

## Quality Function Deployment in Healthcare: Systematic Literature Review

Dias Irawati Sukma<sup>1,\*</sup>, Indra Setiawan<sup>1</sup>, Hibarkah Kurniah<sup>1</sup>, Humiras Hardi Purba<sup>1</sup>

<sup>1</sup> Master of Industrial Engineering Program, Universitas Mercu Buana, Jakarta, 11650, Indonesia

\*Corresponding Author: [diasirawati2005@gmail.com](mailto:diasirawati2005@gmail.com)

### ARTICLE INFO

### ABSTRACT

#### Article history

Received: August 2022  
Revised : October 2022  
Accepted: October 2022

#### Keywords

Healthcare  
House of Quality  
Quality Function Deployment  
Systematic Literature Review

More specific knowledge about Quality Function Deployment (QFD) has grown rapidly. There are many studies on the application of QFD in various industrial sectors including manufacturing, construction and services. QFD is a tool that can be used to assist companies in improving services by translating consumer desires into the technical characteristics of the company. This study aims to provide a broad understanding and knowledge of the application of QFD in the healthcare industry. The approach used is Systematic Literature Review. This study involves a review study of various papers from well-known databases related to the implementation of QFD in the healthcare industry. This paper provides benefits for researchers and practitioners to add insight and references for studies related to QFD in health services.

This is an open access article under the CC-BY-SA license.  
Copyright © 2022 the Authors



## INTRODUCTION

In this era of globalization, all industries must be able to compete in the global market to remain competitive. The intense global market has driven all industries to continuously improve their competitiveness. Among all industrial sectors, the service industry is one of the most decisive industries in increasing the economy and national income. The most important and challenging primary goal of service organizations is to provide high-quality services. The measurement of the main indicators as improving performance is a must to define and measure service quality. One of the main steps in developing this measurement tool is to identify the company's performance and consumer expectations. Service experts agree that service quality results from a comparison between performance and customer expectations. Meeting customer needs can provide a high level of achievement of satisfaction. Therefore, it is very important to understand the difference between customer expectations and service perception.

In the service industry, providing high-quality services is the most important thing and needs attention for all types of service providers because service quality can increase customer satisfaction and have an impact on their good name. Therefore, companies and organizations from various service

industries consider service quality improvement as the key to gain market profits and achieve success. One sector of the service industry is health services. Health services are public services that are considered by the whole community and the government because they can coordinate the entire population and awareness of health status. The health care industry must provide high-quality health services because it involves patients. Patients' perceptions of the quality of health services will help medical organizations to increasingly make changes and progress in providing the best services to increase patient satisfaction. Therefore, it is important for the health care industry to continue to improve the quality of services so that the goals of meeting high patient expectations and promoting hospital competitiveness can be achieved. As the demand for improving health services is faced with challenges from various limited resources and intensive competition. Hospitals should be able to prioritize their focus on dimensions that contribute significantly to improving their services.

Quality Function Deployment (QFD) is a tool that can be used to assist companies in the production or service process by translating consumer desires into the company's technical characteristics (Narto, 2020). QFD was originally proposed in 1966 as an advanced tool for listening to customer voices for continuous product/service quality planning, quality improvement and decision making. Then in Japan, around 1970 QFD technique has proven to be a powerful tool that can be used to translate customer voice into the technical language (Yamani & Munang, 2019).

Cohen (1995) defines QFD as a structured and systematic method for planning and product development that allows the development team to clearly define customer wants and needs. The application of the QFD method in the product design process begins with the formation of a matrix or often referred to as the House Of Quality (HoQ). HoQ displays the voice of the customer (VoC) or the customer's need for a technical response to fulfill it. The HoQ sections/rooms each store specific information for a section of the QFD procedure as shown in Figure 1.

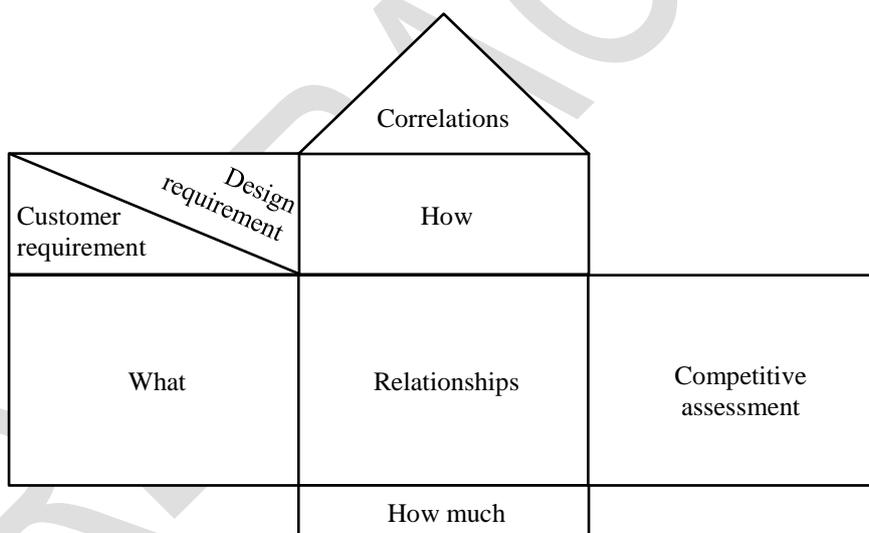


Figure 1. HoQ (Source: Cohen 1995)

This study aims to provide a literature review on the application of QFD in the health care industry and provide contextual knowledge as a means to improve the application of QFD in health services.

