

**DEVELOPING A RESTAURANT ANALYTICS DASHBOARD FOR
OPERATIONAL INSIGHTS**

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Abstract

The restaurant business entails a number of issues, such as selling, controlling employee productivity, and stock. With current traditional strategies, these issues cannot be addressed, and companies end up with low revenues and high costs. The ongoing construction of a restaurant analytics dashboard is a valuable tool that collects data from POS and generates real-time reports on sales, employee performance, and stock. The front part of the application is created using React, whereas the backend is based on the Go programming language; it helps synchronize data effectively in order to provide helpful information and improve decision-making and performance within the organization. Other features like on-sale, performance, and stock control alerts enable restaurant managers to manage waste and employees' productivity, as well as generate more revenues from promotions, among others.

Furthermore, it has unique features such as flexibility and modularity, which make it an ideal tool to meet the needs of disparate forms of restaurants. It also has features to protect data. There is potential for more development the moment advanced technologies such as artificial intelligence and IoT are incorporated into their functioning. This solution is a powerful instrument to solve the questions of a restaurant's profitability and competitiveness.

Keywords: Restaurant Analytics, Dashboard Design, Real-Time Data, Inventory Management, Employee Productivity, POS Integration, Operational Efficiency, Targeted Promotions, AI in Restaurants, Data-Driven Decisions.

I. INTRODUCTION TO RESTAURANT ANALYTICS DASHBOARD

The restaurant industry, which is a highly competitive and service-based industry, is challenged by outstanding operational issues, which, at times, make it difficult for firms in the restaurant industry to record high levels of profitability and growth. Some of the key challenges that may affect the food establishment include: So, it becomes tricky for the restaurant owners to come up with different plans at different times since some of the factors they might need to consider include staff performance fluctuations, unpredictable stock supply and sales trend tracking. Additionally, these problems are compounded by an absence of actual data that could be actionable to increase the overall value of a business and, subsequently, the lives of its occupants. In this regard, analytics dashboards have come up as a revolutionary feature in the industry to solve these challenges for restaurant operators.

A restaurant analytics dashboard is a web platform that visually displays all the necessary, up-to-date figures on restaurant performance. These dashboards are a single-source data management solution that encompasses information derived from POS systems and employee performance and inventory tracking. They are valuable because they allow people – specifically restaurant owners and managers – to convert large amounts of data on business operations into visuals that can be easily interpreted and acted upon. The greatest strength that comes with analytics dashboards is the ability to provide senior-level value that transforms restaurant operations. There will be the capacity to address problems with the flow of sales, stock out, etc., which are likely to foster smoother operations. Enhanced decision-making is another significant benefit because restaurant owners understand factors affecting the income, number of employees, and customers' tastes. These same dashboards help to increase profits through the elimination of waste, improving operational efficiency, and dynamic sales and marketing based on actual sales data.

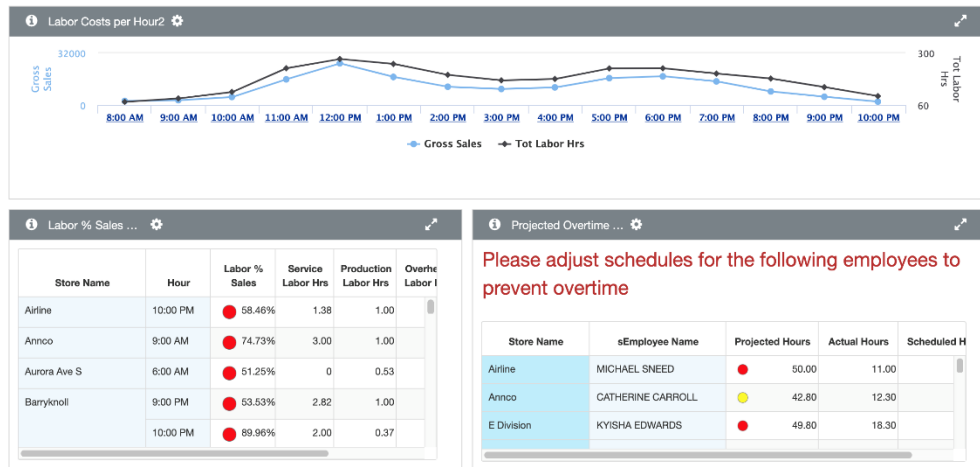


Figure 1: Learn the Basics of Restaurant Business Dashboards

One real-world example of these capabilities is described in the source document - the analytics dashboard has a modern technical platform. The application is designed to have a React front end and a Go back end and operates with POS systems to synchronize data. Some of the popular front-developing tools, such as React, make it possible to design an easily interactive space that enables the manager to move around the dashboard comfortably. At the same time, the Go programming language allows for a very efficient and scalable backend for the system in question, and large amounts of data are not a problem. Integration with POS systems adds additional functionality and streamlines data capture, reduces the likelihood of mistakes and relays real-time data on sales, staff and stock positions. Thus, restaurant analytics dashboards are key to addressing problems related to organization operations and achieving the benefits of effective analytics usage. These sophisticated dashboards combine with current systems, thereby solving the information problem of restaurant owners and offering them tools for

making correct management decisions to achieve profitability and withstand fierce competition in the restaurant industry.

II. UNDERSTANDING KEY OPERATIONAL CHALLENGES IN RESTAURANTS

Restaurants are located uniquely within the fast-service sector, where efficiency measures great allies in their performance and customer satisfaction (Kwansa & Parsa, 2014). Even though management practices today have advanced significantly, many organizations encounter fundamental problems that hamper performance. Several challenges common with restaurants include issues in analyzing trends in sales and revenues, managing workforce productivity and time, and controlling inventories. Unfortunately, these challenges do not provide sufficient solutions; therefore, data solutions are strongly required.

