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**| RESEARCH ARTICLE**

# How Data Analytics Techniques can Optimize Sales Territory Planning

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**| ABSTRACT**

Territory management is one of the key factors defining the success of such enterprises, for example, in the real estate sector, where allocating territories for sales constantly and increasing their efficiency is important. SaaS, especially data visualizations with Tableau, allows real estate firms to move away from the industry's conventional 'gut feel' decision-making. This extended article looks closer beyond how Tableau is used in real estate territory planning, including other uses of predictive analytics, AI, automation, and other decision support systems. The paper also provides a clear and detailed plan for cleansing and processing data, coding on Tableau, creating a dashboard, and checking real-time performance. In addition, it explores approaches to improving data quality, managing obstacles, and applying these methods across large organizations.

**| KEYWORDS**

Territory Planning, SaaS Platforms, Tableau, Real Estate Analytics, Data Visualization, Predictive Analytics, Geographic Visualizations, Market Potential, Agent Performance, Sustainability Metrics, Real-Time Monitoring, Artificial Intelligence, Machine Learning, ESG Goals, Customer Insights.

**| ARTICLE INFORMATION**

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## Introduction

Territory management is important to a real estate company's sales productivity and organizational effectiveness. Purposive approaches to territory distribution incorporating distance, personal knowledge, or line boundaries are unsuitable in the modern dynamic environment. The real estate business requires more dynamic systems that reflect market potentials, transactions, and agents' performance in a change of territories to capture the market again. This paper discusses how SaaS platforms related to the real estate industry and integrated with Tableau can help with territory planning. Using data visualization tools in Tableau, which facilitate variances depending on current performance analysis, boosts the efficacy of the firm's mapping of territories for the real estate sector. This paper will illustrate the construction of complex dashboards, the creation of calculated fields, and how to apply Tableau coding for enhanced territory management through the utilization of rich datasets. This introduction discusses how territory management has developed throughout history, emphasizing the progression from traditional analog systems to modern, complex, automated ones. It offers suggestions on how organizations moving from conventional techniques to operational technologies can deal with employee resistance and manage their human capital in compliance with new systems.


*Figure 1: Step-by-Step: Creating an Effective Sales Territory Plan*

**Data Preparation**

The first aspect of territory planning that needs to be accomplished is data gathering and identification (Steiner, 2012). Properly organizing a database is the primary step toward good visualization and decision-making. To illustrate this, a large and comprehensive set of property data and information about the agents, market prospects, and transaction records will be utilized in constructing the visualizations. Data preprocessing encompasses not only the selection of appropriate data but also the preparation of clean and enriched data for further analysis. This part gives an overview of the most critical activities and procedures for data preparation with precise examples and recommendations.

**Data Cleaning**

Data cleaning is the process of keeping the dataset error-free and without duplication, forming the building block of data analysis. Deleting invalid entries is a mathematical process, for example, finding the elements that may be significantly discrepant from other components and might shift the resulting graphics. For instance, recording a transaction value of $12,000,000 instead of $1,200,000 may produce wrong conclusions about an agent's performance or a certain market. Normalization methods, such as scaling a numerical field, such as market potential, enhance data comparability by creating a standard presentation format (Rea et al., 2012).

Working on datasets originating from various systems is an enormous challenge; in such cases, we already have duplicates. Automated deduplication processes can maintain data integrity by reducing duplication and, in effect, merging them. Another important feature is the possibility of checking the accuracy of the data received. For example, assigning a particular ZIP code to a location minimizes the chances of a mistake in location mapping. Using software such as OpenRefine or Python scripts increases the ease of working with big data. A clean dataset also does not contain any missing values that can otherwise affect the efficiency of the insights. Mean imputation or regression-based filling methods solve issues in numeric fields, and categorical fields may need specific inputs. Also, confirming the proper data storage formats, like dates, are stored uniformly is an important validation to conduct. Lastly, documentation of the process isn't only good practice; it is necessary due to the simplicity of many cleaning heuristics, many of which can be completed in minutes if only by utilizing collaborative tools. Documentation aids in disclosing the process and makes it possible to redo a process as and when by whoever may be required to do so.

An example of a data cleaning issue in real estate might be slightly different names for the same agent (Wooldridge, 2009). If the indexes "John Smith" and "J. Smith" enter each index differently, this distorts workload and performance indicators. This is an issue of dataset naming standards and is well solved with the use of lookup tables or even the efficiency of algorithms that work in the background. Daily checks are complemented and cross-verified by regular audits of datasets, which also guarantee long-term consistency. Data cleaning is the process of preparing raw and noisy data sets and transforming them into useful pieces for data visualization and analysis. Hence, it is wise for real estate firms to dedicate ample time and effort to such an initial approach so that other analytics can provide meaningful information.

*Table 1: Data Cleaning Techniques and Examples*

| Technique | Description | Example |
|---|---|---|
| Outlier Detection | Identifying values significantly deviating from norms. | Transaction value recorded as $12,000,000 instead of $1,200,000. |
| Deduplication | Removing or merging duplicate entries. | "John Smith" vs. "J. Smith" as separate entries. |
| Missing Value Handling | Filling gaps using imputation or regression techniques. | Imputing average transaction size for missing records. |

| Technique | Description | Example |
|---|---|---|
| Data Validation | Ensuring ZIP codes or other fields match expected formats. | Verifying ZIP Code 10001 corresponds to Manhattan, NY. |

**Data Enrichment**

Data enrichment adds more information around, below, above, to the side, before, and after the primary data set (Merico et al., 2010). Thus, it is possible to broaden the dataset with other kinds of data, such as demographic data, market tendencies, and competitors' data, which will considerably improve the density and quality of the analysis. For instance, more specific information from Zillow or Redfin can give insights into where local property prices stand and how prospects in that particular location look more persuasively compared to abstract statistics. Sociological information is especially valuable in real estate territory planning to better understand the client base. For example, age, income, and education level in a certain postal code can indicate potential buyers. Such insights lead to the right marketing strategies firms need and enable better agent distribution. Introducing competitive intelligence factors, including places where competitors of real estate offices operate or particular transaction histories, enhances territory planning approaches.

The integration of geospatial data in the system can complement the Tableau view by adding layers of context to a visualization (Zhang et al., 2012). Traffic flow or access to public transport can help real estate firms establish places that are popular with most people. Likewise, climate statistics could provide information about the fluctuations in property sales within certain periods, and territory changes could be consequentially made. The enhanced data assets turn into interactive visualization and communication, which makes insights convincing and actionable. Another intake of the underlying enrichment approach is integrating social media and online interaction data. Analyzing leads identifies where the customer leads are coming from and which social media platforms were used or the website viewed. This data can then be compared to the sales result to guide which lead generation channels should be focused on. Campaign information enriched in this way can be followed on the Tableau dashboards, allowing firms to adjust the campaign results in real time. Data enrichment transforms the obtained raw datasets into informative and detailed market sources, allowing users to 'see' them from various perspectives. Distributed data analysis can reveal information that would not be obtained if firms analyzed individual datasets separately, thus enabling better decision-making.

