Bibliometric Analysis of Graduate Dissertations Written Based on Quality Function Deployment (QFD) Method: An Overview of Health Management Profile

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A B S T R A C T

Innovative and distinctive ways of doing business have emerged in countless sectors from past to present. Organizations serving in the health sector have also aimed to continue their service offerings in the best way by keeping up with innovations and differences. For this purpose, Quality Function Deployment (QFD) emerges as a method used for health institutions. Postgraduate thesis studies carried out with the method of Quality Function Deployment (QFD) in Turkey, which were published between the years 1995-2020 in YÖK's Thesis search engine (Yöktez), were included in the research. Bibliometric analysis technique was used in this study and in order to analyze the postgraduate theses produced in the field of search was made with the in Turkish and English on these keywords "Kalite Fonksiyon Göçerimi", "Kalite Fonksiyon Yayılımı", "Kalite Evi", "Kalite Yayılımı", "Kalite Göçerimi", "Kalite İşlev Yayılımı", "Kalite Fonksiyon Açınımı", "Quality Function Deployment", "House of Quality" ve "Quality Function Evolution" in YÖK's Thesis search engine (Yöktez). Subsequently, 154 theses were reached and evaluated within the framework of bibliometric features. It is aimed to present a bibliometric analysis of Quality Function Deployment (QFD) studies for researchers and to reveal unstudied issues or shallower points on the subject.

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INTRODUCTION

The importance of time and quality is increasing day by day for health institutions and organizations are looking for new management and production techniques. When compared with traditional models the Quality Function Deployment (QFD) Method, which can provide numerous contributions to organizations, if can be fully implemented in processes, it plays a critical role in better understanding the wishes of the individuals receiving service, increasing the quality and the management of the organizations.

Academic studies related to quality in the field of health contribute and guide numerous professionals, especially health managers. The Quality Function Deployment (QFD) Method, which has a deep-rooted history among the studies related to quality, is only recently gaining popularity in the Turkish literature. There are different researches and studies in which the method has an application area in health services or institutions, albeit limited (Kolodinsky, 1995).

In this study, starting from the idea of examining the studies on Quality Function Deployment (QFD), it has been tried to examine how the method has a share in health services. It is aimed to provide researchers with a bibliometric analysis of Quality Function Deployment (QFD) studies and to reveal unstudied issues or shallower points on the subject. The importance of Quality Function Deployment (QFD) Method in health services and bibliometric analysis are mentioned and the analysis of the thesis studies on Quality Function Deployment (QFD) is included.

Literature Review: Conceptual Framework of Quality Function Deployment (QFD)

The constantly changing demands and needs of individuals have become one of the important points that different sectors and professionals serving in these sectors should focus on. Professionals have to build strategies focused on strong relationships and communication that create value for individuals. The Quality Function Deployment (QFD) Method is exactly what we encounter in these matters (Cohen, 1995). The method works on the basis of the "*Voice of the Customer (VoC)*" phenomenon, which is one of its unique concepts and is widely used in product, process or service design.

QFD is a planning and quality improvement tool that is used before the production phase of a service or product starts and is used until the final stage. The method is based on the wishes and needs of the customers from the first stage of the process, and thus, the process is completed with an application in which errors are relatively minimized (Lowe and Ridgway, 2000).

Although QFD is mostly used in organizations that offer production output, it is seen that organizations with service output also prefer and apply this method. QFD can be used to integrate the experience of the professionals, customers, or the real requests that are overlooked, with the product, who focus on technical details in the processes in the production enterprises. In addition, the QFD Method is an significant tool in increasing the existing service quality in service enterprises (Martins and Aspinwall, 2001).