## RESEARCH METHOD

This study presents the best steps to study, explore and analyze the application of QFD in the healthcare industry. This Systematic Literature Review (SLR) study begins with determining the topic, namely the application of QFD in the healthcare industry. Then proceed to the systematic stage of SLR. The following is an explanation of each stage (Figure 2):

1. Collection of Papers.

Search Papers from famous databases like Research Gate, Google Scholar. Search papers using the keyword "Quality Function Deployment". The collected papers were 138 papers.

2. Screening Papers by topic.

The papers that have been collected are then filtered based on the chosen topic, namely QFD Implementation in the health care sector. Filter papers into 60 papers according to relevant topics. Paper screening is done based on title and abstract.

3. Screening papers by content.

After the paper is selected based on the topic, then it is filtered again based on the content analysis of the full text. This analysis includes research focus, purpose, findings, implications.

4. Summary of papers.

After obtaining the final 40 papers, then summarizing all relevant papers based on the identity of the paper and research results. Grouping all papers into several aspects, namely papers based on the area of publication, papers based on the year of publication and grouping papers based on publishers.

5. Benefit analysis

Analyze the benefits obtained from each paper. Analyzing research gaps to be developed in future research.

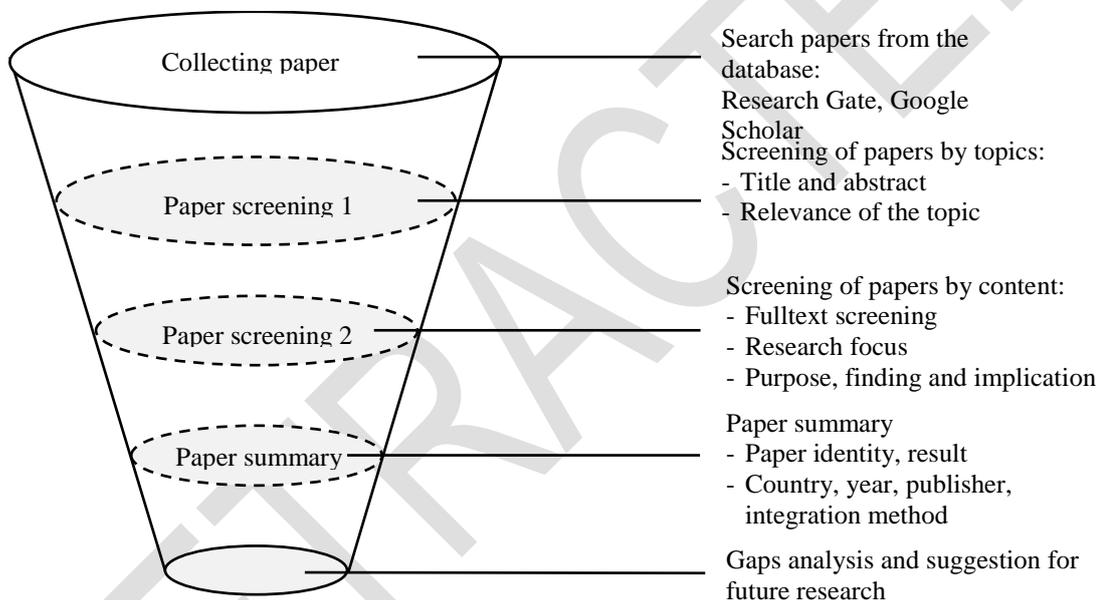


Figure 2. Literature Review Framework

RESULTS AND DISCUSSION

A total of 40 selected papers will be reviewed in more detail by extracting each paper to obtain the contents of the paper. Then the selected papers are summarized based on the identity of the paper and research results. The following descriptions of each paper can be seen in Table 1.

Table 1. An existing literature review of Quality Function Deployment.

No	Paper Identity	Result
1	(Gupta & Srivastava, 2011)	Help managers to prioritize the importance of service quality that can increase customer satisfaction in health services
2	(Al-Bashir et al., 2012)	A new model has been proposed to be implemented to improve MDMS performance.
3	(Venkateswarlu & Birru, 2012)	Improving the quality of hospital services
4	(Sharma, 2012)	Results include the CTG function with its Raw Weight and Priority Score. The detailed theoretical analysis of the results shows the basic functional limitations of the outgoing machine.

