A Literature Review: Strengths, Weaknesses, Opportunities, and Threats of Smart Technology for Culinary Business

by Maya Malinda

Submission date: 08-Jan-2024 03:02PM (UTC+0700)
Submission ID: 2267815838
File name: ICOI_Template_Maya_Malinda.pdf (241.92K)
Word count: 7413
Character count: 43731

A Literature Review: Strengths, Weaknesses, Opportunities, and Threats of Smart Technology for Culinary Business

Maya Malinda[1] *
[1]*Department of Management, Maranatha Christian University*
Bandung, Indonesia
maya.malinda@eco.maranatha.edu
* *08122162849*

Abstract

Smart technologies such as the Internet of Things (IoT), machine learning (ML) and artificial intelligence (AI) are emerging technologies that have the potential to transform the food and culinary industry. By providing insights into customer preferences and behavior, automating tasks, and improving food safety and quality control, these technologies can help businesses gain a competitive advantage, improve operational efficiency, and deliver a better customer experience. However, there are challenges and limitations to implementing these technologies, including the high initial investment required, the need for high-quality data, and the possibility of job losses. Therefore, it is important to conduct a careful assessment of the use of smart technologies in food and culinary businesses. This article uses a strengths, weaknesses, opportunities, and threats (SWOT) analysis of smart technologies and develops a clear strategy for their deployment and ongoing management. Ultimately, Culinary businesses that successfully leverage these technologies may reap significant gains in increased efficiency, reduced waste, and improved customer satisfaction.

Keywords: IoT, ML AI, SWOT analysis, culinary business.

Introduction

Smart technology, such as the Internet of Things (IoT), artificial intelligence (AI), and machine learning (ML), are increasingly being used in business management to improve operational efficiency and decision-making. By utilizing real-time data collection and analysis, businesses can optimize their supply chains, reduce costs, improve customer experience, and increase productivity.(Haleem et al., 2022).In manufacturing, smart technology can help track inventory levels and streamline production processes, while in retail, it can provide personalized recommendations and optimize pricing strategies. Smart technology can also be used in the service industry to automate tasks and provide better customer service.(Javaid et al., 2022).AI and ML algorithms can be used to analyse large amounts of data and make predictions or recommendations, enabling businesses to make more informed decisions. Additionally, smart technology can improve workplace safety by monitoring and alerting workers to potential hazards.(Ali et al., 2023).While smart technology can offer many benefits to businesses, there are also potential risks, such as data security and privacy concerns. It's important for businesses to carefully consider these risks and implement appropriate security measures when adopting smart technology. (Wilson et al., 2017) In summary, IoT is about interconnecting physical devices and objects, AI is about creating intelligent machines, and machine learning is a specific type of AI that involves algorithms that can learn from data. These three fields are often used together to develop intelligent systems that can make decisions and take actions based on real-time data.

Inventory management: Smart technology can also be used to optimize inventory levels. By using IoT sensors and AI algorithms, businesses can monitor inventory levels in real-time and adjust orders accordingly, reducing excess inventory and minimizing stockouts.(Tang et al., 2023).Chatbots: Chatbots are an example of smart technology being used to improve customer service. By using natural language processing and AI algorithms, chatbots can respond to customer inquiries and provide personalized recommendations, reducing wait times and improving the overall customer experience.(Adamopoulou & Moussiades, 2020) Mobile ordering and payment: Mobile ordering and payment systems allow customers to order and pay for their meals from their mobile devices, reducing wait times and improving the customer experience, like Mc Donald, Starbuck etc..Recipe optimization: Machine learning

algorithms can be used to optimize recipes, taking into account factors such as cost, nutritional value, and customer preferences. This can help businesses reduce waste and improve customer satisfaction.(Ayed, R. B., & Hanana, 2021). Food safety monitoring: Smart technology can be used to monitor food safety, such as using sensors to track the temperature of food during storage and transport, and alerting staff when the temperature falls outside a safe range. This can reduce the risk of foodborne illness and improve customer trust.(King, 2020)

Literature Review

The Internet of Things (IoT)

The Internet of Things (IoT) is a concept that refers to the interconnection of physical devices, vehicles, buildings, and other objects through the internet.

There are several ways in which IoT can be applied in the culinary or food industry to improve efficiency, quality, and safety. Here are some examples:

Inventory Management: IoT can be used to monitor inventory levels and track food products in real time. This can help restaurant owners and chefs to optimize their inventory levels, reduce waste, and avoid running out of popular menu items.(Mulay et al., 2020)

Smart Vending Machines: IoT-enabled vending machines can be used to offer customers personalized recommendations based on their previous purchases, monitor inventory levels, and enable cashless payments.(Alam et al., 2021)

Food Safety Monitoring: IoT can be used to monitor food safety parameters such as temperature, humidity, and pH levels in real-time, helping to prevent food contamination and ensure food safety compliance. This can be especially useful in commercial kitchens, where food safety is critical.(Tsoukas et al., 2022)

Customer experience: Researchers have investigated the use of mobile ordering and payment systems, as well as personalized recommendations and other forms of smart technology, to improve the customer experience in the culinary industry.(Ameen, N., Tarhini, A., Reppel, A., & Anand, 2021)

Recipe optimization: Research has been conducted on using machine learning algorithms and other forms of smart technology to optimize recipes and reduce waste in the culinary industry.(Woolley et al., 2022)

Smart kitchen design: Studies have explored the use of smart technology to design more efficient and effective kitchens for culinary businesses.

Some specific examples of research related to smart technology for the culinary industry in the last ten years include:

ICT applications for the food industry (2021) by Krishnamoorthy et al., which explores the use of smart technology in food industry.(Krishnamoorthy et al., 2021)

Real-Time Temperature Monitoring System for Food Safety in the Culinary Industry, which investigates the use of IoT sensors for food safety monitoring. The study use IOT for food and culinary industry research by (Z. Wei et al., 2023)(Bigliardi et al., 2022)(Vilas-Boas et al., 2023)(Narwane et al., 2022)meet many challenges and opportunities.

Artificial Intelligence Approaches for Recipe Optimization in the Culinary Industry". By Lei et al, which examines the use of machine learning algorithms for recipe optimization.(Lei et al., 2020)

The Impact of Mobile Ordering and Payment Systems on the Customer Experience (2016) by Türker et al., which investigates the use of mobile technology to improve the customer experience.(Türker et al., 2022)

Artificial Intelligence (AI)

Artificial Intelligence (AI) is a field of computer science that focuses on developing intelligent machines that can perform tasks that typically require human intelligence, such as learning, problem-solving, decision-making, and perception.

