

Retraction

Retracted: Empirical Analysis for Improving Food Quality Using Artificial Intelligence Technology for Enhancing Healthcare Sector

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

- (1) Discrepancies in scope
- (2) Discrepancies in the description of the research reported
- (3) Discrepancies between the availability of data and the research described
- (4) Inappropriate citations
- (5) Incoherent, meaningless and/or irrelevant content included in the article
- (6) Manipulated or compromised peer review

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

- [1] S. K. UmaMaheswaran, G. Kaur, A. Pankajam et al., "Empirical Analysis for Improving Food Quality Using Artificial Intelligence Technology for Enhancing Healthcare Sector," *Journal of Food Quality*, vol. 2022, Article ID 1447326, 13 pages, 2022.

Research Article

Empirical Analysis for Improving Food Quality Using Artificial Intelligence Technology for Enhancing Healthcare Sector

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Artificial intelligence or AI has a wide range of applications in healthcare and food industries. AI helps in different ways in medical industries, such as analysing the disease progression rate, effective prediction of treatment method, and proper disease diagnosis. Advantages of artificial intelligence in the food business include enhanced customer accessibility, improved technological innovation, readily accessible client requirements and comments, strategic advantage through unique products, and plenty others. Different AI technologies such as “Machine Learning (ML),” “Neural Language Processing (NLP),” “Rule-Based Expert Systems (RESs),” “Deep Learning (DL),” and so on are used in healthcare and food industries for big “medical data” analysis. This study has applied three critical variables to measure the application of AI in enhancing food quality (viz., usage of machine learning models, NLP models, etc.). This study has stated that these models support in enhancing the overall food quality in an effective manner. The present research analyses the importance of these AI technologies in enhancing service quality in healthcare and food industries. A primary survey-based data analysis has been done with 153 individuals taken from healthcare industries. Moreover, statistical analysis has been done in this research with SPSS software. Four independent variables are taken in this research, which are ML, NLP, RES, and DL. The service quality of healthcare has been taken as a dependent variable, and the effect of independent variables on “enhancing healthcare service” has been analysed. Secondary thematic analysis has been done to justify primary data. The results show that 43.79% of the individuals have supported DL and 56.86% have supported the treatment prediction ability AI. 37.9% of the individuals have also supported AI over traditional medications. Further analysis has shown that independent variables ML, DL, NLP, and RES have a strong positive correlation with improving SQ. These results have been justified by secondary journals, and it is proved that AI technologies enhance the service quality in healthcare and food sectors.

1. Introduction

AI technology is one of the most extensively used technologies in today’s world; especially in the healthcare and food and beverage industry, this technology serves many purposes. Disease detection and treatment prediction,

evaluating food quality, using equipment, categorizing foods, and testing hypotheses are some of the advantages of AI technology. ML is used extensively for disease prediction as this technology can analyse a patient’s medical history from that it predicts an efficient treatment framework. The food industry is struggling to sustain the market and is also

deficient in food safety as a result of deliberate engagement. Automation is the ideal strategy for accomplishing these challenges in the food market. According to the studies by Wahl and colleagues, AI application is successful and effective when it is used in proper circumstances [1]. This statement can be justified by the ML application. ML can effectively analyse the treatment cost, disease progression, and patient's physical condition. The treatment cost is analysed by determining the "patient cohort"; the disease progression rate and the patient's physical condition are analysed by "safe learning algorithm of neural networks." This algorithm is effective in determining different external data of patients. This includes data on CT scans, MRI scans, X-rays, and screening scans. Effective analysis of these data helps healthcare professionals in determining a patient's condition and disease progression rate.

The NLP analysis on the other side is effective in determining a patient's psychological state. As per the viewpoint of Calvo and researchers, NLP is an effective source of determining a person's mental state through social media data sources [2]. The need for effective psychological assistance can be determined in this way. Different "personalised mental health interventions" can be analysed through NLPs. The critical objective of the study is to understand the factors influencing improving food quality using artificial intelligence technology for enhancing healthcare sector.

AI technology is the future of the medicine, food and beverage industry, and other industries. Its wide range of benefits has opened up new avenues for doctors and clinicians. Successful diagnosis by MRI, CT, and so on is easily possible with the help of machine learning technology. Complex image processing and analysis of patient data are performed using neural networks and in-depth learning process. An in-depth analysis of patient data using effective AI technology has resulted in better and easier healthcare management. In addition, AI technology enhances recovery time by providing needed treatment. Now, another technology that is advancing in a new era of prosperity is called Internet of Things (IoT). IoT plays an important role in crop and land management decisions. SM and IoT is an AI program that helps farmers and food producers benefit from their businesses, reduce risks, and improve utilization of available resources. It uses analyses to measure soil temperature, amount of nitrogen, phosphorus, and potassium (NPK) in soil, moisture, water content, capacity in soil, amount of photosynthetic electricity, and oxygen content in soil. Data collected by various identifiers is returned to the data center or to the cloud at a higher rate so that appropriate measurements can be taken in a timely manner. The results of the analysis, a view of the data obtained, are important when using the capital array.

RES works on specific pattern recognition and this method are effective in determining the disease progression rate. According to the studies by Kumar and other researchers, large datasets are often analysed through different RES neural classifiers [3]. This algorithm is more effective in analysing the disease progression rate in specific diseases, such as diabetes. This language is used in "mobile healthcare" to determine the severity of a disease. In this aspect, cloud computing and the "Internet of things" are also used for more accurate analysis.

DLs are effective in large data analysis and due to this reason, this technology is extensively used in the analysis of large patient datasets. This technique also helps to determine the overall mortality rate, disease progression rate, and recovery rate of patients. DLs are the most technologically advanced technology of AI due to their wide advantages [4]. Link prediction can be used to determine the traffic at a node through disease network, say a specialist, and whether the patient should be referred to that specific entity without causing unwanted delay [5].

The curriculum is designed to monitor and predict various environmental impacts of crops such as climate change. ML algorithms play an important role in this. ML algorithms work with satellites to monitor crop sustainability, weather forecasts, and agricultural markers to identify pests and diseases. In addition, the company is very confident in the data it provides to its customers and access to more than a billion agricultural data. Data such as rainfall, wind speed, solar energy, and temperature based on historical values are important for estimates. Analysis has played a key role in planning and selecting plants for agricultural areas.