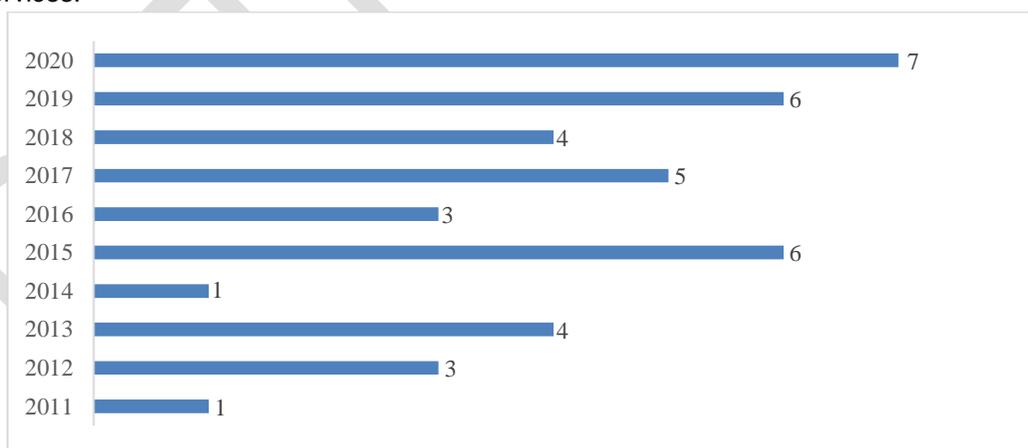
No	Paper Identity	Result
5	(Sinha et al., 2013)	The behavior and attitudes of the staff have the highest weighted score, meaning that if they are increased, there will be almost a 25 percent increase in the hospital.
6	(Azadi & Farzipoor Saen, 2013)	The QFD model can incorporate criteria such as cost of service and ease of implementation
7	(Shih & Chen, 2013)	QFD is a proven tool for process and product development, which translates the voice of the customer (VoC) into engineering characteristics (EC), and prioritizes the ECs, in terms of customer's requirements
8	(Gremyr & Raharjo, 2013)	The application of QFD leads to an increased awareness of a complex multiple-customer concept.
9	(Yeh & Lai, 2015)	Top management can apply a V-shaped performance matrix to determine the importance of improving quality management
10	(Chowdhury & Quaddus, 2014)	The optimal strategy is the campaign, recruitment of skilled human resources, performance measurement, and monitoring
11	(Lee et al., 2015)	Coupled fuzzy logic with QFD in healthcare services enables medical practitioners to understand customer requirements and include them for continuous improvement during the health service delivery
12	(Ionica & Leba, 2015)	QFD method can be implemented in the innovative product NPD approach to produce innovative products by achieving customer satisfaction requirements
13	(Hashemi et al., 2015)	The QFD used showed that the time spent on prescribing medication had been reduced by more than 20 percent.
14	(Nordin, 2015)	The satisfaction coefficient is used to formulate optimization outputs for new and better health services
15	(Sandelands, 2015)	The fuzzy QFD approach can provide a framework for analyzing technical requirements that can lead to the synthesis of a customer-oriented system
16	(Wibawa et al., 2016)	Choose the best priority of improvement measures to increase user satisfaction.
17	(Wood et al., 2016)	QFD has been applied in the construction industry with a special focus on supporting green hospital design
18	(Pourmadadkar et al., 2017)	Prioritization of improvement in treatment for cardiovascular disease (CVD).
19	(Dehe & Bamford, 2017)	Using QFD generated effectiveness and efficiency by creating an information exchange platform and providing the stakeholders with a framework to optimize the decision-making
20	(Kassela et al., 2017)	The results provided insight into the benefits and challenges arising from the application of a specific tool QFD.
21	(Hsu et al., 2017)	The significant and positive relationship between corporate social responsiveness and profitability
22	(Priyono & Yulita, 2017)	Service attributes and technical requirements that require improvement as priority improvements have been identified
23	(Schillo et al., 2017)	QFD provides a systematic approach as a Multi-Stakeholder policy that captures the voices of stakeholders and aligns them with policy
24	(Moğol Sever, 2018)	Eliminate queues and increase service time
25	(Raziei et al., 2018)	QFD and Servqual characteristics can be used to translate patient requirements into design characteristics and quality
26	(Kim et al., 2018)	Utilizing QFD to develop services on a national scale in Korea
27	(Ali Akram et al., 2018)	provides very useful data for health statisticians and hospital authorities to track different public health parameters and further improve services.
28	(Siregar, 2019)	It was found that 4 attributes were the main priority for improvement, including good communication with patients, preparedness of medical personnel, the competence of medical personnel, and medical equipment.
29	(Joshi & Bhargava, 2019)	Green QFD provides knowledge, attitudes and roles of health practitioners in medical waste management to provide environmentally friendly services
30	(Barad, 2019)	QFD developed 2 matrices to improve the strategic health care system into a need for increasing cyber information / procedures