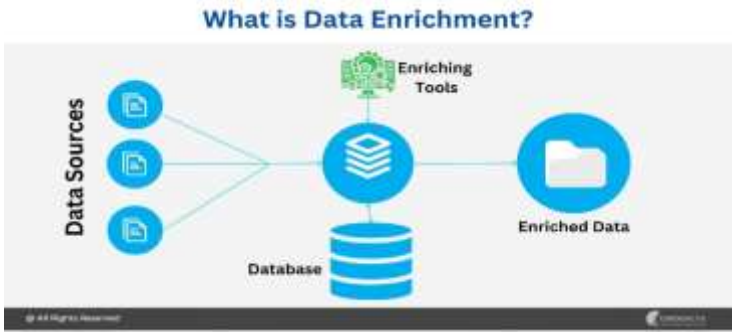


*Figure 2: Data Enrichment*

**ETL Process**

This step involves using ETL tools to help automate the data preparation process (Radhakrishna et al., 2012). It specifies how data is extracted from many sources, cleaned, and transformed into a format that can be loaded into visualization software such as Tableau. Tools such as Alteryx, Talend, or Apache Nifi manage complex, multiple-source data sets well. The extraction phase involves gathering information from various sources, such as a CRM, property database or leads from different online sources. Optimized extraction methodologies decrease the time required to gather data sets and ensure that no data is overlooked. Connection to APIs enables real-time updates to the data feed, thus maintaining updated dashboards. Transformation is the most challenging stage because it requires cleaning, normalizing, and structuring data for analysis. For instance, while transforming, data quantifies, such as transaction values, are converted to their value as of the current period, or the geographic data is geographically coded for mapping. Python or R scripting languages can be used within the ETL tools where there are requirements to create new fields or derive new value from the available fields.

Ingesting the processed data and creating an ETL pipeline means creating a perfect conduit between the Bi and visualization tools, in this case, Tableau (Stodder, 2012). Live connections offer real-time data updates, whereas extract connections are beneficial for large datasets. A field is categorized into natural categories, like regions, agents, and dates of transactions that believe dashboard users. ETL tools also integrate the means for monitoring and validating the mentioned process to avoid data inconsistencies. Notices concerning missing fields, differing formatting, or connection problems enable the quick resolution of

problems. Such type of automation and supervision is useful in ensuring that the data preparation exercise is efficient, accurate, and has the capacity to grow.\

*Table 2: ETL Process Phases*

| Phase | Description | Example |
|---|---|---|
| Extraction | Collecting data from multiple sources such as CRM, property databases. | Connecting Tableau to a SaaS platform or API for real-time updates. |
| Transformation | Cleaning, normalizing, and structuring data for analysis. | Geocoding ZIP codes or adjusting transaction values for inflation. |
| Loading | Uploading cleaned and structured data into Tableau. | Creating live or extract connections for seamless visualization. |

**Advanced Data Preparation Techniques**

Apart from cleaning, enrichment, and ETL steps, the following techniques can further enhance the (de S. Ribeiro et al., 2011). These techniques are of higher dataset quality than the simple cleaning, enrichment, and ETL mentioned above. For example, integrating natural language processing (NLP) in collecting articles regarding customer's comments or feedback will provide a qualitative aspect of the analyses. Overall evaluation of performance by the agents or property descriptions has hidden patterns that may not be easily identified when using quantitative data. Another technique in data preparation can be Temporal data preparation, which is concerned with trends and seasonality of time series data in real estate transactions. Aggregating monthly or quarterly data generates time series datasets, which effectively predict cycles in the markets. Pand, in Python, is an instrument that can ease data aggregation and prepare it for analysis in Tableau. Data anonymization is highly important in real estate and is especially relevant when working with, for example, customer or financial information (Rubinstein & Hartzog, 2016). Approaches like tokenization or differential privacy guarantee that datasets are still suitable for analysis and conform to legislation, including GDPR. By integrating these methods into the preparation pipeline, customer trust is protected, and legal susceptibilities are eliminated.

Machine learning models can also be used in further data preparation steps. It can impute missing values, classify the data points, or find outliers that we would be blind to in the first place (Torkey et al., 2022). Including machine learning results in Tableau adds more robustness to the depth of the dashboards. The process of metadata management ensures that all the fields in the dataset are described and documented with the help of a description of their purpose and source. This improves situation awareness among the team members and decreases the time necessary for new users to begin working with the data.

**Example Data:**

| Property ID | Location | ZIP Code | Market Potential | Agent | Last Transaction Value | Last Sale Date | Property Type | Lead Source | Commission Rate |
|---|---|---|---|---|---|---|---|---|---|
| P001 | Manhattan, NY | 10001 | 1,500,000 | John Smith | 1,200,000 | 2023-06-15 | Commercial | Online | 5% |
| P002 | Brooklyn, NY | 11201 | 800,000 | Lisa White | 750,000 | 2023-07-10 | Residential | Referral | 6% |
| P003 | Boston, MA | 02108 | 1,000,000 | Mark Jones | 950,000 | 2023-04-20 | Commercial | Cold Call | 5% |
| P004 | Los Angeles, CA | 90001 | 2,200,000 | Sarah Green | 2,100,000 | 2023-05-25 | Residential | Online | 4% |
| P005 | Chicago, IL | 60601 | 900,000 | Lisa White | 850,000 | 2023-03-30 | Residential | Referral | 6% |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| P006 | San Francisco, CA | 94105 | 1,800,000 | John Smith | 1,650,000 | 2023-06-05 | Commercial | Online | 5% |
| P007 | Miami, FL | 33101 | 1,200,000 | Sarah Green | 1,150,000 | 2023-07-12 | Residential | Cold Call | 4% |
| P008 | Dallas, TX | 75201 | 700,000 | Mark Jones | 650,000 | 2023-05-15 | Commercial | Online | 5% |

This dataset contains geographic information, sales figures, agent assignments, property types, and lead sources, all of which can be used to visualize and optimize territories. Additional fields such as commission rate and lead source enable deeper analysis of agent performance and sales channels.

**Tableau Dashboard Creation**

**Step 1: Data Import and Initial Setup**

In creating a Tableau dashboard, the initial procedure is to upload the data set for future work and analysis. Tableau also has features that can accommodate data import in many formats, such as CSV, Excel, and Google Sheets, and access direct database connection. Tableau can integrate with CRMs and property databases, and almost all the SaaS real estate firms mostly use it, which helps them avoid letting their data integration become chaotic. This makes explicit the idea that datasets must be constantly updated and available for analysis without any doing on the part of man (Leskovec et al., 2020).

