



# **Redefining Dining: How Digital Transformation and Robotics Are Revolutionizing Restaurants**

## **[Part 2]**

Exploring the Top 7 Full-service and Quick-service Restaurant Challenges and Their Automation-driven Solutions

In Part 2 of our series "Redefining Dining," we examine how high-tech solutions are essential for overcoming the final four most pivotal challenges facing full-service and quick-service restaurants today.

In Part One, we saw how the restaurant industry used digital transformation and robotics to tackle rising costs, labor shortages, and fierce competition; this segment will address the remaining challenges and provide actionable strategies to stay competitive in a complex market.

1. Rising Costs
2. Labor Shortages
3. Declining Foot Traffic and Increased Competition
4. Changing Consumer Preferences and Cleanliness
5. Lack of Traceability
6. Operational Inefficiencies
7. Obsolete Tech and Cyber Security

## **Challenge 4. Changing Consumer Preferences and Cleanliness Demands**



With health-conscious content splashed across everyone's social media feeds and embedded in their algorithms, people are shifting towards healthier, more sustainable dining options, which affect FSRs and QSRs equally.

Maura Keller with Bar and Restaurant News mentions that this trend requires full-service and quick-service establishments to innovate with plant-based menu items, ethical sourcing practices, and environmentally friendly initiatives. Moreover, the increasing adoption of GLP-1 drugs, such as Ozempic, among consumers is likely to have sizable implications for the restaurant industry.

*"This could drive increased demand for menu items that cater to these dietary preferences, such as salads, lean protein sources, and dishes with minimal fats or sugar content. Restaurants may need to expand their healthy menu selections and provide more detailed nutritional information to attract and retain customers."*

—*Sujeet Naik | Coresight Research Analyst*

These medications may reduce appetite and calorie intake, causing customers to request smaller portions and lower average check amounts at restaurants. People taking these medicines may also prefer nutritious, low-calorie menu options, increasing the demand for healthier dishes at full-service and quick-service restaurants.

**Solink, a cloud services provider for restaurants like Arby's and Burger King, indicates, "Preferences are shifting towards healthier, more sustainable dining options. This trend requires restaurants to innovate with plant-based menu items, ethical sourcing practices, and environmentally friendly initiatives."**

Evolving business practices to meet these preferences are required to meet returning customer expectations, entice new customers, and even comply with regional regulatory standards. Pivoting business practices includes taking a white-glove approach to their kitchens and dining areas.

*66% of respondents to a survey on behalf of Checkit in its report 'The Financial Impact of Getting Food Safety Wrong' cited bad food hygiene as a reason for not returning to a restaurant compared to 16% of diners who said slow or bad service would put them off.*  
—*Emma Eversham, Restaurant Online.*

Restaurant cleanliness, both in terms of food safety and facility cleanliness, has a powerful impact on attracting and keeping customers.

**“A study by P&G found that the cleanliness of a business is an essential factor for more than 90% of Americans when deciding whether they'll return to the establishment.”**  
—Kristen McDermott, author of an article titled ‘Understanding the importance of restaurant cleanliness.’

So even if a full-service or quick-service restaurant owner has changed their practices to offer the most health-conscious, mouth-watering menu in town, failing to maintain the dining area will steer customers to a competitor.

## **Solutions for Changing Consumer Preferences and Cleanliness Demands**



While we mentioned before that service robots can save on expenses, both FSRs and QSRs can turn those savings into affording healthier ingredients to provide higher-quality food at lower prices.

*"We wanted to make nourishing, healthy food affordable. So, we decided to use robotics to do just that."*  
—Claimed one participant in the ‘Applications and Implications of Service Robots in Hospitality’ study published in Cornell Hospitality Quarterly.

Automation, robotics, and advanced technologies are transforming the restaurant industry, driving colossal transformations to meet the rising consumer demand for healthier food options, sustainability, and cleanliness.

**“While the fast-casual sector typically spends around 20% on ingredients, its use of robotics has allowed it to spend 40% on ingredients, thus providing higher-quality food to its customers.”**

**—A restaurant founder volunteering in the same study in Cornell Hospitality Quarterly professed**

One fundamental way technology caters to changing priorities is by standardizing meal portions.