No	Paper Identity	Result
31	Abdurrozzaq (Hasibuan et al., 2019)	33 service quality characteristics are prioritized for further improvement, with the main priority being patience recovery
32	(Gonzalez, 2019)	QFD and benchmarking to bridge the gap and assess the extent to which customers are happy and satisfied with the products and services provided by the business
33	(Barutçu, 2019)	Designing the mHealth app for a higher level of satisfaction
34	(Kayapinar Kaya & Erginel, 2020)	Quality Function Deployment used to prioritize patient needs and patient expectations
35	(Putra & Wang, 2020)	With QFD, it can be seen that there is a strong relationship between doctors' skills, behavior and attitudes of officers, as well as having quite modern equipment
36	(Cropley, 2020)	QFD combined with Value Engineering creates innovative methods and results in a quality function of maximizing results and becomes a model for customer satisfaction in the field of cost management
37	(Nie et al., 2020)	Improving the quality of health services with QFD and Todim to ensure quality improvement by the psychological behavior of the patient who provides the assessment
38	(Mathews et al., 2020)	Application of integrated quality functions and failure modes and analysis of effects in the selection of subcontractors for the ISO/IEC 17025. standard
39	(Duan et al., 2020)	Application of QFD with fuzzy mechanism analyzes washing machine quality accidents
40	(Yeganegi, 2020)	Increase customer satisfaction which has an impact on increasing profits

Based on Table 1, it can be seen that this paper summarizes as many as 40 papers related to the application of QFD in the health care industry. Based on the summary, then grouping into several aspects such as year of publication, country of publication, integration method and publisher. The following is a description of each based on the grouping of papers.

**Classification of papers**

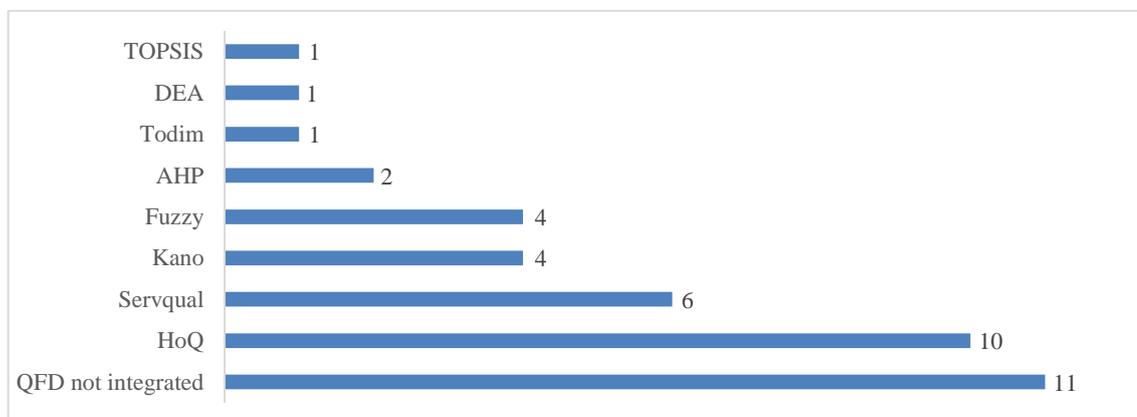
This study classify the papers based on the aspects reviewed. The identified papers were traced from publications from 2011 to 2020 (Figure 3). The analysis found that the application of QFD is still relatively new because the development of this tool is reviewed based on the selection of papers in the last 10 years. QFD is considered an innovation in improving the service quality. So this method needs to be developed again. The success of QFD in the healthcare industry has brought significant benefits to the industry sector. Then the QFD method becomes the main target for the service industry, especially health services.



