Essentials of Service Design and Innovation

Developing high-value service businesses with PCN Analysis

Fourth Edition

by Dr. Scott E. Sampson
Passey Professor of Service Operations
and Business Management
Marriott School of Management
Brigham Young University
Provo, Utah, 84602, USA
ses3-pba@sm.byu.edu

http://services.byu.edu

January 5, 2015 update
©2015 SES

About the Cover

The front cover is a picture of "painted ladies," a series of colorful houses of similar architecture (in this case, Victorian architecture). These houses are off of Alamo Square in San Francisco, which is a city known for innovation, and where I worked in the early 1980s. The reason I chose this picture is because the houses remind me of PCN Diagrams.

Essentials of Service Design and Innovation: Developing high-value service businesses with PCN Analysis, Fourth Edition. Published January 2015. ©2015 Scott E. Sampson. All rights reserved. This publication is protected by copyrights, and permission should be obtained from the author prior to any reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or similar. To obtain permission, send a written request to: Dr. Scott Sampson, 660 TNRB, Brigham Young University, Provo, Utah, 84602, USA. Companies and products used in examples throughout this book may be trademarked by their respective trademark holders.

Summary Table of Contents

PART I: SERVICE ANALYSIS BASICS 1
Chapter 1 – The Importance of Service Design 3
Chapter 2 – Understanding Services 11
Chapter 3 – Creating PCN Diagrams 21
Chapter 4 – Identifying the Value Proposition 33
Chapter 5 – Strategic Process Positioning 45
Chapter 6 – Conducting a Service Process Audit 53
PART II: SERVICE DESIGN AND MANAGEMENT 57
Chapter 7 – Managing Across the Regions 59
Chapter 8 – Customization and CRM Systems 73
Chapter 9 – Process Control and Job Design 79
Chapter 10 – Managing the Customer Roles 93
Chapter 11 – Assuring Interactive Quality 103
Chapter 12 – Performance Measurement and Customer Feedback 113
PART III: SERVICE IMPROVEMENT AND INNOVATION 133
Chapter 13 – Improvement through Lean Services 135
Chapter 14 – Servitization and Deservitization 151
Chapter 15 – Systematic Service Innovation 165
Chapter 16 – Building a Service Value Network 175
Chapter 17 – Using PCN Analysis Across the Organization 185
PART IV: CASE STUDIES 189
Chapter 18 – Higher Education case study 191
Chapter 19 – Healthcare case study 209
Chapter 20 – Financial Services case study 221
Chapter 21 – Computer retail case study 231
Chapter 22 – Video Entertainment case study 241
PART V: ADVANCED TOPICS 259
Chapter 23 – Visualizing Concepts from Service Models 261

Chapter 24 – Physical Summary 271

Detailed Table of Contents

Summary Table of Contents i
Detailed Table of Contents ii
Synopsis ix
Preface to the Fourth Edition xi
PART I: SERVICE ANALYSIS BASICS 1
Chapter 1 – The Importance of Service Design 3
- The good, the bad, and the ugly 3
- Good design is crucial 5
- Becoming a Design Engineer 5
- Becoming a Service Engineer? 7
- Services are indeed different 8
- We need a service design tool 10

Chapter 2 – Understanding Services 11
- Two “services” 11
- Service operations 12
- Service Supply Chains 14
- Services are interactive processes 17
- Visualizing interactive processes 18

Chapter 3 – Creating PCN Diagrams 21
- The basics 21
- Three regions of a process domain 24
- Multiple entities 25
- PCN – The N is for Network 27
- Identifying the appropriate region 29
- PCN Analysis summary 30