Incorporating robotics in kitchen operations ensures precise portion control, further reducing food waste and nurturing healthier eating.

According to Kristen Kazarian, the Former Managing Editor of Food Engineering magazine, “Robots, equipped with sophisticated sensors, can mix ingredients to achieve the exact consistency required, ensuring uniform quality across all batches. This automation enhances efficiency, reduces labor intensity, and minimizes waste by accurately measuring ingredients.”

*“Robotic kitchen assistants can help chefs create dishes with precision, ensuring consistency and reducing the likelihood of excess ingredients going to waste.”*

*—CRQLAR*

This level of precision is crucial as more customers seek out restaurants that can cater to specific dietary needs and preferences. In addition to standardizing food portions, AI technology can help restaurants construct healthier menus.

The advent of AI-optimized menus is disrupting the restaurant industry by enabling restaurants to effectively accommodate customers' evolving consumer preferences with healthier food options. By leveraging extensive datasets encompassing dietary trends, nutritional data, and customer feedback, AI algorithms generate menus that comply with health guidelines and are flavorful enough to get customers to leave raving reviews.

**"Implementing AI-driven menu optimization can align food offerings with consumer preferences for healthier options, driving customer satisfaction and loyalty."**

**—Marissa Nolan, MasterCard.**

Technological advancements empower FSRs and QSRs to meet their customers' evolving demands, underline a healthy and desirable reputation, and maintain hygienic facilities.

Kristen McDermott's article emphasizes, "A clean restaurant environment is not just a matter of compliance but a crucial factor in customer retention and brand reputation."

Cleanliness and hygiene have always been paramount in the restaurant industry. While the pandemic has heightened these concerns, it has not made it easier for restaurants to meet these higher standards.

*"Cleaning a restaurant can be a challenging task," says Jud West, owner of WashRite Services*

*"Among the many factors that must be considered, grease ranks high. Even a thin veneer or small patch of grease accumulated on surfaces makes them slippery and hard to clean. Removing grease requires specialized chemicals and tools and can be a time-consuming task,"*

Properly sanitizing and cleaning a restaurant is time-consuming, and cutting-edge devices like PUDU SH1, developed by Pudu Robotics, can play a pivotal role in maintaining high cleanliness standards.



Heavy-duty, lightweight floor scrubbers like PUDU SH1 can help workers complete their floor-washing duties quickly. From spot scrubbing a goopy sauce spill to cleaning an entire floor that'd impress any health inspector, advanced cleaning technologies help restaurant staff get tough jobs done quicker and easier.

Implementing advanced cleaning technologies can directly affect a restaurant's bottom line by maintaining customer loyalty and attracting new patrons.

**“75% of customers would not return to a restaurant if they perceived it unclean.”**

**—Kristen McDermott**

In addition to physical cleanliness, advanced technologies can help maintain a healthy atmosphere. Smart HVAC systems regulate air quality to ensure comfort and safety for customers and staff.

Dana Krook with TouchBistro notes in an article titled Restaurant Cleaning Tips & Free Checklist, “Enhanced air filtration systems are increasingly common in restaurants, addressing air quality concerns and promoting a healthier dining experience.”

*“Enhanced air filtration systems are a critical addition to modern restaurants, helping to ensure a safe and pleasant dining environment.”*

*—Dana Krook, TouchBistro*

Adopting automation, robotics, and advanced technologies in the restaurant industry addresses growing consumer demands for healthier, more sustainable, and cleaner dining experiences while improving operational efficiency and profitability.

To stay competitive and relevant as consumer expectations increase, restaurants must embrace these innovations.

## Challenge 5. Lack of Traceability



Supply chain disruptions remain a constant challenge, worsened by raw material shortages and global events like the COVID-19 pandemic, the Ukraine and Middle East conflicts, and international trade tensions, notably Brexit.

*“These issues present substantial hurdles for the industry, affecting production timelines and driving up costs.”*

—Lee Weiner, Factbird Sales Director for North America

When sourcing organic, locally grown, or plant-based ingredients in high demand, it can be a headache for restaurants to find and afford them. Operators also often don't have the time, energy, and funds, especially when the products' origins are unclear.

Traceability is integral to the supply chain, allowing suppliers to track a food or beverage product through all stages. Customers want to know about the sources of food, beverages, and related products.