**Figure 3.** Publication by year

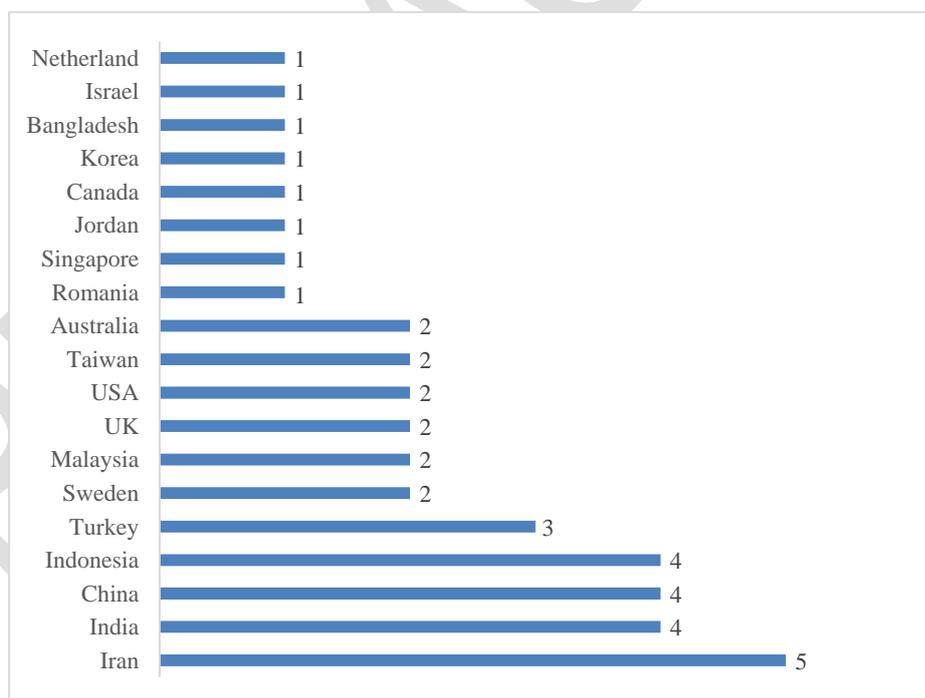
Based on a thorough identification, as many as 10 papers have used the QFD method as the main method in improving the service quality. This shows that the QFD method is a single method that can provide significant changes when applied. In addition, QFD is also a method for product/service development. QFD itself can provide recommendations for the right model in developing products/services. When applied to an industry or research, QFD is often integrated with various methods of improvement, weighting and decision making to obtain complex results. Based on the

analysis, the integration method includes the AHP method to analyze or support decision-making. The fuzzy method can model very complex nonlinear functions so that it can build and apply experiences directly. Data Envelopment Analysis (DEA) method as a tool to measure efficiency criteria. Kano's method can lead to the development of broad service differentiation by analyzing customer attributes. The integration of the QFD method with several other methods can be seen in Figure 4.



**Figure 4.** Integration method

This study also identifies the distribution of publications by country and publisher. The analysis found that Iran is the largest supplier of publications with 5 papers. Then Elsevier became the most recommended publisher in this literature study. Information about the distribution of papers and where the papers are published can be seen in Figure 5 and Figure 6.



**Figure 5.** Publication by area

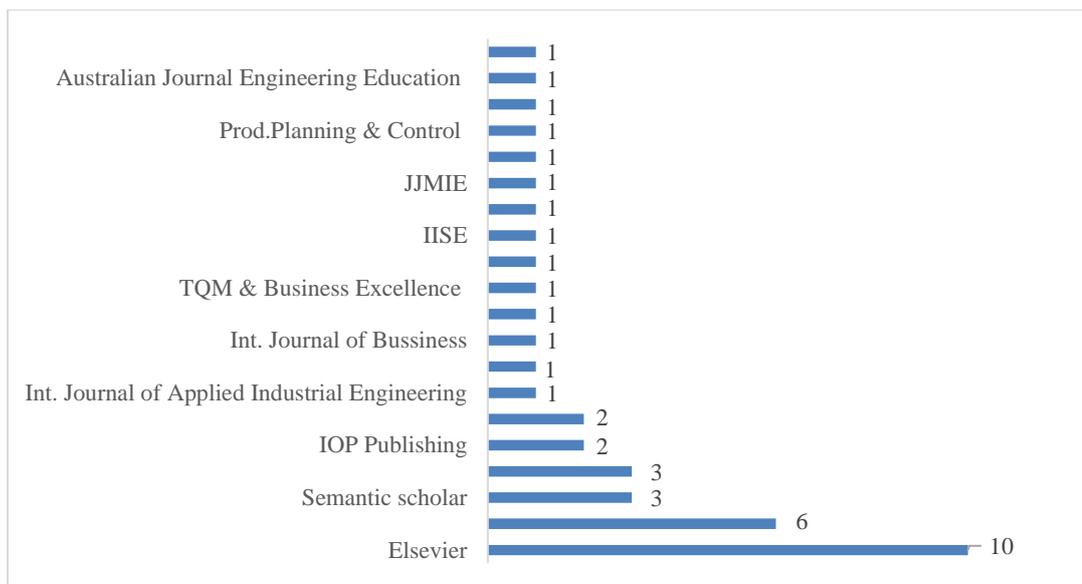


Figure 6. Papers by publisher

### QFD Implementation Benefits

The presence of QFD as an improvement method brings significant advantages to the healthcare industry. This is because QFD can be the basis of activities to translate customer desires. This paper has analyzed the advantages that the healthcare industry gets when implementing QFD. QFD can increase competitiveness through continuous improvement of its quality and productivity. Broadly speaking, the benefits of QFD are as follows:

1. Focus on the customer.
2. Time efficiency.
3. Teamwork-oriented.
4. Orientation to documentation.

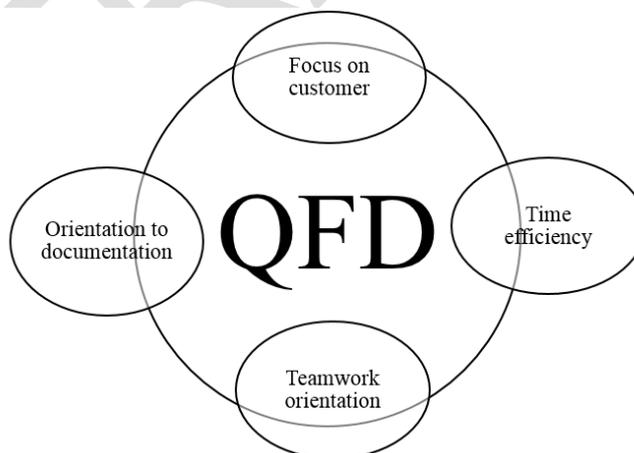


Figure 7. Benefits of QFD

Based on the four benefits of QFD in Figure 7, we can see that specifically the benefits of implementing QFD in the health care industry are increasing product reliability, improving service quality, increasing customer satisfaction, shortening time to market, reducing design costs, improving communication, increasing productivity and increase company profits. This QFD method also has weaknesses, including requiring specific skills when translating quality characteristics, difficulties in filling out the matrix and being a project without continuation.

## Gaps and Future Research

QFD is a method used to support and implement the philosophy of Total Quality Management (TQM). Quality is paramount to all industries. By focusing on improving quality, customers will feel satisfied. This will have an impact on company profits. In future research, it is recommended to focus more on the application of QFD based on TQM. QFD itself consists of three stages. All activities carried out at each stage can be applied like a project, with the planning and preparation stages first. The three stages are (1) Voice of Customer collection stage; (2) the stage of compiling a house of quality (House of Quality); (3) Analysis and implementation stage. Each stage of the implementation of QFD requires special attention to obtain complex and reliable results.

## CONCLUSION

The main focus of QFD as a method or approach used to improve services so the service industry need to implement it, especially health services. QFD can produce output by the tastes and desires of consumers. Since being developed for the first time QFD has developed into a powerful tool to improve service quality that focuses on customer needs. This method requires special attention at each stage. Through HoQ the implementation of QFD becomes more structured and valuable so that the expected goals will be achieved. Future research is suggested to apply QFD with the TQM foundation.

## REFERENCES

- Al-Bashir, A., Al-Rawashdeh, M., Al-Hadithi, R., Al-Ghandoor, A., & Barghash, M. (2012). Building medical devices maintenance system through quality function deployment. *Jordan Journal of Mechanical and Industrial Engineering*, 6(1), 25–36.
- Ali Akram, M., Iqbal Mahmud, M., Riad Bin Ashraf, S., Awal, S., & Talapatra, S. (2018). Enhancing the Healthcare Service Using Quality Function Deployment and Database Management System in the Outpatient Department of a Government Hospital of Bangladesh. *International Research Journal of Engineering and Technology*, 5(4), 2022–2029.
- Azadi, M., & Farzipoor Saen, R. (2013). A combination of QFD and imprecise DEA with enhanced Russell graph measure: A case study in healthcare. *Socio-Economic Planning Sciences*, 47(4), 281–291. <https://doi.org/10.1016/j.seps.2013.05.001>
- Barad, M. (2019). Linking cyber security improvement actions in healthcare systems to their strategic improvement needs. *Procedia Manufacturing*, 39, 279–286. <https://doi.org/10.1016/j.promfg.2020.01.335>
- Barutçu, S. (2019). mHealth apps design using quality function deployment. *International Journal of Health Care Quality Assurance*, 32(4), 698–708. <https://doi.org/10.1108/IJHCQA-08-2018-0195>
- Chowdhury, M. M. H., & Quaddus, M. A. (2014). A multi-phased QFD based optimization approach to sustainable service design. *International Journal of Production Economics*, 171, 165–178. <https://doi.org/10.1016/j.ijpe.2015.09.023>
- Cohen. (1995). *Quality Fuction Deployment: How to Make QFD Work for You*. Addison Wesley Publishing Co.,.
- Cropley, D. H. (2020). Applying quality function deployment to the design of engineering programmes: approaches, insights and benefits. *Australasian Journal of Engineering Education*, 00(00), 1–14. <https://doi.org/10.1080/22054952.2020.1776532>
- Dehe, B., & Bamford, D. (2017). Quality Function Deployment and operational design decisions—a healthcare infrastructure development case study. *Production Planning and Control*, 28(14), 1177–1192. <https://doi.org/10.1080/09537287.2017.1350767>
- Duan, P., He, Z., He, Y., Liu, F., Zhang, A., & Zhou, D. (2020). Root cause analysis approach based on reverse cascading decomposition in QFD and fuzzy weight ARM for quality accidents. *Computers and Industrial Engineering*, 147. <https://doi.org/10.1016/j.cie.2020.106643>
- Gonzalez, M. E. (2019). Improving customer satisfaction of a healthcare facility: reading the customers' needs. *Benchmarking*, 26(3), 854–870. <https://doi.org/10.1108/BIJ-01-2017-0007>