AI technologies are important in healthcare and food industries as apart from analysing patients' disease progression and treatment methods, these technologies are also effective in determining overall medical cost. Thus, AI promotes improving the overall service quality (SQ) in healthcare industries. Artificial intelligence is not just for these purposes. It allows the world to solve problems more effectively, automate the food sector, and revolutionize food quality. The sector can analyse and ensure that favourable conditions, like seed sowing, plant health, irrigation, and climate control, are enhanced using a digital platform, resulting in higher quality in food sector. Processing, safe storage, and transport can all benefit from it [6, 7]. Intelligent devices like smart robots can also help reduce logistic costs [8]. The improved SQ helps in enhancing the rate of satisfied patients and this, in turn, improves the treatment method. The present research analyses the impact of different AI technologies on SQ improvement. The research has been done with primary data analysis using a survey-based interview followed by a statistical data analysis using the IBM SPSS software. Secondary thematic data analysis also has been done in this research to support the primary data. The research effectively describes the importance of AI technologies in improving the SQ in the healthcare industries of the United Kingdom.

The next section of the paper describes the literature review followed by the methodology involved. Then, the analysis and interpretation of the methodology is done followed by findings and discussions. Finally, the paper is concluded in the conclusion section.

2. Literature Review

2.1. Application of AI Technologies in Healthcare Sectors. AI technologies are essential in the healthcare and food industry for the effective analysis of patient data. Different AI technologies such as DL and ML can successfully analyse

large patient data [9]. This data includes Electronic Health data or EHR and Electronic Medical Data or EMR. These two datasets are extensively analysed through machine learning, deep learning, and other AI algorithms. The dataset includes demographic information of a patient, physiological and psychological information, case history, and medical loan information. Healthcare professionals use AI algorithms for rapid and accurate analysis of patient data. This helps them in analysing the patient's condition more rapidly [10]. In the food business, AI is well known for its convenience, precision, and cost-cutting capabilities. Pressure to fulfil food demand is expected to rise as the world's population continues to expand. Thus, AI has been used to meet this demand in areas such as supply logistics, food selection, food quality and quantity enhancement, and adequate industrial sanitation.

Apart from that, high-level AI technologies such as DL help in medical image processing. Complex medical images such as scans, tumours, oncogenic cellular images, and neurological images can be processed through DL [11]. This method is effective in determining the rate of oncogenic cell progression or the metastasis level. RES and NLP help in large patient data analysis and pattern recognition. Pattern recognition specifically helps in the case of psychological patients. Doctors and medical professionals analyse the emotional and expressional change in patients and use that data to determine patient condition. Pattern-based recognition is an effective technique to determine the external and internal changes in a patient [12]. The measurement of internal change is done by measuring the heart rate, galvanic skin response, body temperature, and so on. The external changes are measured through observing the postural, eye movement, language tone, speech recognition, and so on. These observations help psychologists in determining the mental health condition of patients [13]. Moreover, AI-based technologies are used in healthcare to analyse the emotional changes in healthcare professionals such as doctors, nurses, pathologists, and so on. Medical care professionals are directly associated with patient care; thus, their emotional changes and mental condition must be analysed beforehand. AI-based technologies help to enhance the SQ by providing appropriate quality treatment methods. Analysis of patient condition, drug delivery system, and treatment prediction are examples of this [14].

According to the studies by Schönberger, the "patient-facing" and "clinical" applications of AI technologies effectively help healthcare professionals in determining a patient's condition [15]. This method is highly appreciable for reducing the excess pressure from medical and healthcare professionals. According to the research of Chen and Decary, ML can be effectively used in healthcare sectors to enhance the overall "efficacy," "access" and effective "safety" [16].

Figure 1 shows the way that AI has helped medical and healthcare professionals in improving the SQ. Their studies show AI automation such as "ML, NLP, and medical robotics" has effectively enhanced the treatment quality, treatment safety, treatment efficacy, and overall service. The most effective use of AI is that it successfully gathers data

from human intelligence and instead of replacing that, it uses that to produce output. This way, AI has effectively performed complex tasks in the healthcare sectors.

2.2. Advantage of AI Technology. AI technologies have a wide range of advantages in different healthcare sectors, such as diagnosis, service extension, operational service, health monitoring, and so on [17] along with food and beverage industry such as production, storage, accessibility, safety, and vigorous monitoring. Many researchers have stated that AI technologies are the future of the health industry as well as food nutrition industry as they are used for improving the overall SQ in hospitals and healthcare sectors and automation in food industry would help generate increased revenue with increased productivity and reduce wastes.

2.2.1. Clinical Decision. AI technologies help in performing different medical imaging such as MRI and different scans such as CT scan, ECG scan, and X-ray scan [18]. In the case of "high-risk" patients, this technology successfully analyses different treatment procedures. This prediction and analysis save the patient from harsh adverse effects. Continuous monitoring and diagnosis through AI technology help medical and healthcare professionals in analysing the recovery progress of patients [19]. This method also predicts the faults or errors in treatment methods and helps medical professionals in changing the treatment procedure. In this aspect, NLP, ML, and "automatic image processors" are most effective. AI technologies are effective in analysing the "drug delivery" system [20].

2.2.2. Service Extension. Another effective advantage of AI technology is online medical service. This technology helps people in getting appropriate medical and healthcare services through "online counselling," "appointment booking," and "e-treatment" [21]. This way, patients can enjoy the top-most medical service without any extra hassle [22]. Different "patient engagement tools" help individuals in understanding their medical conditions and monitor disease progression [23]. This method is effective while monitoring chronic disease. These tools include smart devices, wearable, and different chatbots [24].

2.2.3. Extending Operational Service. The AI technologies help healthcare professionals enhance the overall operational service. This is done by predicting the staff number, equipment number, and facility available. "Integrated voice technology" is used during large EHR analysis [25]. This helps in serving different purposes, such as "data entry," "proper clinical documentation," "voice interface," and so on [26].