**Ainsley Lawrence, with Food Safety Technology, highlights, “The primary reason restaurants implement traceability systems is to prevent the spread of foodborne illnesses.”**

The last thing a full-service or quick-service restaurant wants is a foodborne disease outbreak.

Poor traceability can cause contamination and spoilage, threatening public health and leads to other ESG concerns. Inaccurate traceability also leads to problems with ethical sourcing. FSRs and QSRs without sustainability measures undermine consumer trust and brand loyalty and may contribute to environmental harm and compliance risks.

As Michael Davis, Director of Supply Chain Brain, indicates, "It complicates compliance with regulatory requirements, such as the United States FDA's regulations, potentially leading to legal penalties and loss of business licenses."

## Solutions for a lack of Traceability



Due to supply chain complexities and the need for transparency, restaurants need help ensuring the traceability of their food products. However, technology and robotics offer promising solutions to these issues.

"Advanced automation solutions streamline operations by tracking the origins and movements of ingredients, thereby improving accuracy."

—Krista Dinsmore, Sculpture Hospitality

For instance, Iis Tussyadiah, a co-author of the journal titled 'Applications and Implications of Service Robots in Hospitality', concluded that "Technology-driven solutions, including advanced robotics, enhance traceability by automating record-keeping processes and improving accuracy in tracking food products."

**Robotics and automation help manage the sorting and labeling of ingredients, ensuring that each item is accurately recorded from its source to the final dish.**

—Iis Tussyadiah

This real-time data is crucial for effective traceability, mitigating potential problems, and reducing the risk of errors and fraud. RFID technology represents a highly effective method for improving traceability.

GrubTech's F&B's Management with Technology Team states that RFID technology enables full-service and quick-service eateries to "trace each item from supplier to plate," ensuring comprehensive recording of every stage in the food journey.

By attaching RFID tags to food products and containers, restaurants can achieve real-time tracking throughout the supply chain. GrubTech expands this to illustrate that "the integration of automation and robotics in restaurants supports accurate tracking and management of inventory, reducing errors and improving transparency."

Robotics further amplify traceability by automating record-keeping and sorting processes.

*"Advanced technology-driven solutions, including AI and robotics, are transforming the way restaurants handle record-keeping by automating data collection and processing, thus enabling real-time tracking and analysis of inventory, sales, and operational metrics."*

—H. Kim and H. Q, *The Journal of Foodservice Business Research*

Automation can handle labeling and documentation, assuring the accurate tracking of ingredients from source to final dish. AI and robotics minimize human error, enhance traceability, and boost operational efficiency. Moreover, data analytics supplement automation and RFID to optimize food product tracking and address supply chain challenges.

**"Data analytics helps restaurants detect and respond to potential threats quickly by analyzing patterns and anomalies in real-time."**

—Solink

This three-pronged approach improves the ability to track food products and operational efficiency. Furthermore, restaurants that forgo sourcing products from far-flung places and turn to their own backyards save money in the long run and support their local economies.

Multiteria USA manufactures food service counters and mobile kiosks and finds that "Local food sourcing can strengthen restaurant supply chains by reducing reliance on distant suppliers and enhancing transparency."

This transparency also helps boost customer satisfaction and build trust, especially since patrons are more environmentally-conscious than ever.

*"Studies show that 77% of consumers younger than Gen X want restaurants to be more transparent about the environmental impact of their foods."*

—Marissa Nolan, MasterCard

Since ESG is at the top of customers' minds, a creative way for restaurants to show their commitment to addressing environmental concerns is through apps. FSRs and QSRS can launch gamified apps where customers win prizes, donate to charities, and support other philanthropic activities.

Restaurants that use these apps drive digital engagement and align their brand with social causes. Adopting and communicating green practices like these keep your restaurant trending and promote positive brand recognition for consumers.

Lastly, delivery apps and robotics can also help restaurants gain transparency within their own operational supply chain.

*According to Jamie with, Librorez, "Integrating technology into dining experiences can enhance guest satisfaction by providing real-time data on food origins."*

Pizza delivery apps have already proven to provide tracking transparency, and delivery robots can provide the same benefits to full-service and quick-service restaurants with multiple floors or attached to convention centers and hotels.