QFD is a proactive quality improvement tool that takes customers' wishes and needs as input. The method has a unique working format. QFD works with the matrices system. A matrix has two basic spines horizontally and vertically (Azadi and Saen, 2013). Although there are various models of QFD developed by different people, the QFD implementation process generally consists of 4 stages. These stages are (Shrivastava and Verma, 2014);

- Stage 0, Planning
- Stage 1, Determination of Customer Requests and Needs
- Stage 2, Create the House of Quality
- Stage 3, Evaluation of Outputs

1. Stage 0, Planning

At this stage, where the first steps of QFD are taken, the organization and customers to which the method will be applied are defined. Full support from the organization regarding the work is provided, which is critical for the QFD method to work properly and for the process to progress. The product or service on which the QFD will be operated is decided. The QFD team and an implementation schedule are prepared. Matters such as the budget and materials that will be needed are determined and work is started for their supply.

2. Stage 1, Determination of Customer Requests and Needs

At this stage, where the concept of "*Voice of the Customer*" is based, the needs and wishes of the customers constitute the basic data. The most important stage of the QFD process is Stage 1, where the customer's voice is listened to. Because, the working subjects to be focused on are determined according to the wishes and needs of the customers and the process is started in QFD studies (Schubert, 1989).

3. Stage 2, Create the House of Quality

It has been stated before that the QFD Method has a unique working principle. Whichever of the models related to QFD is preferred, the first and basic matrix of the method is the "*House of Quality*". The data collected from the customers, that is expressed as "*Voice of the Customer*", are placed on the horizontal parts designed in this basic matrix. On the vertical sections, "*Technical Answers*" created for each customer requirement are placed. The relationships

between these parts form the output of the House of Quality matrix. Figure 1 shows the setup of the House of Quality Matrix and the sub-matrices involved.
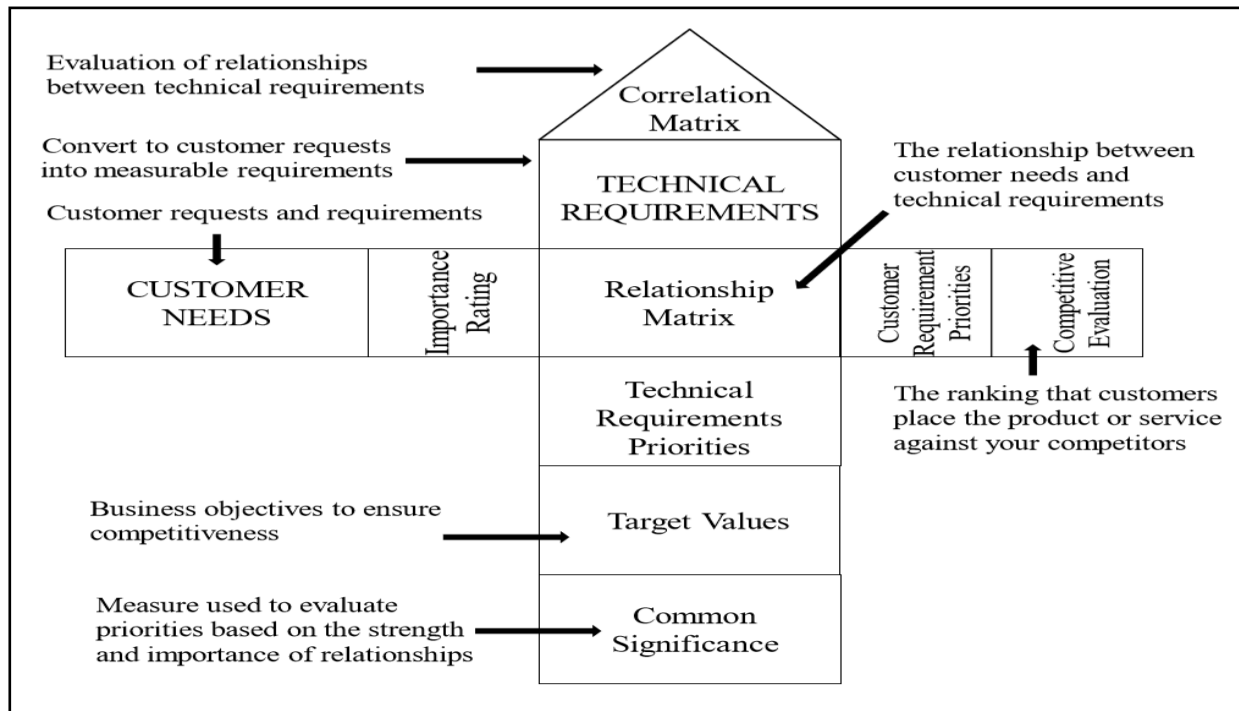