2.2.4. Effective Health Monitoring. As per the viewpoint of Umair and other researchers, the ability of AI in large patient data analysis is extensively used for monitoring patient conditions [27]. The detection capability of AI technologies

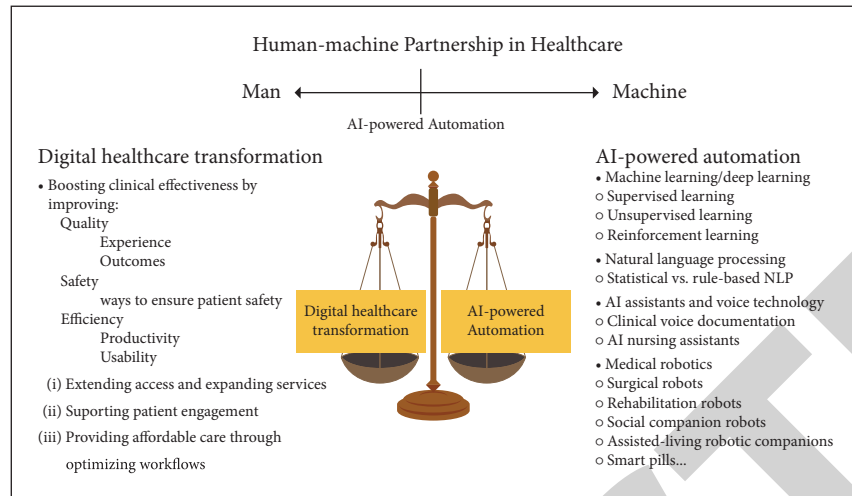


FIGURE 1: Relationship of human-made and machine-made treatment facilities [16].

has helped researchers and medical professionals in increasing the overall treatment efficacy and robustness. In rural areas, the lack of physical monitoring has been reduced through implementing AI technologies that in turn have enhanced the rate of recovered patients. The early diagnosis and continuous monitoring have helped numerous patients with severe diseases.

2.2.5. Explain Ability. According to the studies of Amann and other colleagues, although AI technologies have lots of diverse advantages and are well suited for healthcare industries, it lacks several features [28]. Explain ability is one of them, and this explains the presence of “consent” proper approval and effective certifications. The process of treatment prediction and disease detection might be fast with the help of AI; still, it creates ethical questions about patient consent and security. Some researchers stated that excess dependency on “high-level AI algorithms” such as the opaque algorithm reduces the effective use of resources [29]. However, this is still at a level of “controversial theory” and does not have proper practical evidence.

2.2.6. Effective Diagnosis and Proper Treatment. AI technologies have been used for many years for disease detection, especially for infectious disease detection. During the late 1970s, different early-RES systems have been developed to monitor and analyse “blood-borne infection” [30]. These early AI technologies, including MYCIN and RES technologies, have proven to analyse infectious diseases. However, their efficacy and potentiality were way poorer than normal disease prediction, and thus these technologies never got an effective clinical trial until recently [26]. The diverse and wide array of advantages of NLP has attracted medical and healthcare professionals in implementing NLP in their clinical trials. Particularly, the ability of “speech translation,” “automatic emotion detection,” and “machine translation” has acted as the biggest success factor for disease diagnosis [31].

One of the most attractive features of ML is its prediction capability, and this is done with the use of “population health” ML [32]. This ML technology can analyse the number of individuals who might be at risk of “hospital admission or readmission” and the number of individuals who are more prone to accidents. This is done by analysing their EHR and EMR data [33].

2.2.7. Increased Patient Engagement. ML and DL analyse EHR and EMR of patient data and through their output, medical professionals often create “patient care plans” [34]. This plan effectively tells people when or how they might be or are associated with major health problems. AI technologies are also used for enhancing “patient engagement” through “personalised” medical care plans. These plans are more effective in increasing patient engagement due to their “e-mail alert” and “message alert” systems. This way, individuals can follow up with the healthcare plan and can reduce the efficacy of chronic disease.

2.2.8. AI in Health Administration. AI technologies are also useful for hospital administration. Different AI technologies such as ML and NLP can be used to enhance the process of healthcare administration [35]. ML technology is highly effective in “claim processing,” effective clinical documentation, and “effective patient clearance record” [36]. The fast and quick administrative process saves time for nurses and healthcare professionals and also enhances the accuracy of administration. NLP is extensively used for large patient data analysis as this technology makes the overall process of data analysis and data documentation more robust [37]. Many healthcare sectors in the UK are using NLP nowadays to create different chatbots. These chatbots are more frequently used during online medical counselling. However, there are still questions about the ethical concern of these chatbots as they are prone to sensitive information leakage [38].

2.2.9. AI in Food Sector. Apart from tackling global food demand via increased production, efficiency, storage and delivery, and ability to reduce carbon footprint, optimizing nutrient intake through food is an important part of maintaining and improving one's health. Individuals can improve their diets by switching ingredients, but it could be challenging to discover feasible alternatives for ingredients in a meal and evaluate which alternatives are healthier for their specific nutritional restrictions.

2.3. Efficacy of AI in Different Diseases' Detection and Treatment. The efficacy of AI technologies can be improved through appropriate data analysis from "medical devices" and EHR and EMR data. According to Shi and other researchers, the patient's clinical data are often gathered from medical notes, reports, tests, and demographic information [39]. Different studies have shown that the use of AI in radiology enhances the image processing accuracy for radiologists. During electrodiagnosis and different medical screening, ML and NLP algorithms can be used to enhance the precision and accuracy rate [40].

Figure 2 shows that apart from cognitive influence, AI technologies are extensively used for different medical imaging purposes. Enhancing the efficacy and overall accuracy of different cognitive anomalies can be achieved through translating the medical notes into EHR and EMR [42]. This work is also done with the help of different AI technologies. Electrodiagnosis helps medical and healthcare professionals in analysing the internal changes and disease progression of a patient. This way, AI technologies increase the precision level of the treatment method. NLP and ML are effective in test translation and due to this feature, they are used specifically for creating EHR and EMR. The data generated through these algorithms are further tested to analyse the patient's condition [43].

The "double-blinded validation study" through the "IBM Watson" algorithm is used for the detection of oncogenic cells. This technology is also used for early cancer detection. This way, AI technologies increase the early detection and recovery rate of cancer patients. DL is also used for analysing cellular progression and NLP helps in detecting "skin cancer" [44]. Thus, it can be stated that AI technologies are gradually improving the service facility and quality in hospitals and nursing homes.

AI algorithms are effective in "neuroscience" as they can monitor the movements of patients with severe neurological disorders. For example, the movements and disease progression of a patient that has severe "quadriplegia" can be done with AI technologies [45]. A "man/machine" interface can be used to detect the timing of "motor neuron discharge." This is an effective treatment method for controlling the movement of "upper limb prostheses."

Cardiac imaging is an advanced method of analysing the heart condition in patients. The "**Arteries Cardio DL application**" is an effective AI technology for detecting unstable cardiac output [46]. This method is used for cardiac disease detection in patients. In this method, AI algorithms are used to transform the MRI image into automated

imaging. This way, healthcare professional can observe the ventricles and can detect the core problem. This method enhances cardiac disease detection efficacy by reducing time.