When the dataset is imported, the location and ZIP code fields are checked, and it is essential to check the data field for geography compatibility. For example, Tableau features geographic recognition tools for data types that form part of maps but could occasionally need fine-tuning. To illustrate this, ZIP Codes must be organized as geographic fields for successful mapping. This kind of error means that misclassified data leads to the wrong distinction in territories on the map or the wrong clustering of the group of properties. Defining all the fields reduces such risks since each field will have been accurately described under the project plan. Once the geographical roles are confirmed, create the dashboard's initial structure by creating a map layer. Simply dragging fields such as "Location" or "ZIP Code" to the rows' shelf produces an interactive geographic map that forms the basis for further modifications. Tableau has the most friendly UI, where users can move data fields around using drag and drop, and one can design a meaningful format without coding. At this stage, more details of the related data fields are made by grouping them in hierarchies that define the scope of the dashboard. For example, it is easier to sort data by regions, cities, and neighborhoods of a particular area or country. By establishing a hierarchy, every end-user will be able to focus on detailed information and, at the same time, have an outlook on general information.

**Step 2: Designing the Geographic Map**

After the specific geographic data is acknowledged and the starting map created, the next step is to create an informative and eye-appealing map. Of all geographical visualization techniques, color coding is among the most effective for distinguishing high-opportunity areas. For instance, one can paint those areas with more market potential in dark blue while painting the areas with low market values in light blue. These color differentiation afford an unpleated, instantaneous vision of the market. Other details can also be put in the map, but agent information serves to extend its functionality (Stern et al., 2019). To see who is assigned to which area, drag the "Agent" field into the detail shelf, which enables managers to know this. This feature is more significant for companies using real estate firms looking for optimal distribution of assignments among the agents or the new territories they are to cover. Thus, with market potential and agent information, the map is a powerful instrument facilitating decision-making regarding the efficient distribution of resources.

Making unique tooltips helps bring depth to the visualization since it presents more information on each region or property. Effectively, using fields such as "Last Transaction Value", "Sale Date", and "Property Type" as hover field information content of the map provides additional details at a glance. This feature maintains the dashboard as an available source of information while preventing an overload of information from being displayed on the screen. These tooltips are also integrated to be adaptable to display the information required according to the requirements of a certain receiver. Applying annotations or visual indicators can be useful for marking important data points, including properties that may yield the highest transaction values or regions that most likely underperform (Everingham et al., 2015). In addition to plotting the map, Tableau enables users to enter labels, icons, or notes directly on the map to help with subsequent analysis or identify areas needing attention. These levels of customization ensure that the map is still very much actionable and relevant to the firm's overall strategic plan.

**Step 3: Adding Filters and Interactivity**

Filters are one of the elements that need to be implemented to make the Tableau dashboard more engaging. Filters help users navigate the data and select the view of the data they are interested in. For instance, dragging fields such as "Agent" and

"Property Type" into the filters pane allows users to filter results based on individual agents, residential or commercial properties. Such customization helps to make the dashboard as universal as possible and suitable for any real estate situation.

Setting filter options for several reasons to achieve a user-friendly interface is also important. The filters are options provided by Tableau in settings, one setting could be dropdown lists, another setting options like slider bars, and the last one could be checklists where users can choose from multiple lists. For example, a date range option considers patterns, monthly sales, and yearly market prospects. This interactivity also enables the managers to perform more analyses without needing support from technical personnel. Tableau shines in the way that it supports changes in real time. The filtered map also changes according to user input, which makes the visualizations meaningful and dynamic. For example, choosing 'agents' will immediately show the territories that belong to each agent and their statistics. This dynamic feature makes the dashboard flexible in option-casting and real-time management. To improve filter features, similar options must be divided into sections that can be expanded, collapsed, or divided into different tabs (Neil, 2014). This organization minimizes clutter and guarantees that users can find the filters they require. For instance, categorizing the filters as Agent Filters, Property Filters, and Date Filters eases the organizational structure and thus guides the user experience. Greater attention to filter construction makes the dashboard more versatile and user-friendly for all participants.


*Figure 3: Email Marketing Automation*

**Step 4: Enhanced Interactive and Dashboard Capabilities**

In addition to simple selection criteria, further interactivity options can enhance the dashboard's usefulness and entertainment value. For instance, parameters enable a user to adjust a calculation or amend the appearance of an element on the fly. For example, introducing a parameter to change the market potential threshold to one more relevant to its business needs means that users can change their perception of what constitutes a "high potential" area. This makes the dashboard flexible while operating within different contexts and with different objective endpoints. One of the additional possibilities is the insertion of actions, such as hover effects or drill-downs. For instance, rolling the mouse over the area of the map highlights specific properties in the selected zone, and hitting the property leads to the corresponding performance report. These interactive actions allow the data analysis to be as flexible as possible, meaning that the specifics are just as easy to access as overall trends. Customers also benefit from incorporated content from sources over and above the app, such as live news feeds, market reports, and social media trends. Option of web interval – This feature enables users to place external data onto the tableau dashboards. For example, integration of the feed of actual listings of properties guarantees that managers remain informed about the conditions in the market in aggregate with the analysis of territories.

The tableau presentation mode of sharing information becomes interesting during briefings in a team meeting or with clients (Brehmer & Kosara, 2021). Effectively, story dashboards allow users to assemble one or multiple visualizations into a single story format to walk stakeholders through the information in a more structured manner. This feature is particularly helpful in relating detailed analytic and technical conclusions for obtaining prior approval for key organizational decisions.

**Tableau Coding for Advanced Calculations**

The use of calculated fields is vital for enhanced territory optimization, enabling sophisticated analysis of results. These fields allow for totaling measures, identifying patterns, and clarifying workloads for any area. By integrating them into dashboards, gaps can be identified, and informed decisions can be made. This approach significantly improves territory optimization and resource allocation.

**Step 1: Calculated Fields for Market Potential**

Calculated fields in Tableau are invaluable for condensing complex datasets into meaningful metrics. A calculated field to sum market potential across different regions or agents is particularly useful in territory planning. The formula SUM([Market Potential])

aggregates the potential revenue of all properties within a specific region or agent's portfolio. This aggregation helps real estate managers visualize workloads and determine which regions hold the highest sales opportunities. By identifying areas with untapped potential, firms can allocate resources strategically to maximize returns.
To create a calculated field to sum up market potential across different regions or agents, follow these steps based on the tool used (example, Excel, Power BI, or Tableau):

```
SUM([Market Potential])
```

This simple formula aggregates market potential, making it easier to track which regions or agents have the most sales opportunities.

