QUALITY IMPROVEMENT DESIGN OF EDUCATION SERVICES IN GAGAS CERIA KINDERGARTEN BY USING QUALITY FUNCTION DEPLOYMENT (QFD) METHOD

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Abstract

Nowadays, community is aware of the importance of the growth and development of children in education. Parents choose the best kindergartens for their children. Gagas Ceria Kindergarten is one of the best kindergartens located in the middle of Bandung City, offers early childhood education services in accordance with the concept of modern education. Presently, there has been a decrease in term of the number of internal applicants, in the last five years. Internal applicants are the students who come from the Playgroup of Gagas Ceria Foundation. This shows that the level of customer loyalty of Gagas Ceria Kindergarten has decreased. To solve this problem, Gagas Ceria Kindergarten plans to improve the quality of education service management to achieve the target number of applicants in the next school year. This research study aimed to provide recommendations to improve the quality of education service management based on the eleven true customer needs. This study employed Quality Function Deployment (QFD). There were three stages conducted in this study. The first stage determines the priority of the technical characteristics developed using the QFD first iteration, House of Quality (HoQ). The second stage was the development of alternative concepts chosen for the concept that will be developed by Gagas Ceria Kindergarten. The third stage was to determine the critical part priority using the QFD second iteration, Part Deployment. The results of this research study are seven priority technical characteristics and twenty-five priority critical parts which become the formulations for the thirteen final recommendations.

Keywords: House of Quality, Part Deployment, Quality Function Deployment, Gagas Ceria Kindergarten, True Customer Needs

1. Introduction

Currently there is an increase number of kindergartens in Indonesia, especially in the area of Bandung City, West Java. This can be seen from the growth of kindergarten students' number and the growth of kindergarten schools' number in Bandung. Based on data from the Ministry of Education and Culture of Republic Indonesia, there are five sub-districts in the highest number of students and kindergartens [3]. One of them is Lengkong Subdistrict which is in the third place with 801 kindergarten students. Compared to the number of kindergarten schools, Lengkong Subdistrict ranks in the first place having 24 kindergartens. This shows that with the large number of students and kindergartens in Bandung, Lengkong Subdistrict has the highest competitiveness.

Gagas Ceria Kindergarten is selected of the research object, which selected based on the data from the Ministry of Education and Culture of Bandung City (2018) which stated that Gagas Ceria Kindergarten is one of the A-accredited kindergartens in Lengkong Subdistrict area [4]. This shows that at one time the Gagas Ceria Kindergarten could be used as a comparative study of other kindergartens in the region. Located in the center of Bandung, this kindergarten determines the market segment of the upper-middle class.

Based on the interviews with stakeholders of Gagas Ceria Kindergarten, there were two groups enrolling in Gagas Ceria Kindergarten, namely external applicants (ie those who were not from Gagas Ceria playgroup) and internal applicants (ie those who were from Gagas Ceria playgroup). Every year, Gagas Ceria Kindergarten always prioritizes internal applicants when accepting new students. Gagas Ceria parties determines the customer loyalty level of the Gagas Ceria Foundation for the offered services. In fact, number of the internal applicants in each year does not reflect the expectations of Gagas Ceria parties. This can be proven in Figure 1 regarding the number of applicants and the number of students received based on the target determined by Gagas Ceria Kindergarten.