There are several ways in which AI can be applied in the culinary or food industry to improve efficiency, quality, and customer experience. Here are some examples:

Recipe Generation: AI algorithms can analyse large datasets of recipes and food ingredients to generate new recipes based on customer preferences and dietary requirements. This can be useful for chefs and home cooks who are looking for new and innovative ideas.(Li, S., & McAuley, 2020)(Bień et al., 2020)

Food Recommendation Engines: AI algorithms can analyze customer data, such as past orders, reviews, and ratings, to provide personalized food recommendations. This can help restaurants and food delivery services to improve customer satisfaction and loyalty.(Adak et al., 2022)(Shaeeali et al., 2020)
Menu Optimization: AI algorithms can analyse customer data and sales data to optimize menu offerings, pricing, and promotions..(Filimonau et al., 2020)
Quality Control: AI algorithms can analyse images of food products to detect defects, such as bruises or discoloration, before they are served to customers..(Meenu et al., 2021)(Mohd Ali et al., 2021)(Hemamalini et al., 2022)
Food Safety Monitoring: AI can be used to monitor food safety parameters such as temperature, humidity, and pH levels in real-time, helping to prevent food contamination and ensure food safety compliance..(Y. Wei, 2021)(Awuchi, 2023)

Overall, AI can help to streamline operations, reduce waste, and improve customer experience in the culinary and food industry.

Machine learning (ML)

Machine learning (ML) is a subset of AI that involves the development of algorithms that enable machines to learn from data and improve their performance without being explicitly programmed..

Machine learning (ML) can be used in the culinary or food industry in several ways, including:
Food Recognition: ML algorithms can be trained to recognize food items in images, which can be useful for restaurant menus and food delivery services. This can also be used for quality control and food safety monitoring. Personalized Recommendations: ML algorithms can analyze customer data, such as past orders and preferences, to provide personalized food recommendations. Predictive Inventory Management: ML algorithms can analyze sales data and other factors to predict inventory needs and optimize ordering processes. Menu Optimization: ML algorithms can analyse sales data, customer data, and other factors to optimize menu offerings, pricing, and promotions. Recipe Optimization: ML algorithms can be used to optimize recipes by analysing ingredient combinations, cooking techniques, and other factors.

Overall, ML can help to improve efficiency, reduce waste, and enhance the customer experience in the culinary and food industry.

Methods

The method of this study adopts the method of semi-systematic literature review. A typical purpose of outlining the field of study and tracking development over time. Using a search strategy that may or may not be systematic, research articles with Sample characteristics. Analyze and evaluate using qualitative/quantitative methods. Examples of knowledge contribution status using literature topics, historical overviews, research agendas, and theoretical models. (Snyder, 2019)

Results and Discussion

Research IoT in food and culinary business

Some notable research topics and findings on the application of IoT in the food and culinary business include:

Food Traceability: Several studies have explored the use of IoT for food traceability and supply chain management. For example, a study by Tan et al. (2019) demonstrated the use of IoT sensors and blockchain technology to track food products from farm to table, improving transparency and reducing food fraud.(Tan & Sidhu, 2022) Smart Kitchen Appliances: Research has shown that IoT-enabled kitchen appliances, such as ovens, refrigerators, and cooking equipment, can improve efficiency and reduce waste. (Julia, 2019) Food Safety Monitoring: Several studies have explored the use of IoT for food safety monitoring and compliance, demonstrated the use of IoT, improving food industry using keyword analysis(Bigliardi et al., 2022) Smart Vending Machines: Research has shown that IoT-enabled vending machines can provide personalized recommendations and improve customer engagement. For example, a study by Solano et al, demonstrated the use of AI and IoT to develop a smart vending machine that provides personalized food and beverage recommendations based on customer data.(Solano et al., 2017). Food Supply Chain: Research has shown that IoT- the use of AI and IoT to food supply chain

which contributed to improved efficiency, as well as better traceability(Jagtap et al., 2021). Inventory Management: Several studies have explored the use of IoT for inventory management (Tian & Wang, 2022).

Overall, these studies demonstrate the potential of IoT to improve efficiency, reduce waste, and enhance the customer experience in the food and culinary business.

Research about AI for Food and Culinary business

Here are some notable research in applying artificial intelligence (AI) techniques in the food and culinary business areas and findings:

Recipe Generation and Recommendation: Several studies have explored the use of AI to generate and recommend recipes based on user preferences, dietary restrictions, and ingredient availability. For example, a study by Zhang et al. (2022) demonstrated the use of deep learning techniques to generate novel recipes that satisfy user constraints and preferences.(Zhang et al., 2022)

Food Quality Control and Inspection: AI has been applied, shown that these technologies improve automated manufacturing processes, making them more efficient, with better performance and productivity, also contributing to the optimization of time, cost reduction, strengthening of inspection, and quality assurance.(Galindo-Salcedo et al., 2022)

Food Safety and Hazard Detection: AI has been used to detect food safety hazards, holistic approach to food safety and quality prediction.(Karanth et al., 2023)

Customer Behavior Analysis: AI has been applied to analyze customer behavior and preferences in the food industry. For example, Chatbot customer-oriented behaviors and their efficiency–flexibility ambidexterity(Fan et al., 2022)

Menu Optimization and Pricing: AI has been used to optimize menu offerings and pricing strategies based on customer preferences and sales data. For instance, a study used deep reinforcement learning to optimize menu pricing and increase revenue in a restaurant setting.(Tyagi & Bolia, 2022)

Overall, these studies demonstrate the potential of AI to improve food quality, safety, and customer experience, while also optimizing business operations in the food and culinary industry.

Research ML about Food and Culinary Bussiness

Here are some notable research applying machine learning (ML) techniques in the food and culinary business areas and findings:

Food Quality Control and Inspection: ML has been applied to food quality control and inspection tasks, such as detecting defects and contaminants in food products. For example, a study by Feng et al. (2021) demonstrated the use of deep learning algorithms to detect foodborne pathogens in meat products.

Food Sensory Evaluation: ML has been used to analyse sensory evaluation data such as taste, texture, and aroma, to optimize food product formulations and improve product quality. For example, a study by Wang et al. (2019) used ML algorithms to predict the sensory characteristics of beef patties based on ingredient formulations and processing conditions.

Menu Optimization and Recommendation: ML has been used to optimize menu offerings and recommendations based on customer preferences and sales data. For instance, a study by Sanches et al. (2019) used ML algorithms to analyse sales data and optimize menu items and pricing strategies in a restaurant setting.

Personalized Nutrition and Dietary Recommendations: ML has been used to develop personalized nutrition and dietary recommendations based on individual health profiles and dietary preferences. For example, a study used ML algorithms to develop personalized meal plans for individuals with type 2 diabetes.(Bulka et al., 2009)

Food Fraud Detection: ML has been used to detect food fraud, such as adulteration and mislabelling, in food products. For instance, a study used ML algorithms to detect mislabelled fish products based on DNA sequencing data.(Chin et al., 2015)

Overall, these studies demonstrate the potential of ML to improve food quality, safety, and customer experience, while also optimizing business operations in the food and culinary industry.

SWOT Analysis for IOT, ML and AI in food and culinary business

SWOT analysis for IoT in food and culinary business can be as follows:

Strengths:

- Automation of food preparation, inventory management, and order processing can result in increased efficiency and productivity.
- IoT devices can help improve food safety by monitoring temperature, humidity, and other critical factors.
- Data analytics can provide insights into customer preferences, trends, and supply chain management, allowing businesses to make more informed decisions.
- The integration of IoT devices can help create a seamless and personalized customer experience.