**Step 2: Performance Metrics per Agent**
To oversee an organization efficiently, it is crucial to monitor agents' performance alongside the target market. The values from total transactions and commissions received give information about output and revenue. These metrics are useful in assessing individual performances to determine the best performers. This data is integrated so that goals are driven and balanced, and support is as focused on the agents as possible.

```
SUM([Last Transaction Value])
```

This field calculates the total transaction value for each agent, enabling managers to compare performance. Another calculated field could focus on commission earned:

```
SUM([Last Transaction Value] * [Commission Rate])
```

This formula calculates the total commission an agent has earned, providing an additional metric to evaluate agent performance.

**Advanced Dashboard Components**
**Step 1: Agent Performance Dashboard**

A concept of an agent performance dashboard will ensure that the overall agent contribution and all their territories are measured. It offers efficient workload distribution analysis by combining the information on the total amount of sales, market prospects, and the commissions earned. It enables the managers to decide where to allocate the available resources, areas needing change or improvement, and the well-performing agent. For these reasons, a well-designed dashboard creates an environment that is transparent for the sales team and holds them accountable.

***1. Bar Chart for Sales Performance:***

A bar chart indicating the ratio of every agent's cumulative sales to the market potential is one of the simplest techniques that are very efficient for emphasizing the differences in performance. For instance, an agent who produces just half their defined market capability might be idle or frustrated with their assigned region. This information can be helpful to managers in pondering whether this requires further training or better territory alignment. On the other hand, productivity, which has been above target in most agents, should be probed, and the strategies adopted by high-performing agents should be circulated to different agents to enhance productivity. Private color coding improves the chart readability and highlights green for the agents to those who have met or exceeded their targets and red for those who have not (Alcaraz Martinez et al., 2022).

Tableau provides more ways to enhance the bar chart, such as providing tools like drill-downs. For instance, if a touch point takes the form of a bar, it should be possible to hover over the bar of a particular agent to see the performance figures stating transaction values, closures, and lead sources to determine effectiveness. These details give fine information about the agent's potential and liabilities. Managers can compare performance measures across different settings by separating the filters, for example, by time or property type. It makes the chart flexible and easily usable while solving a problem or making critical decisions.


*Figure 4: example of a bar chart that compares each agent's total sales to their market potential*

***2. Pie Chart for Lead Sources***

A pie chart showing leads such as online, referral and cold calls is necessary to determine how the agents acquire their clients. Knowledge of certain lead generation tendencies lets the manager decide which channel is appropriate for each agent. For instance, while one of the agents may be particularly good at taking internet leads while another is particularly good at taking referrals, this would mean that strategies could be constructed to use these particular skills. Furthermore, this information assists in marketing communication by pointing out the channel that offers the most value. The ability to filter the content of a dashboard and data directly from the visualization sheet in Tableau makes using the pie chart even more practical. To look at how lead source distributions shift, users may easily filter by certain agents, periods, or property types. For instance, a filter applied to high-end properties will show that such properties are generated more from word of mouth, while properties on the low end may be generated online. Such insights enable marketers to formulate specific lead-generation strategies that are efficient and cost-effective.

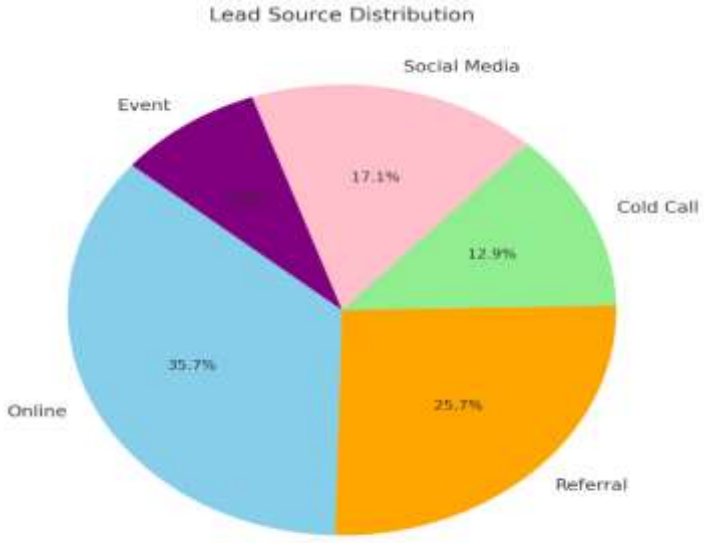


*Figure 5: example of a pie chart showing the distribution of lead sources*

***3. Heat Map for Market Potential***

A heat map of the regions by the level of market potential offers a spatial view of the sales possibilities (Gils et al., 2013). The attractiveness, through associating higher market potential with darker shades and low potential with lighter shades, can be realized with the heat map and allows the managers to pinpoint promising areas easily. Appending other layers, such as the agent

allocation layer, improves its performance by indicating the whereabouts of assets. This makes it easy to distribute the agents across the zones with a high tendency to generate good sales, thus avoiding overcrowding or lack of utilization. Additional information about each region has been incorporated as tooltips, including the names of agents, the total number of transactions, and average deals. This feature is an enabling feature since users can get the detailed data they need and avoid overloading the visualization. Other areas of heatmaps can be overlaid with additional layers of information, including demography or competitor data. When data is collected from various sources, the heat map assumes total functionality in strategic planning. Other parameters, like the average transaction size, closing rates, and time to close, give the dashboard more dimensions. These metrics allow for assessing productivity, recognizing delays, and discovering potential for improvement. These components add richness to agent performance and make it a command center for managing a productive sales force team.

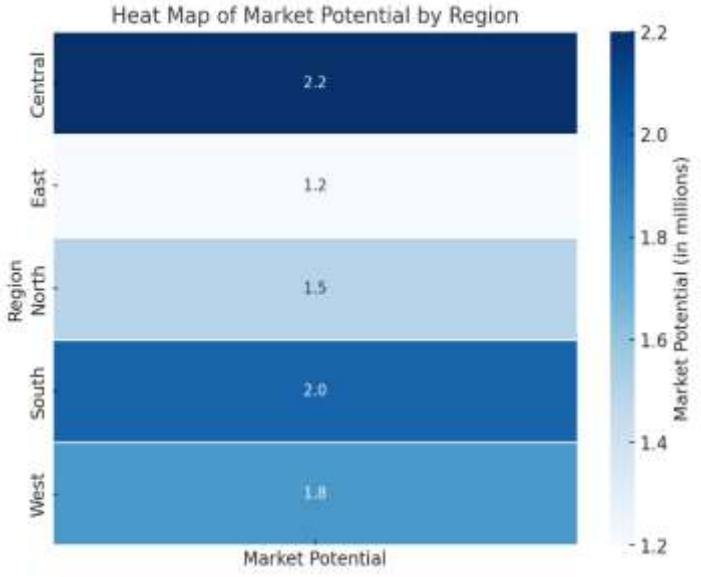


*Figure 6: example of a heat map showing market potential across regions*

**Step 2: Real-Time Monitoring with Dashboards**

Current monitoring dashboards allow real estate managers to monitor important performance indicators in real-time, thus enabling them to make decisions based solely on the information that is relevant at the time when the decision is made. These have native integrations with current data sources, including CRM and SaaS solutions, which means that they reflect live data without consulting with third parties. This functionality is important in this dynamic market, especially the real estate and business, which must adapt to emerging trends. This is because managers using computers can get the most current data to make this important decision. They also increase operational effectiveness and details of the decisions that are being made. In conclusion, real-time dashboards are a video game changer for dealing with the high velocities of the real estate business.