Figure 1. House of Quality (HOQ) Matrix (Fung, 1999)

4. Stage 3, Evaluation of Outputs

In the evaluation of the outputs, which is the final stage of the QFD method, the consideration of the transactions made throughout the process is made. However, the QFD method is not formed at this final stage. Outputs are evaluated and analyzed in every transaction made throughout the process. This minimizes possible errors.

MATERIALS AND METHODS

Purpose of the Research

The Quality Function Deployment Method (QFD) is a quality improvement tool generally used in production-based businesses. It is known that this method can also be used for service businesses. In both Turkish literature and foreign literature, there are studies in which the method is used for health institutions that are a service business. The main problem of this study is to determine the applications of the QFD method in service enterprises, where there are relatively few studies compared to production enterprises, and to determine the share of health services-related research in postgraduate theses.

The purpose of this research is to provide researchers with detailed information about the postgraduate thesis on the Quality Function Deployment (QFD) Method and to help researchers develop a new perspective on this method, which can be used in quality improvement tools in health services.

Scope, Method and Restrictiveness of Research

In line with the research problem and purpose stated above, YÖK's Thesis search engine (Yöktez) was used to analyze the postgraduate thesis produced in the field of Quality Function Deployment (QFD). Thesis studies published between 1995-2020 were included in the research. Yöktez has been chosen as a data source because it is the research area with the highest access to academic information on postgraduate thesis in Turkey. Postgraduate thesis studies published outside of Yöktez are excluded from the scope.

Within the scope of the study, all published thesis studies were transferred to the SPSS 22.0 (Statistics Program for Social Sciences) package program and all calculations were carried out through this program. When scheduling that research in order to analyze the postgraduate theses produced in the field of searched in Turkish on these keywords "*Kalite Fonksiyon Göçerimi*", "*Kalite Fonksiyon Yayılımı*", "*Kalite Evi*", "*Kalite Yayılımı*", "*Kalite Göçerimi*", "*Kalite İşlev Yayılımı*", "*Kalite Fonksiyon Açınımı*", also searched in English on these keywords "*Quality Function Deployment*", "*House of Quality*" and "*Quality Function Evolution*" in YÖK's Thesis search engine (Yöktez). Totally of 10 different keywords related to the subject were searched. While choosing these keywords, the previous studies in the academic literature were examined and the terms used there were compiled.

Analysis Methods of Research

The bibliometric analysis method was used on the thesis. Bibliometric analysis is one of the most convenient methods used in the analysis of resources in a field. Although the usage areas of bibliometric studies are extremely wide, they have been widely used by various disciplines for a long time. Because they make a significant contribution to the recognition of certain areas of interest, to draw attention to shallow issues in known study areas, and to identify unstudied areas as well as study areas. Bibliometric studies, provides a general picture of a research area that can be classified by elements such as articles, authors, or journals (Chun-Hao and Jian-Min, 2012). There are various definitions of bibliometrics put forward by different researchers. Bibliometrics is a method for the application of mathematics and statistics to the written communication environment in order to understand the nature and course of a discipline (Pritchard, 1969). In another definition, bibliometrics is the quantitative study of physically published units or bibliographic units, or both (Broadus, 1987). Bibliometrics can be expressed as the criterion of texts and knowledge in simpler definition (Norton, 2001).

Some features in the thesis discussed in this study were analyzed by creating categories. By examining the different features of the studies conducted in a field, a contribution is made to the academic literature thanks to the findings obtained. It is possible to make these evaluations thanks to bibliometric studies. Bibliometrics is a useful contemporary tool that enables researchers to examine research areas, evaluate outputs and research results (Grant et al. 2000). Various disciplines in economics and management have used bibliometric studies either to help us understand previously analyzed data or to show us possible hidden patterns that could be very interesting (Neely, 2005; Wagstaff and Culyer, 2012). Examining the publications that have been put forward in certain periods on any field is important in terms of revealing the developments and progresses. The findings obtained through bibliometric analysis not only provide information about the progress in the sciences and the stages they have gone through, but also enable future evaluations (Kalyane and Sen, 1995).