2.1 Controlling Sales and Revenue

Tracking sales and revenue accurately is crucial to achieving the best results for any restaurant. Restaurants must learn the peak times, general merchant meal choices, and the most ordered meals to address corresponding service and price patterns. Nevertheless, relying on manual or outdated systems to monitor sales means that insights are delayed and can be far from complete. The use of a paper-based system or a standalone spreadsheet eliminates real-time integration, thus making it challenging to identify areas of improvement (Jannach et al, 2014). Further, sales trends are not always exact and do not always have the same periodicity due to the impact of some extra factors like holidays, weather conditions, or other regional events. If they do not get data in consolidated form, they fail to adjust when they can lose money during high-demand periods. The situation is made worse by isolated data silos, given that front-end information, kitchen-specific data, and the data from the point-of-sale system are often not linked. This separation presents restaurants with a challenge when trying to evaluate total restaurant profitability.

2.2 Monitoring Staff Performance and Scheduling Inefficiencies

Another area of concern for restaurants revolves around meeting the best staff management means. Employee performance has a direct bearing on service delivery, which has a direct bearing on customers' satisfaction and loyalty. Employing conventional methods of tracking performance, including self- and supervisor feedback or mid- and end-of-the-year performance appraisals, is more or less subjective and less effective. This may lead to some disparity in service delivery and performance as well as in the assessment of the training requirements. The problem is compounded by scheduling inefficiencies. The employees working in many restaurants still produce the staff schedules on their own, which is time-consuming and highly inaccurate (Sommerville, 2007). It is likely to cause some restaurants to have more employees than necessary during some hours of the day and to lack enough employees during other times. If the organization hires too many workers, the cost escalates, but if it hires few employees, then service delivery and morale will be affected. Overall, such inefficiencies introduce problems

that not only include day-to-day operations but, in addition, are associated with the high turnover rate in restaurants.

2.3 Inventory Management Issues Leading to Wastage or Shortages

Operators also have to strive to keep food waste charges low while keeping just-in-stock out of stock at the same time. This becomes challenging because the stock is reactive to perishable ingredients, customers' inconsistency in purchasing habits, and suppliers' unreliable delivery. Historical techniques of handling inventory, like conducting stock counts physically at fixed intervals or simply setting up specific standard reorder points, rarely incorporate those variables in the real-time sense. These directly reduce profitability by leading to wastage due to overstocking or spoilage. On the other hand, stockout situations result in menu unavailability and customer dissatisfaction, hence a negative impact on the restaurant. For example, in restaurant management, it is impossible to make sound purchasing decisions or to alter the menu depending on obtainable inventory. Lastly, there are perennial problems arising from ineffective inventory tracking, where it is difficult to find the causes of losses or deficiencies.

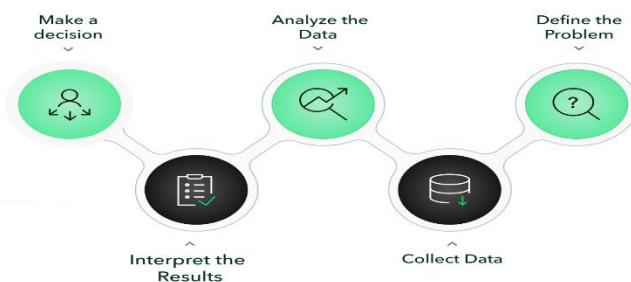
2.4 How Traditional Methods Fail to Address these Challenges

Conventional approaches to handling such operational issues are generally post-situation instead of pre-situation strategies. For example, using monthly sales reports means that the data is historical and cannot be used within the business at the moment, pending the analysis. Likewise, manual timing and inventory management are time-consuming and prone to errors, which means there is little room for improvement. These methods also do not have scalability, especially in the context that business requirements are constantly evolving, especially when implementing changes at multiple locations, such as in cases of restaurant chains. The broken-down system of traditional systems augments these issues further. When the data is not integrated, it remains distributed among various operational regions, leaving an analyst with no way of discovering connections between them (Gandomi & Haider, 2015). Due to this, restaurant managers are forced to work with their instincts. At the same time, in the real world, the decisions made are based on data and information, making it possible for restaurant managers to make bad choices out of poor information.

2.5 Data-Driven Strategies as the Solution

Data-driven strategies are a revolutionary concept that can rectify these drawbacks. With advanced analytics involved in the process, restaurants can get real-time data concerning sales, the performance of their employees and the stocks they need to restock. Computer-integrated systems facilitate the combining of data collected from different sources so that managers can base their decisions on current information (Prasad, 2000). For example, it is easy and immediately informative to have a set of charts that will show trends in sales. At the same time, such a style is immediately actionable in terms of finding new opportunities for development or areas of weakness. Thus, automated scheduling systems can be helpful in organizing staff work according to previously used data and future expectations, thus preventing staff wasted time

and increasing their contentment. Likewise, manufacturing resource planning systems, which have analysis capabilities, can estimate the specific inventory necessitated, avoiding over-ordering or depletion. Finally, the deployment of data initiates institutions of restaurants to transform the methods of operation from a simple reactive approach to anticipating and controlling operations. Subsequently eliminating the flaws that are associated with traditional approaches, these solutions open the avenue to optimization of efficiency, profitability and customer satisfaction in an industry that is rapidly escalating in terms of competitiveness.



 rapidops

Figure 2: 5 Powerful Strategies for Data-Driven Decision Making

III. FEATURES OF AN EFFECTIVE RESTAURANT ANALYTICS DASHBOARD

When designing and implementing restaurant analytics, major considerations should be made to arrive at the best solution when facing issues that affect restaurant operations. Some specific features should be included in such dashboards to make them effective and to assist restaurant owners in making the right decisions.