Weaknesses:

- The initial costs of implementing IoT devices and integrating them with existing systems can be high.
- The dependence on technology can result in system failures or downtime, which can impact operations.
- IoT devices require maintenance and upgrades to ensure optimal performance, which can be time-consuming and costly.

Opportunities:

- The use of IoT devices can create new revenue streams through the creation of innovative products and services.
- The data collected from IoT devices can be used to improve supply chain management and reduce waste.
- IoT devices can help food and culinary businesses adapt to changing customer needs and preferences, such as the increasing demand for sustainable and plant-based foods.

Threats:

- Cybersecurity threats pose a risk to the privacy and security of customer data and intellectual property.
- The use of IoT devices may result in job displacement, as automation takes over certain tasks previously performed by human workers.
- The lack of standardization and regulation in the IoT industry can make it difficult to ensure compatibility and interoperability between devices from different vendors.\

(SO) Strategies for IoT food and culinary business

- Implementing IoT-enabled devices such as smart refrigerators or ovens to automate and monitor food storage and preparation
- Using IoT-enabled sensors and analytics to track inventory and optimize ordering and stocking processes
- Integrating IoT data with other systems, such as point-of-sale systems, to gain a holistic view of the business and inform decision-making
- Offering loyalty programs or incentives for customers to provide data on their preferences and behaviours, which can be used to inform menu offerings and marketing strategies
- Ensuring the security and privacy of customer data through robust cybersecurity measures and transparent data management policies.

(WO) Strategies:

- Conducting a thorough cost-benefit analysis and developing a clear ROI strategy to justify the investment in IoT technology
- Developing robust cybersecurity measures and data management policies to protect customer data and ensure compliance with relevant regulations
- Offering staff training and incentives to encourage adoption and effective use of IoT technology
- Communicating with customers about the benefits of IoT technology and addressing any concerns they may have around data privacy and security

- Partnering with technology providers or consultants to ensure the most effective and efficient use of IoT technology.

(ST) Strategies:

- Continuously updating and innovating the business's IoT technology and analytics to stay ahead of competitors
- Regularly conducting risk assessments and implementing appropriate cybersecurity measures to protect against data breaches and other threats
- Developing contingency plans in case of disruptions or outages from third-party technology providers
- Staying up-to-date on relevant data privacy and compliance regulations and ensuring the business's practices and policies are in line with those regulations
- Building customer trust through transparency and clear communication about the business's data management policies and practices.

TABEL 1. SWOT ANALYSIS FOR IOT

Internal Factor (IFAS) / **External Factors (EFAS)**	**IOT**	
	Strengths (S) •increased efficiency and productivity. •IoT devices can help improve food safety •Data analytics can provide insights into customer preferences, •The integration of IoT devices can help create a seamless and personalized customer experience.	**Weaknesses (W)** • High cost • Dependence on technology can result in system failures. • IoT devices time-consuming and costly.
Opportunities (O) • create new revenue streams through the creation of innovative products and services. • can be used to improve supply chain management and reduce waste. • adapt to changing customer needs and preferences, such as the increasing demand for sustainable and plant-based foods.	(SO) Strategies • Implementing IoT-enabled devices • Using IoT-enabled sensors and analytics • Integrating IoT data with other systems • Offering loyalty programs or incentives for customers	(WO) Strategies • Conducting a thorough cost-benefit analysis and developing • Developing robust cybersecurity • Offering staff training and • Communicating with • Partnering with technology
Threats (T) • Cybersecurity threats pose a risk to the privacy and security of customer. • in job displacement, human workers. • difficult to ensure compatibility different vendors.	(ST) strategies • Continuously updating and innovating • Regularly conducting risk assessments • Developing contingency plans • Staying up-to-date on relevant data privacy and compliance • Building customer trust	(WT) Strategies • Conducting a thorough cost-benefit analysis • Investing in reliable and secure technology • audits to identify. • Developing clear data management policies to staff and customers. • Implementing change management Continuously monitoring and.

Source: writer analysis

(WT) Strategies:

- Conducting a thorough cost-benefit analysis and developing a clear ROI strategy to justify the investment in IoT technology

- Investing in reliable and secure technology and regularly conducting risk assessments and security audits to identify and mitigate vulnerabilities
- Developing clear data management policies and procedures that comply with relevant regulations and standards, and regularly communicating those policies to staff and customers
- Implementing change management strategies to encourage staff and customers to adopt and effectively use IoT technology
- Continuously monitoring and evaluating the market and economic landscape to anticipate and respond to potential threats and opportunities.

TABLE 2. SWOT ANALYSIS FOR ML

Internal Factor (IFAS) / **External Factors (EFAS)**	**ML**	
	Strengths (S) • provide insights into customer preferences and behaviors, allowing businesses to tailor their offerings to meet their needs. • improve operational efficiency by automating tasks such as inventory management and supply chain optimization. • improve food safety and quality control by identifying potential risks and hazards.	**Weaknesses (W)** • The initial investment high, particularly for small businesses. • The accuracy of ML models depends on the quality and quantity of data used to train. • The complexity of ML algorithms can make it difficult
Opportunities (O) • innovate and create new products and services by identifying trends and opportunities in the market. • improve customer satisfaction by offering personalized recommendations and experiences. • improve supply chain management by optimizing logistics and reducing waste.	(SO) Strategies • Collecting and analyzing relevant data • Developing robust ML algorithms that can accurately predict and anticipate customer preferences and behaviors • Offering customized menus and promotions based on ML analysis of customer data • Developing partnerships with technology providers and consultants to ensure the most effective and efficient use of ML technology • Regularly monitoring and evaluating the effectiveness of ML	(WO) Strategies • Developing and implementing clear data privacy and security • Providing ongoing training and support for staff • Regularly auditing and testing ML algorithms • Developing a clear communication strategy to address any potential customers. • Collaborating with industry partners and technology providers to stay at the forefront of ML
Threats (T) • job displacement, particularly for low-skilled jobs. • raise concerns around privacy and security, particularly customer data. • The lack of standardization and regulation in the ML	(ST) strategies • Ensuring data privacy and security through robust policies and procedures. • Balancing the use of ML technology with human interaction • Focusing on unique and innovative uses of ML technology • Developing a long-term technology roadmap and	(WT) Strategies • Ensuring the availability and quality of data • Investing in education and training for staff • Conducting regular audits and testing to identify and mitigate biases in ML. • Developing contingency plans for technical failures or errors. • Prioritizing data privacy and security compliance • Staying up to date with technological advancement • Implementing strong cybersecurity

Source: writer analysis

Here is a SWOT analysis for Machine Learning (ML) in the Food and Culinary Business:

Strengths:

- Machine learning can provide insights into customer preferences and behaviours, allowing businesses to tailor their offerings to meet their needs.
- ML can help improve operational efficiency by automating tasks such as inventory management and supply chain optimization.
- ML can help improve food safety and quality control by identifying potential risks and hazards.

Weaknesses:

- The initial investment required to implement ML systems can be high, particularly for small businesses.
- The accuracy of ML models depends on the quality and quantity of data used to train them, which can be a challenge in the food industry where data can be scarce and difficult to obtain.
- The complexity of ML algorithms can make it difficult for non-technical staff to understand and utilize them effectively.