In this direction, the theses included in the study were analyzed in contexts such as the years they were published, genres, languages, universities, departments and institutes. The key word forming the backbone of the study was determined as "*Quality Function Deployment*". In addition, Turkish and English keywords related to the method were also searched. As a result of the research and the classifications created, the findings on QFD in health services and health management are also included.

RESULTS

Findings about Thesis Studies

The yearly distribution of thesis studies between the years 1995-2020 included in the study is as shown in Table 1. As can be seen in the Table, the three years in which the most thesis studies were published were 2019, 2014 and 2007, respectively.

Table 1. Years of Thesis Studies

| Years of Thesis	N	%
1995	1	0.64
1996	1	0.64
1997	1	0.64
1998	1	0.64
1999	4	2.59
2000	3	1.94
2001	2	1.29
2002	4	2.59
2003	6	3.89
2004	3	1.94
2005	8	5.19
2006	9	5.84
2007	11	7.14
2008	4	2.59
2009	9	5.84
2010	7	4.54
2011	7	4.54
2012	6	3.89
2013	3	1.94
2014	11	7.14
2015	9	5.84
2016	5	3.24
2017	7	4.54
2018	7	4.54
2019	18	11.68
2020	7	4.54
Total	**154**	**100.0**

When the types of thesis are examined. it is seen that 33 of them are doctoral thesis and 121 of them are master's thesis out of a total of 154 studies. Among the thesis included in the research. 21.43% of them are doctoral thesis and 78.57% of them are master's thesis. as seen in Graph 1.
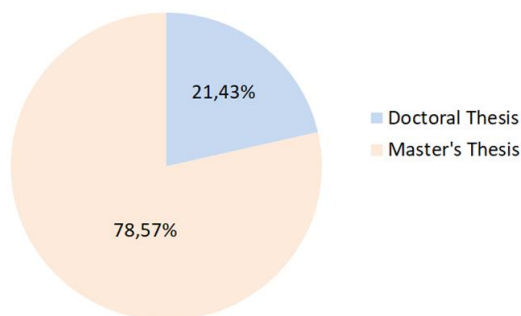

Graph 1. Types of Thesis

The written language of 133 of them is Turkish and the written language of 21 of them is English out of 154 studies. It is seen that 86.36% of the theses are written in Turkish. And 13.64% in English in Graph 2.
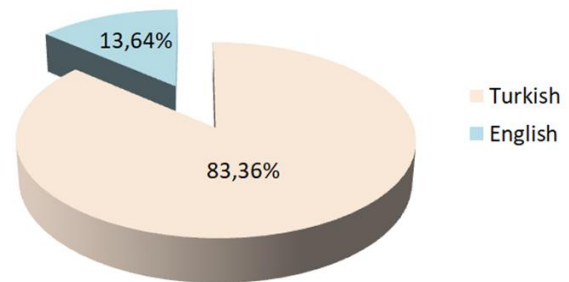
Graph 2. Written Language of Thesis

It has been determined that. 129 full texts are open to access and 25 full texts are not accessible of the 154 thesis studies reached. It is seen that the full text of 83.76% of the published thesis studies is open to access. and the full text of 16.24% is not accessible in Graph 3.
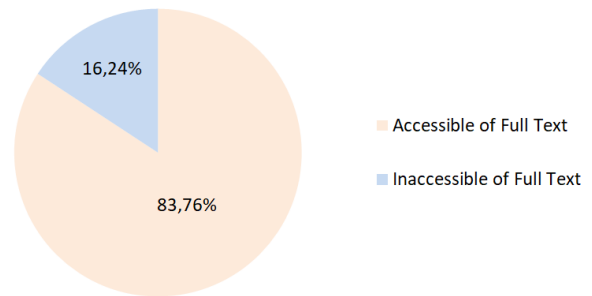
**Graph 3.** Accessibility Status of the Full Text

Thesis Studies by Universities

The distribution of the thesis studies on QFD according to universities is given in Table 2. According to this Table. the three universities with the highest number of studies on QFD were Istanbul Technical University. Dokuz Eylul University and Gazi University. respectively.