ML algorithms are highly effective in detecting the rate of stroke in patients. This is done by "movement controlling and detecting" through different ML algorithms, such as PCA. In this algorithm, researchers implemented normal heart rate and heart condition information. Now, on the condition that a patient's heart rate changes the machine effectively detects and creates an "alarm signal," this helps doctors to rapidly start the treatment procedure for reviving the patient [47].

AI technologies are important for disease detection, treatment prediction, administration, and in several other sectors of the healthcare industry [48] and for procurement, manufacturing, storing, packaging, safety, and decision-making in the food sector. Although there are several disadvantages present, the advantage and contributions of AI algorithms in the medical industry cannot be denied. Apart from improving the "Service Quality," AI algorithms have also changed the way of medical treatments. Its rapid detection, accurate prediction, and effective translation have enhanced the number of recovered patients.

The usage of machine learning algorithms enables understanding the overall pattern of the requirements in the food industry; it has been understood that the food industry deals with perishable products and therefore need to understand the overall demands so as to meet them in an effective manner. The usage of ML algorithms tends to support in enhancing the supply chain process and forecast the pattern so as to enhance the food quality and support in enhancing the revenues and profits of the company.

3. Research Methodology

The present research consists of both primary and secondary data analysis. Both quantitative and qualitative methodology has been done in this research. A deductive research approach has been used to describe the impact of AI-based technologies. Different AI technologies may have a significant positive or negative effect on the SQ of healthcare and food sectors in the UK. Due to this, the primary data analysis has been done for this research. The primary research data has been done with quantitative data analysis. Survey-based primary research analysis has been carried out. The research enables using descriptive research design for performing the study; the authors focus on understanding the critical concepts related to AI in enhancing the food quality in an effective manner. Both primary and secondary data source are applied to perform the study.

Approximately 153 individuals have been taken for this analysis and the individuals are taken from different healthcare and food sectors of the UK. Random sampling methodology has been done for the primary data analysis. The survey was conducted in an online Google form to maintain social distance and isolation during the COVID-19 pandemic. Three questions were prepared for this survey to effectively analyse the impact of AI-based technologies in improving SQ. The impact of these technologies in patient

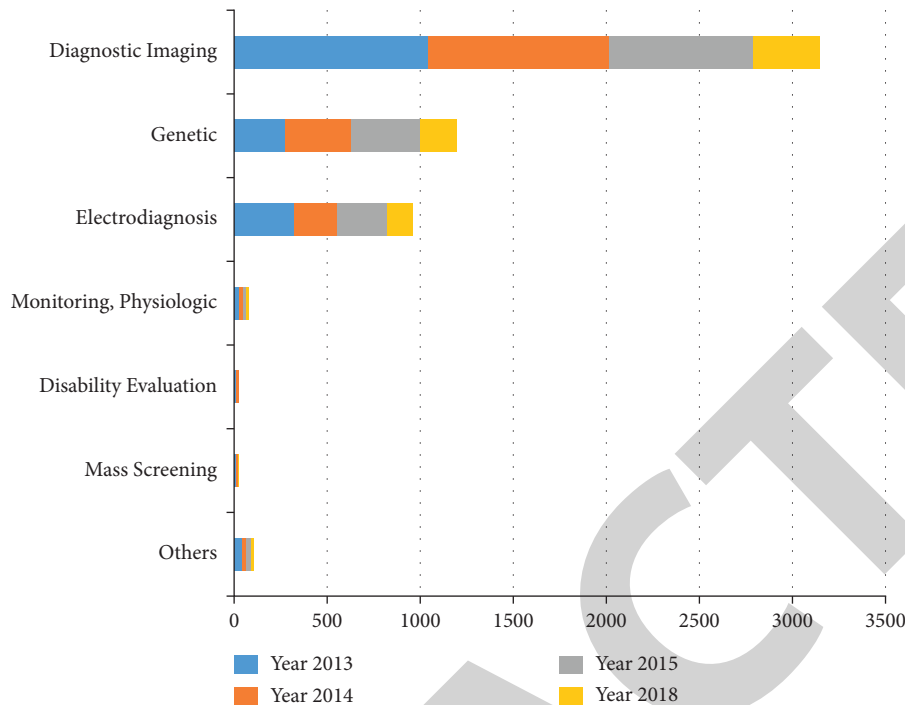


FIGURE 2: Role of AI in medical imaging [41].

data analysis and treatment prediction has also been analysed through this survey.

Among the 153 individuals, only 33 individuals have been found who are associated with specific hospitals and healthcare sectors that use AI-based technologies. Therefore, these 33 individuals were further surveyed with various questions related to AI, ML, DL, RES, and NLP and their impact on improving the SQ. The collected responses were converted to numerals and were kept in an Excel datasheet. After that, this datasheet was used for statistical data analysis with IBM SPSS software version 26. Linear regression, correlation, and ANOVA have been done in this research. Four independent variables were taken, which are ML, NLP, RES, and DL. The impact of these four variables was tested against one dependent variable SQ and the impact was measured at a 95% confidence level. After the regression analysis, a “Structural Equation Model” or SEM was drawn “Microsoft Word.” This model effectively analyses the effect of the four independent variables, which are ML, NLP, DL, and RES, on the one dependent variable SQ.

The SEM model also helps the researcher in describing the interrelation of each independent variable. The significance which has been analysed at a 95% confidence level was further tested for *P* value. A value of 0.05 or below demonstrates a statistically significant relationship. Moreover, the Pearson correlation was analysed to describe the level of correlation. The value of ± 1 indicates that the dependent and independent variables have a strong correlation. Secondary research has been done to validate the data obtained from primary analysis. The data for secondary research analysis were taken from different peer-reviewed articles and journals and the validation of primary data was done using those supporting articles. The articles and journals were taken

from Google Scholar and the articles of the last 5 years were selected. The outcome was selected based on the support of secondary research on the primary data. The supporting journals help the researcher in analysing the importance of AI technologies in enhancing the overall service quality. Figure 3 shows the research flowchart adapted.

Research Questions.

- (1) What is the most appropriate AI technology for the healthcare and food industry?
- (2) How do AI technologies help in improving service quality in healthcare and food sectors?

4. Analysis and Interpretation

4.1. Survey Analysis

Q.1) what do you think is the most important AI-based technology for enhancing service quality in the UK healthcare and food industry?