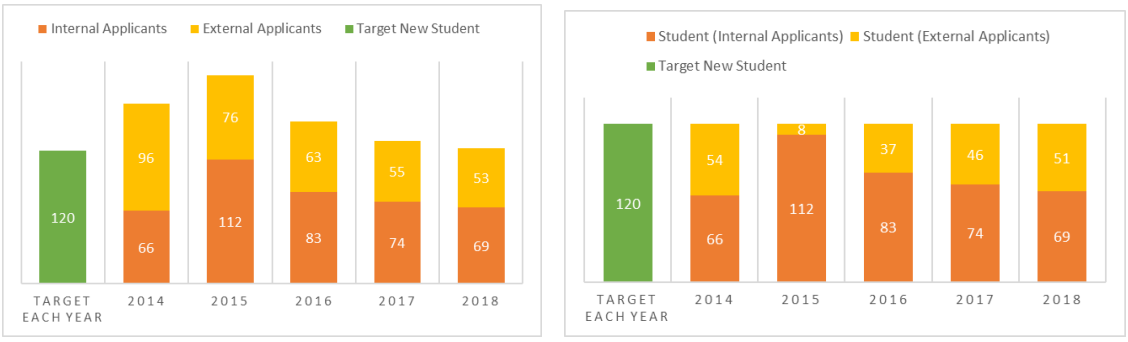


Figure 1 Comparison of Internal and External Applicants with Target New Students
(Source: Gagas Ceria Kindergarten, 2018)

In Figure 1, it can be seen that the target number of students in Gagas Ceria Kindergarten from the past five years are the same, which is 120 students. Every year, the total number of external and internal applicants always exceeded the specified target. It can be concluded that every year there are many people interested to enroll their children to Gagas Ceria Kindergarten. As mentioned earlier, Gagas Ceria Kindergarten focuses more on internal applicants, so that Gagas Ceria Kindergarten will accept all internal applicants. The remaining acceptance quota will be filled from the external applicants. Based on the charts above, each year the number of internal applicants of Gagas Ceria Kindergarten has decreased. It shows the level of customer loyalty has decreased, so that it becomes the concern of Gagas Ceria Kindergarten to increase the quality of its services.

Based on the interview with the representatives of Gagas Ceria Kindergarten, especially Gagas Ceria Kindergarten has several competitors' kindergartens that implement the montessori curriculum. The competitors are Pascal Montessori School dan Bandung Montessori School. The main reason for Gagas Ceria Kindergarten choosing both competitors is because according to Gagas Ceria Kindergarten, currently some parents prioritize the montessori curriculum which focuses on children's interests and development. Gagas Ceria Kindergarten intends to implement the curriculum to improve the quality of educational services it has. Figure 2 shows a comparison of the existing conditions of Gagas Ceria Kindergarten with competitors.

Aspects	Gagas Ceria Kindergarten Conditions	Pascal Montessori School Conditions	Conditions Bandung Montessori Sc
Facilities	Narrow parking lot. Classrooms are not in accordance with the interests and development of children.	Narrow parking lot. Classrooms are in accordance with the interests and development of children.	Large parking lot. Classrooms ar accordance with the interests development of children.
Activities	Lack of supporting activities in the form of music, sports, science, technology and robotic, and religious activities.	Supporting activities in the form of music, sports, science, technology and robotic and religious activities have been held every day according to children's interests and development.	Supporting activities in the form of m sports, science, technology and roboti religious activities have been held ever according to children's interests development.
'arents and Staff	Complaints or comments from parents are not responded quickly	The response of parents has been treated responsively, in addition, communication is carried out through an application and email.	The response of parents has been tr responsively. In addition, communicat carried out through an email.
urriculums	Not focusing on children's' interests and talents.	Focus on children's interests and talents by adhering to the montessori and inclusion curriculum.	Focus on children's interests and taler adhering to the montessori and incl curriculum.
Teacher	Teachers' concern about children's development and the development of the level of children's education are still lacking.	Teachers' concern for children's development is very good, this is supported by the holding of training for educators every period.	Teachers' concern for childe development is very good, this is supp by the holding of training for educ every period.

Figure 2 Comparison Study with Competitors
(Source: Preliminary Survey, 2018)

The result of the preliminary survey was obtained through depth interviews and observations with parents of kindergarten students in Gagas Ceria and kindergarten students' competitors. Based on the results of the comparative study, the existing conditions of Gagas Ceria Kindergarten have

shortcomings in facilities, activities, communication, curriculum, and teaching staff, so that the quality of education services is needed by identifying customer needs in previous studies using the Education Quality and Refined Kano Method and adjusting to level object ability. The results of identification of customer needs and competitor comparative studies will be input variables to produce technical characteristics and critical parts to develop recommendations in this study. Based on the problems experienced by Gagas Ceria Kindergarten, it can be stated that refinement and improvement in the quality of education services are needed so that Gagas Ceria can reach the target.

