

# **CHAPTER 2**

## **LITERATURE REVIEW**

### **INTRODUCTION**

From a marketing standpoint, the key issue for the success of a service organisation is whether customer notice differences in the quality between competing suppliers (Lovelock, 1992). It pays off to improving quality in the eyes of the customer.

Consumer typically view customer service in relative terms based on their expectations and experiences. Customer service satisfaction depends on how well the service that customers receive match with their expectations (Austin, 1992). Age, gender, ethnicity, and income shape many of the customers' expectations (Webster, 1989).

Causes of poor services are long waits for service, impolite sales clerks, unavailability of advertised services, sales clerks who had little or no product knowledge (Mayer and Morin, 1987).

### **EVOLUTION OF SERVICES**

Services provide a variety of crucial functions, for example, the distributive infrastructure for extractive and manufactured goods, the capital markets for financing enterprises, the administrative functions that enable a society to exist, the maintenance and



recycling (rent or leasing) facilities for durable goods, and the activities (health, education, recreations and insurance) that enhance the quality of the labour force.

Since mid-1980, many services previously considered non tradable have been actively traded. The acceleration of world trade integration, measured as the ratio of trade to GDP, began in the mid-1980s. It was supported by the surge of Japanese overseas investment after the 1985 Plaza Accord, the trade arrangements of European Union, the US-Canada free trade agreement, the Uruguay Round, particularly, the General Agreement on Trade in Services (GATS). Thus, the frameworks for the conduct of services trade have been set. Since then, many have begun to redefine services.

Historically, the official economic definition of services gives little guidance to what is the nature of a service. Nevertheless, understanding the original definition do throw some light on how the concepts have been changed. Fundamentally, the economist's approaches to services have been institution based or activity based.

French philosophers, in the eighteenth century, considered the beginning of economics as a systematic field of study. Their belief was that the soil provided the only real form of wealth and therefore agriculture alone was productive and all other activities as "derived." The extractive is later categorised as "primary" by Fisher in 1939, with the term "secondary" to mean agricultural or pastoral and manufacturing sectors. The term "tertiary" that was intended to mean a third kind of sector, namely services, had caused term "tertiary" to be mistaken as relative rank or third in importance.

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Figure 1 illustrates the proposed model for the development of the *Staphylococcus aureus* infection. The model shows the progression from the initial exposure to the bacterium, through colonization and infection, to the development of a full-blown infection. The model is based on the following assumptions:

- The initial exposure to the bacterium is the primary factor in the development of the infection.
- The bacterium must first colonize the host before it can cause an infection.
- The host's immune response plays a critical role in the development of the infection.
- The host's immune response is influenced by a variety of factors, including the host's genetic makeup, the host's age, and the host's overall health.
- The host's immune response is also influenced by the presence of other infections.
- The host's immune response is also influenced by the presence of other factors, such as stress and malnutrition.

The model suggests that the development of the *Staphylococcus aureus* infection is a complex process that involves a combination of factors. The model is based on the following assumptions:

- The initial exposure to the bacterium is the primary factor in the development of the infection.
- The bacterium must first colonize the host before it can cause an infection.
- The host's immune response plays a critical role in the development of the infection.
- The host's immune response is influenced by a variety of factors, including the host's genetic makeup, the host's age, and the host's overall health.
- The host's immune response is also influenced by the presence of other infections.
- The host's immune response is also influenced by the presence of other factors, such as stress and malnutrition.

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1. **Introduction**  
 2. **Background**  
 3. **Methodology**  
 4. **Results**  
 5. **Discussion**  
 6. **Conclusion**  
 7. **References**  
 8. **Appendix**  
 9. **Notes**  
 10. **Tables**  
 11. **Figures**  
 12. **Supplementary Materials**  
 13. **Author Contributions**  
 14. **Funding**  
 15. **Conflicts of Interest**  
 16. **Acknowledgments**  
 17. **References**  
 18. **Appendix**  
 19. **Notes**  
 20. **Tables**  
 21. **Figures**  
 22. **Supplementary Materials**  
 23. **Author Contributions**  
 24. **Funding**  
 25. **Conflicts of Interest**  
 26. **Acknowledgments**  
 27. **References**  
 28. **Appendix**  
 29. **Notes**  
 30. **Tables**  
 31. **Figures**  
 32. **Supplementary Materials**  
 33. **Author Contributions**  
 34. **Funding**  
 35. **Conflicts of Interest**  
 36. **Acknowledgments**  
 37. **References**  
 38. **Appendix**  
 39. **Notes**  
 40. **Tables**  
 41. **Figures**  
 42. **Supplementary Materials**  
 43. **Author Contributions**  
 44. **Funding**  
 45. **Conflicts of Interest**  
 46. **Acknowledgments**  
 47. **References**  
 48. **Appendix**  
 49. **Notes**  
 50. **Tables**  
 51. **Figures**  
 52. **Supplementary Materials**  
 53. **Author Contributions**  
 54. **Funding**  
 55. **Conflicts of Interest**  
 56. **Acknowledgments**  
 57. **References**  
 58. **Appendix**  
 59. **Notes**  
 60. **Tables**  
 61. **Figures**  
 62. **Supplementary Materials**  
 63. **Author Contributions**  
 64. **Funding**  
 65. **Conflicts of Interest**  
 66. **Acknowledgments**  
 67. **References**  
 68. **Appendix**  
 69. **Notes**  
 70. **Tables**  
 71. **Figures**  
 72. **Supplementary Materials**  
 73. **Author Contributions**  
 74. **Funding**  
 75. **Conflicts of Interest**  
 76. **Acknowledgments**  
 77. **References**  
 78. **Appendix**  
 79. **Notes**  
 80. **Tables**  
 81. **Figures**  
 82. **Supplementary Materials**  
 83. **Author Contributions**  
 84. **Funding**  
 85. **Conflicts of Interest**  
 86. **Acknowledgments**  
 87. **References**  
 88. **Appendix**  
 89. **Notes**  
 90. **Tables**  
 91. **Figures**  
 92. **Supplementary Materials**  
 93. **Author Contributions**  
 94. **Funding**  
 95. **Conflicts of Interest**  
 96. **Acknowledgments**  
 97. **References**  
 98. **Appendix**  
 99. **Notes**  
 100. **Tables**  
 101. **Figures**  
 102. **Supplementary Materials**  
 103. **Author Contributions**  
 104. **Funding**  
 105. **Conflicts of Interest**  
 106. **Acknowledgments**  
 107. **References**  
 108. **Appendix**  
 109. **Notes**  
 110. **Tables**  
 111. **Figures**  
 112. **Supplementary Materials**  
 113. **Author Contributions**  
 114. **Funding**  
 115. **Conflicts of Interest**  
 116. **Acknowledgments**  
 117. **References**  
 118. **Appendix**  
 119. **Notes**  
 120. **Tables**  
 121. **Figures**  
 122. **Supplementary Materials**  
 123. **Author Contributions**  
 124. **Funding**  
 125. **Conflicts of Interest**  
 126. **Acknowledgments**  
 127. **References**  
 128. **Appendix**  
 129. **Notes**  
 130. **Tables**  
 131. **Figures**  
 132. **Supplementary Materials**  
 133. **Author Contributions**  
 134. **Funding**  
 135. **Conflicts of Interest**  
 136. **Acknowledgments**  
 137. **References**  
 138. **Appendix**  
 139. **Notes**  
 140. **Tables**  
 141. **Figures**  
 142. **Supplementary Materials**  
 143. **Author Contributions**  
 144. **Funding**  
 145. **Conflicts of Interest**  
 146. **Acknowledgments**  
 147. **References**  
 148. **Appendix**  
 149. **Notes**  
 150. **Tables**  
 151. **Figures**  
 152. **Supplementary Materials**  
 153. **Author Contributions**  
 154. **Funding**  
 155. **Conflicts of Interest**  
 156. **Acknowledgments**  
 157. **References**  
 158. **Appendix**  
 159. **Notes**  
 160. **Tables**  
 161. **Figures**  
 162. **Supplementary Materials**  
 163. **Author Contributions**  
 164. **Funding**  
 165. **Conflicts of Interest**  
 166. **Acknowledgments**  
 167. **References**  
 168. **Appendix**  
 169. **Notes**  
 170. **Tables**  
 171. **Figures**  
 172. **Supplementary Materials**  
 173. **Author Contributions**  
 174. **Funding**  
 175. **Conflicts of Interest**  
 176. **Acknowledgments**  
 177. **References**  
 178. **Appendix**  
 179. **Notes**  
 180. **Tables**  
 181. **Figures**  
 182. **Supplementary Materials**  
 183. **Author Contributions**  
 184. **Funding**  
 185. **Conflicts of Interest**  
 186. **Acknowledgments**  
 187. **References**  
 188. **Appendix**  
 189. **Notes**  
 190. **Tables**  
 191. **Figures**  
 192. **Supplementary Materials**  
 193. **Author Contributions**  
 194. **Funding**  
 195. **Conflicts of Interest**  
 196. **Acknowledgments**  
 197. **References**  
 198. **Appendix**  
 199. **Notes**  
 200. **Tables**  
 201. **Figures**  
 202. **Supplementary Materials**  
 203. **Author Contributions**  
 204. **Funding**  
 205. **Conflicts of Interest**  
 206. **Acknowledgments**  
 207. **References**  
 208. **Appendix**  
 209. **Notes**  
 210. **Tables**  
 211. **Figures**  
 212. **Supplementary Materials**  
 213. **Author Contributions**  
 214. **Funding**  
 215. **Conflicts of Interest**  
 216. **Acknowledgments**  
 217. **References**  
 218. **Appendix**  
 219. **Notes**  
 220. **Tables**  
 221. **Figures**  
 222. **Supplementary Materials**  
 223. **Author Contributions**  
 224. **Funding**  
 225. **Conflicts of Interest**  
 226. **Acknowledgments**  
 227. **References**  
 228. **Appendix**  
 229. **Notes**  
 230. **Tables**  
 231. **Figures**  
 232. **Supplementary Materials**  
 233. **Author Contributions**  
 234. **Funding**  
 235. **Conflicts of Interest**  
 236. **Acknowledgments**  
 237. **References**  
 238. **Appendix**  
 239. **Notes**  
 240. **Tables**  
 241. **Figures**  
 242. **Supplementary Materials**  
 243. **Author Contributions**  
 244. **Funding**  
 245. **Conflicts of Interest**  
 246. **Acknowledgments**  
 247. **References**  
 248.



