

AI Food Safety Monitoring in the Food Service Sector: Perceived Benefits and Limitations.

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Introduction

Ensuring the safety of food is paramount for the food service establishments. Whilst the monitoring of food handler food safety practices can be done by the supervisory and management staff through the visual observation during the day-to-day operation of the food service business, it can often be challenging, inconsistent and time-consuming. Importantly, a lack of regular supervision and monitoring is considered to be one of the main barriers to minimising the risk of food handling malpractices in food service (1, 2, 4, 5).

Novel Artificial Intelligence (AI) software utilising CCTV footage could revolutionise food safety monitoring in food service through providing the opportunity of consistent monitoring and real-time feedback. A recent qualitative study suggested that the use of such novel technology may facilitate improvements in food safety implementation (3).

There is a need to explore the perceptions of the food service industry stakeholders about the use of novel AI monitoring technology to understand and inform the further development of such technology.

Purpose

To determine industry stakeholder and expert perceptions regarding the benefits and limitations of the novel AI food safety monitoring technology; and to identify the requirements of the intended users regarding the development of such technology.

Methods

Study design:

Interview schedules, informed by a preceding literature review were designed for this study. In-depth interviews were carried out with three groups of stakeholders:

- **Experts**, such as representatives of academia, regulatory authorities and environmental health officers (n=11);
- **Food service managers**, including owners, general managers, employees carrying out managerial duties (n=9);
- **Food service employees**, including chefs, waiters, baristas and workers in non-managerial roles (n=4).

Data Analysis:

All interviews were recorded, transcribed and the content of the interviews was qualitatively analysed. Respondent perceptions of benefits and limitations of using novel AI monitoring were explored.

Ethical Approval was obtained from the Health Care and Food Ethics Committee at Cardiff Metropolitan University (Reference no.: PGR-5508).

References

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Results

In the interviews the industry experts and the food service stakeholders shared agreement that continuous monitoring *"cannot be accomplished by only one person"* in the establishment, such as a manager or an owner.

Interview respondents expressed positive sentiment towards the role of novel technologies, saying that *"there is definitely a role for digital involvement"* (Expert 12) and that *"real-time feedback is beneficial"* (Expert 21).

However, many were uncertain about the need for the novel AI monitoring and shared an opinion that *"it could never fully replace a manager keeping an eye on something"* (Expert 14) and that *"there has to be that human element"* (Expert 12).

Perceived benefits of novel AI technology discussed by the industry experts and managers

1. Continuous monitoring with effective feedback

Industry experts acknowledged that continuous feedback replacing snapshot auditing would give a more in-depth data about the business. Food service managers shared an opinion that using an AI software could be more effective when monitoring a team, allowing continuous monitoring which would not be practical if done in a traditional way via observation.

"We're never going to be inspecting every single minute of every single day of what they're doing. It's just the snapshot[...] So, yeah, it sounds exciting." (Expert 10)

2. Speed of monitoring

Speed of the AI-powered monitoring, allowing to highlight the issues automatically, was perceived as beneficial by the food service managers and by the industry experts.

"It would definitely help managers, it would speed up a process." (Supervisor 3)

3. Encouraging compliance

Food service managers suggested that having a novel monitoring tool may have a positive effect on employee food safety compliance, because employees would know that they are always being monitored and will be shown the output statistics.

"I think they'd [employees] understand the importance of, you know, doing everything according to the protocol." (Manager 29)



Perceived limitations of the novel AI technology discussed by the industry experts and managers

1. Financial investment

Cost of novel technology and the financial investment into installing and maintaining it was mentioned as one of the core limitations, perceived by the experts and managers. This was particularly worrying for smaller businesses that may not have sufficient resources.

Lots of expenses for owners as well, isn't it? To get all cameras and..." (Business owner 11)

2. Time investment

Food service managers highlighted the need to invest time to learn how to operate the novel software and to review the results obtained via monitoring.

"You are probably going to have to find the time to review and determine whether or not you need to take any further action, as a result of the findings." (Expert 25)

3. Loss of responsibility

Concerns regarding the fact that the use of AI video monitoring may give a false sense of security and loss of responsibility to the management teams was highlighted by the managers.

"If I know that there's a camera watching, do I need to keep an eye that everyone should wash their hands? [...] [Managers may] feel like it's not any longer a part of their responsibility." (Manager 13)



Considerations for the introduction of the novel AI technology discussed by the industry stakeholders

1. Clearly identified purpose

Industry experts and food service employees suggested that the purpose of the novel technology and the use of the final output should be clearly defined to the managers and the employees.

"But how are you going to use the information that you're getting from this[...]. And who should review it? [...] It can't be a police scenario." (Expert 4)

2. Using as a supplementary tool

Managers and experts stated that novel AI technology is beneficial when used as a supplementary tool which helps the monitoring; and that it cannot be used to prevent poor practice by itself.

"Some managers [...] would use it as a tool to catch people out[...] but it's more just to monitor and help and support." (Employee 27)

"If added supplementary[...] you'd still be gaining a lot from it, and being able to tell those patterns [...] that need to be acted on." (Manager 13)



Significance of study

- This qualitative study determined that although stakeholders perceived various benefits of novel AI monitoring technology, they also expressed concerns and suggestions, related to the use of such technology.
- Importantly, novel AI monitoring technology was perceived of most benefit when used as a supplementary monitoring tool with a clearly defined purpose.
- This study provides valuable findings regarding the practical considerations when developing novel monitoring technologies and introducing them to the food service business.