According to Figure 4, 56 participants or 36.601% out of the 153 surveyors have chosen ML as the most effective AI technology for the healthcare industry. 67 participants or approximately 43.79% of the surveyors have chosen DL, 17 participants or 11.11% have chosen NLP, and only 8.49% or 13 individuals have chosen the RES. This analysis shows that the majority of the surveyed people have supported DL as the most effective AI-based technology.

Q.2) How do you think AI technologies improve service quality?

According to Figure 5, 87 individuals or 56.86% of the surveyed individuals have stated that AL improves

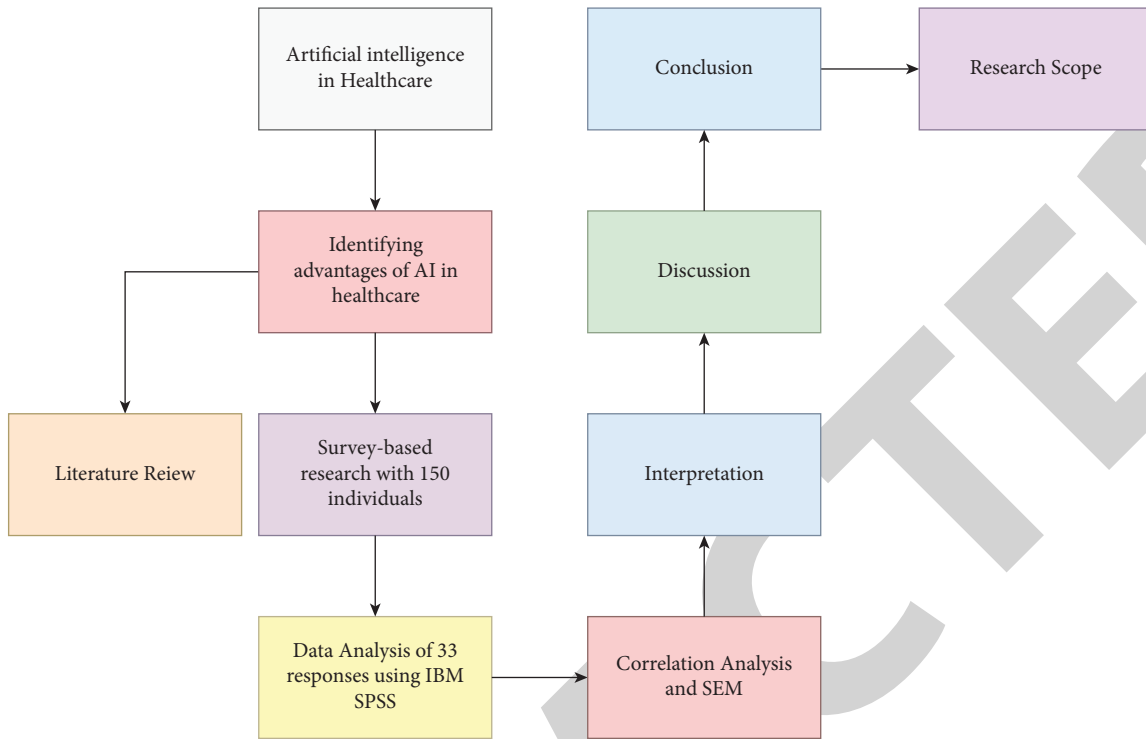


FIGURE 3: Research flowchart.

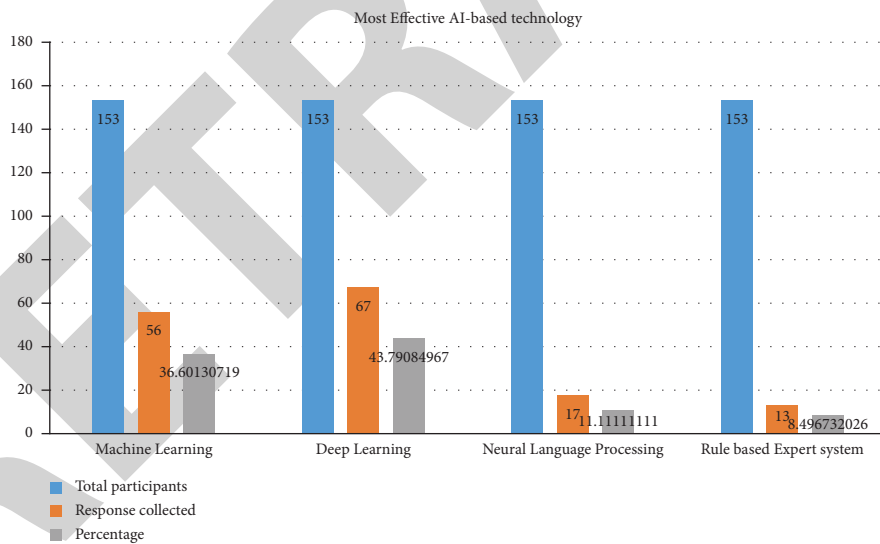


FIGURE 4: Graphical representations of effective AI-based technologies.

patients’ health by effectively predicting the treatment method. 29.411% of the individuals stated that AI technologies analyse the disease progression rate to improve patients’ health. 7.84% of the respondents have stated that AI analyses the “Electronic Health Record or

EHR” to enhance a patient’s health. Only 5.88% of the individuals supported that AI detects a patient’s mental health. This proves that the majority of the surveyed individuals have supported the treatment prediction capability of AI for improving a patient’s health.

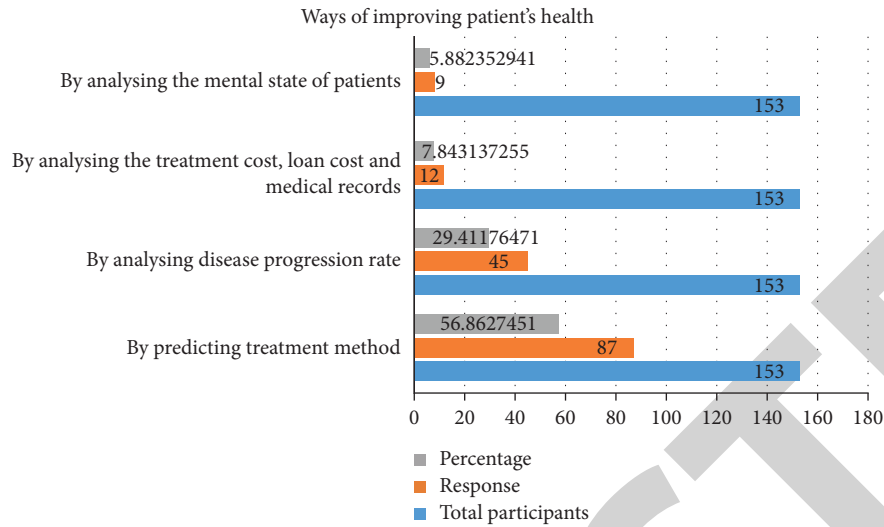


FIGURE 5: Graphical representation of patient's health improvement through AI.