Adam Smith, during the industrial revolution era, made a distinction between 'productive' and 'unproductive' labour. The criterion he used was that productivity depended upon 'tangibility' which in turn was associated with the durability of the economic activity. Thus services are described as unproductive because they perish generally in the very instant of their performance and do not fix or realise themselves in any vendible commodity. Alfred Marshall argued that all activities produce utilities that satisfy wants. He explained that individual cannot create material things. When he is said to produce material things, he merely produces utilities. In other words, his efforts and sacrifices result in changing the form or arrangement of matter to adapt it better for satisfaction of wants. All that he can do in the physical world is either to readjust matter so as to make it more useful or put it on the way of being made more useful by nature.

The definition of services by Riddle in her book, *Service-Led Growth* in 1986 is given as, "Services are economic activities that provide time, place, and form utility while bringing about a change in or for the recipient of the service."

Services are produced by •

- (i) the producer acting for the recipient
- (ii) the recipient providing part of the labour
- (iii) the recipient and the producer creating the service in interaction.

The evolution of definitions of services is tabulated below.

1. Die erste Gruppe ist die Gruppe der **„Kleinrentner“**. Diese Gruppe ist die größte Gruppe und besteht aus denjenigen, die eine kleine Rente erhalten. Sie sind in der Regel älter und haben eine geringere Einkommenskraft.

2. Die zweite Gruppe ist die Gruppe der **„Mittleren Rentner“**. Diese Gruppe ist die zweitgrößte Gruppe und besteht aus denjenigen, die eine mittlere Rente erhalten. Sie sind in der Regel mittleren Alters und haben eine moderate Einkommenskraft.

3. Die dritte Gruppe ist die Gruppe der **„Großrentner“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine große Rente erhalten. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

4. Die vierte Gruppe ist die Gruppe der **„Rentenlosen“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die keine Rente erhalten. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

5. Die fünfte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

6. Die sechste Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

7. Die siebte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

8. Die achte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

9. Die neunte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

10. Die zehnte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

11. Die elfte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

12. Die zwölfte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

13. Die dreizehnte Gruppe ist die Gruppe der **„Rentenempfänger“**. Diese Gruppe ist die kleinste Gruppe und besteht aus denjenigen, die eine Rente erhalten, aber keine Rente empfangen. Sie sind in der Regel jünger und haben eine hohe Einkommenskraft.

Table 2.1 - Historical definitions of Services

The Physiocrats	c. 1750	All activities other than agricultural production
Adam Smith	1723-90	All activities that do not end in tangible products
J.B.Say	1767-1832	All non-manufacturing activities that add utility to goods
Alfred Marshall	1842-1924	Goods (services) that pass out of existence at the moment of creation
Western Countries	1925-60	Services do not lead to a change in the form of a good
Contemporary		All activities that does not lead to a change in the form of a good
Dorothy I. Riddle	1986	Services are economic activities that provide time, place, and form utility while bringing about a change in or for the recipient of the service

Another inadequate definition of services is by listing. Example of services by listing is that; the service industries are transportation; retail trade; insurance;..., etc. (Ammer and Ammer 1984). The definition of Services by attributes, typically include intangibility, labour intensity, simultaneity of production and consumption, and parishability. Further examinations reveal that services industries do produce tangible result, such as the professional consultations or seminars have some tangible documentation in writing of the service provided. Not all services industry is labour intensive, for example, the computer software industries are actually not labour-intensive. Separation or “Decoupling” of production and consumption of the services sectors as in





the distant learning using wide area network via satellite. Some of the examples above actually make the definition of services inadequate.

So the strategic definition of Services must take into consideration of the three key elements as follows:

- I. the nature of the product output
- II. the unique inputs used
- III. the purpose served by the service production process

## **CLASSIFYING SERVICES**

The primary function of classifying services industries is to help us understand the economic trends by analysing and make comparisons among economies. Classification by United Nations or the World Bank is to be followed.

- 1. The Production-based Classification
- 2. Consumption-based Classification
- 3. Function-based Classification

(b)  $\mathcal{H}_1$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(c)  $\mathcal{H}_2$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(d)  $\mathcal{H}_3$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(e)  $\mathcal{H}_4$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(f)  $\mathcal{H}_5$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

## Problem 2 (10 points)

Let  $\mathcal{H}$  be a hypothesis class. Suppose that  $\mathcal{H}$  is a set of functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ . Suppose that  $\mathcal{H}$  is a set of functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ . Suppose that  $\mathcal{H}$  is a set of functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(a)  $\mathcal{H}_1$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(b)  $\mathcal{H}_2$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

(c)  $\mathcal{H}_3$  is the set of all functions  $f: \mathbb{R} \rightarrow \mathbb{R}$  such that  $f(x) = 0$  for all  $x \in \mathbb{R}$  and  $f(x) = 1$  for all  $x \in \mathbb{R}$ .

## **DEFINITION OF QUALITY**

Many articles and books have stressed the importance of service quality but defining it is difficult (Parasuraman, Zeithaml, and Berry 1985). They defined service quality as “perceptions' result(ing) from a comparison of consumer expectations with actual service performance.”

