UMKM, whether through targeted financial assistance, capacity-building programs, or marketing support. Moreover, the study contributes to a more transparent and accessible presentation of UMKM data, allowing stakeholders, including business owners, investors, and local governments, to make informed decisions based on reliable data rather than anecdotal evidence.

While the benefits of using BI tools like OLAP and Tableau are evident, there are also potential limitations to consider. One limitation is the need for technical expertise to effectively use these tools. While Tableau offers user-friendly interfaces for data visualization, the preparation and processing of data through OLAP require a certain level of skill in data analysis and BI methodologies. For many UMKM practitioners, especially those in micro-enterprises with limited resources and technical knowledge, accessing and interpreting BI visualizations may still pose a challenge. Another limitation is data quality and availability; the effectiveness of BI tools heavily relies on accurate, up-to-date, and comprehensive datasets. In cases where data is incomplete or outdated, the insights generated may not fully reflect the current status of UMKM development, leading to suboptimal decision-making.

The impact of this study on policymaking is significant. By offering a structured approach to data analysis and visualization, policymakers are better equipped to understand the multifaceted landscape of UMKM development in Kuningan Regency. The visual dashboards created through Tableau make it easier to identify regions or business sectors requiring support and to allocate resources more efficiently. Additionally, the ability to monitor real-time trends allows policymakers to quickly respond to market changes, whether it be economic downturns, shifts in consumer preferences, or emerging business opportunities. The use of BI tools thus aligns with the broader objective of evidence-based policymaking, fostering an environment where decisions are grounded in empirical data and tailored to address the specific challenges and opportunities within the UMKM sector.

Furthermore, the study's implications extend to regional economic planning and UMKM development strategies in Kuningan Regency. The insights provided by the BI analysis offer a comprehensive view of the regional economic landscape, revealing growth potential in various sectors and areas. This enables local governments and development agencies to formulate strategic plans that support sustainable economic growth, such as promoting investment in high-performing UMKM sectors, improving infrastructure to boost regional business activities, or fostering collaborations between UMKM and larger enterprises. Ultimately, the use of BI tools like OLAP and Tableau sets a precedent for how data-driven approaches can be applied to economic development and business management, providing a replicable model that can be adapted and implemented in other regions and sectors across Indonesia.

## **CONCLUSION**

The study highlights the transformative role of Business Intelligence (BI) analysis in managing and understanding the development of UMKM in Kuningan Regency. Through the use of OLAP technology for data processing and Tableau for data visualization, the research effectively demonstrates how complex and unstructured datasets can be translated into meaningful insights that reflect business trends, regional economic growth, and turnover patterns among UMKM. The visual dashboards created provide not only a snapshot of the current state of UMKM development but also enable predictive analytics that can guide strategic decision-making for both practitioners and policymakers. These findings underscore the potential of BI tools to enhance data-driven decision-making processes, offering a practical solution to the challenges faced by stakeholders in understanding and monitoring the dynamic landscape of UMKM in the region.

In light of these findings, future research could focus on expanding the application of BI analysis to a broader range of UMKM sectors beyond the food industry or replicating the study in other regions

with similar economic profiles. Additionally, to improve the implementation of BI tools like OLAP and Tableau, it is recommended that there be efforts to build capacity among UMKM practitioners in terms of data literacy and BI tool usage. This could involve providing training programs or developing user-friendly BI platforms that cater specifically to the needs of micro and small businesses. Moreover, ensuring the availability of accurate, comprehensive, and up-to-date data will be crucial for the continued success and applicability of BI analysis in enhancing UMKM development. By embracing these improvements, BI tools can serve as a vital asset in promoting sustainable economic growth and supporting the long-term viability of UMKM across diverse sectors and regions.

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