

# Service Redesign Using Factor Analysis, TRIZ, and Service Blueprint (Case study on Garuda Indonesia's sales and service office at Senayan City)

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**Abstract.** Indonesia is a country that has potential to be the one of the biggest airline industry. This potential leads the competition in airline industry more aggressive. Garuda Indonesia as the leading airline must maintain its position as a leader in Indonesian airline industry. To maintain its position, Garuda Indonesia has repaired all of its aspects, one of them is service. The most important service area that give the most complete facilities to customers and contributions to Garuda Indonesia, is sales and service office (SSO). This research is trying to suggest recommendations of service redesign on Garuda Indonesia's SSO in order to create better customer satisfaction. This research uses factor analysis to analyze the factors that contribute to the customer preferences. The result shows the duration of service delivery, facilities in waiting area and frontliner's competencies are the major factors that contribute to the failure points in sales and service office. In the next stage, the TRIZ contradiction analysis is used resulting twelve inventive principles. Furthermore, new service design of Indonesia airline's sales and service office is proposed following the principles generated in TRIZ through service blueprint.

## 1 Introduction

In last five years, number of passengers at Soekarno-Hatta International Airport increased significantly both in domestic and international flight. As a result, Garuda Indonesia as one of the most leading airline in Indonesia, will face more intense competition. In answering this challenge, Garuda Indonesia had been developed the seven drivers strategy. This strategy will maximize its business aspects in order to gain the competitive advantage for Garuda Indonesia. One of those aspects is brand and services.

The brand and service will give five-star service to customers on all of its service areas. The first touchpoint, sales and service office, is the key of service as it happens to be the first place customer and frontliner meets [1]. However, based on Garuda Indonesia Airlines, the internal assessment reported that sales and service office scored below average on customer satisfaction. The existing Uplifting Service didn't match the expected service by customer (service failure), while in fact, service has to accommodate the needs of service's stakeholders; customers, frontliners and company, so the service failure can be prevented [2].

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From previous explanation, it can be concluded two problem statements: (1) the need to study the contributed factors of customer preferences in sales and service office as an effort to understand Garuda Indonesia's customers, (2) the need to redesign the service design on sales and service office as an effort to improve the quality of Garuda Indonesia's service. The ultimate goal to be achieved is the creation of a proposed service design of the sales and service office that can meet customer preferences.

## **2 Literature Study**

### **2.1 TRIZ**

This study uses a TRIZ-based method, using factor analysis as a supporting tool in order to analyze the problem and service blueprint as the service design method for the research output. TRIZ (Theory of Inventive Problem Solving) is a systematization innovation method used for solving business problem with non-experiential domain using the knowledge base [3].

The conceptual framework comprises of five main stages. The initial input is a problem that occurs in service operations. Stage one and two analyze the original problems using various tools, such as cause and effect diagram, in order to provide insightful information for more detailed problem solving. Stage three structures the formulated problems into a typical TRIZ contradiction. Stage four uses TRIZ problem resolution tool to eliminate the contradictions. After the contradiction is successfully eliminated, it collects the innovative solutions to service design. The last stage will evaluate the generated ideas. If solutions are still not found, the problem solving process must be iterated back to the first stage in order to redefine the original problems.

### **2.2 Service Blueprint**

Service blueprint is a detailed mapping from all service activities and interactions. Service blueprint is structured into five regions and four boundaries. Five regions includes physical evidence, customer actions, onstage interaction, backstage interaction, and support process. Service blueprint divides service into onstage and backstage activities [4].

## **3 Research methodology**

### **3.1 Preliminary problem analysis**

Factor analysis method was perform to identify the existing service problems as well as to eliminate the variables that have no effect to customer preferences. The data was collected using questionnaire. The questionnaire was developed through Revised Service Quality (Servqual) and Garuda Indonesia's Uplifting Service concept in five categories, including Product Knowledge, Attitude, Skills, Proess, Facilities, and Premises, with total of 43 variables.

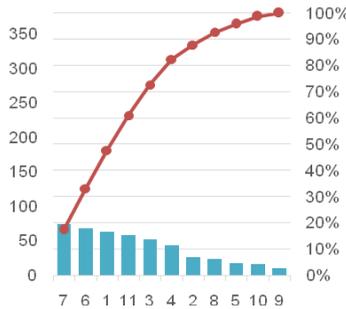
Factor analysis was performed using SPSS 16. The analysis was conducted using principal component analysis with varimax rotation and Kaiser normalisation as an extraction method. The eleven factors identified were chosen since the initial eigenvalues is more than 1.0 [5].The KMO coefficientwas .627, which meant the adequacy for principal component analysis is acceptable. The value of Cronbach's Alphawas .703 which indicated a high degree of reliability.The matrix rotation extracted eleven factors and eliminated nine variables that did not have significant value (loading < 0.55). Table 1 shows eleven factors and the characteristics that will be considered as the customer preferences or preferences in sales and service office.