3.1 Essential Features

3.1.1 Real-Time Sales Tracking: An essential component of restaurant analytics is the opportunity to monitor sales figures in real time. Business in restaurants is highly dynamic, and therefore, sales information has to be available to track success at all times. In the working process, managers are able to track revenue changes in real-time, determine when demand is highest and adjust actions accordingly. The integration of systems for real-time processing, say in applications in finance like electronic funds transfer systems, improves efficiency highly (Kendall et al, 2011). Similarly, restaurant dashboards can benefit from real-time or near-accurate time synchronization with the point of sales (POS) in order to ensure a sales data latency-free process.

Dashboard to track sales and expenses of restaurant

This slide showcases dashboard that can help restaurant to keep track of sales and expenses. Its key elements are total sales, average transactions, non labor margin, expenses by category etc.



This graph/chart is linked to excel, and changes automatically based on data. Just left click on it and select 'Edit Data'.

Figure 3: Dashboard To Track Sales And Expenses Of Restaurant Strategies To Increase Footfall And Online

3.1.2 Employee Performance Metrics: Performance measures, which are also important facets of analytics dashboards, are also critical in restaurants where the productivity of every employee hired is paramount to the success of the business. Such measures may include the productivity of workers, the efficiency of service delivery, client satisfaction, and sales revenue. When correctly interpreted, the results facilitate recognition of top performers and productivity issues within a particular group. In addition, the work on goals and objectives can be used to identify benchmarks for programs of recognition, motivate workforces, and enhance morale (Rodriguez & Walters, 2017). Predictive analysis could increase operational productivity with patterns and trends, thus helpful in assessing employees' performance in restaurant contexts.

3.1.3 Inventory Level Monitoring and Alerts: Three of the primary inventory considerations that restaurants face include spoilage, stockouts, and stock level excess. In order to create these elements of effective fleet management, essential features for monitoring stock and supplies, as well as making alerts about low and overstock supplies, should be included. Dashboards introduce the managers to detailed information on inventory details, which enables people to maintain the necessary quantities of ingredients in the right proportions without incurring losses. Kumar (2019) defines an accurate and real-time approach to predictive analytics and real-time data overview, which enhance inventory management with the help of trends obtained from historical data. In this way, he provides users with the option to make the reports and visualizations fully customizable.

3.1.4 Customizable reports and visualizations: An essential component of restaurant analytics is report and dashboard creation capabilities that allow restaurants to build personalized reports that reflect their business. Every restaurant is different; it differs in factors of operation, its goals, and milestones. Interactivity enables customers to configure the layout and adjust the priorities of the peculiar widgets to fit the view of company performance. For instance, a small café might place more emphasis on sales for individual meals, while a big restaurant might consider the rate at which tables are turned over. When presented in the form of charts, Graphs or tables, it becomes easier to understand, and even the owner of the restaurant does not take much time to make the necessary decisions. Financial dashboards must be user-specific to adapt to the needs of restaurant analytics (Gill 2018).

3.2 Usability Engineering for Simple Accessibility

When it comes to reporting, dashboard content's usability depends highly on the UI design. The appropriate planning of interfaces enables effective acquiring, analyzing and utilizing of data. A dashboard should be easy to navigate, and it should ideally have all the dynamic metrics grouped in a meaningful manner. The users should not be able to figure out how to use it. The authors found that ineffective and complex dashboards can hinder rather than improve users' ability to understand and work with data. The effectiveness of electronic funds transfer systems depended on UI simplicity, which proves the point that simplicity is a phenomenon crossed between the dashboard design.

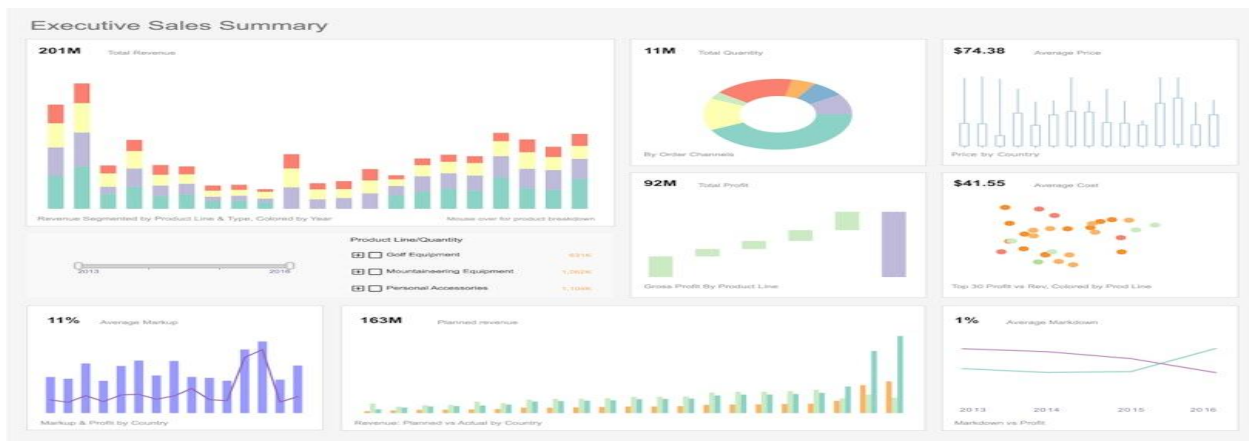


Figure 4: Dashboard UI Design: 14 Best Practices for Stakeholders

3.3 Scalability and Adaptability for Different Types of Restaurants

The factors that are often overlooked when developing a restaurant analytics dashboard are scalability and flexibility. The structure of the restaurant changes over time, or new business models, such as delivery or takeaway services, will evolve, and this will require a different structure of data. All these above are essential, dynamic requirements that should ideally be

