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Cooking up Value:

How to Use the Internet of Things to Improve the Commercial Kitchen's Performance

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Restaurants and the IoT's Promise

To illustrate the promise the IoT holds for the commercial kitchen, let's look at how it could help the popular and fast-growing restaurant sector, specifically the quick service (QSR) and fast casual segments.

As consumer demands and tastes change, the market share of these establishments is rapidly expanding. This trend is expected to continue, as the global QSR market is forecasted to grow at Compound Annual Growth Rates (CAGRs) of 5.54% and 5.22%, in terms of revenue and volume, respectively, for the period of 2015-2019¹.

While this growth is a huge opportunity, the industry has challenges. Arguably, the biggest one is managing operational costs. QSR chains face a constant struggle to control a wide range of cost centers—including those related to food and material purchases, food preparation, food waste, energy, and labor. Left unchecked, these can erode the operator's already thin margins.

Consider the restaurant manager, who is on the front line of the business and is responsible for the restaurant's performance. One of the restaurant manager's biggest—and most important—challenges is ensuring all the food the restaurant serves is safe. Yet the processes used to make certain the restaurant complies with all relevant food safety regulations are far from optimal. They're manual and paper based and, subsequently, are inefficient and time consuming. Furthermore, the processes suffer from a distinct lack of

transparency: The manager has little visibility into food safety beyond the checks and balances currently in place. This could make the restaurant vulnerable to failing a food safety audit or, worse, serving customers unsafe food.

Another challenge involves restaurant operations supervision. Because operations aren't automated, the manager typically doesn't have oversight to ensure all employees execute their various tasks consistently. And most outlets also lack integration among various back-of-the-house systems, which makes it difficult to streamline restaurant management and reporting procedures.

Regional managers, who oversee groups of restaurants, face their own set of challenges in restaurant supervision and employee coaching. They typically have limited visibility into how consistently restaurants apply

the operational guidelines corporate puts in place. As a result, regional managers are generally forced to react to operational issues when they arise rather than identifying and dealing with them before they become a problem.

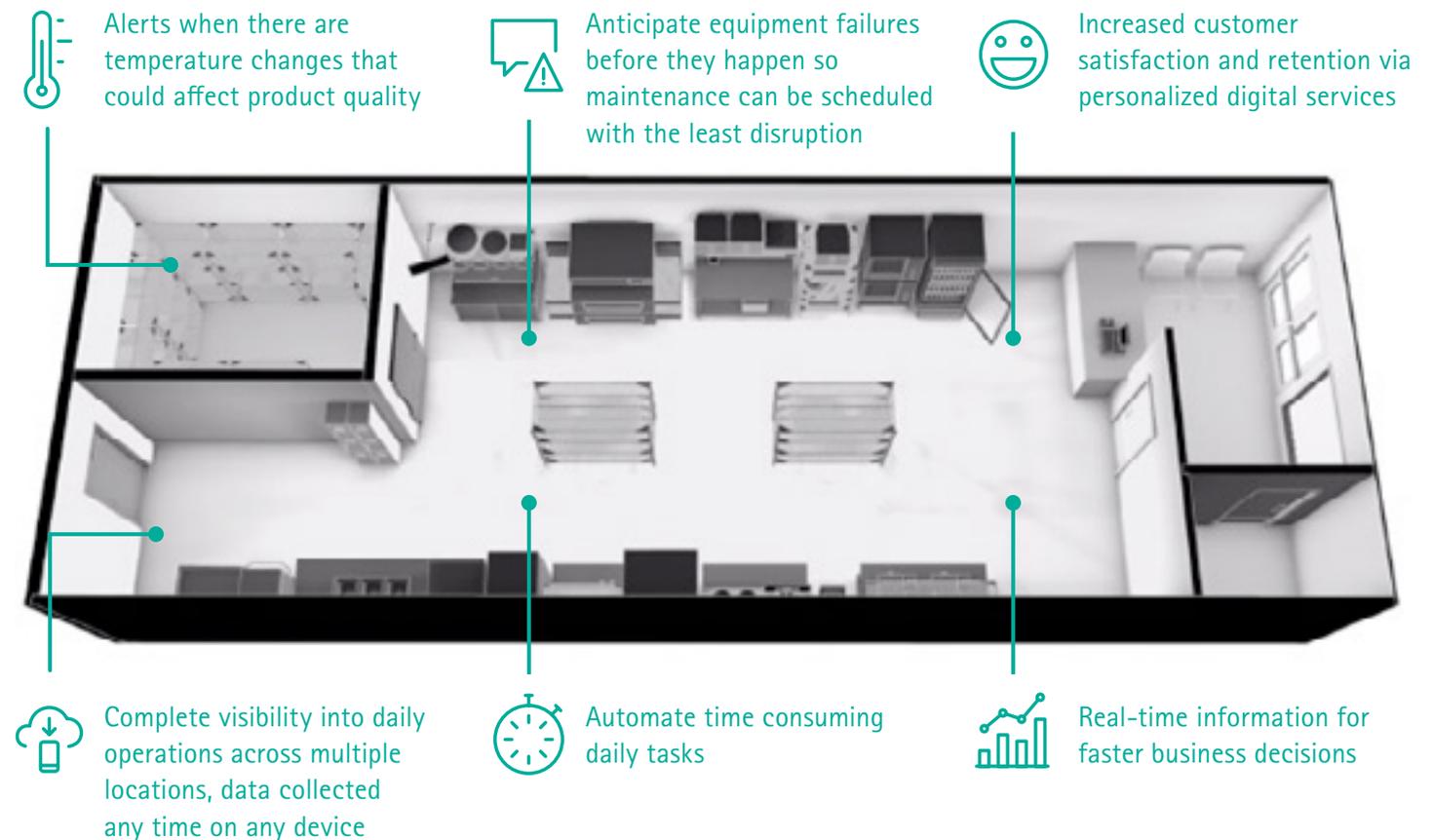
Those at the highest level—the franchise owner and corporate management accountable for all aspects of restaurant operations—also lack information that can help them proactively manage individual restaurants on a real-time basis. Most of their decision making is based primarily on backward-looking financial metrics. Thus, they can't continually monitor restaurant performance and identify ways to improve it—by, for instance, addressing customer service issues as they happen or reducing energy consumption across multiple restaurants.