To solve the service problems, these factors will be analyzed using gap analysis. Factor's gap will be analyzed using pareto analysis in order to obtain the most significant factors that must be improved in sales and service office.

**Table 1.** Factors of Customer Preferences

No	Variables					
1	Self-service machine	Computer with internet	Number of counters	Signage		
2	Customer identification	Friendly	Exciting			
3	Knowledge on promotion	Knowledge on price	Knowledge on route			
4	Advising	Problem analysis	Calling	Confident	Caring	Serving
5	Aromatherapy	Interior Design	Temperature	Ambiance		
6	Printed media	Entertainment	Queuing process			
7	Problem identification	Availability	Processing	Service duration	Seat comfort	
8	Drink and candy offering	Guidance	Sound			
9	Opening					
10	Uniform accessories					
11	Knowledge on local event					

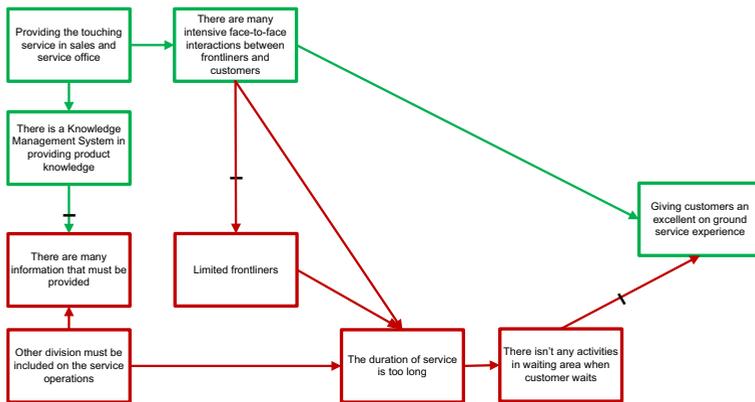
Based on the pareto chart shown in Figure 1, factor no. 7 and no. 6 must be improved in order to enhance the services in sales and service office for customers. This result will be included as the input on the problem modeling.



**Figure 1.** Pareto chart

### 3.2 Problem modeling and formulation

Problem modeling was performed using cause and effect diagram. The diagram was built using function-link-function method in order to understand the relationship among the functions in sales and service office. The cause and effect diagram was built through an intensive interview with the experts.



**Figure 2.** Cause and effect diagram

As shown in Figure 2, the cause and effect diagram successfully identified the back-end problems. First, the duration of service is too long which makes the customer wait for a long time. The involvement of other division also affects the duration of service delivery. This means the current knowledge management system still has some limitations that must be improved. There are three failure points that must be improved and will be drawn on the service blueprint. These three failure points are the duration of service, facilities in waiting area, and the knowledge of frontliners.

Based on the cause and effect diagram, problem statements are formulated as shown in Table 2. After problem formulation, this research used TRIZ service parameters on the contradiction analysis.

**Table 2.** Problem Statements

No	Problem Statement
1	Find an alternative way to obtain an excellent on-ground service experience by providing many face-to-face interactions and eliminating a long service duration.
2	Find an alternative way to obtain an excellent on-ground service experience by does not produce a long waiting time.
3	Find a way to eliminate, reduce, or prevent a long service delivery in order to avoid a long waiting time under the condition of many important information provided by other division.
4	Find an alternative way to eliminate, reduce, or prevent a long service delivery in order to avoid a long waiting time under the condition of limited frontliners.
5	Find a way to increase the effectiveness of providing an excellent on-ground service experience to customers.
6	Find a way to obtain an excellent on-ground service experience by does not require many face-to-face interactions.
7	Find additional benefits from a long service delivery.
8	Find additional benefits from a long waiting time
9	Find additional benefits from the knowledge management system.
10	Find a way to increase the effectiveness of providing many face-to-face interactions
11	Try to resolve following contradictions; face-to-face interactions should be in place in order to produce an excellent on-ground service experience and eliminating the limitation of frontliners.
12	Try to resolve following contradictions; face-to-face interactions should not exist in order to avoid the limitation of frontliner and hindering an excellent on-ground service experience.
13	Try to resolve following contradictions; many information that is needed in order to produce enhanced-knowledge management system and eliminating the involvement of other division.

### 3.3 Contradiction analysis

A root cause analysis of the previous problem statements provides some guidance toward following directions. Based on the analysis of previous problem statement, this research concludes that the relevant 11 service parameters for sales and service office are shown in Table 2.

According to the service parameters in Table 2, this research will improve the sales and service office's service parameters. These parameters consist of service duration, waiting area, face-to-face interactions, reliability or availability, and frontliner's competence.