supported by an effective dashboard design that does not necessarily need frequent redesigning. For example, start-up restaurants may start by implementing just fundamental functionalities, product progress, and complex analytical processing, as many businesses do with their processes. Likewise, flexibility helps make sure that dashboards can fit the types of restaurants, including fast food outlets and elegant restaurants (Cavusoglu, 2019). Scalability is one of the critical dimensions in analytics and it points to the future readiness feature of technology.

IV. TECHNICAL IMPLEMENTATION

Creating a structure for restaurant analytics entails a careful method of thinking through a technical architecture to meet the complexities facing its operations head-on. The following part gives a technical perspective on the operations, including the front-end tools, backend infrastructure, POS, main development issues, and security aspects.

4.1 Front-End Technologies: Why React Was Chosen

React was chosen as the front-end framework because of its outstanding features in the construction of interactive user interfaces. The adaptability of the structure of React also makes the reusable component possible, which further reduces the development time and difficulty level (Nyati, 2018). In the case of the restaurant analytics dashboard, this modularity was advantageous in developing the sales chart, employee real-time production, and inventory graphs trivia. React's virtual DOM allows it to quickly update nuances of the UI without re-rendering the whole page, which is essential when working with real-time data. Additionally, the big ecosystem that React has, such as Redux for handling state management, was proved to be capable of dealing with big data flows. This capability means that users can wade through all the data that may be pushed to the dashboard without any hitches. The ability of React to interoperate with other systems and integrate into large systems made such a decision obvious.

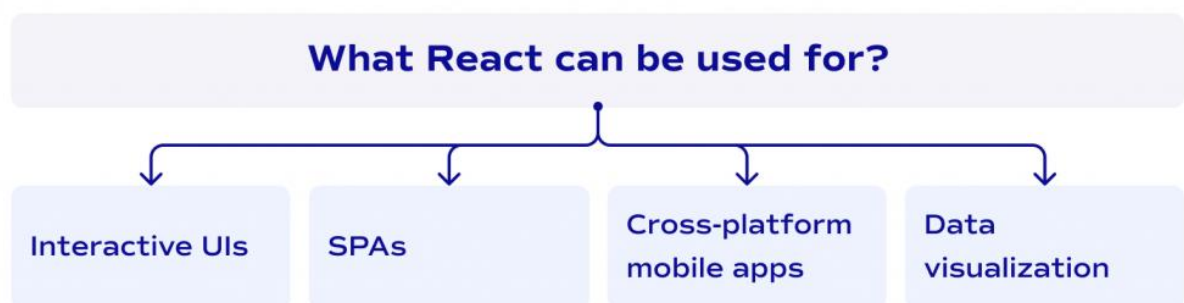


Figure 5: Using React for Front-End Development: A Full Guide

4.2 Backend technologies: benefits of using go

The back end of the dashboard was developed in Go, an efficient, scalable, and simple

programming language. Go's concurrency model; Goroutine was able to manage multiple streams of data from the POS system without hindrances (Nyati, 2018). This capability was critical for displaying real-time data changes on the dashboard. Go's statically typed language definition meant there were fewer runtime issues, as this reduced the level of general errors in the application. The integrated testing and profiling tools available in Go also made the debugging process more accessible, thus delivering a product to market quicker and making the end product more stable. This was particularly strategic given that Go is well suited to high-performance server-side computations, which could be critical in the real-time processing of transactional data from various sources. The language's ability to work well with RESTful APIs made it easier to interface with the front end of the POS system.

4.3 Integration with POS Systems: How Real-Time Syncing Works

Blending the analytics dashboard with the restaurant solution Point of Sale (POS) system was crucial for real-time integration. This integration was done using RESTful APIs, where the POS system and the dashboard could communicate directly. Every transaction that occurred in the POS system was recorded and analyzed by the back end so that the real-time data was shown on the dashboard. To avoid latency issues, data was delivered in real-time using WebSocket protocols. This approach removed the weekly HTTP request cycle, which made the update interval even more pronounced. The integration also involved a data normalization step, which normalized transactional data from different POS systems so that the data in the dashboard appeared uniform. The harmonization of the dashboard enabled the POS system to be compatible with other POS vendors, a feature that made the dashboard suitable for any restaurant's layouts (Free, 2007).



Figure 6: POS Integration: Connecting the Right Tools for Your Business

4.4 Challenges Faced during Development Process and their Resolutions

Several issues emerged during the development process, such as data heterogeneity, the processing of enormous flows of data, and system scalability. A significant cause of data inconsistencies was identified; this stemmed from the fact that the various POS systems used to capture transactions entered data in different formats. The problem was addressed by ensuring

that there was a valid approach to data normalization that would ensure that all the data inputted into the design was normalized. Another core problem was coping with large numbers of concurrent transactions during the period when such rates were most typical. The same was solved by using goroutines in Go effectively so that the system could handle multiple transactions at once without impacting performance. Furthermore, they also coded a load balancer that ensured that when there were high traffic issues in the application, the traffic could be distributed to different servers. Another area of concern was scalability since the demand for information systems increased with the size of the restaurant chains and the corresponding increase in the number of transactions and users. Due to the flexibility of React modularity and Go's powerful server-side capabilities, the application was easily scalable (Grebe, 2019). Capacity validations were also performed to determine any constraints that could slow down the system so as to prepare for future expansion.