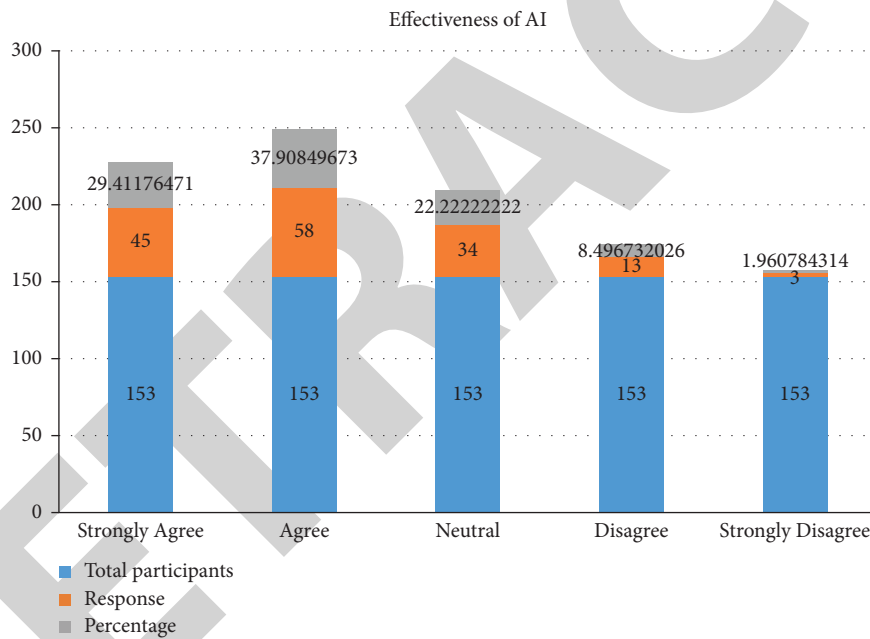


FIGURE 6: Effectiveness of AI.

Q.3) Do you think AI technologies are more effective than traditional methods?

According to Figure 6, 29.41% of the surveyed individuals agreed that AI technologies have more advantages in disease detection than the traditional method. 39.90% of the respondents agreed with the statement and 22.22% gave neutral responses. However, 8.49% and 1.96% of the respondents disagree and strongly disagree with the statement. This proves that the majority of individual agrees that AI is more effective in disease detection and enhancing SQ.

the total months of ML use is 18.27 and for the months of DL use is 20.48. The means for the months of REL and NLP are 24.06 and 29.91, respectively. The total mean of SQ improvement was 61.85. This shows that the majority of the healthcare sectors have used NLP and RES for a longer duration. The standard deviations (SD) for ML, DL, RES, and NLPs are 16.069, 19.802, 18.641, and 18.213, respectively. The SD for the SQ improvement is 21.216. The descriptive statistical analysis helps to analyse the overall mean and SD of each variable.

Correlation analysis has been performed to test the significance level and correlation level between the four independent variables and one dependent variable, as shown in Table 2. According to the Pearson's correlation data, the value for months of ML use is 0.881 and the SQ value is 1.000. This represents that ML and SQ have a strong positive correlation.

4.2. Statistical Analysis. Figure 6 shows the descriptive statistical analysis of the primary data and according to Table 1, the total number of participants is 33. The mean for

TABLE 1: Descriptive statistics.

	Descriptive statistics		
	Mean	Std. deviation	N
SQ (in %)	61.85	21.216	33
Months of ML use	18.27	16.096	33
Months of DL use	20.48	19.802	33
Months of RES use	24.06	18.641	33
Months of NLP use	29.91	18.213	33

TABLE 2: Correlation analysis.

		Correlations				
		SQ (in %)	Months of ML use	Months of DL use	Months of RES use	Months of NLP use
Pearson correlation	SQ (in %)	1.000	0.881	0.902	0.847	0.705
	Months of ML use	0.881	1.000	0.901	0.810	0.610
	Months of DL use	0.902	0.901	1.000	0.770	0.597
	Months of RES use	0.847	0.810	0.770	1.000	0.806
	Months of NLP use	0.705	0.610	0.597	0.806	1.000
Sig. (1-tailed)	SQ (in %)	.	0.000	0.000	0.000	0.000
	Months of ML use	0.000	.	0.000	0.000	0.000
	Months of DL use	0.000	0.000	.	0.000	0.000
	Months of RES use	0.000	0.000	0.000	.	0.000
	Months of NLP use	0.000	0.000	0.000	0.000	.
N	SQ (in %)	33	33	33	33	33
	Months of ML use	33	33	33	33	33
	Months of DL use	33	33	33	33	33
	Months of RES use	33	33	33	33	33
	Months of NLP use	33	33	33	33	33

Similarly, SQ and DL have a strong positive correlation. RES and NLP also have a strong positive correlation with SQ. Neither of the correlation values is <0.050 and the values are between “0.05 and 1.000,” which represents a strong positive correlation. Thus, it can be stated that all the independent variables are strongly correlated with SQ, which indicates that when the independent variables increase, the dependent variable also enhances. Therefore, AI technologies enhance the service quality in the healthcare and food sectors of the UK.

Moreover, the correlation value for ML is 0.881 and for DL it is 0.902, which represents that ML and DL are strongly correlated. The values for NLP and RES indicate that they have a strong positive correlation; the values of ML and RES, ML and NLP, RES, and DL also suggest a positive correlation, indicating that the independent variables also have a positive correlation among themselves.

The significance value for all the independent and dependent variables have been analysed at a 95% confidence level and the results for each variable are 0.000. This proves that all the independent and dependent values are statistically significant. Further analysis has shown that the values of R and “adjusted R square” are 0.880 and 0.862, respectively, with a standard error of 7.873. This proves that the input variables add significant value to the model.