The next step is applying the TRIZ contradiction matrix in order to examine the resolution between the service parameters and the contradictions. TRIZ contradiction matrix of this research as shown in Table 3.

**Table 3.** Service parameter

Problem-solving directions		TRIZ-service parameter	
1	Improving service duration	9	Responsiveness
2	Enhancing frontliner's knowledge	14	Professional competence
3	Effectiveness of service	17	Atmosphere
4	Quality of waiting area	18	Environment quality
5	Involvement of other division	21	Efforts
6	Improving waiting time	25	Waiting time
7	Availability of frontliner	27	Reliability
8	Frontliner's communication	28	Communication
9	Interaction between customer and frontliner	30	Factors
1	Improving service duration	34	Service capabilities
3	Effectiveness of service	39	Performance

### 3.4 Contradiction elimination

This stage will evaluate all of the possible solutions that should be implemented to the existing condition in sales and service office. The possible solution which is known as TRIZ inventive principle

will be chosen as the proposed service resolution. The possible solution that is not chosen will be eliminated. According to the TRIZ contradiction matrix in Table 4, there are 21 underlined TRIZ inventive principles that will be proposed as the service resolution in sales and service office.

**Table 4.** TRIZ Contradiction Matrix

Improving parameter	Worsening parameter									
	9	10	13	19	27	30	34	35	39	
9	N/A	13, 28, 15, 19	28, <u>33</u> , <u>1</u> , 18	8, 15, 35, 38	11, <u>35</u> , 27, 28	<u>1</u> , 28, <u>35</u> , <u>23</u>	34, 2, 28, 27	15, 10, 26	N/A	
14	8, 13, 26, 14	10, 18, 3, 14	13, 17, 35	<u>19</u> , <u>35</u> , <u>10</u>	11, 3	18, 35, 37, 1	27, 11, 3	15, 3, 32	29, 35, 10, 14	
17	2, 28, 36, 30	35, 10, 3, 21	1, 35, 32	<u>19</u> , <u>15</u> , <u>3</u> , <u>17</u>	<u>19</u> , <u>35</u> , <u>3</u> , <u>10</u>	<u>22</u> , 33, <u>35</u> , <u>2</u>	4, 10, 16	2, 18, 27	15, 28, 35	
18	10, 13, 19	<u>26</u> , 19, 6	32, 3, 27	<u>32</u> , <u>1</u> , 19	N/A	15, 19	15, 17, 13, 16	15, 1, 19	2, 25, 16	
21	15, 35, 2	26, 2, 36, 35	35, 32, 15, 31	16, 6, <u>19</u> , 37	19, 24, 26, 31	19, 22, 31, 2	35, 2, 10, 34	19, 17, 34	28, 35, 34	
25	N/A	10, 37, 36, 5	<u>35</u> , <u>3</u> , <u>22</u> , <u>5</u>	<u>35</u> , 38, 19, 18	<u>10</u> , <u>30</u> , <u>4</u>	35, 18, 34	32, 1, 10	35, 28	N/A	
27	21, 35, 11, 28	8, 28, 10, 3	N/A	21, 11, 27, 19	N/A	27, <u>35</u> , <u>2</u> , 40	1, 11	13, 35, 8, 24	1, 35, 29, 38	
28	<u>28</u> , <u>13</u> , <u>32</u> , <u>24</u>	32, 2	32, 35, 13	3, 6, 32	5, 11, 1, 23	28, 24, 22, 26	1, 32, 13, 11	13, 35, 2	<u>10</u> , <u>34</u> , <u>28</u> , <u>32</u>	
30	<u>21</u> , <u>22</u> , <u>35</u> , 28	13, 35, 39, 18	35, 24, 30, 18	<u>1</u> , 24, 6, 27	27, 24, 2, 40	N/A	35, 10, 2	<u>35</u> , 11, <u>22</u> , <u>31</u>	22, 35, 13, 24	
34	34, 9	1, 11, 10	<u>2</u> , <u>35</u>	15, 1, 28, 16	11, <u>10</u> , <u>1</u> , <u>16</u>	<u>35</u> , <u>10</u> , <u>2</u> , <u>16</u>	N/A	7, 1, 4, 16	1, 32, 10	
39	N/A	28, 15, 10, 36	35, 3, 22, 39	<u>35</u> , <u>10</u> , 38, 19	<u>1</u> , <u>35</u> , <u>10</u> , 38	<u>22</u> , <u>35</u> , 13, <u>24</u>	<u>1</u> , <u>32</u> , <u>10</u> , <u>25</u>	1, 35, 28, 37	N/A	

## 4 Results

From TRIZ method, several things revealed as shown in Table 5. First, they could differentiate their offered service, which will be separated into two main parts, fast-service and full-service counte. Customer can choose the services that suitable for their needs on the queuing machine. In addition, the other supporting part can be served using the self-service machine, for example: check-in kiosk.