2. Literature Review

2.1 Quality Function Deployment (QFD) Method

Quality Function Deployment (QFD) is a method used to systematically plan or develop products or services that allow researchers to define in detail the needs and desires of customers, and evaluate the ability of a product or service systematically to meet customer needs [1].

2.2 QFD First Iteration (House of Quality)

QFD first iteration is the stage of identifying true customer needs to produce technical characteristics which will then be developed into alternative concepts. Changes in true customer needs require a matrix that can describe the needs and desires of customers. The matrix is referred to as House of Quality (HoQ) [2]. Figure 3 shows HoQ matrix in general.

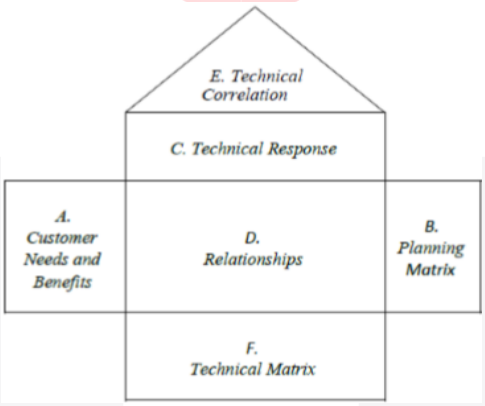


Figure 3 House of Quality
(Source: Cohen. 1999)

2.3 Concept Development

Concept development is a development phase that is based on the technical characteristics of QFD first iteration which is derived from the QFD second iteration stage. The concept development itself consists of two stages, namely the stage of determining the concept and the stage of concept selection [5]. The purpose of developing the concept is to help companies determine the direction of improvement of the concept for the better.

2.4 QFD Second Iteration (Part Deployment)

QFD second iteration is the component planning stage in the product design and development process. In general, the QFD second iteration is called as part deployment. Figure 4 shows the matrix or part deployment in general.

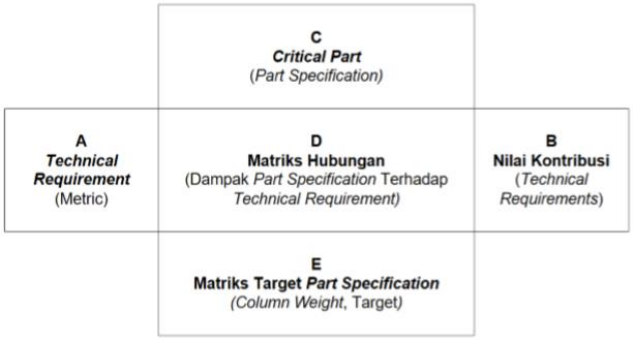


Figure 4 Part Deployment
(Source: Cohen, 1999)

3. Research Method

In Figure 5 below, explain the conceptual model carried out in this study.