According to the ANOVA regression analysis shown in Table 3, the F -value is 51.097, which is higher than the critical alpha value (0.05). Thus, it can be interpreted that the variables are statistically significant. The correlation at 95% demonstrates that there is a 5% chance or a probability of 0.226 ($1-95^5$) that one of the variables shows false results.

The histogram analysis in Figure 7 describes a “left-skewed” and unimodal histogram, which indicates a normal distribution of data. The variable ranges between 0 and 2, which indicates the frequency range of the variables.

According to the cumulative probability scatter plot shown in Figure 8, the expected values have been shown to increase with the observed value. This shows that as the independent variables (ML, DL, NLP, and RES) increase, the SQ increases.

5. Discussion and Findings

According to the survey-based primary data analysis, 43.79% of the surveyed individuals have supported DL as the most effective AI technology. This can be proven by the studies of Hinton as in his research it has been shown that DL can perform various complex tasks to enhance the overall SQ in healthcare and food sector [49]. This includes “complex image processing,” “language translation,” and “speech recognition.” As per the viewpoint of Coccia, DL is an effective method for anticancer therapy [50]. This method helps pathologist process tumour images in patients. This way, early detection of oncogenic tumours are done and this ultimately increases the overall survival rate of patients. The advantages of DL can be analysed by the research of Naylor. His research suggests that apart from image processing, DL also helps in analysing extremely large “heterogeneous datasets” [51]. Moreover, this technology accelerates the data analysis process of AI technologies. Thus, it can be proved that DL is the most effective AI technology for the healthcare

TABLE 3: ANOVA regression.

		ANOVA				
Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	12668.710	4	3167.178	51.097	0.000 ^b
	Residual	1735.532	28	61.983		
	Total	14404.242	32			

(a) Dependent variable: SQ (in %). (b) Predictors: (constant), months of NLP use, months of DL use, months of RES use, and months of ML use.

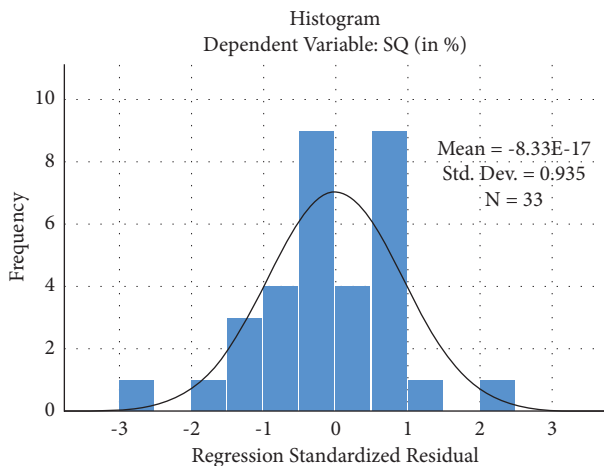


FIGURE 7: Histogram analysis.

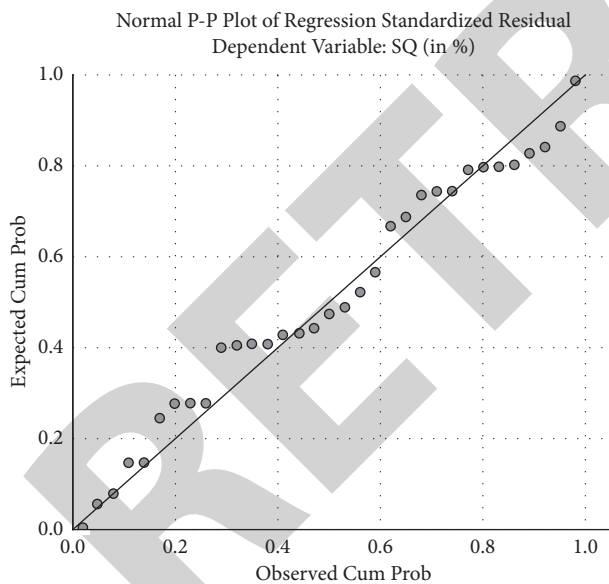


FIGURE 8: Cumulative probability graphical representations.

and food industry. 56.86% have supported the treatment prediction ability of AI and 37.90% have agreed that AI has more effectiveness than traditional methods. According to the studies of Gupta and other researchers, AI technology and ML have shown a significant advantage in the disease progression and treatment method of SARS-CoV-2 [52]. Their studies showed that the use of AI technologies has improved the overall “treatment,” “prediction,” “disease detection,” “screening,” “medication,” and disease forecasting [53]. The method is also suitable for effective analysis

of “drug delivery.” The survey analysis data enables researchers to assess the impact of AI in improving the SQ.

According to correlation analysis, it can be stated that the AI technologies which are ML, DL, NLP, and RES have a strong positive correlation to the SQ, as shown in Figure 9. This indicates that as the impact of AI technologies enhances, the overall SQ improves in the healthcare and food sector. This data can be further justified by the research of Bini, which shows that AI technologies such as “neural network,” “deep learning,” and “machine learning” help in amplifying the rate of cognitive behaviour in humans [54]. This helps doctors and medical professionals in detecting the patient’s physical condition more rapidly. Thus, it can be stated that AI technologies help in improving the overall patient condition and enhance the treatment procedure. The Pearson correlation study proves that the independent variables such as ML, DL, RES, and NLP have a strong correlation with each other. This indicates that on the condition that more than one AI technology is applied in healthcare and food sectors to enhance patients’ health, it would enhance the recovery rate and SQ. This can be proved by Currie and researchers as their studies prove that AI-based algorithms enhance the “medical imaging” and patient’s treatment method [55]. The cumulative probability and histogram analysis prove that the AI technologies add a pacific value to the overall SQ. This indicates that apart from enhancing the “service quality,” AI technologies also increase the rate of patient recovery, thus enhancing the patient satisfaction rate. The SQ is measured by the total number of recovered patients, recovery time, and appropriate treatment prediction. AI technologies successfully boost the overall treatment prediction through early analysis of oncogenic tumours, medical imaging, drug delivery system, and patient data analysis. Advanced AI technologies such as ML and DL are also effective in analysing the psychological state of patients. This occurs through determining the “speech pattern,” “language detection,” “expression analysis,” and communication analysis. Psychologists use AI for the rapid detection of patients’ medical health.