Table 2. Thesis Studies at Universities

Name of the Universities	Number of Thesis (N)	Percentage of Thesis (%)
Akdeniz University	2	1.29
Anadolu University	1	0.64
Ankara University	1	0.64
Bahcesehir University	1	0.64
Balıkesir University	3	1.94
Baskent University	1	0.64
Beykent University	3	1.94
Bilecik Seyh Edebali University	1	0.64
Bogazici University	1	0.64
Çağ University	1	0.64
Çukurova University	1	0.64
Dokuz Eylül University	22	14.28
Dumlupınar University	4	2.59
Düzce University	1	0.64
Ege University	2	1.29
Eskişehir Osman Gazi University	5	3.24
Fatih University	1	0.64
Galatasaray University	3	1.94
Gazi University	11	7.14
Gaziosmanpaşa University	1	0.64
Gümüşhane University	1	0.64
Hacettepe University	2	1.29
İnönü University	1	0.64
İstanbul Arel University	1	0.64
Istanbul Technical University	23	14.93
Istanbul Commerce University	1	0.64
İstanbul University	2	1.29
İzmir University of Economics	1	0.64
İzmir Kâtip Çelebi University	1	0.64
İzmir Institute of Technology	1	0.64
Karadeniz Technical University	3	1.94
Kırıkkale University	1	0.64
Kocaeli University	3	1.94
Maltepe University	1	0.64
Manisa Celal Bayar University	8	5.19
Marmara University	7	4.54
Nevsehir University	1	0.64
Ondokuz Mayıs University	2	1.29
Middle East Technical University	2	1.29
Pamukkale University	1	0.64
Sakarya University	1	0.64
Selçuk University	3	1.94
Sivas Cumhuriyet University	1	0.64
Suleyman Demirel University	3	1.94
Uludag University	4	2.59
Yalova University	1	0.64
Yaşar University	2	1.29
Yeditepe University	2	1.29
Yıldız Technical University	5	3.24
Yüzüncü Yıl University	1	0.64
Total	**154**	**100.0**

Among 50 universities in total. 39 universities where thesis studies are conducted are State Universities and 11 universities are Private/Foundation universities. It is seen that 78% of the universities where the studies are conducted are State Universities and 22% are Private/Foundation Universities in Graph 4.
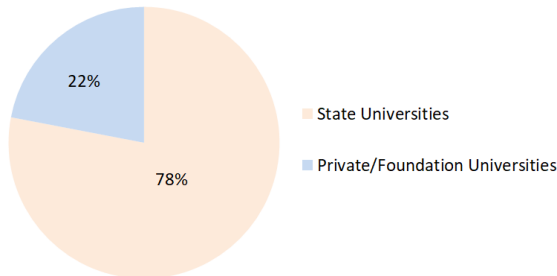
**Graph 4.** Types of Universities where Thesis Are Conducted

A total of 154 thesis have been published. 137 of which have been published within State Universities and 17 of which have been published Private/Foundation Universities. It is seen that 88.96% of the published thesis studies were done be within the structure of State Universities. and 11.04% of them were made within the structure of Private/Foundation Universities in Graph 5.
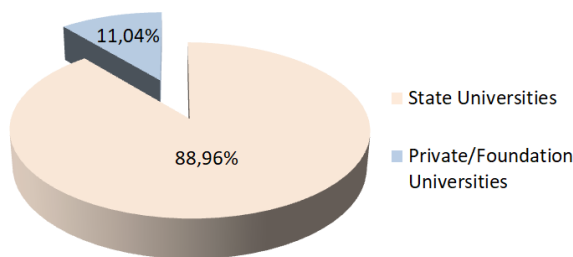
Graph 5. Distribution of Published Thesis According to University Types