Chapter 4 – Identifying the Value Proposition 33
- The common goal 33

  - Happiness based value 36
  - Co-production and the timing of value 36
  - Value speculation and loyalty 38
  - Sustainability 39
  - Value is segment-based 40
  - The B2B myth 40
  - PCN depiction of value 41
  - PCN Analysis summary 43
- Chapter 5 – Strategic Process Positioning 45
  - Process Design Options 45
  - Principles of Process Positioning 47
  - Strategic Process Positioning 50
  - Enabling and Relieving Innovations 50
  - PCN Analysis summary 52
- Chapter 6 – Conducting a Service Process Audit 53
  - Preparing for a Service Process Audit 54
  - Conducting a Service Process Audit interview 54
    - Interview Part 1: Describe the process 54
    - Interview Part 2: Identify steps that are valuable 55
    - Interview Part 3: Identify steps that are problematic 55
  - Summarizing data from a Service Process Audit 56
- PART II: SERVICE DESIGN AND MANAGEMENT 57
- Chapter 7 – Managing Across the Regions 59
  - General managerial differences 59
    - Managing in Region 1: Internal operations 59
    - Managing in Region 2: The back-office 60
    - Managing in Region 3: Personal interactions 60
    - Managing in Region 4: Self-service 60
    - Managing in Region 5: DIY 61
    - Managing Customer Intensity 61
  - Key operational implications 63

    Managing production imbalances: Inventory and Queuing ... 63
    Managing utilization and costing ... 67
  Key marketing implications ... 68
    Experiential service marketing ... 69
    Evaluating market offerings ... 70
    Marketing across the regions ... 70
  PCN Analysis summary ... 72
Chapter 8 – Customization and CRM Systems ... 73
  Providing custom offerings with CRM Systems ... 75
  Customer experience systems ... 76
  PCN Analysis Summary ... 78
Chapter 9 – Process Control and Job Design ... 79
  Process complicatedness and divergence ... 80
    Differences between complicatedness and divergence ... 81
    Airline illustration ... 83
    Managing complicatedness and divergence ... 84
    An example of getting it strait ... 86
  Training Customers ... 88
  Importance of buy-In ... 90
  PCN Analysis summary ... 92
Chapter 10 – Managing the Customer Roles ... 93
  1. Customers as Component Suppliers ... 94
  2. Customers as Labor ... 94
  3. Customers as Design Engineers ... 95
  4. Customers as Production Managers ... 96
  5. Customers as Products ... 97
  6. Customers as Quality Assurance ... 97
  7. Customers as Inventory ... 97
  8. Customer as Competitor ... 98
  Customer role design alternatives ... 99
  PCN Analysis summary ... 101

Chapter 11 – Assuring Interactive Quality 103
  Customer failure prevention 105
  Service Recovery 107
  Dealing with problem customers 107
  Unconditional Service Guarantees 109
  When does quality even matter? 110
  PCN Analysis summary 112
Chapter 12 – Performance Measurement and Customer Feedback 113
  How to measure customers 116
  Using feedback across the organization 117
    1. Goals Relating to Service Product Design: 118
    2. Goals Relating to Marketing: 118
    3. Goals Relating to Operations: 119
    4. Goals Relating to Customer Support: 121
    Short- and long-term objectives 121
  Designing the customer feedback system 122
    Questioning, response type, and analysis 122
    Active or passive feedback solicitation 124
    In-process or ex-post solicitation 127
    Feedback channeling 128
    Final step: Use and review 129
  PCN Analysis summary 129
PART III: SERVICE IMPROVEMENT AND INNOVATION 133
Chapter 13 – Improvement through Lean Services 135
  Applying lean to service operations 135
  1. Enhance strategic interactions. 136
  2. Eliminate wasteful interactions. 139
  3. Enable customers to self-serve or do-it-yourself. 141
  4. Extend offering outside the firm. 145
  Lean service in healthcare 146
  PCN Analysis summary 149