- Gremyr, I., & Raharjo, H. (2013). Quality function deployment in healthcare: A literature review and case study. *International Journal of Health Care Quality Assurance*, 26(2), 135–146. <https://doi.org/10.1108/09526861311297343>
- Gupta, P., & Srivastava, R. K. (2011). Customer Satisfaction for Designing Attractive Qualities of Healthcare Service in India using Kano. *MIT International Journal of Mechanical Engineering*, 1(2), 101–107.
- Hashemi, N., Marzban, M., & Delavari, S. (2015). Quality function deployment: Application to chemotherapy unit services. *Middle East Journal of Cancer*, 6(4), 219–228.
- Hasibuan, A., Parinduri, L., Sulaiman, O. K., Suleman, A. R., Harahap, A. K. Z., Hasibuan, M., Rupilele, F. G. J., Simarmata, J., Kurniasih, N., Achmad Daengs, G. S., & Abdussakir. (2019). Service Quality Improvement by Using the Quality Function Deployment (QFD) Method at the Government General Hospital. *Journal of Physics: Conference Series*, 1363(1). <https://doi.org/10.1088/1742-6596/1363/1/012095>
- Hsu, C. H., Chang, A. Y., & Luo, W. (2017). Identifying key performance factors for sustainability development of SMEs – integrating QFD and fuzzy MADM methods. *Journal of Cleaner Production*, 161, 629–645. <https://doi.org/10.1016/j.jclepro.2017.05.063>
- Ionica, A. C., & Leba, M. (2015). QFD Integrated in New Product Development - Biometric Identification System Case Study. *Procedia Economics and Finance*, 23(October 2014), 986–991. [https://doi.org/10.1016/s2212-5671\(15\)00454-2](https://doi.org/10.1016/s2212-5671(15)00454-2)
- Joshi, S., & Bhargava, P. (2019). Waste Management Integration with Green Quality Function Deployment (G-QFD) for Healthcare Centre. *Production Engineering Archives*, 22(22), 45–49. <https://doi.org/10.30657/pea.2019.22.09>
- Kassela, K., Papalexi, M., & Bamford, D. (2017). Applying quality function deployment to social housing? *TQM Journal*, 29(3), 422–436. <https://doi.org/10.1108/TQM-03-2016-0030>
- Kayapinar Kaya, S., & Erginel, N. (2020). Futuristic airport: A sustainable airport design by integrating hesitant fuzzy SWARA and hesitant fuzzy sustainable quality function deployment. *Journal of Cleaner Production*, 275. <https://doi.org/10.1016/j.jclepro.2020.123880>
- Kim, K. J., Lim, C., Kim, K. H., Kang, S. H., You, H., Jun, C. H., Shin, S. A., Choo, D. S., & Kim, J. H. (2018). Development of service concepts that utilize health-related data: A case study with the National Health Insurance Service of South Korea. *IISE Transactions on Healthcare Systems Engineering*, 8(4), 237–249. <https://doi.org/10.1080/24725579.2018.1502221>
- Lee, C. K. M., Ru, C. T. Y., Yeung, C. L., Choy, K. L., & Ip, W. H. (2015). Analyze the healthcare service requirement using fuzzy QFD. *Computers in Industry*, 74, 1–15. <https://doi.org/10.1016/j.compind.2015.08.005>
- Mathews, S. C., Stoll, R. A., Sternberger, W. I., Cox, P. W., Tober, T. L., Di Mattina, J., Dwyer, C., Barasch, N., Carolan, H., Romig, M., Pronovost, P. J., Barnes, J. F., Ravitz, A. D., & Sapirstein, A. (2020). Prioritizing Health Care Solutions for Pressure Ulcers Using the Quality Function Deployment Process. *American Journal of Medical Quality*, 35(3), 197–204. <https://doi.org/10.1177/1062860619869990>
- Moğol Sever, M. (2018). Improving check-in (C/I) process: an application of the quality function deployment. *International Journal of Quality and Reliability Management*, 35(9), 1907–1919. <https://doi.org/10.1108/IJQRM-03-2017-0043>
- Narto. (2020). Integrasi Metode Swot dan QFD Untuk Meningkatkan Daya Saing Usaha Melalui Pengembangan Produk Otak-Otak Bandeng Gresik. *Spektrum Industri*, 18(1), 65–74. <https://doi.org/http://dx.doi.org/10.12928/si.v18i1.13990>
- Nie, R. xin, Tian, Z. peng, Kwai Sang, C., & Wang, J. qiang. (2020). Implementing healthcare service quality enhancement using a cloud-support QFD model integrated with TODIM method and linguistic distribution assessments. *Journal of the Operational Research Society*, 0(0), 1–23. <https://doi.org/10.1080/01605682.2020.1824554>
- Nordin, N. (2015). A Conceptual Kano and Quality Function Deployment ( QFD ) Framework For Healthcare. *Conference: 2nd International Conference on the Roles of the Humanities and Social Sciences in Engineering 2010 (ICoHSE 2), November.*