Opportunities:

- ML can help businesses to innovate and create new products and services by identifying trends and opportunities in the market.
- ML can help businesses to improve customer satisfaction by offering personalized recommendations and experiences.
- ML can help businesses to improve supply chain management by optimizing logistics and reducing waste.

Threats:

- The use of ML can result in job displacement, particularly for low-skilled jobs.
- The use of ML can raise concerns around privacy and security, particularly with regards to the collection and use of customer data.
- The lack of standardization and regulation in the ML industry can make it difficult to ensure compatibility and interoperability between different systems and vendors.

(SO) Strategies:

- Collecting and analysing relevant data from various sources, including sales data, social media, and customer feedback
- Developing robust ML algorithms that can accurately predict and anticipate customer preferences and behaviours
- Offering customized menus and promotions based on ML analysis of customer data
- Developing partnerships with technology providers and consultants to ensure the most effective and efficient use of ML technology
- Regularly monitoring and evaluating the effectiveness of ML technology and adjusting strategies accordingly.

(WO) Strategies:

- Developing and implementing clear data privacy and security policies and procedures to address potential concerns and risks
- Providing ongoing training and support for staff to ensure effective use and maintenance of ML technology
- Regularly auditing and testing ML algorithms to ensure fairness and accuracy, and including diverse and representative data sets to address potential biases
- Developing a clear communication strategy to address any potential customer concerns or pushback regarding the use of ML technology
- Collaborating with industry partners and technology providers to stay at the forefront of ML innovation and development, and exploring potential applications for ML technology beyond traditional use cases.

(ST) Strategies:

- Ensuring data privacy and security through robust policies and procedures, and partnering with trusted technology providers to minimize the risk of data breaches
- Balancing the use of ML technology with human interaction and creativity to maintain a personal touch and stand out in a crowded market

- Focusing on unique and innovative uses of ML technology to differentiate from competitors and stay ahead of the curve
- Developing a long-term technology roadmap and investing in regular updates and maintenance to stay current with rapidly evolving technology.

(WT) Strategies:

- Ensuring the availability and quality of data through effective data management strategies, such as data cleaning and normalization
- Investing in education and training for staff to ensure they have a strong understanding of ML technology and how to use it effectively
- Conducting regular audits and testing to identify and mitigate biases in ML algorithms, and being transparent about the limitations and potential inaccuracies of ML technology
- Developing contingency plans for technical failures or errors, such as backup systems or manual processes
- Prioritizing data privacy and security compliance by partnering with experts or investing in robust security measures
- Staying up-to-date with technological advancements and adapting accordingly, such as through regular technology updates or partnerships with technology providers
- Implementing strong cybersecurity measures to prevent attacks and minimize the risk of data breaches.

Here is a SWOT analysis for Artificial Intelligence (AI) in the Food and Culinary Business:

Strengths:

- AI can provide insights into customer preferences and behaviours, allowing businesses to tailor their offerings to meet their needs.
- AI can help improve operational efficiency by automating tasks such as inventory management and supply chain optimization.
- AI can help improve food safety and quality control by identifying potential risks and hazards.

Weaknesses:

- The initial investment required to implement AI systems can be high, particularly for small businesses.
- The accuracy of AI models depends on the quality and quantity of data used to train them, which can be a challenge in the food industry where data can be scarce and difficult to obtain.
- The complexity of AI algorithms can make it difficult for non-technical staff to understand and utilize them effectively.

Opportunities:

- AI can help businesses to innovate and create new products and services by identifying trends and opportunities in the market.
- AI can help businesses to improve customer satisfaction by offering personalized recommendations and experiences.
- AI can help businesses to improve supply chain management by optimizing logistics and reducing waste.

Threats:

- The use of AI can result in job displacement, particularly for low-skilled jobs.
- The use of AI can raise concerns around privacy and security, particularly with regards to the collection and use of customer data.
- The lack of standardization and regulation in the AI industry can make it difficult to ensure compatibility and interoperability between different systems and vendors.

TABLE 3. SWOT ANALYSIS FOR AI

Internal Factor (IFAS) / External Factors (EFAS)	AI	
	Strengths (S) • provide insights into customer preferences and behaviors, allowing businesses to tailor their offerings to meet their needs. • help improve operational efficiency by automating tasks such as inventory management and supply chain optimization. • help improve food safety and quality control by identifying potential risks and hazards.	Weaknesses (W) • The initial investment required high, particularly for small businesses. • The accuracy of AI models depends on the quality and quantity of data. • The complexity of AI algorithms can make it difficult for non-technical staff to understand and utilize them effectively.
Opportunities (O) • help businesses to innovate and create new products and services by identifying trends and opportunities in the market. • help businesses to improve customer satisfaction by offering personalized recommendations and experiences. • help businesses to improve supply chain management by optimizing logistics and reducing waste.	(SO) Strategies • Implement AI-powered tools such as chatbots, mobile apps, and digital kiosks • Use AI-powered inventory management systems • Utilize AI to develop new recipes and flavor combinations • Partner with AI companies specializing in supply chain optimization • Incorporate AI-powered health and nutrition tools into menu planning to create personalized meal plans for customers.	(WO) Strategies • Start small: budget allows. • Collaboration: Collaborating with AI companies • Human input: balance it with human creativity and judgment to ensure that the customer experience is not negatively impacted. • Innovation: AI can provide businesses with insights into customer preferences and trends,
Threats (T) • job displacement, particularly for low-skilled jobs. • raise concerns around privacy and security, particularly with regards to the collection and use of customer data. • The lack of standardization and regulation in the AI industry can make it difficult to ensure compatibility and interoperability between different systems and vendors.	(ST) strategies • Invest in cybersecurity measures • Retrain and reskill employees • Balance AI with human input: • Be transparent about data collection and usage	(WT) Strategies • Evaluate the costs and benefits: • Balance AI with human input: • Invest in cybersecurity measures. • Reskill and train employees: • Be transparent about data collection and usage:

Source: writer analysis

(SO) Strategies

- Implement AI-powered tools such as chatbots, mobile apps, and digital kiosks to collect customer data and personalize recommendations.
- Use AI-powered inventory management systems to optimize ingredient ordering and reduce food waste.
- Utilize AI to develop new recipes and flavour combinations that are tailored to customer preferences and dietary restrictions.
- Partner with AI companies specializing in supply chain optimization to streamline the delivery process and ensure ingredient freshness.
- Incorporate AI-powered health and nutrition tools into menu planning to create personalized meal plans for customers.

(WO) Strategies

- Start small: Businesses can implement AI technology in specific areas, such as inventory management or personalized recommendations, to start with and gradually expand to other areas as the budget allows.
- Collaboration: Collaborating with AI companies or experts in the field can help businesses gain access to the latest technology and expertise without investing in it themselves.
- Human input: While AI can provide valuable insights, it is important to balance it with human creativity and judgment to ensure that the customer experience is not negatively impacted.
- Innovation: AI can provide businesses with insights into customer preferences and trends, allowing for the creation of new and innovative dishes that cater to changing tastes and preferences.