Thesis Studies by Institutes and Departments

It can be found in which departments the thesis studies published on QFD are carried out in Graph 6. Accordingly. the Institute of Sciences ranks first with a rate of 52.6%.
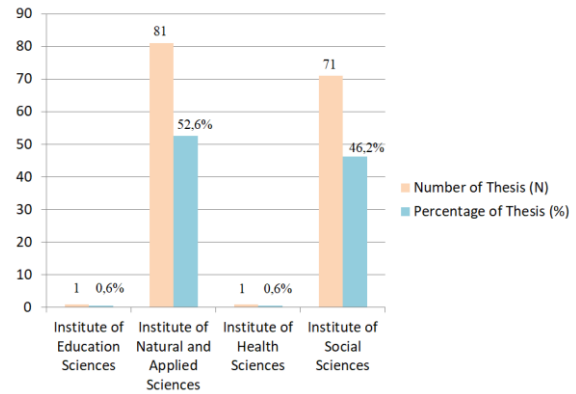
Graph 6. Distribution of Published Thesis According to Institutes

It is seen in which departments the thesis studies are carried out in Table 3. Accordingly. the Department of Business Administration ranks first with 36.36%. the Department of Industrial Engineering ranks second with 29.2%. and the Department of Architecture ranks third with 5.1%.

Table 3. Distribution of Thesis According to the Departments

Departments	N	%
Actuarial Sciences	1	0.6
Computer Engineering	2	1.2
Maritime Transportation Management Engineering	2	1.2
Maritime Business Management	1	0.6
Education and Training	1	0.6
Econometrics	3	1.9
Industrial Engineering	45	29.2
Marine Engineering	1	0.6
Food Engineering	2	1.2
Clothing Industry and Fashion Design	1	0.6
Civil Engineering	5	3.2
Statistics	3	1.9
Business	56	36.4
Management Engineering	2	1.2
Business Administration	1	0.6
Quality Engineering	1	0.6
Mining Engineering	1	0.6
Mechanical Engineering/Machine Education	4	2.5
Metallurgical Engineering	3	1.9
Architecture	8	5.1
Health Management/Health Institutions Management	3	1.9
Total Quality Management	3	1.9
Tourism Management/Tourism Management and Hotel Management	3	0.6
International Logistics Management	1	0.6
International Trade and Business	1	0.6
Total	**154**	**100.0**

The department of business. where the most thesis studies are carried out. has 56 theses. 46.42% percentage of these studies are based on service output. while 53.58% are based on production output. Doctoral dissertations constitute 26.92% of the studies based on service output. Master's dissertations have a rate of 73.08%. On the other hand. doctoral dissertations have 30% percentage in the studies based on production output. while master's dissertations have 60% percentage. 28.27% of the dissertations prepared in the department of business on QFD are doctoral studies and 71.73% of them are master's studies. As a result of these rates. it is seen that the studies within the framework of the business department focus on the production output and also the doctoral dissertations in the field have a lower rate than the master's dissertations.
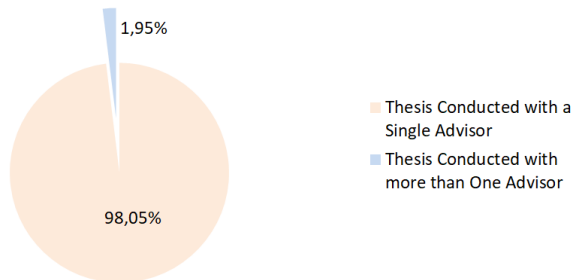
The second department in which the most studies have been carried out on QFD is Industrial Engineering with 45 dissertations. While 51.11% percentage of these dissertations belong to the studies based on the service output. 48.89% belong to the studies based on the production output. Among the studies based on service output. doctoral dissertations have a rate of 13.04%. while master's dissertations have a rate of 86.6%. Also. in studies based on production output. doctoral dissertations have a rate of 22.72%. while master's dissertations have a rate of 77.28%. 17.77%

rate of the dissertations prepared in the department of Industrial Engineering on QFD are doctoral studies and 82.23% of them are master's studies. As a result of these rates. it is seen that the studies prepared within the framework of the industrial engineering department focus on the studies based on the service output. albeit with a by a hair of 2.22%. Also the doctoral dissertations in the field have a lower rate than the master's dissertations.

