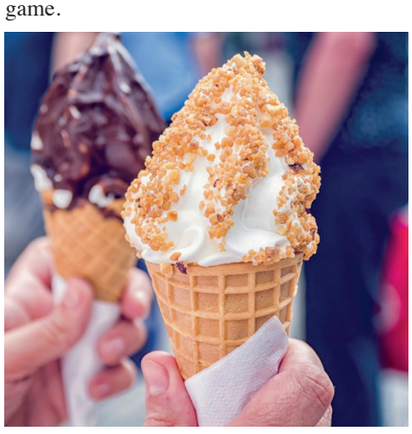
This time it's personal

Iain Ansell asks, is customised vending an effective vehicle for mass personalisation?

Consumer demand for more personalised food and beverage products continues to escalate, so how will the industry rise to the challenge? There are strong indications that a blurring of the edges between food manufacture and food service is on the horizon. And a major evolution of the humble vending machine may be on the cards.

The digital age has spawned a generation of hyper aware and empowered customers. It has also shifted the way the food and beverage industry innovates. In the past, new developments were largely driven by evolving technical capabilities. Today, innovation is increasingly consumer driven. Customer needs and desires come first, and industry players must act smart to stay ahead of the game.



While the digital age has shifted the balance of power in favour of the consumer, it has also unlocked new manufacturing possibilities. Advancements in device connectivity, automation and 3D printing offer much potential for the food and beverage sector. And technologies that organise and leverage big data are taking customer insight and engagement to a higher level. There are more opportunities than ever for brands to listen to and interact with their customers directly.

New technologies to meet consumer demands

Over the next decade, we're likely to see a convergence of these technologies as brands strive to deliver personalisation to the masses. At Sagentia, we've witnessed a steady increase in the number of food and beverage brands approaching us to discuss novel dispense technologies. Some of the conversations we're having centre on truly progressive – even revolutionary – approaches.

For instance, the vending machine concept is ripe for evolution. Integration of novel dispense technologies and automation could see vending machines transformed into mini manufacturing hubs that create personalised products on demand. Pioneering brands are already testing the water: the Let's Pizza vending machine that offers freshly made pizzas with a choice of toppings; Reis and Irvy's frozen yogurt robot; and the customised Oreo cookies robot.

On the face of it, hi-spec customised vending offers an effective way to meet personalisation demands, and the fundamental technologies already exist. However, ensuring such approaches are cost effective and satisfy rigorous HACCP principles is another matter. There are many complex factors to consider and, based on our project experience, there are three key interlinked technical challenges. If the industry can tackle these head on, customised vending could become a serious platform for mass personalisation.

1. Dose, mix and dispense

Food and beverage preparation can be complicated, with multiple factors influencing the quality of the end product. To ensure remote, robotic manufacture is reliable, repeatable and safe, it's important to consider the various production stages in minute detail. Broadly speaking, these can be broken down into the dosing and mixing of ingredients, then the dispense of the final product.

Challenges surrounding ingredient measurement and dosing present the first hurdle. How do you ensure the correct amount is dispensed hygienically and repeatedly? Single serve pods might provide a neat solution, but not

without cost and waste implications.

Then there's the mixing of ingredients. This physical process can impact texture or temperature, which can have repercussions for food quality and safety. And what do you mix the product in? It may be possible to mix some ingredients within the final dispense packaging. If not, a mixing chamber or receptacle is needed – and this will need to be cleaned effectively.

Once a machine touches food, it is contaminated. This can happen either as a fundamental part of the process or accidentally. By conducting a thorough end to end appraisal of the way ingredients are dosed, mixed and dispensed, potential problems surrounding hygiene and ingredient properties can be identified and addressed.

2. Hygiene

While some ingredients, such as coffee, are benign, many others lack microbial stability and production can be inherently unhygienic. Traditional factories are geared up to counter this with robust processes and procedures to avoid contamination and ensure production lines are thoroughly cleaned.

Remote vending machines pose a challenge as their cleanliness cannot be monitored as rigorously. As far as possible, they need to be intelligently engineered to avoid contamination of internal parts. Purposeful design of consumable packaging can play a role, reducing contact between the machine and ingredients. Concepts like the hygienic bag in a box dispense of milk in food service outlets could be adapted for wider applications.

In-process cleaning should also be embraced where necessary to flush any components that do come into contact with ingredients or the end product. This approach has been used successfully in coffee machines where hot water is used to purge milk lines. An added benefit of in-process cleaning with water – as opposed to use of chemical cleaning agents – is that it doesn't risk tainting the flavour of the product. However, the potential growth of biofilms in cold water lines is an associated challenge that needs to be considered.

Inevitably, human intervention is required to facilitate periodic deep cleans. The speed, frequency and effectiveness of cleaning needs to be considered, and it must be easy to remove and wash all internal parts. The goal is to ensure the end product tastes good and is safe to consume, while avoiding excessive energy use, ingredient wastage or machine downtime.

3. Ingredient format

For customised vending to deliver an adequate business return, careful thought should be given to ingredient packaging and storage within the machine. Large packs are clearly more cost effective and sustainable than smaller or single serve options. However, spoilage vulnerability increases when ingredients are kept for a long time, especially if they are exposed to the air. There is a serious risk of contamination when portions are taken and, ideally, bulk packages should be resealed between customers.

Specific ingredients and products bring their own challenges – from crumbs that collect in crevices and liquids that splash, to temperature sensitive pastes and powders that are affected by humidity. While the products of a customised vending machine are likely to be consumed fresh, storage of ingredients in the machine can be problematic, both in terms of their functionality and shelf life.

Potential contamination of stored ingredients should be designed out where possible, and the internal machine environment needs to be managed to prolong shelf life. Since temperature, humidity, exposure to UV and air can all have a bearing on ingredient quality, engineered solutions may be required to control these factors. Ongoing remote monitoring of individual machines' performance can be facilitated with the use of sensors. These can activate an alert to ensure action is taken if vulnerable ingredients or products are at risk of spoilage due to extreme conditions or machine failure.

There are also practical logistical considerations to factor in. Loading of ingredients should be straightforward and must avoid the risk of contaminating machine components or the ingredients themselves. The unloading and disposal of ingredient packaging is another concern, as spent packaging with ingredient residue may represent a hazard.

Collaborate to innovate

A qualitative study undertaken by our sister company Leatherhead Food Research indicates that personalisation is a major driver of food and beverage innovation. Customised vending represents a viable means to achieve this at a mass market level, albeit with technical challenges to overcome. Developing solutions to meet these challenges will require a fusion of skills and knowledge from experts within the food and beverage industry and beyond. Food scientists, process engineers, automation specialists and software designers all have a role to play.

In the short to medium term, we can expect to see an incremental, iterative approach to the development of vending technologies. They are likely to gain momentum in niche segments where ingredient and hygiene challenges are more easily overcome or avoided. Frozen yogurt and ice cream offer much potential. And there is scope for developments in the health category, with the addition of vitamins and minerals, omega-3 fats or functional ingredients to products, for example.

Simple products or those with benign ingredients could also be forerunners. For instance, vending machine manufacture of flat breads might represent a good testbed in markets such as India and Mexico where demand for freshness is high.

Mass personalisation shifts many existing food and beverage production challenges from the factory to the point of sale, requiring them to be looked at in new ways. But focused research and development activity is sure to overcome these obstacles. The food and beverage sector is poised for an age of innovation; new approaches such as customised vending are set to change the face of the industry as we know it. ■

Author
Iain Ansell, MD of Sagentia.