4.5 Security Measures to Ensure Data Protection:

Since the system collects data on sales revenue and its employees, proper security measures were implemented. All information transmitted from the POS system to the back and front ends was encrypted using advanced standards of AES-256 encryption and decryption only. Furthermore, the system incorporated token-based authentication, whereby the dashboard could only be accessed by accredited users. A new RBAC control was developed, which enabled the managers of the restaurants to grant permission to access various data from various users, depending on their roles. For example, an employee could view the specific performance data concerning him, while the manager could view all the available data and data manipulation features of the dashboard. Security assessment and risk analysis were carried out periodically in order to reconcile with data protection legal provisions.



Figure 7: How does AES-256 encryption work to protect your data

V. USE CASES AND REAL-WORLD BENEFITS

Dashboards for restaurant business intelligence solve crucial problems and help make decisions supported by data and resources. These dashboards have proved helpful in solving some of the

challenges confronting restaurant managers and owners, such as cutting down on food waste, increasing employee efficiency and increasing sales through couponing. Examples of actual companies and best-case and worst-case examples demonstrate the value proposition of such a dashboard, making it indispensable for today's restaurant businesses.

5.1 Reducing Food Waste through Better Inventory Tracking

Pest control is another problem associated with restaurants since, most often, the problem arises from the improper storage of food and poor inventory control. This problem is solved by an analytics dashboard with updated inventory data to help with current decision-making. Since managers for P&L are regularly updated with precise stock levels and usage patterns, they can easily detect items that are approaching their best-before date and then find ways of using them up profitably. For example, the problems could be identified in the existing form of the presented information, such as the dashboard suggesting that the excess of fresh vegetables could be used to create daily offers, which will help address the issue with their storage. Furthermore, by tracking purchases from daily or weekly sales figures and seasonal variations, the restaurant is better placed to forecast demand patterns and control its purchasing behaviour (Lasek et al, 2016). In this way, it is possible to avoid the over-purchase of goods that will not be used frequently, but at the same time, avoid cases when certain products are hardly used. However, the problem is that they occupy a significant share of the total procurement expenditures. Hypothetical scenarios demonstrate this benefit: A restaurant that monitors a daily trend that involves a gradual decrease in demand for a particular meal will likely utilize this information to change the menu or portioning and incorporate some marketing strategy without adversely affecting the customer's quality.

5.2 Improving Employee Productivity with Performance Data

Employee performance significantly affects the satisfaction levels of the restaurant and its clients. An analytics dashboard also empowers managers with instruments to evaluate staff performance in terms of order completion accuracy and time taken, among other aspects obtained from customers. This knowledge enables management to express appreciation to hardworking employees and demonstrate where they need to improve. For instance, the dashboard shows that one shift has more extended ticket times than others. This means that receiving such data enables management to look for the cause of the problem, be it a lack of employees, their training or the organization of work, and make alterations. Aligning performance standards with training can help create a productive workforce (Goetzel et al, 2001). In addition, parameters such as speed of performance also play an important role because they create pressure on employees. Some relevant benefits of metrics include the following: Staff is encouraged to perform to target or even surpass it since there is a clear, visible target. Head office staff receives information on time, which leads to efficient performance. For instance, the manager who uses the dashboard to notice busy hours may ensure the best employees during such times, prompt service delivery, and improve customer satisfaction.



Figure 8: Improving Employee Productivity through Training and Development

5.3 Boosting Revenue through Targeted Promotions Based on Sales Data

Another important use of an analytics dashboard is promoting revenues within the organization. From the scanned sales data, the dashboard determines the most ordered products, the least ordered products, and customer preference trends. Such information best enables restaurants to predict and offer attractive offers and discounts that are likely to increase sales and, at the same time, restaurant profitability. For instance, you might find out in the dashboard that sales of a specific appetizer increase on Fridays. Using this understanding, the restaurant can offer the Appetizer in a "Friday Special" that is cheaper than the regular price, so more clients flow to the restaurant, thus increasing overall sales. In the same regard, knowledge of slow-moving dishes helps the management apply selective or one-time aggressive pricing changes or use the item in a new appealing offer without much harm to the bottom line. One of the recommendation methods explained with examples is applying sales trend analysis to the elaboration of restaurant marketing campaigns. This, if witnessed on the dashboard, is an opportunity to increase sales through the introduction of seasonal desserts during summer. Even the joint promotions help create satisfaction among the customers and, at the same time, assist in securing their patronage of the restaurant (Yim et al, 2008).

5.4 Cases and Examples

Evidently, the benefits of using an analytics dashboard can be explained from the practical point of view using examples of its implementation in business (Shanks & Bekmamedova, 2012). For instance, a casual dining restaurant using the dashboard trained employee purchasing to decrease wastage of inventory by a quarter in six months simply by aligning purchasing with actual stock information. Another example is that one fast-food chain increased employees' average ticket time by 15% and overcame most of the company's problems by analyzing the workflow and re-training the employees. That is why hypothetical illustrations containing elements of the case allow for the presentation of potential benefits clearly and persuasively enough for an audience to follow. For example, a real fine-dining restaurant applies the dashboard and sees that wine sells less and less every day of the week except the

weekend. Through the wine pairing promotion scheme done in the middle of the week, the restaurant is able to raise revenues and also increase its popularity. These scenarios demonstrate that the use of a dashboard is to convert large amounts of data into information that can lead to operational and financial changes