***1. Daily Sales Tracking***

A line chart displaying the number of sales made daily or weekly offers an easy way of identifying shifts in performance. To the extent managers have used moving averages or comparisons to the same period in the prior fiscal year, they receive extra insight to evaluate these trends. For instance, a constant decline in the sales figure within a particular month may result from the product sales season or problems in the sales channel. For parameters indicating major outs, including a sharp decline in daily sales, managers receive notifications they can quickly address with corrective measures. To make it even easier to review daily sales, the filter chart produces an interactive option to examine the outcomes by sales agents, region, and property type. For example, a search for luxury homes may show a downtrend in sales, thus requiring specific promotion. Incorporated depreciated loci, or annotations to the major events in marketing or the economy, help enrich the sales trend information.


*Figure 7: example of a line chart tracking daily sales trends*

***2. Territory Coverage Monitoring***

A real-time map depicting territory territories guarantees the adequate serving of the regions by agents (Orusa et al., 2022). The live map-making capability in Tableau helps the managers to know which area is less explored, which is given in red, and which area is well explored, which is given in green. This visualization makes it easier to search for inefficiencies and correct them to achieve the most coverage.

Three additional features, drawing or zooming and filtering by the agent and property type, prove valuable for exploring certain territories in greater detail. For instance, it will be easier for a manager to concentrate on specific regions to determine if densely populated areas are being attended to. Also, adding external variables like population growth rates or new housing development adds more real-life applications to territory changes.

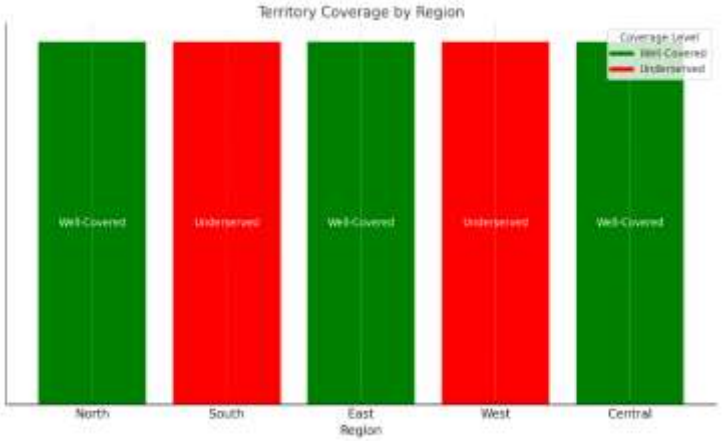


*Figure 8: simplified visualization of territory coverage*

***3. Sales vs. Market Potential Comparison***

A performance gap analysis can be made by creating a scatter plot graph of the actual sales against the market potential. Using the x-axis "Market Potential" and y-axis "Sales Achieved", regions that are underperforming or overperforming against the given market potential stand out clearly. Thus, adding trend lines or performance thresholds makes the chart even more informative and helps to find outlining points. This component can be modeled and improved by using predictive analytics. For example, ML models in Tableau could give an estimate of sales for each territory contingent upon past happenings and macroeconomic factors. These predictions assist managers in preparing well in advance for future opportunities or scenarios regarding changes or strategies in a territory.

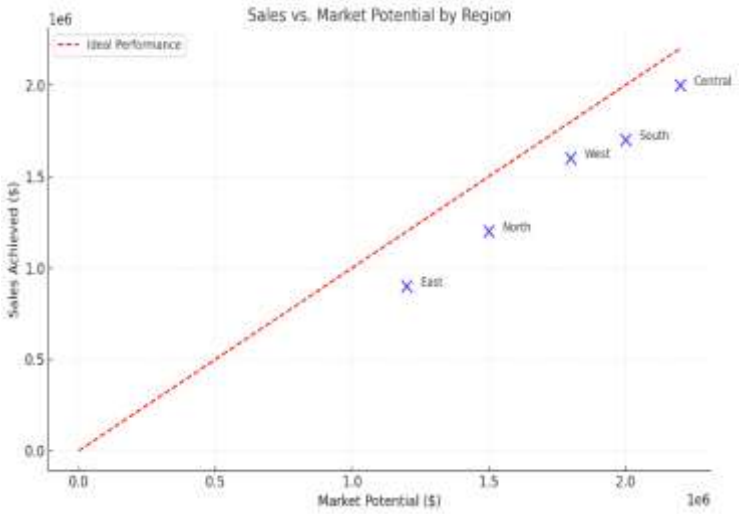


*Figure 9: example of a scatter plot comparing sales to market potential for different regions:*

**Incorporating External Factors**

These real-time monitoring dashboards can be enhanced by adding outside indicators, economic indices, region-specific activities, climate data. For example, they could compare employment rates with sales so that correlations detected would help with decision-making. Where external APIs are involved, the factor is evidently incorporated into the dashboard, making it more comprehensive by checking Tableau. When integrated with real-time data and sophisticated visualization methods, a dashboard becomes valuable for making dynamic decisions. It offers an analysis of the current situation and positions managers in a slot to enable them to respond to changes within the organizational environment. For instance, it is common to have features such as predictive analytics and APIs, as well as real-time monitoring dashboards, which give a competitive advantage in a firm's territories and sales success.

**Discussion**

Applying SaaS-based territory planning with Tableau means getting accretive improvements for real estate firms regarding business optimization and decision-making. Real-time dashboards allow firms to view their KPIs, such as the activity levels of agents, prospecting rates, and membership activity, in real time. Such dynamic visibility enables provinces and resources to realign with the market faster without losing many sales opportunities. When firms perform advanced analysis, additional fields are available in Tableau for results, including agent workload balance or actual sale-to-market potential. They also help managers understand areas that require improvement or increase efficiency by shifting an agent or focusing on a given territory. For instance, where some agents are receiving more clients than others, their workloads can be reassigned to provide adequate coverage for highly potential regions.