Gavin in his book, *Managing Quality* (1988) identifies five alternatives' perspectives.

- The transcendent view of quality is synonymous with innate excellence, a mark of uncompromising standards and high achievement. People learn to recognise quality only through the experience gained from repeated exposure.
- The product-based approach sees quality as a precise and measurable variable. The difference in quality is the differences in the amount of some ingredient or attribute possessed by the product.
- The user-based definitions start with the premise that quality lies in the eyes of the beholder. They equate quality with maximum satisfaction. Different customers have different wants and needs.

## QUESTION 1

Consider the following two regression models. The first model is a simple linear regression model, and the second model is a multiple linear regression model. The first model is a simple linear regression model, and the second model is a multiple linear regression model.

Model 1:  $\hat{y} = 1.5x + 2.5$   
Model 2:  $\hat{y} = 1.5x + 2.5 + 0.5z$

1. The coefficient of  $x$  in Model 1 is 1.5. This means that for every unit increase in  $x$ , the predicted value of  $y$  increases by 1.5 units, holding all other variables constant.

2. The coefficient of  $z$  in Model 2 is 0.5. This means that for every unit increase in  $z$ , the predicted value of  $y$  increases by 0.5 units, holding all other variables constant.

3. The intercept term in both models is 2.5. This represents the predicted value of  $y$  when all independent variables are equal to zero.



- The manufacturing based approach, is supply oriented, and it focuses on conformance to internally developed specifications.
- The value-based definitions define quality in terms of value and price. The trade-off between performance (or conformance) and price, quality comes to be defined as “affordable excellence.”

## **SERVICE QUALITY**

Service quality has been described as a form of attitude, related but not equivalent to satisfaction, that result from the comparison of expectations with performance (Bolton and Drew 1991a; Parasuraman, Zeithaml, and Berry 1988). Researchers suggest that service quality and satisfactions are distinct constructs (Bitner 1990; Bolton and Drew 1991a,b; Parasuraman, Zeithaml, and Berry 1988). The most common explanation for the difference between the two is that; perceived service quality is a form of attitude and a long-run overall evaluation, whereas satisfaction, is a transaction-specific measure (Bitner 1990; Bolton and Drew 1991a,b; Parasuraman, Zeithaml, and Berry 1988).

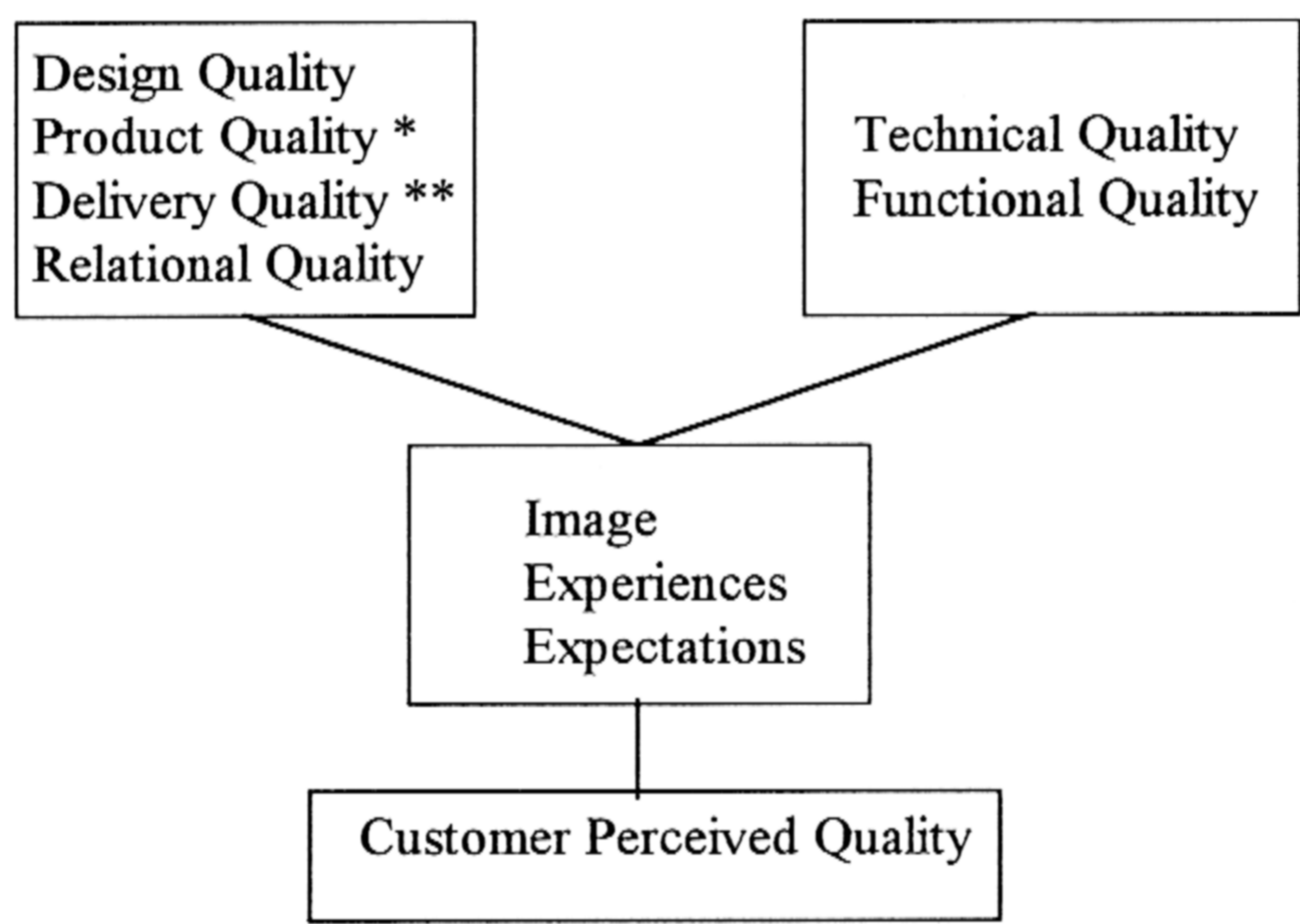
Data from the PIMS (Project of Market Strategy) show that a perceived quality advantage lead to higher profits (Robert D. Buzzell and Bradley T. Grede, 1987).



Since, customers are often involved in service production, a distinction needs to be drawn between the process of service delivery (what Grönroos calls functional quality) and the actual output of the service (what he calls technical quality).

Grönroos (1984) categorised service quality into two categories: technical quality, primarily focused on what consumers actually received from the service; and functional quality, focused on the process of service delivery.

Figure 2.1: Grönroos-Gummersson Quality Model (1987)



\* Invisible/Visible Noninteractive/Interactive

\*\* Own/Subcontracted

By classifying these services into the two divisions, service providers can concentrate their service strategies on both “store service” and “sales service.” Store

a) **Erklären Sie die Bedeutung der folgenden Begriffe:**  
 1. **Strukturformel:** Eine chemische Formel, die die räumliche Anordnung der Atome in einem Molekül zeigt.  
 2. **Valenz:** Die Fähigkeit eines Elements, chemische Bindungen zu bilden.

b) **Zeichnen Sie die Strukturformel des Wassers (H<sub>2</sub>O) und des Kohlenstoffdioxids (CO<sub>2</sub>).**  
 c) **Welche Elemente gehören zu den Metallen?**

d) **Welche Elemente gehören zu den Nichtmetallen?**



e) **Welche Elemente gehören zu den Halogenen?**

f) **Welche Elemente gehören zu den Edelgasen?**

g) **Welche Elemente gehören zu den Alkalimetallen?**

h) **Welche Elemente gehören zu den Übergangsmetallen?**  
 i) **Welche Elemente gehören zu den Lanthaniden?**  
 j) **Welche Elemente gehören zu den Actiniden?**



operation managers might be more involved with front-line employees in improving store service policies and personnel managers might work with the sales service aspects.