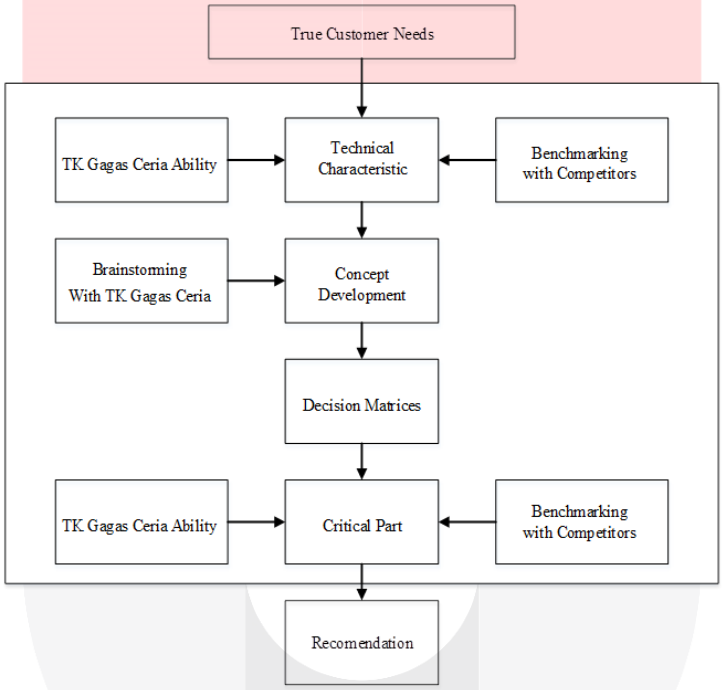


Figure 5 Conceptual Model of Research

The first stage in this research is to get true customer needs data. The attributes obtained are based on previous research with the integration of Education Quality and Refined Kanos. These attributes are used as input variables in this study. In addition, it was also obtained the value of customer expectations for each customer needs that will be used in the search for adjusted importance value. Furthermore, a combination of customer needs and technical characteristics is used using Quality Function Deployment (QFD), so that the technical characteristics that are appropriate to the customer's needs are obtained.

The second stage is the concept development stage. Concept development is carried out through two stages, namely the stage of concept determination and concept selection. Concept selection is based on a comparative study between reference concepts and alternative concepts. Concept development aims to get critical parts from the incorporation of technical characteristics and the development of predetermined concepts.

The third stage is to determine the priority value of each critical part which is the result of this study. Determination of critical part priority values is obtained based on the results of a comparative study with competitors, the company's ability to develop products, measurement of direction of goodness value for each critical part, and targeting that must be achieved by each critical part. The

results of the critical part priority values will then be developed into recommendations for improving service quality.

4. Analysis and Discussion

The initial stage carried out in collecting data is giving the code to true customer needs that have been obtained from previous research, which is about designing the educational service needs of Kindergarten Ceria by using the integration of Education Quality and Refined Kanos. Table 1 shows the results of the true customer needs code, and Table 2 shows the NKP value, and the Kano category of true customer needs is selected

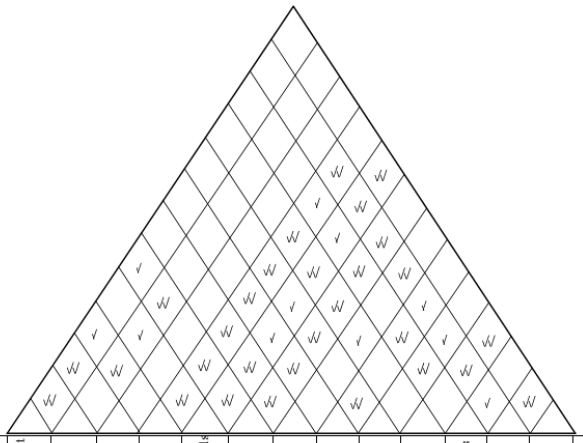
Table 1 True Customer Needs Code

No	True Customer Needs	Code
1	Classrooms are bright and have a comfortable temperature for learning and playing	SPF-01
2	Arranging the room with solid colors to increase children's motivation in learning	SPF-02
3	Adequate supports facilities for parents' accommodation and clean and well-maintained school facilities	SPF-03
4	Health service performance that is in accordance with children's health needs	SPF-04
5	Planting basic religious concepts towards the moral values of children's lives	CUS-01
6	Teachers are able to understand the wants and needs of children	INT-02
7	Teachers are able to understand the potential of children to develop children's talents	INT-04
8	There are extracurricular activities in the field of sports for children	ACT-01
9	There are extracurricular activities in the arts and music for children	ACT-03
10	Interaction (sharing information about children) between teaching staff and parents who routinely encourage parent involvement in the school program	PAS-01
11	School who responsive and fast response for parents' suggestions and complaints	PAS-02

Table 2 NKP Value dan Kano Category

No	True Customer Needs Code	NKP	Kano Categories
1	SPF-01	4.78	O
2	SPF-02	4.53	O
3	SPF-03	4.55	M
4	SPF-04	4.54	M
5	CUS-01	4.59	O
6	INT-02	4.78	O
7	INT-04	4.67	M
8	ACT-01	4.64	M
9	ACT-03	4.55	O
10	PAS-01	4.71	M
11	PAS-02	4.80	M

The results of eleven true customer needs will be developed into technical characteristics. Technical characteristics were obtained based on the results of discussions with the management of Gagas Ceria Kindergarten data benchmarking with competitors, namely Pascal Montessori School and Bandung Montessori School, and data from government regulations regarding the standard of kindergarten education. Next is to determine the value of the relationship between true customer needs and technical characteristics using one iteration QFD, namely House of Quality (HoQ). The results of processing data using the House of Quality matrix will be shown in Figure 6.