Pudu Robotics' iF Design Award-winning delivery robot **SwiftBot**, provides delivery service with food safely enclosed in its casing and minimizes food wastage by ensuring timely and accurate order delivery.



SwiftBot navigates E-gates, electric glass doors, and elevators before food delivery. This innovative robot is ideal for restaurants in office parks, hotels, resorts, or cruise ships. Real-time message alerts inform staff of successful delivery, reducing mistakes or food delays.

**"To remain competitive, restaurants must adopt innovative technologies that improve traceability and address environmental and operational challenges."**

**—Jonathan Hoyles, Forbes.**

## Challenge 6. Operational Inefficiencies



Operational efficiencies regarding inventory mismanagement often leave full-service and quick-service restaurants with an unintended surplus of certain perishable ingredients.

*"Food service sales, including fast-food chains, coffee shops, bars, and restaurants, dropped by 27% due to unpredictable lockdowns, social distancing protocols, and mandatory enforced closings due to the pandemic."*

*—Stacey Haas with McKinsey & Company*

When full-service or quick-service restaurant operators are hit with unexpectedly low demand, which has grown even more unpredictable due to the pandemic and rising inflation, this can result in wasted stock.

Even without a surplus, FSRs and QSRs can have uncontrolled stock wastage.

**“An operation can end up throwing out 4% to 10% of the food it purchases, and that percentage can rise in buffet-style concepts and at restaurants with diverse menu offerings requiring large and varied food inventories.”**

**—86 Food Wastage, a joint cooperative report with the National Restaurant Association, the WWF, and Tork**

Inefficient ingredient use, poor portion control, and a lack of standardized recipes lead to excessive food waste, increasing organic landfill waste and environmental impact.

Furthermore, full-service and quick-service restaurants habitually dispose of perfectly edible food instead of repurposing or recycling it, compounding sustainability issues worldwide.

*“Typically, 84% of unused food goes to waste in American restaurants.”*

*—Sarah Davis with SynergySuite, a prominent restaurant software company*

Improperly managing packaging and disposables is also a problem for restaurants, cutting into their profit margins and further harming the environment. This upsetting and avoidable wastefulness alienates customers and can crush any eatery's reputation.

**“Approximately 55% of consumers say they consider a restaurant's food waste reduction efforts an important factor when they choose a restaurant.”**

**—86 Food Wastage**

## Solutions for Operational Efficiencies



Robotics and technology can also help full-service and quick-service eateries address operational troubles and lack of productivity through better inventory systems, and strategic sourcing can reinforce sustainability and operational efficiency.

*"Automating inventory management helps restaurants decrease overstocking and understocking by 30%, leading to more efficient operations."*

—Sarah Davis with SynergySuite

Implementing automation-driven inventory systems allows FSRs and QSRs to optimize stock control, reduce waste, and save costs. Earlier in this report, Forbes indicated that the restaurant industry is expected to break the 1 trillion-dollar mark, and the restaurants surfing this wave of success are leaning into technology such as inventory management.

Advanced inventory management systems use real-time data to monitor stock levels and predict demand, ensuring that restaurants only order what they need.

**"AI and machine learning in restaurants can predict customer demand more accurately, reducing food waste by up to 40%."**

—Jonathan Hoyles, Forbes.

Intelligent inventory management that alerts managers when stocks are low or about to expire reduces over-ordering and spoilage. Technology that helps prevent unnecessary waste and consistently guarantees fresh ingredients improves restaurant sustainability metrics and profitability.



Krista Dinsmore with Sculpture Hospitality says, "By leveraging technology to accurately track inventory and forecast demand, restaurants can significantly cut down on food waste, thus boosting both sustainability and profit margins."

Restaurant365 conducted an Annual State of the Restaurant Industry Survey for 2024 and discovered that 31% of R365 customers plan to implement AI inventory and purchasing tools.

*"Restaurants that fail to keep up with this level of innovation could suddenly become less competitive."*

—Restaurant365 Research Team

Intelligent inventory management that alerts managers when stocks are low or about to expire reduces over-ordering and spoilage. Technology that helps prevent unnecessary waste and consistently guarantees fresh ingredients improves restaurant sustainability metrics and profitability.

Intelligent inventory systems are not the only solution that can help restaurants, automation and robotics can also perceptibly decrease waste, cut expenses, and realize sustainability goals.