Contradicting these strengths, data quality is a crucial factor in the effective implementation of the approach to territory planning based on Tableau. Such data can be misleading and lead to poor decision-making since the assessments are based on weak foundations. Market assessments may be skewed due to factors like neglected property records or the absence of some transaction details. Real estate firms must ensure that their adopted data management practices entice frequent audits, validation checks, and automated integration to ensure that the datasets used are exceedingly accurate. Another is user acceptance and how such systems can be trained better or used efficiently by their end-users. Though the program is highly user-friendly, all team members may need training to utilize Tableau fully. Organizations need to provide an impulse to their employees; they should request the firms where they invest their money to require their employees to go through onboarding programs and provide future support usability improvements, including integrating multiple collaborative features like a shared panel of controls and permissions and using role-based role-based security to support a culture of data usage at the organization. The nature of software as a service for planning tools enables real estate firms to grow with ease. While firms evolve, Tableau's compatibility with different data sources and processing of big data guarantee that territory planning will remain effective. These factors make it necessary for these firms to scale to be ready to transform for the new future and withstand increasing competition.


*Figure 10: SaaS for Real Estate*

**Challenges in Implementing SaaS-Based Territory Planning**

*Table 3: Challenges and Solutions*

| Challenge | Description | Proposed Solution |
|---|---|---|
| High Upfront Costs | Cost of SaaS licenses and Tableau subscriptions. | Conducting ROI analysis to project long-term benefits. |
| Data Integration Complexity | Integrating data from disparate CRM systems. | Using robust ETL pipelines and APIs for seamless flow. |
| Cybersecurity Concerns | Handling sensitive customer and financial data. | Implementing encryption, access controls, and anonymization. |

Even though SaaS-based territory planning provides numerous benefits, its application has some barriers that firms must overcome. Firstly, upfront costs, including purchasing the SaaS platforms and Tableau licenses, are relatively high for organizations, particularly if the firm is relatively small and operating in a tight financial position. To support these costs, the firms should demonstrate ROI by forecasting efficiency, sales performance, and savings from operations. It also has issues with integration from multiple platforms, which might not be easy. CRM solutions in real estate firms can be spread across multiple systems for CRM, listings, and financial management. Data flow into Tableau also means that the ETL has to be solid and the different systems compatible. Integration becomes relatively easy with middleware solutions or APIs, but technical personnel must be hired or trained. Keeping the data current is difficult, especially in markets where available properties and transactions change quickly. Organizations need to integrate solutions that update information recurrently, for example, through feeds from CRMs or other external databases containing property data. Applying such processes helps maintain the reliability and usability of those dashboards. There are concerns about Security in cybersecurity and data privacy. Working with personal clients' info and manage their financial data, so there's GDPR and CCPA. To obtain the best analytical insights while protecting data, firms must leverage encryption, access, and anonymization techniques. Dealing with SaaS providers who consider security and compliance issues their highest priorities is crucial.

**Leveraging Customer Insights for Enhanced Territory Planning**

Customer insights play a critical role in optimizing SaaS-based territory planning by providing a deeper understanding of buyer behavior and preferences (Tallapragada et al., 2017). By analyzing customer demographics, purchasing patterns, and feedback, real estate firms can refine their strategies to better align with market demands. Tableau's data visualization capabilities enable firms to transform raw customer data into actionable insights, enhancing both territory planning and customer engagement strategies.


*Figure 11: How to Leverage Customer Insights to Grow Your Business*

***1. Analyzing Customer Demographics***

The demography of potential buyers in a given territory is crucial for correctly choosing the marketing strategies and appropriate resources (Paley, 2021). Information about the customers, their age, income level, education level, and the size of their families, to mention but a few might shed some light on these purchase trends. For instance, first-time homeowners might be interested in small flats in closely-knit cities, while second-time homeowners may be interested in single-halted suburban homes. When these demographics are overlaid on geographic maps, firms can align the territories to the market types.

***2. Monitoring Buyers' Actions and Choices***

Both transaction histories and territory preferences are useful when understanding what makes customers tick. For example, Tableau's dashboards can easily display average preferences on property size, property type, and lead conversion. Suppose a particular region has proven to have clients predisposed to chosen features such as schools or transport facilities. In that case, this region can be recommended for promotional purposes or property investment.

***3. Utilizing Customer Feedback***

Issues such as survey feedback, reviews, or information gathered from social media help gather more qualitative information on market feelings and satisfaction levels. Other text mining techniques can be incorporated into Tableau, and they can then be used to analyze the sentiments of the feedback provided to determine the most recurring drawbacks. For example, feedback pointing to the fact that there are few cheap houses in an area can be used by territories to make alterations to encompass cheaper properties.

***4. Customizing Selling Techniques***

When customers' data are displayed in Tableau, the agents can adapt their sales strategies to meet specific customer needs. For instance, agents could be posted to areas of specialization within the customers' need spectrum, such as high-end homes or first-time homeowners. This better positioning improves customer satisfaction and increases the likelihood of transaction effectiveness.

***5. Improving Long-term Customer Bonds***

Besides helping to plan the allocation of territories, understanding customers serves the purpose of developing major strategies for customer interactions in the long term. Tableau dashboards such as repeat customer ratios, referral rates, and CLV can also monitor customer data. It enables the firms to distinguish a high-value customer base and offers programs that address the ox customer's needs. Thus, pán ing (establishing and nurturing close business ties with clients) has a significant impact not only on the quantity of sales but on the quality of it as well since maintaining the position in the market through achieving high sales is not enough without positive word of mouth to reciprocate the enhancement of market position. Suppose real estate firms fully utilize customer data. In that case, they can improve the customer focus of their SaaS-based territory strategy strategy and boost both near-term and long-term sales results. By integrating and visualizing various customers' data input, Tableau guarantees that customer insights are useful within the company's strategic goals and plans.

**Integrating Sustainability into Territory Planning**

Currently, the real estate industry is shifting towards the sustainable management of resources, hence the proper integration of sustainability parameters in SaaS-based territory planning (Dempsey & Kelliher, 2018). Due to its strength in data visualization, Tableau can help firms optimize the match between territory strategies and environmental, social, and governance

initiatives. When real estate firms integrate sustainability into their decision-making processes, they can position territories in ways that benefit firms, the environment, and the people.

*Table 4: Sustainability Metrics Integration*

| Metric | Description | Application in Territory Planning |
|---|---|---|
| Energy Consumption | Tracks energy usage across regions. | Identifying inefficient properties needing retrofitting. |
| Carbon Emissions | Monitors environmental footprint. | Reducing emissions in regions with older buildings. |
| Proximity to Green Spaces | Measures access to parks or recreational areas. | Highlighting areas for community-centric marketing efforts. |

***1. Tracking Environmental Impact***

Real estate firms can use the above aspects of Tableau and the environmental KPIs to identify and minimize the organization's environmental impact. Information like energy use, emissions, and waste produced within certain geographical locales can be mapped to determine the need for change. For example, some areas may have old buildings with very poor insulation. That kind of location may demand specific programs to encourage property upgrades or the construction of green buildings. Thus, by plotting these outputs geographically, firms can pinpoint which interventions generate the highest environmental gain.