(1) *Store service:*

- returns, exchanges or adjustments;
- variety, quality, and dependability of service

(2) *Sales Service:*

- attitude, courteous, knowledgeable, helpful clerks;
- prompt attention, prompt processing of transactions;
- individual attention or service.

Store image is an important factor influencing store patronage (Berry, 1969). According to Webster (1989) demographic characteristics were a factor in consumers' expectations of non-professional services.

Parasuraman and others also suggest that the perceived quality of a service will be the result of an evaluation process in which customers compare their perceptions of service quality and its outcome against what they expected.

Die folgenden Aussagen sind zueinander äquivalent. Zeigen Sie dies.

1.  $\mathbb{R}^n$  ist ein Hilbertraum genau dann, wenn  $n = \infty$  ist.

a)  $n = \infty$  ist.

•  $\mathbb{R}^n$  ist ein Hilbertraum.

•  $\mathbb{R}^n$  ist ein separabler Hilbertraum.

b)  $n = \infty$  ist.

•  $\mathbb{R}^n$  ist ein separabler Hilbertraum.

•  $\mathbb{R}^n$  ist ein separabler Hilbertraum.

•  $\mathbb{R}^n$  ist ein Hilbertraum.

Die folgenden Aussagen sind äquivalent. Zeigen Sie dies.  
a)  $\mathbb{R}^n$  ist ein Hilbertraum.  
b)  $\mathbb{R}^n$  ist ein separabler Hilbertraum.  
c)  $\mathbb{R}^n$  ist ein separabler Hilbertraum.

Die folgenden Aussagen sind äquivalent. Zeigen Sie dies.  
a)  $\mathbb{R}^n$  ist ein Hilbertraum.  
b)  $\mathbb{R}^n$  ist ein separabler Hilbertraum.  
c)  $\mathbb{R}^n$  ist ein separabler Hilbertraum.

The most extensive research into service quality is customer-oriented. Zeithaml, Berry and Parasuraman identified ten determinants or criteria or dimensions used by customers in evaluating service quality (1985) are summarised below:

1. CREDIBILITY (trustworthiness, believability, honesty of the service provider)
2. SECURITY (freedom from danger, risk, or doubt)
3. ACCESS (approachability and ease of contact)
4. COMMUNICATION (listening to customers and keeping them informed in language they can understand)
5. UNDERSTANDING THE CUSTOMER (making the effort to know customers and their needs)
6. TANGIBLES (appearance of physical facilities, equipment, personnel, and communication materials)
7. RELIABILITY (ability to perform the promised service dependably and accurately)
8. RESPONSIVENESS (willingness to help customers and provide prompt service)
9. COMPETENCE (possession of the skills and knowledge required to perform the service)
10. COURTESY (politeness, respect, consideration, and friendliness of contact personnel)

1. Die folgenden Aussagen sind zu bewerten:  
 a. Die Kosten der Abschreibung eines Vermögensgegenstandes sind ein Kostenobjekt.  
 b. Die Kosten der Abschreibung eines Vermögensgegenstandes sind ein Kostenobjekt.

- c. Die Kosten der Abschreibung eines Vermögensgegenstandes sind ein Kostenobjekt.  
 d. Die Kosten der Abschreibung eines Vermögensgegenstandes sind ein Kostenobjekt.  
 e. Die Kosten der Abschreibung eines Vermögensgegenstandes sind ein Kostenobjekt.  
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 z. Die Kosten der Abschreibung eines Vermögensgegenstandes sind ein Kostenobjekt.



## **GAP MODEL OF SERVICE QUALITY**

Earlier research to measure service quality was biased on the uni-dimensional rating scale. Hjorth-Anderson (1984) found that uni-dimensional scales are methodologically invalid.

In 1985, Parasuraman et. al. developed the Gap Model of Service Quality, in their article, “Communication and Control Process in the Delivery of Service Quality”. They found four potential shortfalls within the service organisation that may lead to a gaps between what customers expected and what they received.

They are:

1. Not knowing what customers expect
2. Specifying service quality standard that do not reflect what management believes to be customers’ expectations
3. Service performance that does not match specifications
4. Not living up to the levels of service performance that are promoted by marketing communications.

Improving quality, they argue, requires identifying the specific causes of each gap and then developing strategies to close them. The strength of the gap methodology is that it offers generic insights and solutions that can be applied across different industries. Thus, marketers are capable to close the four gaps in order to improve quality.



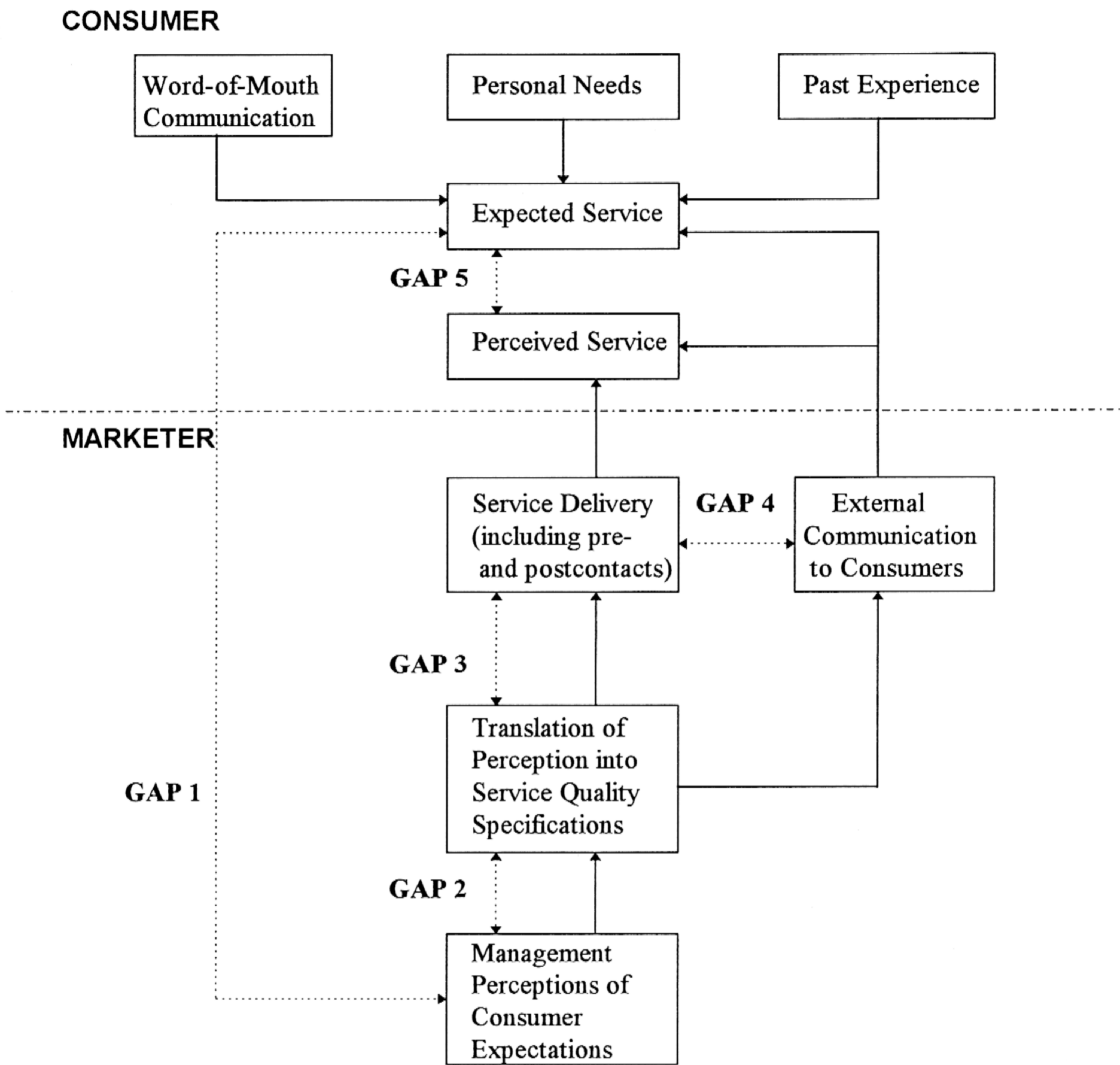
From these four gaps there appear to be another gap on the consumers' side, Gap 5. This Gap 5 is the difference between the consumers' expected service and perceived service. This gap is not within the control of the marketers. It is directly linked to the sizes and directions of the first four gaps. Thus, Gap 5 is termed "Service Quality Gap". The SERVQUAL scale (or an adaptation of it) could be used to measure gap 5.