**"Digital transformation in the restaurant industry has the potential to reduce operational costs by up to 20%, primarily through improved inventory management and reduced food waste."**

—Marissa Nolan, MasterCard.

Kitchen automation has raised the bottom line of large-scale fast-casual restaurants like Sweetgreen, which has struggled for years with profitability.

In a recent Forbes article by Senior Contributor Daphne Ewing-Chow, In 2023, Sweetgreens introduced the Infinite Kitchen automation system in two suburban locations. Infinite Kitchen produced 10% higher ticket sales than other stores in the surrounding market, higher profits, and other benefits.

*"The Infinite Kitchen continues to deliver many benefits to our operating model, such as higher throughput, better order accuracy, portioning consistency, and substantially lower team member turnover,"*

—Mitch Reback, CFO, Sweetgreens

Despite developing and installing Infinite Kitchen's high initial cost of half a million dollars, Sweetgreens is expanding the model to more stores. The popular QSR expects a seven-point margin benefit for locations with the system due to its cost savings and positive public reception.

**65% [of customers] are willing to pay more for sustainable options.**

**—Marissa Nolan, Restaurant and Convenience strategy lead, Mastercard**

However, even independently owned FSRs or QSRs that don't have six figures to spend on a fully automated kitchen can use automation and robots to help. Automated devices can handle stock counting, sorting, and measuring ingredients, immensely reducing human errors that lead to food wastage.

Furthermore, tools like POS systems, which we have already mentioned, can provide detailed sales data. Accurate sales data helps restaurants adjust their orders based on actual consumption patterns, culminating in efficient inventory use and substantial cost savings.



*"Another benefit of real-time inventory monitoring is that it helps you improve your customer experience. Having adequate stock can mean the difference between an angry customer leaving a bad review on social media or a satisfied customer."*

*—Erin Watkins at 5Out, a hospitality and restaurant intelligence enterprise*

It's not just food wastage that concerns the operational efficiency of full-service and quick-service restaurants but also energy and resource usage.

J. Zabin, managing editor of Restaurant Technology News, reports that restaurants are increasingly replacing traditional equipment with Energy Star-rated appliances, which use less electricity and water.

For instance, high-efficiency fryers and steam cookers can reduce energy use by up to 50%. However, there is still work; water usage in the restaurant industry is still remarkably high.

**"While some restaurants have implemented water-saving technologies, many still use traditional systems that consume large amounts of water."**

**—J. Zabin, Restaurant Technology News**

Robotics, such as **PUDU SH1**, can also help FSRs and QSRs reduce water wastage. The innovative upright scrubber dryer's modern features and capabilities replace traditional, manual cleaning methods, often involving excessive water and chemical usage.



By employing cleaning devices like the PUDU SH1 developed by Pudu Robotics, full-service and quick-service eateries can embrace advanced cleaning technology to shrink their environmental footprint and grow operational effectiveness.

Marissa Nolan with MasterCard also states that FSRs and QSRs can draw inspiration from other industry leaders' substantial environmental commitments, such as Starbucks' reduced paper usage and Wendy's goals to cut greenhouse gas emissions by 2030.

*“Technological advancements enable restaurants to operate more efficiently while minimizing waste, a key concern for today's eco-conscious consumers.”*

—Sarah Davis with SynergySuite

Automating inventory management, kitchen operations, and real-time data equip FSRs and QSRs to optimize stock, reduce waste, cut costs, and improve efficiency to achieve sustainability and profitability goals.

## 7. Obsolete Tech and Cybersecurity Risks



Our last challenge is outdated technology and cyber security. Both of these pose extreme risks to full-service and quick-service restaurants.

We all know the old joke that McDonald's ice cream machines never work. While this joke may be exaggerated, old technology does cause substantial problems for restaurants, especially ones struggling to keep and retain loyal customers.

Commercial Appliance Repair (CAR) states that the cooking staff cannot cook food efficiently when equipment does not work correctly in a restaurant's kitchen. FSRs and QSRs need a refrigerator that can maintain a specific temperature to prevent bacteria from developing on stored food.