(ST) Strategies

- Invest in cybersecurity measures: To mitigate the risk of cyber-attacks and data breaches, businesses should invest in robust cybersecurity measures such as encryption, firewalls, and intrusion detection systems.
- Retrain and reskill employees: As certain tasks become more automated, businesses can reskill and train employees in new areas such as AI programming, customer service, and creative design.
- Balance AI with human input: To ensure that the customer experience is not negatively impacted, businesses should balance AI technology with human creativity and judgment.
- Be transparent about data collection and usage: To build trust with customers, businesses should be transparent about their data collection and usage practices, and comply with privacy regulations such as General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA).

(WT) strategies:

- Evaluate the costs and benefits: Businesses should evaluate the potential costs and benefits of implementing AI technology before making any investment decisions.
- Balance AI with human input: To ensure that the customer experience is not negatively impacted, businesses should balance AI technology with human creativity and judgment.
- Invest in cybersecurity measures: To mitigate the risk of cyber-attacks and data breaches, businesses should invest in robust cybersecurity measures such as encryption, firewalls, and intrusion detection systems.
- Reskill and train employees: As certain tasks become more automated, businesses can reskill and train employees in new areas such as AI programming, customer service, and creative design.

Be transparent about data collection and usage: To build trust with customers, businesses should be transparent about their data collection and usage practices and comply with privacy regulations such as General Data Protection Regulation (GDPR) and California Consumer Privacy Act (CCPA) US state law to protect the data and privacy rights.

Conclusion

In conclusion, Smart Technologies have the potential to transform the food and culinary business. Smart technologies can provide businesses with insights into customer preferences and behaviors, automate tasks, and improve food safety and quality control. However, there are also challenges and limitations associated with the implementation of smart technologies, including the high initial investment required, the need for high-quality data, and the potential for job displacement. Nonetheless, businesses that successfully leverage these technologies stand to gain a competitive advantage, improve operational efficiency, and provide a better customer experience. Therefore, it is important for food and culinary businesses to carefully evaluate the SWOT analysis, IFAS and EFAS analysis of IoT, ML, and AI before implementing these technologies, and to develop a clear strategy for their deployment and ongoing management.

Acknowledgement

I would like to thank Maranatha Christian University for supporting this research paper. In addition, I would also like to thank the anonymous reviewers and editors whose constructive feedback and valuable suggestions have greatly improved the quality of this article.

References

Adak, A., Pradhan, B., & Shukla, N. (2022). Sentiment Analysis of Customer Reviews of Food Delivery Services Using Deep Learning and Explainable Artificial Intelligence: Systematic Review. In *Foods* (Vol. 11, Issue 10). https://doi.org/10.3390/foods11101500

Adamopoulou, E., & Moussiades, L. (2020). Chatbots: History, technology, and applications. *Machine Learning with Applications*, *2*, 100006. https://doi.org/https://doi.org/10.1016/j.mlwa.2020.100006

Aheleroff, S., Xu, X., Lu, Y., Aristizabal, M., Velásquez, J. P., Joa, B., & Valencia, Y. (2020). IoT-enabled smart appliances under industry 4.0: A case study. *Advanced Engineering Informatics*, *43*, 101043. https://doi.org/10.1016/J.AEI.2020.101043

Alam, W., Sarma, D., Chakma, R., Alam, M., & Hossain, S. (2021). Internet of Things Based Smart Vending Machine using Digital Payment System. *Indonesian Journal of Electrical Engineering and Informatics (IJEEI)*, *9*, 719–731. https://doi.org/10.52549/ijeei.v9i3.3133

Ali, O., Abdelbaki, W., Shrestha, A., Elbasi, E., Alryalat, M. A. A., & Dwivedi, Y. K. (2023). A systematic literature review of artificial intelligence in the healthcare sector: Benefits, challenges, methodologies, and functionalities. *Journal of Innovation & Knowledge*, *8*(1). https://doi.org/10.1016/j.jik.2023.100333

Ameen, N., Tarhini, A., Reppel, A., & Anand, A. (2021). Customer experiences in the age of artificial intelligence. *Computers in Human Behavior*, *114*(106548). https://doi.org/10.1016/j.chb.2020.106548

Aung, M. M., & Chang, Y. S. (2014). (2013). Traceability in a food supply chain: Safety and quality perspectives. *Food Control*, *39*, 172–184. https://doi.org/10.1016/J.FOODCONT.2013.11.007

Awuchi, C. (2023). HACCP, quality, and food safety management in food and agricultural systems. *Cogent Food And Agriculture*, *9*, 2176280. https://doi.org/10.1080/23311932.2023.2176280

Ayed, R. B., & Hanana, M. (2021). Artificial Intelligence to Improve the Food and Agriculture Sector. *Journal of Food Quality*, 1–7. https://doi.org/10.1155/2021/5584754

Ayvaz, S., & Alpay, K. (2021). Predictive Maintenance System for Production Lines in Manufacturing: A Machine Learning Approach Using IoT Data in Real-Time. *Expert Systems with Applications*, *173*, 114598. https://doi.org/10.1016/j.eswa.2021.114598

Bień, M., Gilski, M., Maciejewska, M., & Taisner, W. (2020). *Cooking recipes generator utilizing a deep learning-based language model*. https://doi.org/10.13140/RG.2.2.23904.51200

Bigliardi, B., Bottani, E., & Filippelli, S. (2022). A study on IoT application in the Food Industry using Keywords Analysis. *Procedia Computer Science*, *200*, 1826–1835. https://doi.org/https://doi.org/10.1016/j.procs.2022.01.383

Blutinger, J. D., Cooper, C. C., Karthik, S., Tsai, A., Samarelli, N., Storvick, E., Seymour, G., Liu, E., Meijers, Y., & Lipson, H. (2023). The future of software-controlled cooking. *Npj Science of Food*, *7*(1), 6. https://doi.org/10.1038/s41538-023-00182-6

Bulka, J., Izworski, A., Koleszynska, J., Lis, J., & Wochlik, I. (2009). Automatic meal planning using artificial intelligence algorithms in computer aided diabetes therapy. In *ICARA 2009 - Proceedings of the 4th International Conference on Autonomous Robots and Agents*. https://doi.org/10.1109/ICARA.2000.4803989

Chin, T., Adibah, A. B., Zainal Abidin, D. H., & Siti-Azizah, M. (2015). Detection of mislabelled seafood products in Malaysia by DNA barcoding: Improving transparency in food market. *Food Control*, *64*. https://doi.org/10.1016/j.foodcont.2015.11.042

Fan, H., Han, B., & Gao, W. (2022). (Im)Balanced customer-oriented behaviors and AI chatbots' Efficiency–Flexibility performance: The moderating role of customers' rational choices. *Journal of Retailing and Consumer Services*, *66*, 102937.