Electrodiagnostics encourages physicians and specialists to recognize internal and classroom changes in a patient’s condition. In this way, AI technology enhances medical accuracy. NLP and ML are very useful in interpreting and through this work; they are used for EHR and EMR production only. Data derived from these algorithms are further analysed to determine the patient’s condition. Blind analysis of the IBM Watson algorithm is used to measure oxygen cells. These technologies are also used to detect early leukemia. In this way, AI technology continues to detect early

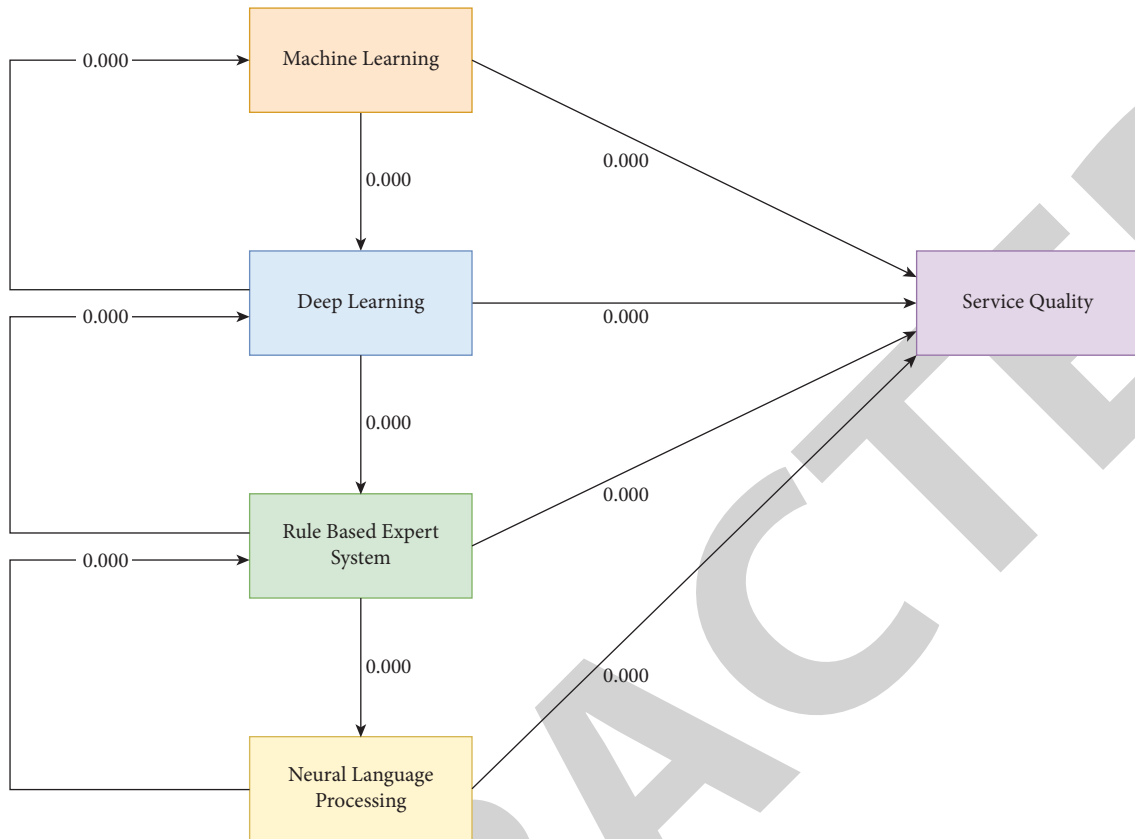


FIGURE 9: Structural equation model (SCM).

and timely recovery of leukemia patients. DL is also used to identify the causes of cell growth and NLP helps identify “skin cancer.” Thus, it can be said that AI technology has gradually improved the delivery and quality of services in hospitals and nursing homes. ML algorithms are useful in stroke detection in patients. This is achieved by “management and operation” of various ML algorithms, such as PCA. In this algorithm, scientists used heart rate and heart rate data. As the patient’s heart rate changes, the machine now works better and produces a “warning signal.” This allows doctors to quickly begin the treatment process to restore the patient. AI is making substantial impact in the food and beverage industry, as in many other industries. AI’s ability to drive higher productivity and profitability, decrease wastes, and defend against logistic interruptions is being recognized by an increasing number of players in the market.

6. Conclusion

AI technologies are the future of medicine, food and beverage industries, and related fields. Their broad array of advantages has opened new opportunities for health and medical care professionals. Effective detection of disease by MRI, CT scan, and so on is done easily with the help of machine learning technology. Complex image processing and large patient data analysis are done with the help of neural networking and a deep learning process. Large patient data analysis with the help of sustainable advanced AI

technologies has made the healthcare administrative process more smooth and effective.

AI technology is important in health and nutrition because it is useful in determining the overall cost of care as well as diagnosing and treating patients. Thus, it promotes the improvement of overall quality assurance (QS) in healthcare. The artificial intelligence does not work for these purposes only. It makes the world a better place to solve problems, improve food quality, and exchange healthy food. Companies can recognize and improve benefits, such as planting, healthy planting, irrigation, and better climate control for the digital platform, making it more profitable for better food. Processing and safe storage and transportation can benefit from this. The study was conducted with key data analysis as well as data-based analysis using the IBM SPSS software. Central data analysis was also performed in this study to support important data. This study highlights the importance of AI technology to improve SQ in the UK health sector.

Moreover, AI technologies increase the recovery rate by predicting appropriate treatment methods. AI’s compelling efficacy has made it a far more popular tool to be used in areas such as analysis, process assessment, and risk management, with the goal of reducing costs, improving quality, and generating higher revenue. Thus, this technology improves the “service quality,” “service method,” and treatment protocol of healthcare sectors, which ultimately alleviates the rate of satisfied patients. The secondary journals also prove the advantages of AI in enhancing service quality.

7. Future Scope

AI technologies are the future of the healthcare and food and beverage industry and it can be proven by this research. Its impact on improving the service quality is appreciable. Moreover, research can be done on implementing AI technologies in performing core medical jobs, such as cardiac and neurosurgery. The imaging process of deep learning is an effective way to analyse different medical images, which can be used for complex scans and screening tests. In the future, AI algorithms can be used for complex physiological and psychological disease detection. Apart from AI's performance in food sector for production and meeting global demands, the use of machine learning in the food industry can potentially minimise production ambiguity, which can lead to better service delivery, greater profits, and lower waste and carbon effluence. Moreover, during online counselling, the security and data protection level can be enhanced to increase the number of satisfied patients.

Data Availability

The data shall be made available from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this paper.

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