Matriks House of Quality

NO	Technical Requirements / True Customer Needs	Facility Operational Management Standards	Learning Support Media	School Health Standards	Learning Curriculum Standards	Academic Management Standards	Learning Method Standards	Learning Time Standards	Academic Qualifications of Educators	Educator Competency Standards	Information Provided Standards	Educator Management Standards	Learning Evaluation Standards	Media for Communication	Adjusted Importance Percentage	Ranking
		1	2	3	4	5	6	7	8	9	10	11	12	13		
1	Classrooms are bright and have a comfortable temperature for learning and playing	9	9												0.13	1
		1.157	1.157													
2	Arranging the room with solid colors to increase children's motivation in learning	9	9												0.12	5
		1.097	1.097													
3	Adequate supports facilities for parents' accommodation and clean and well-maintained school facilities	9		9											0.06	10
		0.551		0.551												
4	Health service proformance that is in accordance with children's health needs	9		9											0.06	11
		0.550		0.550												
5	Planting basic religious concepts towards the moral values of children's lives				9	9	9	9							0.12	3
					1.111	1.111	1.111	1.111								
6	Teachers are able to understand the wants and needs of children								9	9		9			0.13	1
									1.157	1.157		1.157				
7	Teachers are able to understand the potential of children to develop children's talents								9	9		9			0.06	8
									0.565	0.565		0.565				
8	There are extracurricular activities in the field of sports for children	3	9				9								0.06	9
		0.187	0.561				0.561									
9	There are extracurricular activities in the arts and music for children	9	9				9								0.12	4
		1.102	1.102				1.102									
10	Interaction (sharing information about children) between teaching staff and parents who routinely encourage parent involvement in the school program										9		9	9	0.06	7
											0.570		0.570	0.570		
11	School who responsive and fast response for parents' suggestions and complaints										3		9	9	0.06	6
											0.194		0.581	0.581		
	Probability	3	4	4	3	5	4	4	4	3	5	3	5	4		
	Unit	Element	Media	Element	Element	Element	Element	Element	Element	Element	Element	Element	Element	Media		
	Current Situation	4	3	7	7	4	6	6	1	6	4	3	3	6		
	Competitive Benchmark 1	6	3	10	9	4	6	6	3	6	4	4	4	7		
	Competitive Benchmark 2	6	3	9	8	4	6	6	2	6	4	4	4	6		
	Target	6	3	10	9	4	6	6	3	6	4	5	4	7		
	Column Weight	4.643	3.917	1.100	1.111	1.111	2.774	1.111	1.722	1.722	0.763	1.722	1.151	1.151	23.995	
	Percentage Column Weight	0.193	0.163	0.046	0.046	0.046	0.116	0.046	0.072	0.072	0.032	0.072	0.048	0.048		
	Ranking	1	2	12	9	9	3	9	4	4	13	4	7	7		

Figure 6 Data Processing in Matrix of House of Quality

Based on the House of Quality matrix, there are seven priority technical characteristics. Determination of priority technical characteristics based on the results of meeting targets adjusted to benchmarking data with competitors and women from Gagas Ceria Kindergarten. Seven priorities for further technical characteristics will be developed to determine the concept. In determining the concept, this study uses internal concepts (obtained by conducting discussions with the management of Gagas Ceria Kindergarten) and external concepts (obtained by benchmarking with competitors).

There are three choice concepts that will be determined to be developed further using the decision matrices method. The concept is the concept of A (optimization), the concept of B (innovation), and the concept of C (combination). Table 3 is a concept assessment matrix.