The third department in which the most studies have been carried out on QFD is architecture with 8 dissertations. While 47.61% of these studies are dissertations based on service output. 52.39% of them are studies based on production output. Of the studies based on service output. rate of 60% are doctoral dissertations and 40% are master's dissertations. In studies based on production output. rate of 63.63% belong to doctoral dissertations. while 36.37% belong to master's dissertations. 61.90% percentage of the dissertations prepared in the department of architecture on QFD are doctoral studies and 38.1% of them are master's studies. As a result of these rates. it is seen that there are more doctorate studies on QFD in architecture. unlike the departments of business and industrial engineering. In addition. it is seen that the dissertations prepared in the field. focus on the production output with a difference of 4.78% percentage.

Graph 7. Number of Advisors of the Thesis Conducted

The titles of the academicians advising the thesis studies are reached in Graph 8. Of the 158 academicians who supervised the thesis studies. 61 were titled as "*Professor Doctor*". 47 of them as "*Associate Professor*". 49 of them as "*Assistant Professor*". and 1 of them as "*Doctor*" whose appears to be.
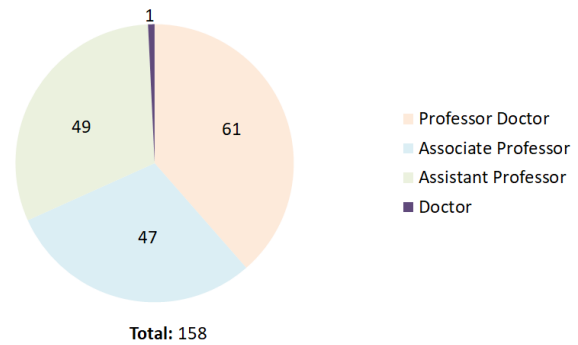
Findings Regarding Researchers and Academicians

In the 154 thesis studies analyzed. 55% of the researchers were women and 45% were men. There are a total of 158 academicians advising these thesis studies on QFD. 32% of these academicians are women and 68% are men. It is seen that the rate of theses conducted with one supervisor is 98.05% and the rate of studies conducted with more than one advisor is 1.95% in the Graph 7.

Thesis Conducted with a Single Advisor
Thesis Conducted with more than One Advisor

1,95%
98,05%

1
49
61
47

Professor Doctor
Associate Professor
Assistant Professor
Doctor

Total: 158

Graph 8. Titles of Academic Advisors

DISCUSSION AND CONCLUSION

The situations identified in this study. in which the theses on the Quality Function Deployment (QFD) Method were analyzed bibliometrically. can be summarized as follows;

- ✓ Although studies on the subject show a downward trend from time to time. it is seen that it has an upward trend especially after 2007.

- ✓ Thesis on Quality Function Deployment (QFD) are mostly concentrated in the Department of Business.

- ✓ QFD studies conducted in Departments of Industrial Engineering are also in the second rank.

- ✓ Thesis on Quality Function Deployment (QFD) in health services are limited compared to other fields. Among the 154 thesis published on QFD. the rate of those related to health services is 3.89%.

- ✓ The rate of thesis about of the Health Management/Health Institutions Management-Management departments is 1.94%.

- ✓ Regarding the subject. it has been determined that the number of theses from State Universities is higher than that of Private/Foundation Universities.

- ✓ There is no thesis study related to QFD. which came out of different departments. except for the

aforementioned 25 departments. In addition. 40% of thesis studies from the departments were limited to a single study. That is to say. only one thesis was published between 1995-2020 by 25 different departments about of QFD.

As a result of the findings. it has been determined that the thesis studies prepared in the field of health management have a low rate. It is suggested to researchers that they can conduct studies in shallow areas related to QFD. As a result. researchers can contribute to the literature and health service providers by conducting various researches on QFD in Health Management.

Conflict of Interest:

The authors declare that they have no conflict of interest.

Ethical Approval (Must be answered):

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