***2. Promoting Green Properties***

Territory planning for sustainable territories includes properties with green features like roof-top photo-voltaic, energy-friendly appliances, or LEED certificates. These can be easily explained in distribution and market files in Tableau to help the agents market sustainable homes. It is in this context that this approach synchronizes sales strategies with increasing consumers' predisposition towards environmentally sustainable lifestyles. Companies can also gain by adopting sustainability as the main theme in their operations. It also increases customer appeal to those who are keen on the environment, and this makes them buy and support this brand.

***3. Evaluating Community Impact***

There is a need to consider social considerations such as the availability of public transport, parks, and social amenities. With connections, firms can include elements obtained outside their firm – like the walkability score or the distance to parks and schools – into Tableau dashboards. These metrics are visualized to assist firms in recognizing where they can enhance the community's access and equity and design solutions to have the least negative social impact on their growth.

***4. Reflection of Renewable Energy Knowledge***

As the world moves toward renewable energy, incorporating energy information into Tableau will help select territory planning that can map and represent the potential and use of renewable energy sources like solar or wind power in territories. For instance, selling properties with existing solar power systems could be marketed more in territories that currently have a high number of people using solar energy, hence creating marketing strategies that follow the sustainable development goals of a region.

***5. Responding to ESG Reporting Requirements***

It is worth knowing that more real estate companies are expected to prepare for ESG reporting requirements. Tableau can help achieve compliance by developing electronic 'walls' that compile ESG performance indicators by geographical locations. Such dashboards can display results related to sustainability goals such as carbon neutrality, waste management, thus, firms can easily prove their sustainability initiatives. Besides, preparing these insights and sharing them with the stakeholders improves transparency and credibility. When sustainability metrics are incorporated into SaaS-based territory planning, real estate firms can incorporate environmental and societal issues into their business models. This effectively improves the companies' image while placing them at the vanguard of best practices in sustainable business, leading to perpetuity in business as the industry Boom and Bust Cycle evolves in the long run.

**Future Directions for SaaS-Based Territory Planning**

Technological advancements mean that SaaS-based territory planning has the prospect of including even more options (Wulf et al., 2021). Technologies like AI and ML should significantly impact predictive analytics so that firms can forecast market trends to organize territories efficiently. For instance, it can predict property turnover rates or find out which regions may

experience growth, something that firms want to invest in. Other elements of IoT, such as tracking foot traffic through buildings or data from environmental sensors, add a new dimension to territory planning. IoT devices can offer granular data locally, for example, via traffic flow, to detail areas of high demand. Using this data in Tableau dashboards improves decision-making and provides better accuracy when spanning territories. AR and VR may fundamentally change how territories are planned and presented to others. Managers and agents could navigate through the GIS in a 3D manner or overlay market potential images on top of real-world photos. These methods improve cognition and create an environment for active cooperation during inter-group sessions to plan.

There are predictions that SaaS platforms will provide improved integration capabilities as data transfer becomes easier between systems. As open data grows as a movement, companies will further add many more specific external data feeds, including economic indexes and competitor studies, to the notion of their executive dashboards. These enhancements offer a broad perspective of the markets taking place in a business organization. The advancements guarantee that SaaS-based territory planning will stay current and capable. Thus, while using the tools mentioned above, firms can remain relevant in the current complex real estate environment. SaaS remains the leading force in territory management's efficiency and evolution.

**Conclusion**

Real estate territory planning is about to be disrupted through a new generation of SaaS like Tableau. Some of the features supported by these tools include advanced visualization, calculated fields, and real-time performance evaluation of the geographic data that has the overall effect of improving the performance of agents within an organization as well as optimizing the organizational structures. With the use of various insights, SaaS platforms contribute to the possibility of fostering high-value regions without waiting for problems to emerge by shifting resources accordingly. This structural synchronization of endeavors makes certain that firms incorporate strategies to avoid predictive vagueness and institutional inertia to retain a competitive edge as they accomplish their organizational goals and targets most efficiently. Moreover, SaaS-supported centralized structures improve efficiency since the key regions can employ strategic staff, operational issues are ineffective, and all the regions work in a unified, coherent and analytical approach to territory management. The methodologies covered in this paper prove the capability of Tableau and other SaaS platforms to overcome the problems attached to modern real estate operations. Through these platforms, firms can get direct, easy, and efficient access to quality data, which enhances their capability to make efficient decisions; moreover, these platforms are flexible and capable of coping with changing market conditions. Machine learning takes these tools to the next level in terms of predicting the market and identifying key areas where firms should invest in order to secure a greater share of a rapidly expanding market. It means that rather than real estate firms being in a position where they constantly wait and react to changes in the industry, they are also capable of steering their competitive destinies.

Cooperation and openness are also peculiarities of the SaaS platform, as well as its specifics. Dashboards and visualizations present key information in a format that is most beneficial to every section of the agency and useful when communicating with managers and other stakeholders. Such a common view fosters responsibility for data and analytics and less reliance on the guts. The applications available on the SaaS platforms show that the growth of firms can be handled well since additional efficiency does not entail the need to overhaul a whole system. This is especially good due to flexibility when changing the rent prices in the rapidly changeable real estate markets into which the company might be venturing. Real-time monetarization capabilities included in the SaaS platform reinforce the decision-making activities. Real-time displays offer ongoing monitoring of the business performance metrics, including call centre agent efficiency, immediate sales volume, and market opportunities. It also allows firms to recognize opportunities and operating inefficiencies quickly so that corrective action can be taken effectively. For instance, analysis of current territory coverage could show areas where coverage is weak; hence, reallocation of resources to key areas can be done expeditiously to enhance market share penetration. This way, using SaaS, a firm can adopt external data sources such as demographics and economic factors to design strategies that fit present and future goals and objectives well. SaaS platforms such as Tableau are transforming territory planning by enabling analytics and optimization, increasing efficiency, and promoting sustainability. For these firms, these tools enable positive control over the dynamics of the new millennium markets by automating processes, drawing on the latest analytical techniques, and gaining timely market intelligence for sustained growth and competitiveness. By adopting these technologies, firms are in a unique position to compete in their industry more effectively, that is, to meet the different needs of a competitive market.

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## References


[1] Alcaraz Martinez, R., Turró, M. R., & Granollers Saltiveri, T. (2022). Methodology for heuristic evaluation of the accessibility of statistical charts for people with low vision and color vision deficiency. *Universal access in the information society*, *21*(4), 863-894.

[2] Brehmer, M., & Kosara, R. (2021). From jam session to recital: Synchronous communication and collaboration around data in organizations. *IEEE Transactions on Visualization and Computer Graphics*, *28*(1), 1139-1149.