https://doi.org/https://doi.org/10.1016/j.jretconser.2022.102937
Filimonau, V., Todorova, E., Mzembe, A., Sauer, L., & Yankholmes, A. (2020). *A comparative study of food waste management in full service restaurants of the United Kingdom and the Netherlands*. https://doi.org/10.1016/j.jclepro.2020.120775
Galindo-Salcedo, M., Pertúz-Moreno, A., Guzmán-Castillo, S., Gómez-Charris, Y., & Romero-Conrado, A. R. (2022). Smart manufacturing applications for inspection and quality assurance processes. *Procedia Computer Science*, *198*, 536–541. https://doi.org/https://doi.org/10.1016/j.procs.2021.12.282
Haleem, A., Javaid, M., Asim Qadri, M., Pratap Singh, R., & Suman, R. (2022). Artificial intelligence (AI) applications for marketing: A literature-based study. *International Journal of Intelligent Networks*, *3*, 119–132. https://doi.org/https://doi.org/10.1016/j.ijin.2022.08.005
Hemamalini, V., Subramanian, R., Subramanian, N., Sambath, M., Thiyagarajan, D., Singh, B., & Raghuvanshi, A. (2022). Food Quality Inspection and Grading Using Efficient Image Segmentation and Machine Learning-Based System. *Journal of Food Quality*, *2022*, 1–6. https://doi.org/10.1155/2022/5262294
Jagtap, S., Duong, L., Trollman, H., Bader, F., Garcia-Garcia, G., Skouteris, G., Li, J., Pathare, P., Martindale, W., Swainson, M., & Rahimifard, S. (2021). *Chapter 5 - IoT technologies in the food supply chain* (C. M. B. T.-F. T. D. Galanakis (ed.); pp. 175–211). Academic Press. https://doi.org/https://doi.org/10.1016/B978-0-12-821470-1.00009-4
Javaid, M., Haleem, A., Rab, S., Pratap Singh, R., & Suman, R. (2021). Sensors for daily life: A review. *Sensors International*, *2*, 100121. https://doi.org/https://doi.org/10.1016/j.sintl.2021.100121
Javaid, M., Haleem, A., Singh, R. P., Suman, R., & Gonzalez, E. S. (2022). Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability. *Sustainable Operations and Computers*, *3*, 203–217. https://doi.org/https://doi.org/10.1016/j.susoc.2022.01.008
Julia, G. S. (2019). *Internet Of Things (IoT) Smart Kitchen Appliances For The U.S. Market* [Universidade De Lisboa]. https://repositorio.ul.pt/bitstream/10451/43703/2/ULFBA_TES_Gabriela_Stepien.pdf
Karanth, S., Benefo, E. O., Patra, D., & Pradhan, A. K. (2023). Importance of artificial intelligence in evaluating climate change and food safety risk. *Journal of Agriculture and Food Research*, *11*, 100485. https://doi.org/https://doi.org/10.1016/j.jafr.2022.100485
King, H. (2020). *Digital Technology to Enable Food Safety Management Systems* (pp. 121–137). https://doi.org/10.1007/978-3-030-44735-9_7
Kiran, D. R. (2019). *Chapter 35 - Internet of Things* (D. R. B. T.-P. P. and C. Kiran (ed.); pp. 495–513). Butterworth-Heinemann. https://doi.org/https://doi.org/10.1016/B978-0-12-818364-9.00035-4
Konur, S., Lan, Y., Thakker, D., Morkyani, G., Polovina, N., & Sharp, J. (2021). Towards design and implementation of Industry 4.0 for food manufacturing. *Neural Computing and Applications*. https://doi.org/10.1007/s00521-021-05726-z
Krishnamoorthy, S., Moses, J. A., Chinnaswamy, A., & Vijayakumar, R. (2021). *ICT applications for the food industry* (pp. 613–626). https://doi.org/10.1016/B978-0-323-91001-9.00001-3
Lei, Z., ul Haq, A., Dorraki, M., Zhang, D., & Abbott, D. (2020). Composing recipes based on nutrients in food in a machine learning context. *Neurocomputing*, *415*, 382–396. https://doi.org/https://doi.org/10.1016/j.neucom.2020.08.071
Li, S., & McAuley, J. (2020). Recipes for Success: Data Science in the Home Kitchen. *Harvard Data Science Review*, *2*(3). https://doi.org/10.1162/99608f92.05852aa8%0A%0A
Meenu, M., Kurade, C., Neelapu, B. C., Kalra, S., Ramaswamy, H. S., & Yu, Y. (2021). A concise review on food quality assessment using digital image processing. *Trends in Food Science & Technology*, *118*, 106–124. https://doi.org/https://doi.org/10.1016/j.tifs.2021.09.014
Mohd Ali, M., Hashim, N., Abd Aziz, S., & Lasekan, O. O. (2021). Quality Inspection of Food and Agricultural Products using Artificial Intelligence. *Advances in Agricultural and Food Research Journal*. https://doi.org/10.36877/aafrj.a0000237
Mulay, O., Bhalerao, M., Bhamare, S., Gaikwad, V., & Sabri, M. (2020). IOT BASED FOOD INVENTORY TRACKING SYSTEM FOR DOMESTIC AND COMMERCIAL KITCHENS. *SSRN Electronic Journal*, *7*, 13–19.
Narwane, V. S., Gunasekaran, A., & Gardas, B. B. (2022). Unlocking adoption challenges of IoT in Indian Agricultural and Food Supply Chain. *Smart Agricultural Technology*, *2*, 100035.