The Gap Model of service quality is shown in figure 2.2 on the following page. This model is useful to help managers and staff to examine their own perception of quality, and to recognise how much they really understand customers' perceptions.

Consider  $\mathcal{H}_n = \{f_n : \mathbb{R}^n \rightarrow \mathbb{R} \mid f_n(x) = \sum_{i=1}^n a_i x_i\}$ . For  
 an arbitrary vector  $a \in \mathbb{R}^n$ , the function  $f_a(x) = \sum_{i=1}^n a_i x_i$   
 is in  $\mathcal{H}_n$ . The set of all functions  $f_a$  is a linear space  
 of dimension  $n$ . The set of all functions  $f_a$  is a linear space  
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 of dimension  $n$ .

Figure 2.2 - Conceptual Model of Seville Quality



Gap 1: Difference between consumer expectations and management perceptions of consumer expectations. Management does not understand how the service

Figure 1: Schematic diagram of the experimental setup.



Figure 2: Schematic diagram of the experimental setup.



should be designed, what support or secondary services the customer requires, etc., i.e. what the right quality for the customer is.

Gap 2: Difference between management perceptions of consumer expectations and service quality specifications. Often in an attempt to reduce costs, management places internal restrictions on how a service is to be performed, restrictions which deprive the staff of the opportunity to meet the customer's expectations of the service.

Gap 3: Difference between service quality specifications and the service actually delivered. Even if the quality of the service is carefully specified in a company, the result in practice may be different from what was intended. Service quality is difficult to standardise, since it is so often dependent on personal contact between the customer and company staff.

Gap 4: Difference between service delivery and what is communicated about the service to consumers. It is important not to promise the customer more than the company can deliver. At the same time, it is important for the company to inform customers about the efforts being made to raise quality, which would otherwise not be visible to the customers.

Gap 5: This gap indicates the difference between expected and perceived service quality. The gap is a function of the other four gaps, i.e.

o caso  $p = 1$ , sempre temos  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k = 0$ ,  
 e, portanto,  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n \frac{1}{k^p} = 0$ .

9. **Exercício** Se  $\{a_n\}$  é uma sequência limitada, então  
 se  $\lim_{n \rightarrow \infty} p_n = 0$ ,  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k p_k = 0$ .  
 (Dica: use o teorema de Bolzano-Weierstrass para obter  
 $p$  tal que  $|p_n| < p$  para  $n$  suficientemente grande,  
 e utilize esse fato para obter o resultado.)

10. **Exercício** Se  $\{a_n\}$  é uma sequência limitada, então  
 se  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k = L$ ,  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^2 = L^2$ ,  
 sempre que  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^2 = L^2$ .  
 (Dica: use o teorema de Bolzano-Weierstrass para obter  
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 e utilize esse fato para obter o resultado.)

11. **Exercício** Se  $\{a_n\}$  é uma sequência limitada, então  
 se  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k = L$ ,  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^2 = L^2$ ,  
 e  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^3 = L^3$ , então  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^4 = L^4$ .  
 (Dica: use o teorema de Bolzano-Weierstrass para obter  
 $p$  tal que  $|a_k| < p$  para  $k$  suficientemente grande,  
 e utilize esse fato para obter o resultado.)

12. **Exercício** Se  $\{a_n\}$  é uma sequência limitada, então  
 se  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k = L$ ,  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^2 = L^2$ ,  
 e  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^3 = L^3$ , então  $\lim_{n \rightarrow \infty} \frac{1}{n} \sum_{k=1}^n a_k^4 = L^4$ .

$$\text{Gap } 5 = f(\text{gaps } 1, 2, 3, 4)$$

## SERVQUAL

In subsequent research, these three researchers found that a high degree of correlation between several of these variables and so consolidated them into five broad dimensions: Tangible, Reliability, Responsiveness, Assurance, and Empathy. They developed a survey instrument called SERVQUAL. Respondents complete a series of scales that measure their expectations of a particular company on a wide array of specific service characteristics. Subsequently, they were asked to record their perceptions of that company's performance on those same characteristics. When perceived performance ratings are lower than expectations, this is a sign of poor quality, the reverse indicates good quality.

The SERVQUAL multi-item scale was developed by A. Parasuraman, V. A. Zeithaml, and L. L. Berry, in their paper, "SERVQUAL : A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality," *Journal of Retailing*, vol. 64, no. 1, spring 1988, pp. 12-40 for the measurement of consumers' perception of service. Their multi-item scale was found through empirical studies which covered five different services categories, namely, appliance repair and maintenance, retail banking, long-distance telephone, securities brokerage, and credit cards. These services represent a cross-





section of industries which vary along key dimensions used to categorise services (Lovelock 1980, 1983).

This scale consists of 22 items or variables spread among five dimensions of quality (listed in order of declining relative importance to customers):

1. Reliability
2. Responsiveness
3. Assurance
4. Empathy
5. Tangibles

### Reliability

Reliability is the ability to perform the promised service dependably and accurately. Reliable service performance is a customer expectation. That means the service, every time, is accomplished on time, in the same manner, and without errors. For example, receiving mail at approximately the same time each day is important to most people. Reliability extends into the back office, where accuracy in billing and record keeping is expected.



1.  $\lim_{x \rightarrow 0} \frac{1}{x} = \infty$  (The limit of  $\frac{1}{x}$  as  $x$  approaches 0 is infinity.)

2.  $\lim_{x \rightarrow 0} \frac{1}{x^2} = \infty$  (The limit of  $\frac{1}{x^2}$  as  $x$  approaches 0 is infinity.)

3.  $\lim_{x \rightarrow 0} \frac{1}{x^3} = \infty$

4.  $\lim_{x \rightarrow 0} \frac{1}{x^4} = \infty$

5.  $\lim_{x \rightarrow 0} \frac{1}{x^5} = \infty$

6.  $\lim_{x \rightarrow 0} \frac{1}{x^6} = \infty$

7.  $\lim_{x \rightarrow 0} \frac{1}{x^7} = \infty$

8.  $\lim_{x \rightarrow 0} \frac{1}{x^8} = \infty$

9.  $\lim_{x \rightarrow 0} \frac{1}{x^9} = \infty$  (The limit of  $\frac{1}{x^9}$  as  $x$  approaches 0 is infinity.)

10.  $\lim_{x \rightarrow 0} \frac{1}{x^{10}} = \infty$  (The limit of  $\frac{1}{x^{10}}$  as  $x$  approaches 0 is infinity.)

11.  $\lim_{x \rightarrow 0} \frac{1}{x^{11}} = \infty$  (The limit of  $\frac{1}{x^{11}}$  as  $x$  approaches 0 is infinity.)

12.  $\lim_{x \rightarrow 0} \frac{1}{x^{12}} = \infty$  (The limit of  $\frac{1}{x^{12}}$  as  $x$  approaches 0 is infinity.)