VI. OUTCOME AND INDUSTRY IMPACT

This paper demonstrates that the restaurant analytics dashboard can enhance the productivity and management of restaurant owners after it has been developed and integrated into the system. This tool has imposed a new way of decision-making in restaurants by giving real-time data on critical areas like sales and the performance of employees and stock. This section discusses the findings of the analysis, foremost of which is the effectiveness of the dashboard and the effectiveness that the implementation of the dashboard has brought on operations, the quantitative value that can be ascribed to the usage of the dashboard and the implications that the use of the dashboard presents to the restaurant industry. Productivity is the most important aspect when comparing the current Q3 state as of 16th December 2013 with the initial Q1 state as of 28th February 2013. In the past, restaurant managers relied on paper-and-pencil or isolated systems to perform different aspects of management and received data that was incomplete or delayed (Vance, 2006). However, with the help of the new analytics dashboard, all these steps are performed seamlessly, and several types of data are present in one place. It also allows the managers to look at the information in real-time, which propels them to make proper decisions. For example, real-time reporting for sales enables sales analysts to make predictions on the likely Sales volumes and enables immediate corrective action on inventories or personnel to be made that formerly could not be done efficiently.

More concrete outcomes also support the efficiency of the dashboard in managing the restaurants. This has mainly been under the headline of efficient decision-making, whereby managers' report being more capable of detecting trends and making anticipatory responses. For instance, eating joint business people can organize employee schedules based on daily business to discover that they serve many customers at a specific period, causing high costs, yet few people at other periods. Moreover, the capability of the dashboard to track the inventory is an asset for the business in this case. In this aspect, the restaurants enjoy automated alerts for low inventory, which have greatly minimized overstocking or running out of stock. This has reduced the wastage of food and, at the same time, meet customers' needs and expectations of available meals. This dashboard's usefulness has improved profitability in several ways, as highlighted above. Some of the benefits realized by restaurants using the tool include increased revenue margins in general from promotion and better pricing techniques. This is especially so as those restaurants strategically advertise high-magnitude items that are popular among customers and generate many sales while at the same time avoiding items that have low popularity, hence inconsequential sales. In addition, the present capacity to assess the performance of employees in various metrics makes bosses identify star performers as well as confront the low performers in restaurants (Solomon, 2016). This leads to increased efficiency

and optimism from the employees, thus a direct line towards the financial profitability aspect of the restaurant.

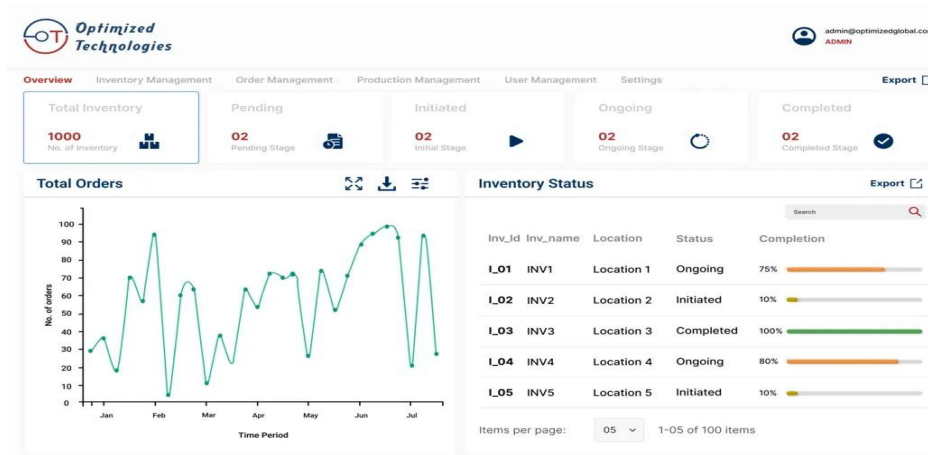


Figure 9: Smart Inventory Management System

This then gives the dashboard more capability to reduce costs not only in the fixed expenses mentioned above but also in the operational expenses. Meanwhile, with real-time data, it is possible to avoid wasting money on unneeded provisions in restaurants (Hajjdiab et al, 2018). For example, based on trends in utilization of facility power or frequency of inventory replenishment, managers can put in place measures that seek to cut down on resource utilization and, hence, cost. The money saved from one area can then be spent on another area, such as advertising, for example, or improving the quality of the services you offer your customers and making your restaurant even more competitive. Apart from isolated restaurants' examples, the use of such analytics tools demonstrates how the industry might improve within the global scope. Because organizations are increasingly using data analysis in decision-making, restaurants of all scales are quickly implementing comparable technologies to stay relevant. This shift is part of a broader paradigm shift to digitization as well as increased incorporation of analytics within the hospitality industry. The broad call set by such efficient and profitable tools as this particular dashboard serves to promulgate innovation in the field.

VII. BEST PRACTICES FOR DESIGNING AND USING ANALYTICS DASHBOARDS

It is equally important to create and use analytics dashboards for data incorporation in various organizations for better decision-making, i.e. restaurants. This section covers recommended processes for designing effective and easy-to-navigate dashboards and how to assess the data gained from them to make decisions and prevent mistakes.