Key Elements of the Connected Commercial Kitchen

By implementing IoT technology in its restaurants' kitchens, an operator can take major strides toward addressing these and other vexing operational challenges.

At a high level, the IoT can automate and standardize several key restaurant processes, as well as provide far greater visibility into restaurants' operations—especially, the condition and status of kitchen equipment.

Figure 1: Key elements of the IoT-enabled kitchen



What does this connected commercial kitchen look like?

At its essence, it encompasses four fundamental elements (Figure 1).

Sensors are attached to the two main types of equipment in the back of a restaurant: refrigeration units that keep food cold and heating equipment that cooks and keeps food warm. Sensors that measure both temperature and humidity, and the power or energy drawn, are affixed to each piece of equipment. In the case of refrigeration equipment, a sensor attached to the door detects whether the door is open or closed, while other sensors determine whether ovens and fryers are turned on or off. Additional sensors keep tabs on the functioning of key mechanisms within each piece of equipment, such as an oven's heating unit and a refrigerator's compressor.

At predetermined, regular intervals (e.g., every 30 or 60 seconds), these sensors send data to a central **"gateway"** placed in the restaurant. This gateway, in turn, aggregates the data and sends it to a secure, cloud-based **platform**. Here, business logic and rules are applied to turn the raw data into actionable information that decision makers can access via dashboards through a **mobile app**. Doing so enables them to see, at a glance and in real time, the status of all the equipment in the restaurant. The app also automatically sends an alert to the restaurant manager when the business rules identify a potential problem or when a particular piece of equipment is operating beyond established limits.

Bringing Benefits to the Table

With this IoT infrastructure in place, a company can gain visibility into its operations the company never had before—which can help it make faster, more informed decisions to improve the business.

The company also can standardize and automate manual and time-consuming tasks—such as safety and compliance checks and inventory management—thus boosting employee productivity and efficiency. Several scenarios illustrate how the connected commercial kitchen could deliver such benefits.

Ensuring food quality and safety

Sensors that regularly monitor the status and temperature of equipment provide accurate real-time information that restaurant managers can use to mitigate changes that could affect product quality or result in violations of food safety regulations.

Think about the all-important cooler door. The aggregated data collected by the sensors can be analyzed to determine if the cooler door was open for longer than the established operational best practices. If it was, an alert is flagged in the mobile app, based on the business rules. This tells the restaurant manager that the items in the cooler may be at risk.

The platform also can send automated alerts to the manager's mobile device when he's out of the restaurant (for example, at night) if it detects the door is open so the manager can take appropriate action before the cooler's contents spoil.

Similar business rules can be used to detect when the temperature inside a cold-temperature equipment is no longer within the established acceptable range. The mobile app dashboard may also be used to view temperature history for any connected equipment.

This solution allows near-real-time insight into the operational status of all connected equipment, thus enabling a higher degree of food safety and compliance as well as helping to reduce spoilage.

Reducing energy consumption

Real-time monitoring of all connected equipment also enables granular measurement of energy consumption. While there may be standard operating procedures in place to ensure optimal energy consumption, verifying those processes is currently done via spot checks and manual audits. Sensors that measure power draw may be used to monitor power consumption in real time, which enables restaurant managers and leadership above them to also identify and correct sub-optimal behavior in real time. Over a long period of time, continuous monitoring of all restaurants' energy consumption, combined with analytics and predictive capabilities, could allow management to further identify potential green initiatives and energy-saving measures to reduce operational costs.