13.  $\lim_{x \rightarrow 0} \frac{1}{x^{13}} = \infty$  (The limit of  $\frac{1}{x^{13}}$  as  $x$  approaches 0 is infinity.)

14.  $\lim_{x \rightarrow 0} \frac{1}{x^{14}} = \infty$

### Responsiveness

Responsiveness is the willingness to help customers and to provide prompt service. Keeping customers waiting for no apparent reason will create unnecessary negative perceptions of quality. In the event of a service failure, the ability to recover quickly with professionalism can create very positive perceptions of quality.

### Assurance

The knowledge and courtesy of employees and their ability to convey trust and confidence is an assurance. The assurance dimension includes the following features: competence to perform the service, politeness and respect for the customer, effective communication with the customer, and the general attitude that the service provided has the customer's best interests at heart.

### Empathy

Empathy is the provision of caring, individualised attention to customers. Empathy includes the following features: approachability, sense of security, and the effort to understand the customer's needs.

### Tangibles

Tangible is the appearance of physical facilities, equipment, personnel, and communication materials. The condition of the physical surroundings is tangible evidence of the care and attention to details exhibited by the service provider. This assessment

## QUESTION

Consider a firm that has a monopoly in a market with a constant elasticity of demand. The firm's marginal cost is constant at \$10. The firm's demand curve is given by  $P = 100 - 0.5Q$ , where  $P$  is the price and  $Q$  is the quantity. What is the firm's profit-maximizing quantity?

## ANSWER

A monopoly firm maximizes profit by producing the quantity where marginal revenue equals marginal cost. The firm's demand curve is given by  $P = 100 - 0.5Q$ , so the marginal revenue curve is given by  $MR = 100 - Q$ . The firm's marginal cost is constant at \$10. Setting marginal revenue equal to marginal cost, we get  $100 - Q = 10$ , which implies that the profit-maximizing quantity is  $Q = 90$ .

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dimension can extend to the conduct of other customers in the service, such as a guest in the next room at a hotel.

SERVQUAL measures consumers' perceptions of service quality depend on a very important assumption, that is service quality is the difference between consumers' expected service and perceived service. In short, Service Quality (SQ) equals Perceived Service (PS) minus Expected Service (ES) and computed in equation as follows:

Service	Quality	=	(Performance - Expectation)
	SQ	=	PS - SQ

From this equation, SERVQUAL actually measures 'GAP 5' of the Gaps' Model of Service Quality, which was developed by them in 1985.

SERVQUAL is an instrument that had been thoroughly tested for reliability by computation of coefficient alpha (Cronbach 1951). The process of purification was done according to recommendation by Churchill (1979) and computed by using the formula for linear combinations (Nunnally 1978) for the pooled data of all the five services. Thus, SERVQUAL can be used to assess and compare service quality across a wide variety of firms or units within a firm. Appropriate adaptation of the instrument may be desirable when only a single service is investigated (A. Parasuraman, V. A. Zeithaml, and L. L. Berry 1988). Customers use the five dimensions described above to form their judgement of service quality, which are based on a comparison of expected service and perceived

For a  $\mathbb{Z}_p$ -module  $M$ , the  $\mathbb{Z}_p$ -rank of  $M$  is the number of elements in a minimal generating set of  $M$ .

Let  $M$  be a  $\mathbb{Z}_p$ -module. Then  $M$  is a  $\mathbb{Z}_p$ -module of rank  $r$  if and only if  $M$  is isomorphic to  $\mathbb{Z}_p^r$ . In this case,  $M$  is a free  $\mathbb{Z}_p$ -module of rank  $r$ .

$$\begin{aligned} & \text{rank } M = r \\ & \text{rank } M = r \end{aligned}$$

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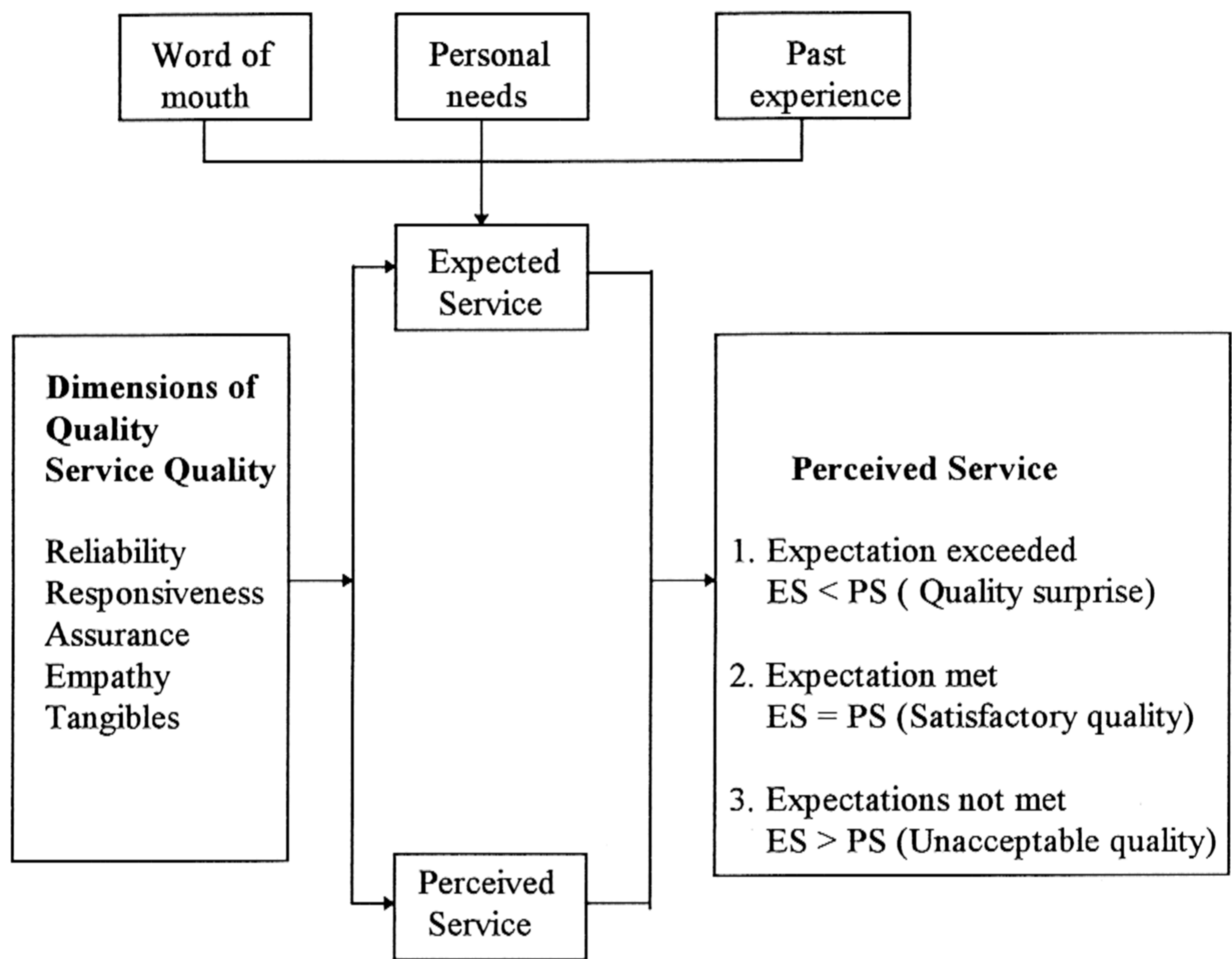
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service. The gap between expected service and perceived service is a measure of service quality; satisfaction is either negative or positive.

Figure 2.3 - Determinants of Perceived Quality Model



However, the concept of  $SQ = PS - ES$  is highly criticised by many subsequent researchers. This provides another re-examination and extension of the conceptual model of service quality strongly put forward by J. Joseph Cronin, Jr & Steven A. Taylor (1992,1994).

the 1000th anniversary of the founding of the city of Moscow in 1480. The monument is a large, ornate structure with a central figure of a man on horseback, surrounded by other figures and architectural details.