https://doi.org/https://doi.org/10.1016/j.atech.2022.100035
Shaeeali, N., Mohamed, A., & Mutalib, S. (2020). Customer reviews analytics on food delivery services in social media: a review. *IAES International Journal of Artificial Intelligence (IJ-AI)*, *9*, 691. https://doi.org/10.11591/ijai.v9.i4.pp691-699
Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/https://doi.org/10.1016/j.jbusres.2019.07.039
Solano, A., Duro, N., Dormido, R., & González, P. (2017). Smart vending machines in the era of internet of things. *Future Generation Computer Systems*, *76*, 215–220. https://doi.org/https://doi.org/10.1016/j.future.2016.10.029
Tan, W. C., & Sidhu, M. S. (2022). Review of RFID and IoT integration in supply chain management. *Operations Research Perspectives*, *9*, 100229. https://doi.org/https://doi.org/10.1016/j.orp.2022.100229
Tang, Y. M., Chau, K. Y., Lau, Y., & Zheng, Z. (2023). Data-Intensive Inventory Forecasting with Artificial Intelligence Models for Cross-Border E-Commerce Service Automation. In *Applied Sciences* (Vol. 13, Issue 5). https://doi.org/10.3390/app13053051
Tian, X., & Wang, H. (2022). Impact of IT Capability on Inventory Management: An Empirical Study. *Procedia Computer Science*, *199*, 142–148. https://doi.org/https://doi.org/10.1016/j.procs.2022.01.018
Tsoukas, V., Gkogkidis, A., Kampa, A., Spathoulas, G., & Kakarountas, A. (2022). Enhancing Food Supply Chain Security through the Use of Blockchain and TinyML. In *Information* (Vol. 13, Issue 5). https://doi.org/10.3390/info13050213
Türker, C., Altay, B. C., & Okumuş, A. (2022). Understanding user acceptance of QR code mobile payment systems in Turkey: An extended TAM. *Technological Forecasting and Social Change*, *184*, 121968. https://doi.org/https://doi.org/10.1016/j.techfore.2022.121968
Tyagi, M., & Bolia, N. (2022). Approaches for restaurant revenue management. *Journal of Revenue and Pricing Management*, *21*. https://doi.org/10.1057/s41272-021-00288-0
Unhelkar, B., Joshi, S., Sharma, M., Prakash, S., Mani, A. K., & Prasad, M. (2022). Enhancing supply chain performance using RFID technology and decision support systems in the industry 4.0–A systematic literature review. *International Journal of Information Management Data Insights*, *2*(2), 100084. https://doi.org/https://doi.org/10.1016/j.jjimei.2022.100084
Vilas-Boas, J. L., Rodrigues, J. J. P. C., & Alberti, A. M. (2023). Convergence of Distributed Ledger Technologies with Digital Twins, IoT, and AI for fresh food logistics: Challenges and opportunities. *Journal of Industrial Information Integration*, *31*, 100393. https://doi.org/https://doi.org/10.1016/j.jii.2022.100393
Wei, Y.-P. (2021). The Effect of Food Safety-Related Attributes on Customer Satisfaction of Ready-to-Eat Foods at Hypermarkets. In *Sustainability* (Vol. 13, Issue 19). https://doi.org/10.3390/su131910554
Wei, Z., Alam, T., Al Sulaie, S., Bouye, M., Deebani, W., & Song, M. (2023). An efficient IoT-based perspective view of food traceability supply chain using optimized classifier algorithm. *Information Processing & Management*, *60*(3), 103275. https://doi.org/https://doi.org/10.1016/j.ipm.2023.103275
Wilson, C., Hargreaves, T., & Hauxwell-Baldwin, R. (2017). Benefits and risks of smart home technologies. *Energy Policy*, *103*, 72–83. https://doi.org/https://doi.org/10.1016/j.enpol.2016.12.047
Woolley, E., Luo, Z., Jellil, A., & Simeone, A. (2022). A data driven approach to reducing household food waste. *Sustainable Production and Consumption*, *29*, 600–613. https://doi.org/https://doi.org/10.1016/j.spc.2021.11.004
Zhang, J., Li, M., Liu, W., Lauria, S., & Liu, X. (2022). Many-objective optimization meets recommendation systems: A food recommendation scenario. *Neurocomputing*, *503*, 109–117. https://doi.org/https://doi.org/10.1016/j.neucom.2022.06.081

A Literature Review: Strengths, Weaknesses, Opportunities, and Threats of Smart Technology for Culinary Business

ORIGINALITY REPORT

15%	%	15%	0%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Hamed Taherdoost. "Chapter 11 Business Intelligence", Springer Science and Business Media LLC, 2023 Publication	1%
2	Hari Kishan Kondaveeti, Chinna Gopi Simhadri, Ganti Lakshmi Yasaswini, G. Kusuma Shanthi. "chapter 8 The Use of Artificial Intelligence in the Food Industry", IGI Global, 2023 Publication	1%
3	Yaser Mohammed Al-Worafi. "Chapter 7 Artificial Intelligence and Machine Learning for Drug Safety", Springer Science and Business Media LLC, 2023 Publication	1%
4	Tarun Kumar Vashishth, Bhupendra Kumar, Vikas Sharma, Sachin Chaudhary, Sunil Kumar, Kewal Krishan Sharma. "chapter 22 The Evolution of AI and Its Transformative Effects on Computing", IGI Global, 2023 Publication	1%

5	Abdo Hassoun, Nour Alhaj Abdullah, Abderrahmane Aït-Kaddour, Mohamed Ghellam et al. "Food traceability 4.0 as part of the fourth industrial revolution: key enabling technologies", Critical Reviews in Food Science and Nutrition, 2022 Publication	1 %
6	Nimesh P Bhojak, Ashwin Modi, Mohammadali Momin. "SERVQUAL model with extended variables of safety awareness and energy conservation: impact on consumer satisfaction with mediating and moderating effect", International Journal of Energy Sector Management, 2023 Publication	1 %
7	Jones, Laura Ann. "Reputation Risk and Potential Profitability: Best Practices to Predict and Mitigate Risk through Amalgamated Factors", Capitol Technology University, 2020 Publication	1 %
8	Maremys Galindo-Salcedo, Altagracia Pertúz-Moreno, Stefania Guzmán-Castillo, Yulineth Gómez-Charris et al. "Smart manufacturing applications for inspection and quality assurance processes", Procedia Computer Science, 2022 Publication	1 %

9	Hari Kishan Kondaveeti, Chinna Gopi Simhadri, Sudha Ellison Mathe, Sunny Dayal Vanambathina. "chapter 13 Plant Disease Classification Using Deep Learning Techniques", IGI Global, 2023 Publication	1 %
10	David P. Stonko, Jonathan J. Morrison, Caitlin W. Hicks. "A Review of Mature Machine Learning and Artificial Intelligence Enabled Applications in Aortic Surgery", JVS-Vascular Insights, 2023 Publication	1 %
11	Paulo Botelho Pires, José Duarte Santos. "chapter 1 Digital Marketing Perspectives", IGI Global, 2023 Publication	<1 %
12	Tetala, Satya Surya Dattatreya Reddy. "Artificial Intelligence Powered Personalized Agriculture", Colorado State University, 2023 Publication	<1 %
13	Meenakshi Sharma, Hinika Shail, Pramod Kumar Painuly, A. V. Senthil Kumar. "chapter 28 AI-Powered Technologies Used in Online Fashion Retail for Sustainable Business", IGI Global, 2023 Publication	<1 %

14	Karthik Raj Kumar Yesodha, Arunkumar Jagadeesan, J. Logeshwaran. "IoT applications in Modern Supply Chains: Enhancing Efficiency and Product Quality", 2023 IEEE 2nd International Conference on Industrial Electronics: Developments & Applications (ICIDeA), 2023 Publication	<1%
15	Tétédé Rodrigue Christian Konfo, Fowe Michelle Carole Djouhou, Mênouwesso Harold Hounhouigan, Edwige Dahouenon-Ahoussi et al. "Recent advances in the use of digital technologies in agri-food processing: a short review", Applied Food Research, 2023 Publication	<1%
16	Castellanos Santamaría, Ana Sofía. "A Policy Proposal for Agricultural Data Governance.", Portland State University, 2023 Publication	<1%
17	Guduru, Rakesh. "Essays on the Influence of Review and Reviewer Attributes on Online Review Helpfulness: Attribution Theory Perspective", The University of Texas Rio Grande Valley, 2023 Publication	<1%
18	Ahmed Srhir, Tomader Mazri, Mohammed Benbrahim. "Towards secure smart campus: security requirements, attacks and counter	<1%

measures", Indonesian Journal of Electrical Engineering and Computer Science, 2023
Publication

