The Role of Digital/ Telecommunication Technology in Food and Nutrition Technology

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Short Communication

Advances in digital/ telecommunication technology has enhanced the development of many cuttingedge applications in the food sector and has gradually moved food and nutrition technology from a labour-intensive model to a model powered by fast and accurate transmission of information.

This write up intends to provide an overview of some existing digital/ telecommunication technologies applicable to modern food production (the radio, television, Radio Frequency Identification Devices, mobile phones, computers/networks/databases/softwares, internet, barcodes and nano technology), and a few of their applications in the food sector. In addition, the potential benefits and opportunities of such technologies are discussed in the context of food production and security. While these technologies have made food production easier and more precise in developed countries, there are still major obstacles which must be overcome to make these technologies accepted and usable in developing countries.

Importance of Digital/ Telecommunication Technology in Food Science and Technology

- It provides new channels for accessing and sharing information e.g via the internet, television, radio and mobile phones where producers can gain access to the latest trends in the food industry. Producers can also disseminate information about their products via these means to the benefit of the consumers also.

- It has helped to change significantly the way players in the food sector value chain collect, analyze, store and share food information for their daily decision making purposes.
- It has resulted in more productiveness in rural markets: lower transaction costs, less information asymmetries, improved market coordination and transparent rural markets e.g mobile banking applications in mobile phones serves as a marketing platform where players in the food industry can easily transact business resulting in lower transaction costs, improved market coordination and transparency.
- Enables compliance of producers with food safety and traceability standards. Mobile phones, radio frequency identification (RFID) systems, wireless sensor networks and global positioning systems (GPS) are some digital/ telecommunication devices used in food science and technology for traceability.
- It reduces wastage in various stages from the field-to-fork value chain by facilitating real-time information exchange.
- Results in the development of trust-based relationships between value chain actors: In conventional food value chains, intermediaries add to reduced transparency and thus increasing price manipulation resulting in mistrust. It can help in reducing the layers of intermediaries and can make transactions unbiased and transparent thus improving the trust factor.
- It leads to the development of value-added services for actors of the food value chain.

Some Digital/Telecommunication Devices and Their Relevance in Food Technology

Radio: The radio has the following benefits in the food sector:

- It serves as a platform where food producers and other stake holders in the food industry can gain advice on how to improve their food productivity and on other latest trends in the food industry.
- It also serves as a window via which producers can advertise their products.
- Consumers can also gain access to new and existing food products in the market via the radio.

Television: The television plays the following role in the food sector:

- Expertise sharing
- Information dissemination about food products and services
- Advisory role

Radio Frequency Identification Device (RFID)

- **Supply Chain Management**: In supply chain management, RFID tags are used to monitor and track food products during distribution and storage for safety and easy recall [1].
- **Food Safety:** RFID systems can be used to monitor the temperature range of food products during transportation and storage [2].
- **Other Applications:** RFID technology has also been used in monitoring the ripening of climacteric fruits during transportation and vending.

Mobile Phones

- Mobile phones are used to check for the authenticity of products.
- Mobile telephones are also used to send information and advice to producers and consumers.
- Mobile phones are also used for mobile payments as well as serving as trading floors.
- Mobile Ordering: Food companies that sell mostly through ordering rely on mobile phones for order placements.

Computers, Networks, Databases and Softwares

These are used to collect, analyse and share information that is relevant to food security. Examples of application of computers in the food sector include:

Computer Controlled Devices

Their applications range from computer controlled production lines, to computers that control the quality control aspects of products. Examples; Automated milking systems and 3D food printers.

Software Packages

Examples are OpsSmart® Traceability solutions and Trace Verified used for food traceability purposes.

Predictive Databases

Some examples of predictive database tools used in the food sector are:

- **Com Base:** Is an internet-based free database used to determine microbial safety and likely spoilage of a range of food formulations.
- **Forecast**: a collection of bacterial spoilage models which account for fluctuating temperatures, dynamic processing environments, modified atmospheres and new product type.
- **Food Spoilage Predictor**: This program can be used to predict the rate of microbial spoilage in a wide range of chilled, high protein foods such as meat, fish, poultry and dairy products. It can predict remaining shelf-life at any time in the cold chain.
- **Sea Food Spoilage Predictor**: Can be used to predict the shelf life of sea food stored under either fluctuating or constant temperature condition.
- **Fare Microbial™:** Consists of a contamination and growth module and an exposure module to enable probabilistic microbial risk assessment.
- **Water Activity and Mould Free Shelf Life (Water Analyzer Series):** This series of programs can be used to predict the water activity of component products under a range of different conditions, including the efficacy of packaging films.
- **ERH-CALC**: Used to calculate the theoretical equilibrium relative humidity (ERH). From this data, the model then predicts the mould free shelf life (MFSL) of the ambient stored product.
- **Hazard Analysis Critical Control Point (HACCP):** HACCP documentation software is widely used.
- **Chill Chain (Cool Van):** Used to predict the temperature of food during a single/multi drop journey in a refrigerated van. This knowledge can help in predicting shelf life as well as enabling a producer to ensure that a chilled food will be at the correct temperature when it reaches the retailer.

Interne

- With the internet, producers can go online to learn about new markets and partnerships.
- It also gives food producers and marketers all over the globe universal accessibility by making the world a global village. Information, new innovations, production procedures, training materials and advances in the food sector can be accessed via the internet.

Barcode Technologies

Barcodes represent data to uniquely identify a product. The data can be used to trace the product forward and backward through the supply chain. Barcodes on food packages improve product information, eliminate food waste and improve the safety of products consumed.

Nano Technology

In the field of traceability, nano solutions enable food safety and food preservation. Nano materials may be used in smart packaging and in food handling to detect pathogens, gases, spoilage, and changing temperature and moisture [3].

Challenges in Developing Countries

Whereas developed countries are enjoying the benefits of applying digital technology in the food sector, most developing countries are not maximizing these advantages due to the following factors:

- Poor digital technology and ICT infrastructure.
- Not taking an inclusive approach with telecommunications technology and ICTs – attention to differently abled, semi-literate/illiterate users.
- High cost of telecommunications technology services and lack of sustainable business models.
- Decline of public expenditure on agriculture/food in developing countries.

Recommendations

However, these challenges can be overcome if all the issues listed above as challenges are addressed.

Conclusion

Advances in digital/ telecommunication technology are playing an increasing role in addressing some of the challenges faced in the food sector. Embracing these advances will help to curb some of the nutrition and food security challenges currently being faced.

References

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