The monument is a large, ornate structure with a central figure of a man on horseback, surrounded by other figures and architectural details. The monument is set against a background of a cityscape with buildings and trees. The overall style is classical and monumental.

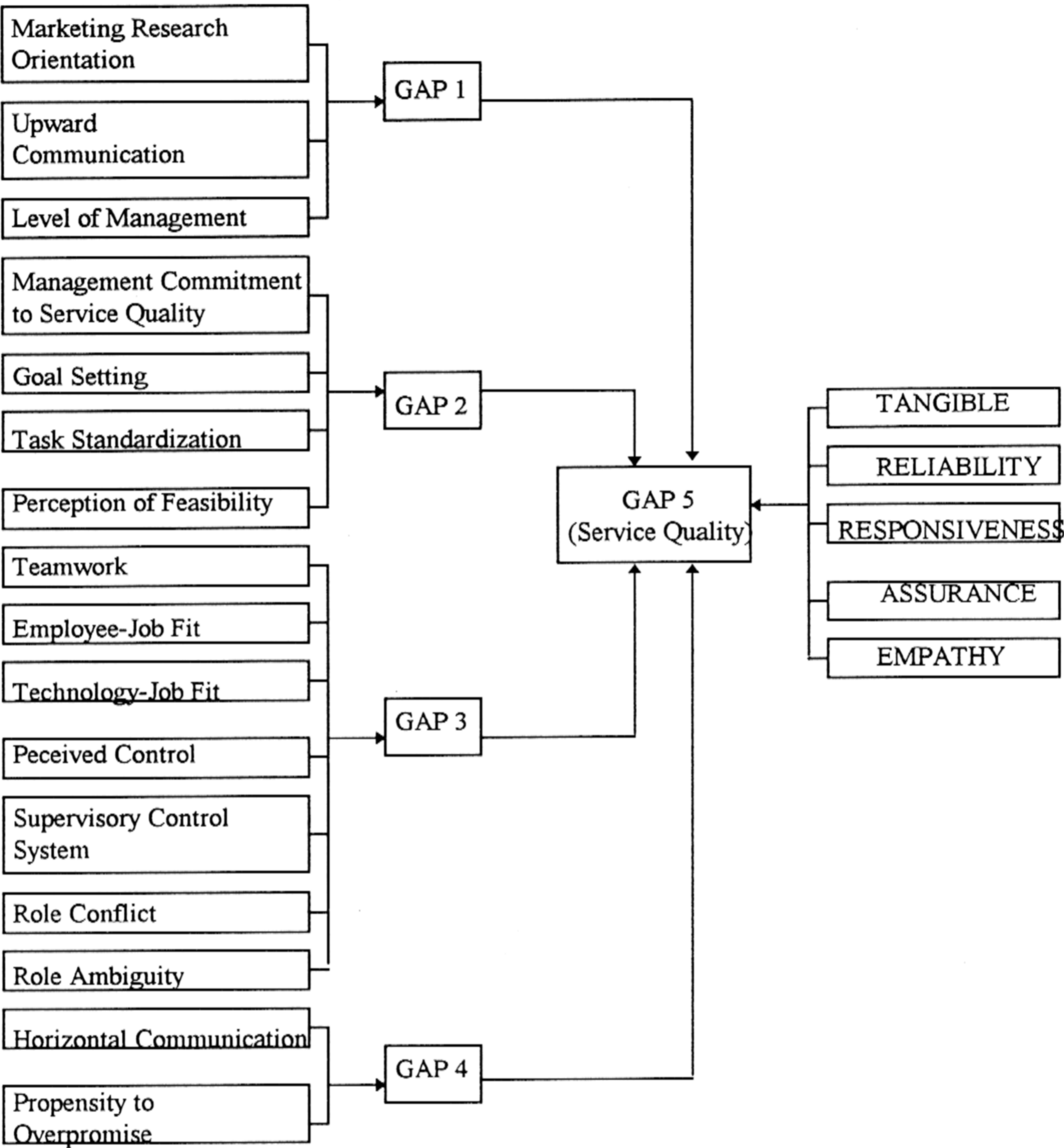
## **EXTENDED MODEL OF SERVICE QUALITY**

From the Gap Model of Service Quality developed by Parasuraman et. al. (1988), Gap 5 is used to measure the service quality which is the difference between customers' perceptions of service quality and expectation of service quality. A further development of the original gap model is shown in Figure 2.4. This new model illustrates the inter-organisational factor which affect the different gaps. It thereby facilitate an analysis of what caused the gaps and how they can be reduced.

## 2. THE FIRST EIGHT YEARS

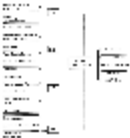
There are some very interesting accounts of the early months of the life of a child. For example, the first few months of life are described in the book *The First Eight Years* by the author, who is a child psychologist. The book is written in a very simple and easy-to-read style, and it is a very good introduction to the study of child psychology. The book is written in a very simple and easy-to-read style, and it is a very good introduction to the study of child psychology.

Figure 2.4 -Extended Model of Service Quality





## THE HISTORY OF THE



## SERVPERF - AN ALTERNATIVE TO SERVQUAL

Bolton & Drew (1991) developed the longitudinal model, in contrast to Parasuraman (1995, 1988) cross-sectional surveys of customers. His model can provide useful insights about how customers' perceptions of changes in service performance affect their global evaluations of service quality. They performed the study by having three survey waves because the changes over time in individual customers' ratings of the components of service quality, are sensitive to the effects of a service change. The average ratings of perceived quality changes slowly, it becomes noticeable only in the long run after service changes has taken place.

According to Cronin & Taylor (1992) the conceptualisation and operationalisation of service quality (SERVQUAL) is inadequate. There is little, if any theoretical or empirical evidence supports the relevance of the expectations-performance gap as the basis for measuring service quality (Carman 1990). In fact, the marketing literature appears to offer considerable support for the superiority of simple performance based measure of service quality (Bolton and Drew 1991a,b; Churchill and Surprenant 1982; Mazis, Ahtola, and Klippel 1975; Wodruff, Cadotte, and Jenkins 1983). Bolton and Drew used the common assumption that service quality is analogous to an attitude as a basis to suggest that satisfaction is an antecedent of service quality.

Cronin & Taylor, suggested that the instrument to be called 'SERVPERF'. The difference between SERVQUAL and SERVPERF is that, the former measure service



quality by having perception service (P) minus expectation (E), whereas, SERVPERF measures only the performance. SERVPERF actually measures the perceived quality as in Parasuraman et. al.'s model.

The advantages of using SERVPERF are that it only needs half of the number of items used in SERVQUAL for the same study and at the same time provides a higher degree of validity. SERVPERF is also superior for measuring service quality compared to SERVQUAL, weighted SERVQUAL or weighted SERVPERF.