Keeping equipment running well

With real-time monitoring of assets and the ability to use analytics tools, the connected commercial kitchen solution can anticipate the failure of key equipment components before it happens.

Consider a refrigerator's compressor. Sensors on compressors can continually monitor key metrics—such as vibration and operating temperature—and send that data to the platform. Predictive analytics can help determine the overall health of the compressor and, if any of the data is running outside of the desired range, generate an alert on the app—much like the “check engine” light on a car. This alert gives the manager time to have the compressor checked out and repaired or replaced when the restaurant isn't open—and before it fails in the middle of the lunch rush. Such proactive maintenance also extends the life of the refrigerator, ultimately reducing the total cost of ownership for that equipment.

Over time, this asset-monitoring capability may also extend the life of an asset and reduce its total cost of ownership.

Standardizing Compliance Management

One area in which the IoT can provide considerable value is management of food safety and compliance processes. Restaurants want to avoid running afoul of food safety regulations at all costs, and for good reason: If they're found to be non-compliant, they'll suffer from negative publicity that can drive customers away (some for good) and lost sales from being shut down until they fix the problem. However, the processes to ensure a restaurant complies with all relevant regulations are manual and paper based. Subsequently, they are inefficient, require a lot of labor hours to execute, and introduce the opportunity for errors.

By using the IoT to automate daily tasks, such as completing compliance reports, a QSR can standardize how employees execute those tasks across restaurants. This helps reduce labor costs and frees up the restaurant manager's time to focus on higher-value tasks.

Enabling better decisions through real-time insights

The IoT extends visibility into restaurant operations beyond the immediate restaurant manager. It enables regional managers, franchise owners and corporate decision makers to, in real time, monitor key data on multiple restaurants from anywhere, anytime. Such visibility gives them greater control over how the restaurants perform and helps them make faster, more fact-based decisions.

Moving Forward with a Strong IoT Foundation

It's clear that the IoT can dramatically improve several key dimensions of a kitchen's operations. These improvements include:

- Enhanced food quality and compliance with food safety regulations
- Lower energy costs and reduced food waste
- Reduced total cost of ownership for key assets such as refrigeration units, ovens, and fryers
- Lower labor costs and greater employee efficiency and productivity

Such benefits are not insignificant. Given the high costs and inefficiencies of the typical QSR business model—and the resulting low margins—any kind of operational improvement or cost reduction can have a big impact on the business and its bottom line.

But that's only the beginning. While initial adoption of this solution will lead to better line of sight into day-to-day kitchen operations that results in greater efficiency and lower operating costs, more significant benefits will likely accrue over the longer term as kitchen operators add greater functionality and other offerings.

For instance, adding self-diagnosis and predictive maintenance capabilities to equipment can further minimize downtime and service disruption. Advanced levels of automation in restaurant operations can drive even greater standardization and consistency across restaurants, which can spur more rapid adoption of new product lines across the board. And by connecting cameras and motion sensors to a connected kitchen solution, a QSR could monitor food preparation equipment to gain more insights on how to boost product quality and training, as well as improve workplace safety and get real-time alerts of accidents.

Eventually, enhancements to the same solution could even unlock new ways to increase customer satisfaction and retention, as well as create new revenue streams, by offering personalized, value-added digital services. For instance, customers may be willing to pay a small additional fee to watch, via a mobile app from their home, their specific order being made. While this may seem far-fetched today, it's only one example of how the connected commercial kitchen solution could boost the top line as well as the bottom line.

IoT and Commercial Kitchens: The Future Is Now

Internet of Things technology offers plenty of promise to improve commercial kitchen performance, and we expect the connected commercial kitchen to gain momentum soon—to the point at which the IoT will be seen as a “default” capability for commercial kitchens. Until then, QSR chains and commercial kitchen operators can generate competitive differentiation through “early-mover” advantage. They should look to get ahead by building a foundation for the IoT and taking the initial steps toward eventually adopting the full solution. This starts with investigating how to best leverage the IoT in their operations via a proof of concept and pilot. High-level steps in that effort include the following:

- Partnering with an IoT solution provider to investigate the feasibility of connecting existing equipment
- Identifying target use cases and capabilities to influence key business drivers

- Selecting a representative sample of outlets to build a working proof of concept solution
- Measuring actual benefits, refining the business case, and developing a plan to roll out a pilot program across a larger number of outlets

By making the move today, companies can begin to reduce their energy consumption, automate compliance management, and improve their line of sight into daily operations.

Ultimately, the connected commercial kitchen solution offers a compelling opportunity to achieve centralized oversight at the corporate and franchisor level that helps reduce labor and operating performance gaps and eliminate unit-to-unit variability—which, in turn, results in better, more predictable business outcomes and greater overall system performance and profitability.





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Footnotes

¹ <http://www.refrigeratedfrozenfood.com/articles/90070-qsr-market-growing-6-cagr-by-2019>

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