Table 3 Concept Assessment Matrix

Selection Criteria	Concept A	Concept B	Concept C
Effectivity	0	-	+
Efficiency	0	-	+
Eligibility	0	+	+
Ease of use	+	+	0
Estimated cost requirements	0	-	-
Total +	**1**	**2**	**3**
Total 0	**4**	**0**	**1**
Total -	**0**	**3**	**1**
Total	1	-1	2
Ranking	2	3	1
Continue?	**No**	**No**	**Yes**

Based on Table 3 above, it can be concluded that the concept chosen is Concept C. The concept of C is chosen because it has the highest-ranking value compared to other alternative concepts, as well as a combination of concept attributes that adequately meet the desired improvement targets. The C concept will be developed to produce critical parts. Critical parts are derivative results of technical characteristics obtained from the data processed using a one-time iteration QFD (House of Quality). Critical parts are obtained by brainstorming with the management of Gagas Ceria Kindergarten, benchmarking with competitors, and the results of literature studies on the regulation of early childhood education. Next is the stage of determining the value of the relationship between technical characteristics and critical parts with two iterative QFD, namely Part Deployment. Figure 7 is the result of data processing using the Part Deployment matrix.

	Direction of Goodness	TB	TB	TB	MTB	MTB	MTB	TB	TB	TB	MTB	TB	TB	MTB	TB	TB	TB	TB	TB	TB	MTB	TB	MTB	TB	MTB	TB	MTB	MTB	MTB	
	Critical Part / Technical Requirements	Facility criteria for parents	Types of facility for parents	Criteria for children's classroom facilities	Criteria for health facilities	Types of health facilities	Types of health facility equipment	Inclusion curriculum criteria	Criteria for educators of inclusion curric	Criteria for students of inclusion curriculum	Types of inclusion curriculum facilities	Montessori curriculum criteria	Criteria for educators of montessori curriculum	Types of montessori curriculum facilities	Curriculum criteria for religious and moral values	Minimum work experience	Minimum type of educator certificate	Minimum level of formal education	Criteria for improving educators quality	The organizer facilities of educators quality improvement	Training frequency	Certification frequency	Outbound frequency	Seminar frequency	Types of seminar activities	Comparative study frequency	Daily learning evaluation procedure	Types of daily learning evaluation procedure	Criteria of communication media	Procedure of communication media	Percentage Column Weight
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	
1	Facility Operational Management Standards	9	9	9																											0.193
		1.741	1.741	1.741																											
2	School Health Standards				9	9	9																								0.046
					0.413	0.413	0.413																								
3	Learning Curriculum Standards							9	9	3	9	9	9	3	9	9	9	9	9	9	9	9									0.046
								0.417	0.417	0.139	0.417	0.417	0.417	0.139	0.417	0.417	0.417	0.417	0.417	0.417	0.417	0.417									
4	Academic Qualifications of Educators															3	9	9													0.072
																0.215	0.646	0.646													
5	Educator Management Standards																		3	9	9	9	3	9	9	9					0.072
																			0.215	0.646	0.646	0.646	0.215	0.646	0.646	0.646					
6	Learning Evaluation Standards																										9	9			0.048
																											0.432	0.432			
7	Media for Communication																												9	9	0.048
																													0.432	0.432	
	Probability	5	3	4	5	3	4	4	3	4	3	4	3	3	4	5	3	4	4	3	4	3	5	4	4	5	5	5	5	4	
	Unit	Criteria	Unit	Criteria	Criteria	Unit	Unit	Criteria	Criteria	Criteria	Unit	Criteria	Criteria	Unit	Criteria	Year	Type	Element	Criteria	Organization	Times/Year	Times/Year	Times/Year	Times/Year	Type	Times/Year	Procedure	Type	Criteria	Procedure	
	Current Situation	4	2	4	3	1	11	0	6	0	0	0	6	0	4	0	0	2	3	2	0	0	2	3	1	1	0	0	6	6	
	Competitive Benchmark 1	4	2	7	3	2	12	5	8	1	5	10	8	12	7	1	2	2	5	3	3	1	2	10	3	1	2	3	8	7	
	Competitive Benchmark 2	4	3	6	4	2	13	0	6	0	0	10	7	12	6	0	1	2	5	3	2	1	2	8	2	1	1	3	8	6	
	Target	4	3	7	4	2	13	5	8	1	5	10	8	12	7	1	2	2	5	3	3	1	2	10	2	1	2	3	8	7	
	Column Weight	1.741	1.741	1.741	0.413	0.413	0.413	0.417	0.417	0.139	0.417	0.417	0.417	0.139	0.417	0.632	1.062	1.062	0.632	1.062	1.062	1.062	0.215	0.646	0.646	0.646	0.432	0.432	0.432	0.432	19.694
	Percentage Column Weight	0.088	0.088	0.088	0.021	0.021	0.021	0.021	0.021	0.007	0.021	0.021	0.021	0.007	0.021	0.032	0.054	0.054	0.032	0.054	0.054	0.054	0.011	0.033	0.033	0.033	0.022	0.022	0.022	0.022	
	Ranking	1	1	1	24	24	24	18	18	28	18	18	18	28	18	12	4	4	12	4	4	4	27	9	9	9	14	14	14	14	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	