Second, they could improve the service experience by installing new facilities in waiting area, such as television and wireless fidelity (wi-fi) that could increase the customer's patience. However, it still needs a limitation, such as fixed channels or low volume, in order to prevent harmful situation. In addition, a facility that could give a new experience like plane's interior showroom or experience room will entertain customers in an innovative way. This facility could also be an alternative way to offer merchandise or partner's product. Combining the cross-selling activity with the experience room would reduce the efforts of frontliners. Moreover, applying a unique decorations when celebrating local event also could give another good experience.

Third, providing feedback channel for customers could increase the customer's trust. Also, they could integrate their feedback channel with knowledge management system. In addition, to shorten the duration of service, a real-time ticket price notification along the chatting feature will be installed on knowledge management system. Frontliners does not need to leave their counter. Last, to initiate the customer researches by internal management, CCTV as a security tool can be used to study their behavior. These proposed principles and the main functions related to them can be found in Table 4. These proposed principles are drawn to the proposed service blueprint.

## 5 Conclusion

There are 11 factors (components) that represent consumer preferences on sales and service office, including sign and additional facilities, main knowledge, problem solver, sensory pleasures, facilities in waiting area, main service aspects, instructions and offerings, opening, accessories, and additional knowledge. Based on the TRIZ analysis, there are three service aspects that must be improved through 12 possible solutions as shown in Table 5.

There are some limitations of this research. This research does not include the solution evaluation. So the impact of this research is still not clear enough. There is not any study that verified the benefit of this service redesign. For further research, the solution evaluation must be included to sharpen the analysis. Furthermore, this research suggests the airline firms that have on-ground physical channels can be generally applied to other airline firms and even other industries providing ticketing services.

**Table 5.** Proposed principle of problem resolution

Service resolution	Principle	Definition	Main-functions
Differentiating service	1. Segmentation	Dividing a system into parts	<ul style="list-style-type: none"> <li>• Fast-service counter</li> <li>• Full-service counter</li> <li>• Gives frontliner a specific task for each counter</li> <li>• Differentiates customers based on               <ul style="list-style-type: none"> <li>• Purposes: for work or non-work</li> <li>• Number of tickets: one ticket or more than one ticket</li> </ul> </li> </ul>
	4. Asymmetry	Alters a process so that it is different from the others	
	33. Homogeneity	Focuses on the consistency in grouping similar features	
Customer's feedback	35. Transformation of Properties	Utilizes resources for changing the service operations	<ul style="list-style-type: none"> <li>• Provides a whistleblower system</li> <li>• Provides a whistleblower signage</li> <li>• Provides internal research using CCTV</li> </ul>
	10. Preliminary Action	A prior action is performed before the service is launched	
	15. Dynamization	Makes services more flexible	
Self-service machine	22. Convert Harm into Benefit	Using harmful occurrences as a way to realize benefits	<ul style="list-style-type: none"> <li>• Installs self-check in kiosk</li> </ul>
	23. Feedback	Utilizing market information from market in order to improve a service	
	26. Copying	Imitates another service	
Facilities in waiting area	2. Taking off	Eliminate low-value service process from the system	<ul style="list-style-type: none"> <li>• Installs experience room</li> <li>• Adds electronic entertainment such as TV and wi-fi</li> <li>• Limits the flexibility in using entertainment system</li> </ul>
	21. Skipping	Skips unnecessary functions that may cause delay	
	25. Self-service	Allows customer to play a role in the delivery of the service	
Combining service activities	32. Color changes	Focuses on physical characteristics to satisfy customers	<ul style="list-style-type: none"> <li>• Adds cross-selling activities</li> <li>• Combines cross-selling with experience room</li> </ul>
	17. Another dimension	Encourages thinking about changing the look of a service	
	30. Flexible Shells & Thin Films	Isolates harmful issues by using thin barrier	
Store's atmosphere	16. Partial or excessive actions	Doing more or less functions, efforts, or tasks	<ul style="list-style-type: none"> <li>• Decorates sales and service office based on local events</li> </ul>
	5. Merging	Combine ideas, needs and feedbacks to produce new service	
Enhancing KMS's features	31. Porous materials	Creates holes in a system to improve a service performing	<ul style="list-style-type: none"> <li>• Installs new features in KM such as               <ul style="list-style-type: none"> <li>• Online courses</li> <li>• Online tests</li> <li>• Real-time price's notification</li> <li>• Chatting to link the front-end to back-end, back-end to other division</li> </ul> </li> </ul>
	3. Local quality	Making changes in the service in different environments	
	28. Another Sense	Substitutes mechanical means with sensory means	
	19. Periodic Action	Changing a service offers, or delivery from continuous to periodic	

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