*"Likewise," CAR continues, "it would be best to have an oven that can cook food to the proper temperatures so you do not risk anyone getting sick from your restaurant's food."*

Moreover, Industry Kitchens states that other technologies can endanger workers and customers, such as "a ventilation malfunction could cause dangerous gases to linger around your kitchen staff and food."

**"Kitchen appliances like gas ranges and deep fryers can emit carbon monoxide – an odorless yet potentially dangerous gas."**

**—Industry Kitchens**

Lastly, the breakdown of kitchen devices can cause service and food quality to suffer, leading to unhappy customers. Old stoves can lose their ability to heat precisely and accurately, causing inconsistent cooking temperatures. This can severely cost full-service and quick-service restaurants when customers return an overcooked sirloin or, even worse, cause food poisoning.

Furthermore, an article published by Restaurant News spells out three ways why old equipment can devastate restaurants:

- **First, poor equipment can cause downtime in the kitchen**  
When kitchen equipment fails, food prep slows, causing service delays.
- **Secondly, poor equipment can create a health hazard**  
Malfunctioning equipment can cause health hazards like spoilage or undercooking.
- **And lastly, damaged equipment can cause your restaurant to be shut own**  
Improperly functioning equipment can cause restaurants to fail health and safety inspections.

As the FSRs and QSRs increasingly use digital ordering and point-of-sale (POS) systems, failure to update and secure these technologies can easily cause them to crash, which can result in long waits and lost revenue.

*"An outdated POS system is often slow and prone to errors, leading to longer transaction times and frustrated customers. Employees spend more time troubleshooting issues, which detracts from their primary responsibilities of serving customers and driving sales. Over time, these inefficiencies can lead to a significant loss in productivity and revenue."*

—Ujwal Subedi, an editor with DibTech POS solutions

Cyber criminals can also target full-service, and quick-service restaurants through outdated POS systems to steal customer and business data.

**"The importance of incorporating cybersecurity measures capital investments from the outset, and not as an afterthought, cannot be overstated."**

—Lee Weiner, Factbird Sales Director for North America

Modern Restaurant Management (MRM) staff states that FSRs and QSRs should not take cyber security threats lightly, as even lucrative restaurant chains face devastating vulnerabilities. In March 2024, a cyber criminal attacked Panera's systems and compromised the international QSR's personal information.

*"A former employee filed a class action lawsuit against Panera following a data breach earlier this year. The suit claims that Panera is to blame for the breach, which exposed employees' personal information, including Social Security numbers."*

—MRM staff, 'Best Practices for Handling a Data Breach'

Panera is not the only high-profile restaurant chain facing a class action lawsuit for cybersecurity breaches.

**"Other class actions filed against Arby's and Golden Coral. Panda Express may also be sued for a data breach that the chain experienced in March [2024]. Restaurant chains are also subject to claims associated with customer information being stored in POS systems, which has also been the subject of class action claims (Chili's restaurants is an example)."**

—Matt Green, partner and Deputy Chair of Obermayer's Litigation Department

*"Outdated POS systems are more vulnerable to cyberattacks due to outdated security protocols and lack of regular updates."*

—Ujwal Subedi, DibTech

Solink underscores that obsolete technology is more susceptible to cyber threats, "protecting customer data is paramount, necessitating robust cybersecurity measures and regular system updates to prevent breaches that could damage reputation and customer trust."

Relying on outdated POS systems or neglecting to update systems keeps restaurants, especially QSRs, highly vulnerable to cyber-attacks.

Unfortunately, some full-service and quick-service restaurants have learned that neglecting cyber security threats tarnishes a restaurant's reputation, erodes customer trust, and can cost them enormously in a lawsuit.

Restaurant owners wouldn't leave their doors unlocked, so they shouldn't leave themselves open for cyber attacks, which means relying on old technology.

## Solutions for Obsolete Tech and Cyber Security Risks



Upgrading kitchen devices and technology is crucial for FSRs and QSRs to maintain operational efficiency, protect customers and themselves, and stay competitive. Modern commercial kitchen equipment elevates food quality by ensuring consistency and precision.

Industry Kitchens believes investing in high-quality equipment and technology is vital to restaurant quality. For example, professional-grade mixers and processors aid in food preparation, enabling chefs to maintain consistency in their dishes. This uniformity plays a role in customer satisfaction, ensuring patrons can expect the same quality each time they order a dish.