19	Chairote Yaiprasert, Achmad Nizar Hidayanto. "AI-Driven Ensemble Three Machine Learning to Enhance Digital Marketing Strategies in the Food Delivery Business", Intelligent Systems with Applications, 2023 Publication	<1 %
20	Lakhvinder Singh, Dinesh Dhankhar. "chapter 13 Artificial Intelligence for Innovative Customer Services in the Hospitality Industry of India", IGI Global, 2023 Publication	<1 %
21	Selvakumar Guruswamy, Milica Pojić, Jayashree Subramanian, Jasna Mastilović et al. "Toward Better Food Security Using Concepts from Industry 5.0", Sensors, 2022 Publication	<1 %
22	Vijayakumar Raja, Srinivasan Krishnamoorthy, J.A. Moses, C. Anandharamakrishnan. "ICT applications for the food industry", Elsevier BV, 2022 Publication	<1 %
23	Xue-Feng Shao, Wei Liu, Yi Li, Hassan Rauf Chaudhry, Xiao-Guang Yue. "Multistage implementation framework for smart supply chain management under industry 4.0",	<1 %

Technological Forecasting and Social Change, 2021
Publication

---

24 G. Arvindaraj, B. Manikandan, R. Rokesh, M. Abinaya. "AI-Automated System for Ingredient Planner using Machine Learning Algorithms", 2023 7th International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), 2023 <1%
Publication

---

25 Kamel Mouloudj, Vu Lan Oanh LE, Achouak Bouarar, Ahmed Chemseddine Bouarar, Dachel Martínez Asanza, Mayuri Srivastava. "chapter 1 Adopting Artificial Intelligence in Healthcare", IGI Global, 2023 <1%
Publication

---

26 Pitchai Pandiyan, Subramanian Saravanan, Kothandaraman Usha, Raju Kannadasan, Mohammed H. Alsharif, Mun-Kyeom Kim. "Technological advancements toward smart energy management in smart cities", Energy Reports, 2023 <1%
Publication

---

27 Suehrer, Juri. "Sustainable Impact – How Foreign Direct Investments (FDI) Contribute to Achieve the Sustainable Development Goals (SDGs)", University of Northumbria at Newcastle (United Kingdom), 2022 <1%
Publication

28	Aneesh Pradeep. "Empowering Special Education Through Information Technology", 2023 International Conference on Circuit Power and Computing Technologies (ICCPCT), 2023 Publication	<1 %
29	Nikolaos Peladarinos, Dimitrios Piromalis, Vasileios Cheimaras, Efthymios Tserepas et al. "Enhancing Smart Agriculture by Implementing Digital Twins: A Comprehensive Review", Sensors, 2023 Publication	<1 %
30	Abdulaziz, Shady Gomaa. "A Theoretical Framework for the Adoption of Cloud Computing in Hospital Information Systems", University of Malaya (Malaysia), 2023 Publication	<1 %
31	Ali B. Mahmoud. "chapter 15 The Metaverse and Web 3.0", IGI Global, 2023 Publication	<1 %
32	Daniel Constantino Zacharias, Adalgiza Fornaro. "Brazilian offshore oil exploration areas: an overview of hydrocarbon pollution", Ambiente e Agua - An Interdisciplinary Journal of Applied Science, 2020 Publication	<1 %

33	Francisco Manzano-Agugliaro, Mehdi Chihib, Mimoun Chourak, José Antonio Martínez et al. "Monitoring energy consumption of vending machines in university buildings", Energy Reports, 2023 Publication	<1 %
34	Hiba Ben Aribi, Mohamed Hedi Ghidaoui, Sami Fattouch. "chapter 14 Monitoring Environmental Performance of Agricultural Supply Chains Using Internet of Things", IGI Global, 2023 Publication	<1 %
35	Hua Fan, Bing Han, Wei Gao. "(Im)Balanced customer-oriented behaviors and AI chatbots' Efficiency–Flexibility performance: The moderating role of customers' rational choices", Journal of Retailing and Consumer Services, 2022 Publication	<1 %
36	Kailash Chandra Juglan, Brahmmanand Sharma, Aastha Gehlot, Sardar Parminder Singh, Ali Hussein, Malik Bader Alazzam. "Exploring the Effectiveness of Natural Language Processing in Customer Service", 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE), 2023 Publication	<1 %

37	Mulundumina Shimaponda-Nawa, Glen T. Nwaila. "Integrated and intelligent remote operation centres (I2ROCs): Assessing the human–machine requirements for 21st century mining operations", Minerals Engineering, 2024 Publication	<1 %
38	Ni Zeng, Gianpaolo Vignali, Daniella Ryding. "Chapter 19 Understanding the Application of AI-enabled Chatbots in Luxury Fashion Retailing", Springer Science and Business Media LLC, 2023 Publication	<1 %
39	Saba N. S., Ritesh Gandhi, Sindhu R. Rajendran, Natasha D. Abraham. "chapter 1 Revolutionizing Digital Marketing Using Machine Learning", IGI Global, 2023 Publication	<1 %
40	Shraddha Karanth, Edmund O. Benefo, Debasmita Patra, Abani K. Pradhan. "Importance of artificial intelligence in evaluating climate change and food safety risk", Journal of Agriculture and Food Research, 2023 Publication	<1 %
41	Valeria Vergine, Ilaria Sergi, Teodoro Montanaro, Angela Tafadzwa Shumba, Fabrizio Luca Benvenuto, Luigi Patrono.	<1 %

"Leveraging Internet of Things and Distributed Ledger Technology for Cold Chain Management in Freight Transportation", 2023 8th International Conference on Smart and Sustainable Technologies (SpliTech), 2023
Publication

---

42 Yogita Yashveer Raghav, Rupesh Kumar Tipu, Ruchika Bhakhar, Tanu Gupta, Kriti Sharma. "chapter 11 The Future of Digital Marketing", IGI Global, 2023 <1%
Publication

---

43 Zhao, Jianfeng. "Rethinking Value for Money in Public Private Partnerships: A Critique, Analysis and Model for Transport Infrastructure Projects", University of Northumbria at Newcastle (United Kingdom), 2023 <1%
Publication

---

44 Ivo Perez Colo, Carolina Saavedra Sueldo, Mariano De Paula, Gerardo G. Acosta. "Intelligent approach for the industrialization of deep learning solutions applied to fault detection", Expert Systems with Applications, 2023 <1%
Publication

---

45 Raouf Mehannaoui, Kinza Nadia Mouss, Karima Aksa. "IoT-based food traceability system: Architecture, technologies, <1%

applications, and future trends", Food Control, 2022
Publication

46 Rashi Jain, Mandeep Mittal, Sachin Kumar Mangla, Rajendra Baraiya. "Optimizing supply chain strategies for deteriorating items and imperfect manufacturing under carbon emission regulations", Computers & Industrial Engineering, 2023 <1%
Publication

47 Damini Goyal Gupta, Varsha Jain. "Chapter 10 Use of Artificial Intelligence with Ethics and Privacy for Personalized Customer Services", Springer Science and Business Media LLC, 2023 <1%
Publication

48 Sandeep Jagtap, Farah Bader, Guillermo Garcia-Garcia, Hana Trollman, Tobi Fadiji, Konstantinos Salonitis. "Food Logistics 4.0: Opportunities and Challenges", Logistics, 2020 <1%
Publication

Exclude quotes	On	Exclude matches	Off
Exclude bibliography	On		