7.1 Creating Effective and User-Friendly Dashboard Interfaces

Several factors shape the design of an analytics dashboard and thus determine ease of use and performance. KPI dashboards should be straightforward in order that users will be able to

understand what they are seeing and where to find it. Several general guidelines are particular to the content to be presented: graphic facilities like graphs, charts, heat maps, etc., shall be used to help elucidate information rather than become a compulsion. A dashboard is optimally designed when user-centered design is applied. The following approach is customizing the dashboard according to the needs of the target group (Yang, 2014). For example, the restaurant manager may need real-time sales data, while a chef might need stock alerts or supplier reports. Moreover, it contributes to improving usability. Users can modify their view by including filters, drill-downs, and other widgets, which ensure that what they see is relevant to what they have to do. The last factor is Accessibility. Most dashboards should be compatible with the three commonly used platforms: computers, mobile devices, and tablets at any given place and time. When choosing the colour of stock tickers, the colour schemes should meet the accessibility standards for users with either visual impairment or colour blindness (World Wide Web Consortium, 2018). Dashboards were developed to extract and compile valuable data, which can be used to identify growth areas or monitor trends in a fashion that is easy for the executive teams involved to understand and process.

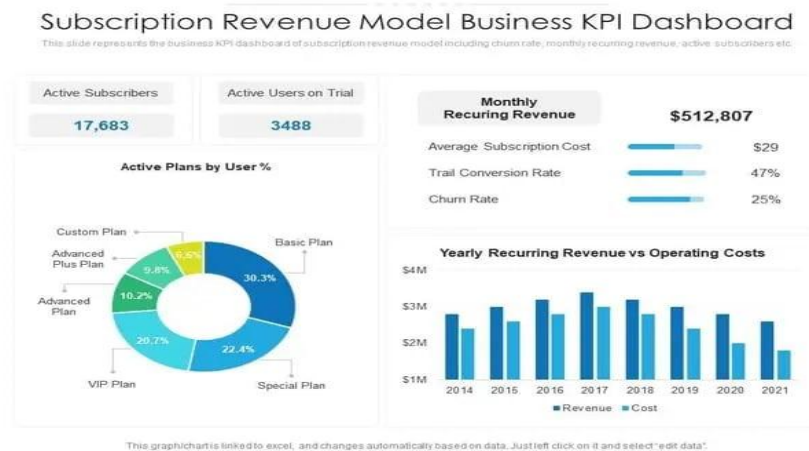


Figure 10: KPI Dashboards & How to Use Them in Your Marketing

7.2 Best Practices for Interpreting and Acting on Dashboard Insights

The development of an efficient dashboard provides users with information in the form of organized graphics; the information must then be utilized. Data obtained from dashboards has to be helpful, which, in this case, is understood as helping in decision-making and enhancing operations. For example, when a dashboard shows that sales are falling every three hours, restaurant operators can make promotional offers to increase sales during that time. Thea is displayed in the dashboard. It should be reviewed at an appropriate frequency. Key performance indicators such as daily sales or inventory management often require daily review, but others, such as trends, may be adequately reviewed weekly or monthly. Cohesion guarantees that possible challenges are diagnosed and fixed before they worsen (Eckerson,

2010). One crucial lesson learned is that training is essential, at least for the training of the dashboards, as is support. Employees should know not only how to work the dashboard but also what indicators presented signify. Thus, giving associated meanings, such as hovering or supporting indications, should improve users' understanding and data literacy.

7.3 Avoiding Common Pitfalls

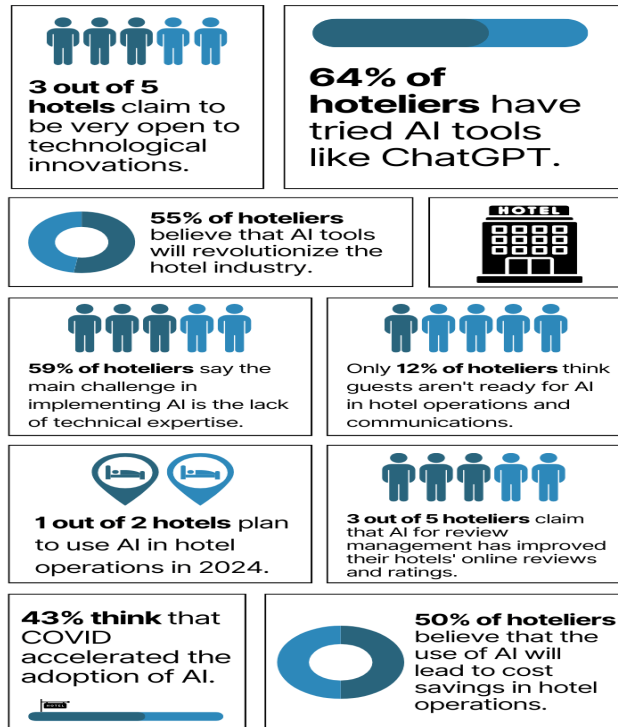
However, dashboards can be less than expected if some of the following risks are not averted. Some pitfalls of complex interfaces include an overload of information, and although more information may be provided, the audience gets tired. To avoid this, dashboard designers should ensure that the KPIs used are in line with organizational strategies. One problem is the poor quality of data used in organizations today. If the information provided is inaccurate or outdated, the dashboard may not work, defeating its purpose. The use of trustworthy sources in the data and increasingly frequent audits guarantees the validity of clicking statistics (Redman, 1998). Lastly, users understandably have a low appreciation of the systems, and in most cases, they do not even use them; this is because their input is not respected during the design and implementation stages. Involving the end users in the process helps develop a product that will be used in the given project, and the end users will use that dashboard for a long time.