**“This reliability ensures that food is prepared properly and served promptly, contributing to the overall dining experience.”**

**—Industry Kitchens**

Modern Restaurant Management's Saleem Khatri weighs in on POS mobility and how upgrading technologies helps FSRs and QSRs become more competitive and benefit the guest experience:

*"Some restaurant operators with outdated solutions still need to be more willing to embrace new technologies. Typically, operators subscribe to the 'if it ain't broke, don't fix it' phrase. In contrast, others don't realize the full range of benefits a cloud-based, mobile-enabled next-generation system designed specifically for the unique workflows of a restaurant can deliver."*

Restaurant News' article 'Why Poor Equipment Is Bad for a Restaurant' highlights how new devices can help restaurant operators concentrate more on serving their customers the best food possible.

**“It is best to invest the money in new equipment for your restaurant as soon as possible. It will take away a lot of stress from running a business and improve the chances of your business thriving. When people can get great meals quickly and easily, word will get around in the community, and your business should soon start to boom.”**

**—Commercial Appliance Repair**

Having reliable and quality equipment in the fast-paced restaurant industry means full-service and quick-service restaurants stay open, profitable, and maintain a sterling reputation. Preventing cybersecurity attacks on security software and device firmware is also imperative for FSRs and QSRs to remain competitive.

*"42% of cybersecurity incidents in retail and hospitality this year have come from malware, more than any other category. Enabling automatic updates for your robust security software will ensure you stay safe from these developing threats."*

*—Modern Restaurant Management Team, 'Why Cybercriminals Target Restaurants and How to Protect Yours'*

Upgrading technology and automation is essential for protecting full-service and quick-service restaurants from device breakdowns and cyber attacks, and they can mitigate these risks by implementing robust security protocols.

Solink clarifies that modern systems have encryption, regular security updates, and modern threat detection capabilities that safeguard sensitive data from unauthorized access. By upgrading to these advanced systems, FSRs and QSRs can protect themselves against the growing threat of cyber attacks.

**"Effective strategies include robust backup and recovery procedures and secure communication protocols to safeguard against these threats."**

**—Lee Weiner, Factbird Sales Director for North America**

Vigilant FSRs and QSRs install stricter data security measures and systems and adjust their Wi-Fi networks to better protect against cyber attacks.

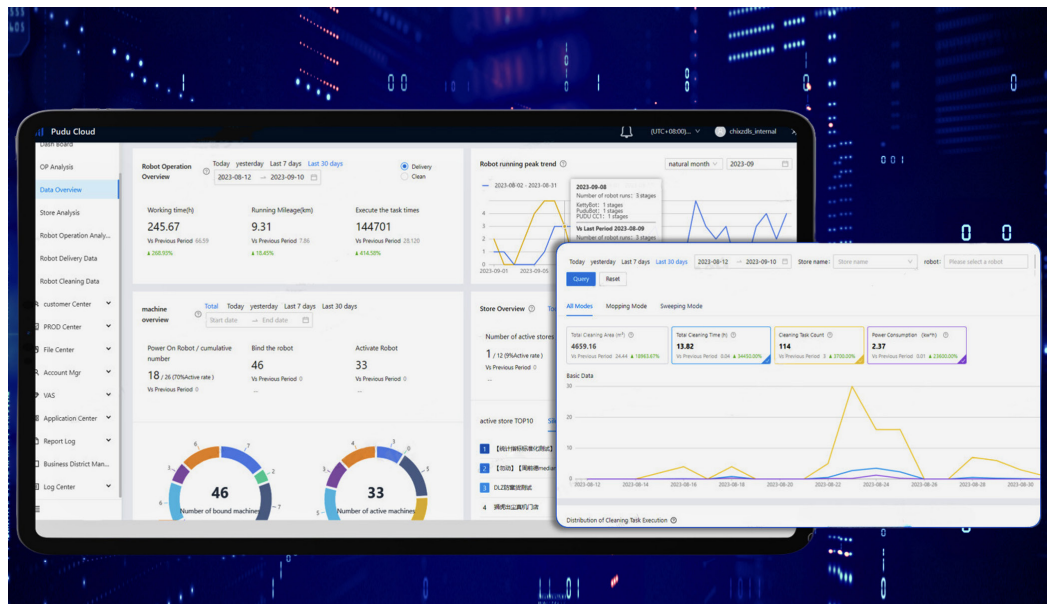
*"Using separate Wi-Fi networks for customers and workstations and going a step further by hosting your most sensitive systems, like cash registers, on a separate network from other work devices, will minimize the number of entry points a hacker has into your systems."*

*—Modern Restaurant Management Team*

Robotics also offer several advantages in enhancing security and operational efficiency in full-service and quick-service restaurants.