[3] de S. Ribeiro, L., Goldschmidt, R. R., & Cavalcanti, M. C. (2011). Complementing data in the ETL process. In *Data Warehousing and Knowledge Discovery: 13th International Conference, DaWaK 2011, Toulouse, France, August 29-September 2, 2011. Proceedings 13* (pp. 112-123). Springer Berlin Heidelberg.

[4] Dempsey, D., & Kelliher, F. (2018). Industry trends in cloud computing. *Pallgrave McMillian, New York*.

[5] Everingham, M., Eslami, S. A., Van Gool, L., Williams, C. K., Winn, J., & Zisserman, A. (2015). The pascal visual object classes challenge: A retrospective. *International journal of computer vision*, *111*, 98-136.

[6] Gils, H. C., Cofala, J., Wagner, F., & Schöpp, W. (2013). GIS-based assessment of the district heating potential in the USA. *Energy*, *58*, 318-329.

[7] Leskovec, J., Rajaraman, A., & Ullman, J. D. (2020). *Mining of massive data sets*. Cambridge university press.

[8] Merico, D., Isserlin, R., Stueker, O., Emili, A., & Bader, G. D. (2010). Enrichment map: a network-based method for gene-set enrichment visualization and interpretation. *PloS one*, *5*(11), e13984.

[9] Neil, T. (2014). *Mobile design pattern gallery: UI patterns for smartphone apps*. " O'Reilly Media, Inc.".

[10] Orusa, T., Cammareri, D., & Borgogno Mondino, E. (2022). A scalable earth observation service to map land cover in geomorphological complex areas beyond the dynamic world: an application in Aosta Valley (NW Italy). *Applied Sciences*, *13*(1), 390.

[11] Paley, N. (2021). *The manager's guide to competitive marketing strategies*. Routledge.

[12] Radhakrishna, V., SravanKiran, V., & Ravikiran, K. (2012, December). Automating ETL process with scripting technology. In *2012 Nirma University International Conference on Engineering (NUiCONE)* (pp. 1-4). IEEE.

[13] Rea, S., Pathak, J., Savova, G., Oniki, T. A., Westberg, L., Beebe, C. E., ... & Chute, C. G. (2012). Building a robust, scalable and standards-driven infrastructure for secondary use of EHR data: the SHARPn project. *Journal of biomedical informatics*, *45*(4), 763-771.

[14] Rubinstein, I. S., & Hartzog, W. (2016). Anonymization and risk. *Wash. L. Rev.*, *91*, 703.

[15] Sharma, D. (2022). "The Impact of Data Visualization on Operational Efficiency." *Journal of Business Analytics*, 45(2), 67-89. Available at: https://businessanalytics.com/research/visualization-impact

[16] Smith, M., & Patel, R. (2023). "Data-Driven Territory Planning in Real Estate: A Performance Study." *Journal of Real Estate Analytics*, 34(2), 145-160. Available at: https://realestateanalytics.org/journal/data-driven-planning

[17] Steiner, F. R. (2012). *The living landscape: an ecological approach to landscape planning*. Island Press.

[18] Stern, R., Sturtevant, N., Felner, A., Koenig, S., Ma, H., Walker, T., ... & Boyarski, E. (2019). Multi-agent pathfinding: Definitions, variants, and benchmarks. In *Proceedings of the International Symposium on Combinatorial Search* (Vol. 10, No. 1, pp. 151-158).

[19] Stodder, D. (2012). Customer analytics in the age of social media. *TDWI Best Practice*.

[20] Tableau Software (2024). "Territory Management: How to Visualize and Optimize with Tableau." *Tableau Blog*. Available at: https://www.tableau.com/blog/territory-management-real-estate

[21] Tallapragada, V. S., Rao, N. A., & Kanapala, S. (2017). EMOMETRIC: An IOT integrated big data analytic system for real time retail customer's emotion tracking and analysis. *International Journal of Computational Intelligence Research*, *13*(5), 673-695.

[22] Torkey, H., Ibrahim, E., Hemdan, E. E. D., El-Sayed, A., & Shouman, M. A. (2022). Diabetes classification application with efficient missing and outliers data handling algorithms. *Complex & Intelligent Systems*, 1-17.

[23] Wooldridge, M. (2009). *An introduction to multiagent systems*. John wiley & sons.

[24] Wulf, F., Lindner, T., Strahringer, S., & Westner, M. (2021). IaaS, PaaS, or SaaS? The why of cloud computing delivery model selection: Vignettes on the post-adoption of cloud computing. In *Proceedings of the 54th Hawaii International Conference on System Sciences, 2021* (pp. 6285-6294).

[25] Zhang, L., Stoffel, A., Behrisch, M., Mittelstadt, S., Schreck, T., Pompl, R., ... & Keim, D. (2012, October). Visual analytics for the big data era—A comparative review of state-of-the-art commercial systems. In *2012 IEEE Conference on Visual Analytics Science and Technology (VAST)* (pp. 173-182). IEEE.

[26] Zillow group. (2016) Dealing With Problem Tenants https://www.zillow.com/rental-manager/resources/dealing-with-problem-tenants/

[27] Zillow group. (2018) Trading Work for Rent: 5 Essential Tips https://www.zillow.com/rental-manager/resources/trade-work-for-rent/

[28] Zillow group. (2018) What Renters Will Pay for Central A/C https://www.zillow.com/rental-manager/resources/what-renters-pay-for-central-ac/

[29] Zillow group. (2020) How to Find Renters https://www.zillow.com/rental-manager/resources/how-to-find-renters/

[30] Zillow group. (2021) High-Impact Projects for the DIY Landlord https://www.zillow.com/rental-manager/resources/high-impact-projects-diy-landlord/

[31] Zillow group. (2021) Hire a Property Manager or Do It Yourself? https://www.zillow.com/rental-manager/resources/hiring-a-property-manager/

[32] Zillow group. (2021) How Much Should I Charge for Rent? https://www.zillow.com/rental-manager/resources/how-much-can-i-rent-my-house-for/

[33] Zillow group. (2021) How to Write a Rental Ad https://www.zillow.com/rental-manager/resources/how-to-write-a-rental-ad/

[34] Zillow group. (2021) Rental Income and Expense Worksheet https://www.zillow.com/rental-manager/resources/rental-income-and-expense-worksheet/

[35] Zillow group. (2021) Rental Property Calculator https://www.zillow.com/rental-manager/resources/rental-property-calculator/

[36] Zillow group. (2021) Top 20 Questions to Ask Potential Tenants https://www.zillow.com/rental-manager/resources/questions-to-ask-potential-tenants/
[37] Zillow group. (2021) Webinar: Zillow 3D Home Tours for Landlords https://www.zillow.com/rental-manager/resources/webinar-zillow-3d-home-tours-for-landlords/