VIII. FUTURE TRENDS FOR RESTAURANT ANALYTICS

There are high expectations for the development of the restaurant analytics area in the near future due to an increase in interest in utilizing innovations like artificial intelligence (AI), the Internet of Things (IoT), and machine learning (ML). These advancements are aimed at improving the analytics dashboards to offer more elaborate information to the restaurant operators. Specifically, the application of these technologies will impact how data is collected, processed, and utilized in restaurants and will mitigate some of the unresolved problems that hinder effective restaurant operations. It has established itself as the foundation of the next generation of analytical technologies. Through the processing of a large amount of structured and unstructured data, artificial intelligence detects patterns that are concealed from human perception (Castro & New, 2016). For instance, while using the purchase data regarding the customer, a restaurant can predict their preference, hence using AI to recommend a specific meal to be prepared. In the same way, using AI to analyze consumer feelings from online reviews and posts on social networking provides an additional way to handle complaints, as well as take advantage of positive comments. These applications specifically emphasize the improvement of the accuracy and specificity of analytics dashboards enabled by AI.

STATISTICS ABOUT AI IN HOSPITALITY

Explore the latest insights into how artificial intelligence (AI) is adopted and utilized within the hospitality industry, uncovering its impact on guest experiences and operational efficiency.



M A R A

Figure 11: The Future of Hospitality Industry: Integrating AI into Hotels and Restaurants

Another revolutionary change includes the employment of IoT devices in restaurants as well. From temperature control to alerts on inventory, equipment functioning and hygiene, we see that the Internet of Things is creeping into every corner of modern kitchens. For instance, IoT sensors can monitor the temperature of fridges and ovens through the network and raise an alarm whenever there is any variation from the usual standard. Not only does this capability support compliance with health regulations, but it is also effective at preventing equipment failures and spoilage of inventory. IoT devices send data directly into the analytics dashboard, bringing real-time capabilities and analysis back to the managers for more decision-making. These developments are supported and reinforced by machine learning that improves the predictive qualities of the analytics dashboard. The use of ML algorithms can involve the

analysis of historical data in order to produce results for future outcomes, including sales expectations or employee requirements (Bohanec et al, 2017). For example, based on such applications as predictive analytics, it will be easier for restaurants to predict the number of customer demands during certain seasons or specific points in a day – it will enable restaurants to adjust the use of their resources accordingly. Such anticipations reduce costs and optimize profits at this level of the company's operation. Also, ML can improve the inventory by using past consumers' demands to analyze the ingredients to purchase for quick and efficient sales, though cutting wastage.

These technologies will improve as time goes on and should positively affect the functioning and presentation of restaurant analytics dashboards. Predictive analytics, for example, is a relatively giant leap from descriptive analytics, giving restaurants foresight from data. However, unlike historical metrics, dashboards will become more overarchingly prescriptive by lessening with predictive models. This change will extend operators' ability to manage challenges and threats as well as exploit opportunities, thereby revolutionizing decision-making. Customer expectations are also dynamic, something that often influences how restaurant analytics will look in the future. The expectations of modern diners regarding personalized experience and full integration of an analytics dashboard have been on the rise (Batra, 2018). The fact is that functional options like dynamic menu customization, the optimization of the loyalty program, and individual marketing campaigns are already becoming crucial for customer satisfaction and retention. Customer relationship management options and feedback systems should also be incorporated into analytics dashboards to look at what potential customers are offering according to trends or new preferences that crop up so that operators can act quickly.



Figure 12: How CRM Dashboard can help to grow your Business Performance

IX. CONCLUSION

That is why analytics dashboards have become critical ways of solving operational problems within restaurants. The restaurant analytics dashboard mentioned above is built to provide a comprehensive set of tools to improve decision-making and business adjustment. This solution helps restaurant owners overcome some of the issues inherent to the business, such as obtaining detailed information on sales activity, employee productivity or stock supplies in real-time. Reliable from the technical side, it has a React front layer, a Go backend, and a direct connection to the POS to provide accurate and fresh data to the stakeholders. Analyzing the main characteristics of this dashboard, one should describe its benefits for contemporary restaurants. Selling data in real-time gives the owners a chance to track revenues and understand some changes in sales more accurately, allowing for effective planning of periods with higher demand (Adam, 2018). Measures on employee performance provide a clear insight into performance that is expected of the individuals hired within an organization, and it positively influences staff performance. Further, the inventory of management is used to prevent overstocking and to prevent excessive shortages in the supply of stocks. Altogether, these features develop a robust working environment where raw and unstructured data often result in value-added analyses to guide restaurant entrepreneurs to make wise decisions.

Implementing such solutions is even more vital to various restaurants as the industry grows to adapt to the rising customer demands and competitiveness. While traditional approaches to operations management are sometimes appropriate, they can regularly fail to supply the level of flexibility and distinctiveness needed in today's competitive climate. That is why the use of analytics can help restaurants optimize their activity, decrease expenses, and increase the gross, which will lead to the growth of the restaurants' profitability. The entire culture of relying on data is essential not only for the constant enhancement of the current operations but also for the future issues that a business entity may face or new opportunities that it may experience. It is recommended that restaurant owners and managers research and invest in analytics to ensure they can evolve and compete better. Analytics Dashboard is not a gadget; it is an advantage for businesses that helps organizations to adapt to the competitive environment of data monopoly (Milani, 2019). No matter whether you want to optimize inventory management, increase staff motivation or get the most out of your sales, some of the right-designed dashboards can provide you with measurable advantages that can be taken into account for years. The fact is that with the constant growth of new technologies, implementing such solutions will be more a necessity than a simple additional value to become a competitive and growing sector in the restaurant business. With the adoption of an analytics solution, restaurant owners are better positioned to achieve operational requirements, customer satisfaction, and long-lasting profitability. Every organization now needs an analytics dashboard because it is worth the investment since the gains far exceed the losses.

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