Figure 7 Matrix of Part Deployment

In Figure 7 above, there are 29 initial and selected critical parts of 25 critical parts to be used as development priorities. The development was carried out to determine the final recommendation for the development of educational services at Gagas Ceria Kindergarten. The following are the results of the final recommendations for the development of educational services at Gagas Ceria Kindergarten.

Table 4 Final Recommendation

Recommendations	True Customer Needs Code	
Add a comfortable waiting room facility and add a parking area that is sufficient to accommodate the guard's vehicle	SPF-03	
Add air conditioning, adjust the amount of light intensity that enters the room, and adjust the color of the room that is appropriate for the level of motivation for learning	SPF-01	
	SPF-02	
Establish criteria for handling child health and add UKS space along with complementary facilities, and add first aid kits and equipment in each classroom	SPF-04	
Add inclusion curriculum into the Gagas Ceria Kindergarten learning system and complete its supporting facilities	INT-02	
Add the montessori curriculum to Gagas Ceria kindergarten learning system and complete its supporting facilities	INT-04	
	ACT-01	
	ACT-03	
Implement curriculum on religious and moral values on a regular basis, and implement existing religious teachers	CUS-01	
Determination of a standard of at least one year of work experience in a similar field	INT-02	INT-04
Determination of minimum standards for certification belonging to educators in accordance with the current and future curriculum		
Hold training activities by using experienced and competent outside trainers to improve the quality of educators according to the right criteria		
Hold certification activities in accordance with the current and future curriculum, to support the quality of educators		
Hold seminars to all educators and parents who will be routinely done		
Determination of daily learning evaluations, so parents can know the growth and development of children significantly by using procedures that allow the delivery of information that is easy, responsive, safe, and paper less (such as applications or e-mail)	PAS-01	
Add communication media that supports responsive criteria, convenience for various parties, and safe (such as applications). Besides that, it is adapted to the media that are most commonly used by parents in communicating	PAS-02	

In Table 4, there are thirteen final recommendations produced based on 25 critical parts that have been previously determined. This final recommendation is used for the development of educational services at Gagas Ceria Kindergarten. Based on the table above, it can be concluded that thirteen recommendations that have met seven true customer needs.

5. Conclusion

The results of this study can be formulated into several conclusions, namely in the first iteration QFD stage, there are thirteen technical characteristics derived from eleven true customer needs, and seven of them are priority technical characteristics that will be developed in concept development. In the two iteration QFD, the results of concept development, 29 critical parts will be formulated and 25 of which are the critical part priorities that will be developed into recommendations. These recommendations will be an improvement in the quality of Gagas Ceria Kindergarten education services in achieving the specified targets. There are thirteen recommendations that can be used as reference sources for improving the quality of education service delivery at Gagas Ceria Kindergarten.

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