According to Lin Engineering, because new food preparation, serving, and autonomous delivery robots have reliable security features and can operate with minimal human intervention, they reduce security breach avenues.

Pudu Robotics ensures the security of its **product's software** by integrating advanced cybersecurity measures, safeguarding against potential attacks that could compromise any functionality. The company's commitment to security is reflected in its open-platform architecture, which is designed to provide robust protection while allowing seamless integration with various systems.



Additionally, Pudu Robotics' provides a comprehensive warranty, guaranteeing that customers are fully supported in the rare event of a malfunction because their top priority is guaranteeing the reliability and functionality of their products.

*"Besides protecting against cyber security threats and device breakdowns, upgrading technology and robotics can magnify a restaurant's overall operational efficiency and guest satisfaction levels—more accurate data management, which contributes to smoother daily operations." Explains Saleem Khatri with Modern Restaurant Management, "These new developments will create more value for businesses, resulting in more structured and time-saving technology in the foreseeable future."*

Adoniram Sides, SVP at Lightspeed, spotlights that data-driven strategies streamline operations, reduce challenges, and provide actionable insights to nurture superior dining experiences and customer loyalty.

As the full-service and quick-service industry evolves, staying current with technological advancements will be imperative for maintaining security and operational excellence.

## Conclusion



In 2024, full-service and quick-service restaurants face skyrocketing costs, dwindling foot traffic, labor shortages, and fierce competition. Supply chain disruptions complicate ingredient sourcing, causing operational inefficiencies, stock wastage, and hindering the introduction of healthier and more sustainable menu items driven by new consumer demand.

To conclude this list of obstacles, outdated technology threatens cyber security and devastates customer service, FSR, and QSR's trustworthy reputations.

*"Consumers prefer excellent customer service, and because they have multiple choices in the restaurant and beverage sector, they can simply neglect your restaurant or bar and buy food or beverage from another establishment."*

*—KEXY Research Team, an inventory management system provider*

However, FSRs and QSRs can solve each of the seven formidable challenges with cutting-edge automation, robotics, and technology.

**“48% of consumers believe technology improves their dining experience.”**

**—Marissa Nolan, Restaurant and Convenience strategy lead, Mastercard**

By integrating service and cleaning robotics and automation, which drive efficiency, refine customer experiences, and optimize operational performance, full-service and quick-service restaurants can look forward to a brighter future.

Full-service and quick-service restaurants increasingly turn to automation to meet customers' evolving needs for better value and convenience for dine-in, take-out, and drive-thru experiences.

*“As economic and technological landscapes evolve, restaurants must stay agile, focusing on providing value, enhancing digital experiences, and judiciously adopting automation to drive the industry forward.”*

*—Jen Chick, US Restaurant & Food Service Leader at Deloitte*

As the demand for eating away from home remains healthy, but consumer and operational budgets remain stagnant, FSRs and QSRs welcome digital transformation and automation to help produce value for customers and drive sustainable business growth.

Digital transformation and robotics are not just fundamental for the success of full-service and quick-service eateries, but also play an exceptional role in amplifying local economies and empowering culture and community.

*Jocelyn Doyle, Marketing and Communications lead for the Sustainable Restaurant Association, opines,*

*“Restaurants provide a modern-day substitute for that tribal fire where people from different households and families can come together to share meals, socialize, meet new people, catch up with old friends, explore burgeoning romances, gather for celebrations, and even mourn our dead.”*

Recognizing every restaurant's vital role in uniting people worldwide, Pudu Robotics invites all who contribute to this cornerstone of humanity to discover our cutting-edge service and cleaning solutions.

## Pudu Robotics



At Pudu Robotics, we are committed to revolutionizing restaurant efficiency and elevating customer service to new heights through cutting-edge robotics technology.

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