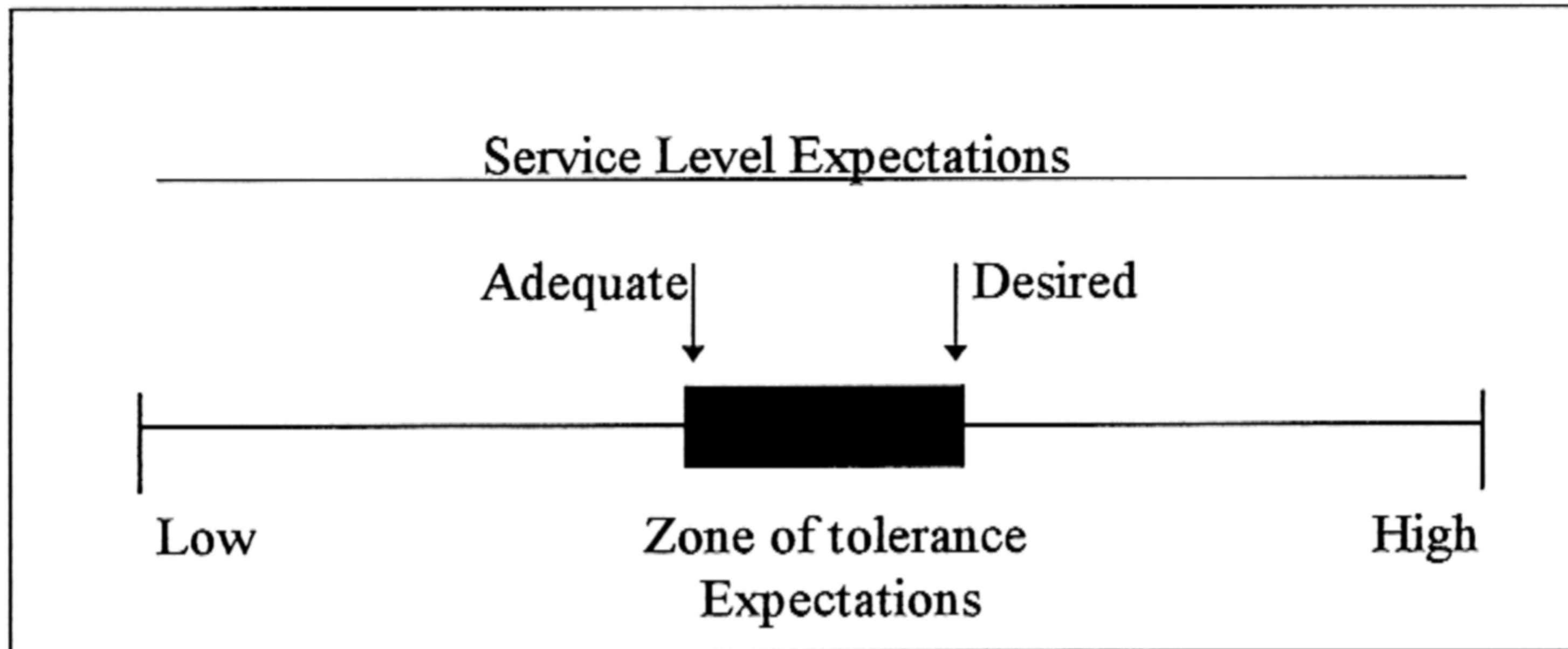
### **ZONE OF TOLERANCE**

Subsequent to their recent study in 1993, the Gaps Model of Service Quality can further be extended. Three authors found that there are two levels of the customers' expectations of the service, adequate and desired (Parasuraman et al., 1991). The first level is what the customer finds acceptable and the second what he or she hopes to receive. The distance between the adequate level and desired level is the 'zone of tolerance' (Figure 2.5). The zone expands and contracts like an accordion. Like the zone of tolerance. The two levels may vary from customer to customer and form one situation to another for the same customer. Similarly they vary depending the quality dimension involved.





Figure 2.5 - Zone of Tolerance



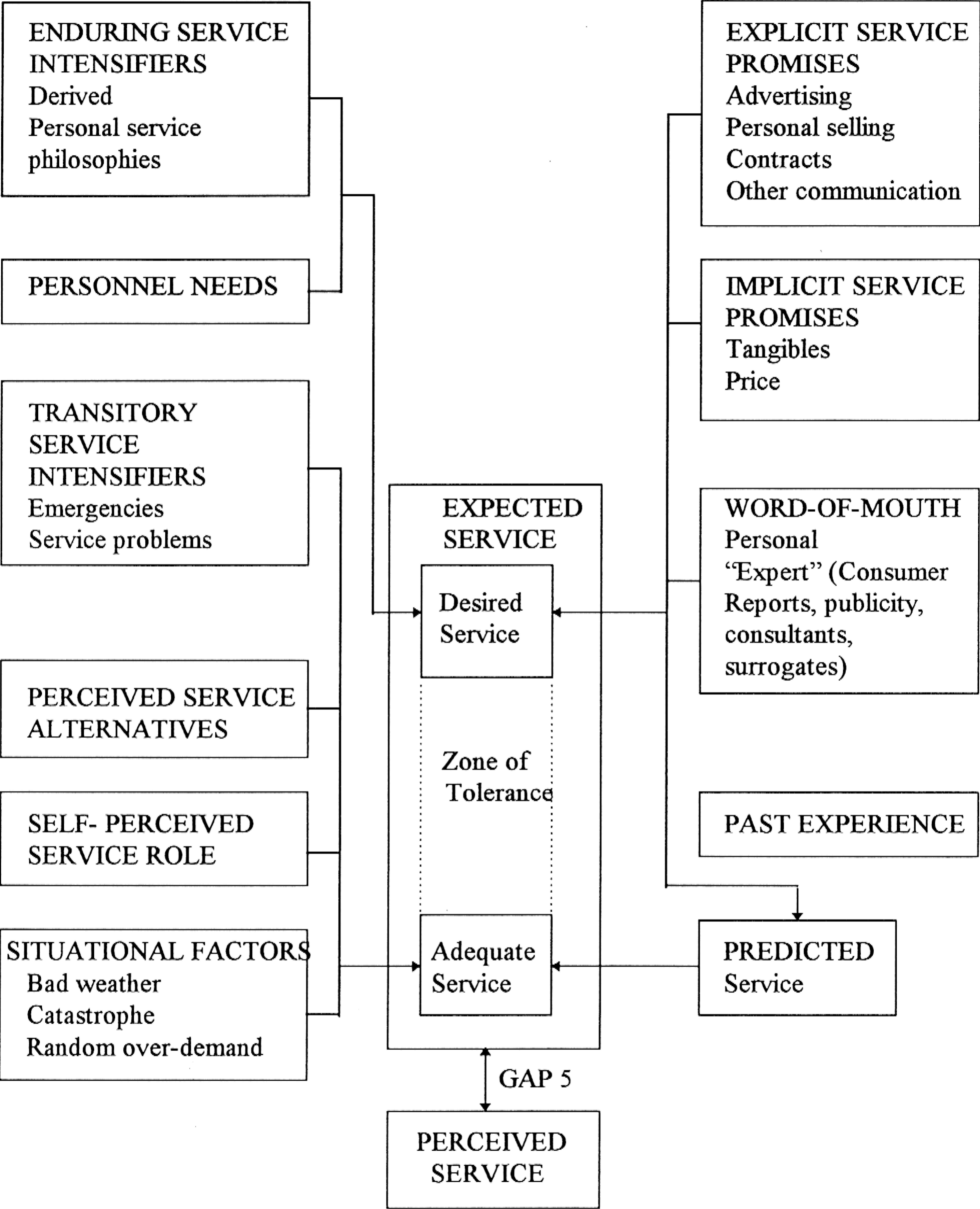
This zone of tolerance explained why most customers do not complaint nor shift to other competitors immediately even though the level of service quality provided is below their desired level.

### **NATURE AND DETERMINANTS OF CUSTOMER EXPECTATIONS OF SERVICE**

Subsequently in 1993, the three researchers developed the generic model (Figure 2.6) of which customer expectations is divided into four main sections: (1) the expected service component, (2) antecedents of desired service, (3) antecedents of adequate service; and (4) antecedents of both predicted and desired service. Various determinants of the size of the “zone of tolerance” are shown below.



Figure 2.6 - Nature and Determinants of Customer Expectations of Service



# Section Two: Assessment of the Student's Learning

**Student Learning Objectives**  
 The student will be able to:  
 1. Identify the components of a system.  
 2. Analyze the system for its purpose and function.

**Assessment of Student Learning**

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