- Pourmadadkar, M., Beheshtinia, M. A., & Ghods, K. (2017). An integrated approach for healthcare services risk assessment and quality enhancement. *International Journal of Quality and Reliability Management*, 37(9–10), 1183–1208. <https://doi.org/10.1108/IJQRM-11-2018-0314>
- Priyono, A., & Yulita, A. (2017). Integrating Kano Model and Quality Function Deployment for designing service in hospital front office. *Intangible Capital*, 13(5), 923–945. <https://doi.org/10.3926/ic.1001>
- Putra, N. U., & Wang, F. K. (2020). Integrating quality function deployment and failure mode and effect analysis in subcontractor selection. *Total Quality Management and Business Excellence*, 31(7–8), 697–716. <https://doi.org/10.1080/14783363.2018.1444473>
- Raziei, Z., Torabi, S. A., Tabrizian, S., & Zahiri, B. (2018). A Hybrid GDM-SERVQUAL-QFD Approach for Service Quality Assessment in Hospitals. *EMJ - Engineering Management Journal*, 30(3), 179–190. <https://doi.org/10.1080/10429247.2018.1443670>
- Sandelands, E. (2015). Combined quality function deployment and the logical framework approach to improve quality of emergency care in Malta. *International Journal of Health Care Quality Assurance*, 7(4), 1–40. <https://doi.org/10.1108/09526862199400001>
- Schillo, R. S., Isabelle, D. A., & Shakiba, A. (2017). Linking advanced biofuels policies with stakeholder interests: A method building on Quality Function Deployment. *Energy Policy Journal*, 100(October 2016), 126–137. <https://doi.org/http://dx.doi.org/10.1016/j.enpol.2016.09.056>
- Sharma, J. (2012). Optimised design and development of a bio-medical healthcare device through quality function deployment (QFD). *International Journal of Electronic Healthcare*, 7(1), 68–87. <https://doi.org/10.1504/IJEH.2012.048670>
- Shih, H.-S., & Chen, S.-H. (2013). A Conceptual Design of a Mobile Healthcare Device – An Application of Three-Stage QFD with ANP and TRIZ. *International Journal of Operations Research*, 10(2), 80–91. <https://doi.org/10.13033/isahp.y2013.001>
- Sinha, M., Camgöz Akdağ, H., Tarım, M., Lonial, S., & Yatkın, A. (2013). QFD application using SERVQUAL for private hospitals: a case study. *Leadership in Health Services*, 26(3), 175–183. <https://doi.org/10.1108/LHS-02-2013-0007>
- Siregar, I. (2019). Application Quality Function Deployment to Improve Quality of Patient Service in Hemodialysis Installation. *IOP Conference Series: Materials Science and Engineering*, 598(1), 0–4. <https://doi.org/10.1088/1757-899X/598/1/012038>
- Venkateswarlu, C., & Birru, A. K. (2012). Integrated Quality Function Deployment as a Tool for Quality Achievement in Healthcare. *International Journal of Applied Industrial Engineering*, 1(2), 80–92. <https://doi.org/10.4018/ijaie.2012070106>
- Wibawa, J., Meyliana, Widjaja, H. A. E., & Hidayanto, A. N. (2016). Integrating IS Success Model, SERVQUAL and Kano Model into QFD to improve Hospital Information System quality. *Proceedings of 2016 International Conference on Information Management and Technology, ICIMTech 2016, November*, 29–34. <https://doi.org/10.1109/ICIMTech.2016.7930297>
- Wood, L. C., Wang, C., Abdul-Rahman, H., & Jamal Abdul-Nasir, N. S. (2016). Green hospital design: Integrating quality function deployment and end-user demands. *Journal of Cleaner Production*, 112, 903–913. <https://doi.org/10.1016/j.jclepro.2015.08.101>
- Yamani, A. Z., & Munang, A. (2019). Rancang Bangun Alat Panjat Untuk Penderes Nira Kelapa Di Kabupaten Banyumas. *Spektrum Industri*, 17(1), 87. <https://doi.org/10.12928/si.v17i1.12727>
- Yeganegi, K. (2020). The integration of QFD Technique and Value Engineering and its Applying in a Healthcare Center. *SSRN Electronic Journal*, 650–659. <https://doi.org/10.2139/ssrn.3601792>
- Yeh, T., & Lai, H. . (2015). Evaluating the effectiveness of implementing quality management practices in the medical industry. *Springer*, 19(October), 102–112. <https://doi.org/https://doi.org/10.1007/s12603-014-0486-4>