Chapter 14 – Servitization and Deservitization 151
  Servitization 151
    The perils of servitization 152
  Deservitization 153
    Service commoditization 154
    Service disintermediation 158
    Customers as competitors 159
    Impacts of deservitization 161
  Countering deservitization 162
  PCN Analysis summary 163
Chapter 15 – Systematic Service Innovation 165
  (1) Documenting the base process 166
  (2) Select steps to focus on for innovation 166
  (3) Enumerate and interpret process positioning options 166
  (4) Identify promising innovation configurations 170
  Good innovation is not unconstrained brainstorming 173
  PCN Analysis summary 174
Chapter 16 – Building a Service Value Network 175
  Getting beyond the dyad 175
  Establish a Service Value Network 178
  Selling a product versus selling a network 180
  Selling a network offering for competitive advantage 182
  PCN Analysis summary 184
Chapter 17 – Using PCN Analysis Across the Organization 185
  PCN Analysis for Marketing Management 185
  PCN Analysis for Human Resource Management 186
  PCN Analysis for Strategic Management 186
  PCN Analysis for Operation Management 187
  PCN Analysis summary 188
PART IV: CASE STUDIES 189
Chapter 18 – Higher Education case study 191

Traditional Higher Education 191
On to online education 195
Education for the masses: Wikipedia! 196
The perils of deservitization 201
Developing a resistance to deservitization 202
The Divergence Difference 204
Chapter 19 – Healthcare case study 209
Healthcare involving comorbidities 210
PCN Representation 211
Diagnosing process failure 213
Coordination via a Care Coordinator 215
Service process innovation 218
Summary 219
Chapter 20 – Financial Services case study 221
Deservitization trends 223
Mortgage lenders 223
Building a Service Value Network 227
Chapter 21 – Computer retail case study 231
Full-service sales 231
Deservitization 232
Commoditization 234
The amazing re-servitization 236
Apple's iPod content network 238
Chapter 22 – Video Entertainment case study 241
The 1599 foundation for video entertainment 241
The 1888 introduction of the kinetograph 242
The 1896 premiere of the movie theater 243
The 1976 disintermediation at Walmart 244
The 1985 re-intermediation at Blockbuster 246
The 1997 re-deservitization by Netflix 248
The 2002 revival of spontaneity at Redbox 250

The 2005 video entertainment revolution 255
Attempts at re-servitization 257
PART V: ADVANCED TOPICS 259
Chapter 23 – Visualizing Concepts from Service Models 261
Visualizing Chase’s Customer Contact model 261
Visualizing Schmenner’s Service-Process Matrix 262
Visualizing Sampson’s Unified Service Theory 263
Visualizing Shostack’s Service Blueprinting 264
Visualizing Judd/Lovelock/Gummesson’s Rental/Access Paradigm 266
Visualizing Vargo & Lusch’s Service-Dominant Logic 267
Chapter 24 – Physical Summary 271
Referenced Sources 275
List of Figures 281
Index 284

Synopsis

Services represent the largest portion of economic activity in developed nations, and are likely an important part of your business. Unfortunately, services traditionally have lacked the rigorous design tools we see used in designing physical products.

The Problem: Effectively designing and improving service business processes.

The essence of *every* service business is interactive processes that simultaneously involve both customers and service providers. Extensive survey data shows that, in the U.S., customer satisfaction with services is significantly below customer satisfaction with manufactured goods.[1] In fact, service business processes are more difficult to manage than manufacturing processes, largely because of customer involvement in service processes, which leads to problems such as:

- Incongruous expectations of customers and providers. Service offerings can be difficult to describe in concrete terms, and customers may expect different levels of service than providers intend to provide.
- Inconsistent service delivery due to unreliable customer participation. Some customers perform their process roles well, whereas other customers can disrupt service delivery through inadequate effort, ability, and/or motivation.
- Ineffective processes that are not able to meet customer needs at an acceptable level.
- Inefficient processes that consume inordinate amounts of time. Interaction, by its very nature, breeds inefficiency.

These types of problems result in customers being dissatisfied with the value received from service providers, leading to decreased loyalty.

The Solution: PCN Analysis.

The purpose of PCN Analysis is to improve service business processes by systematically documenting the processes, assessing value coming from process components, identifying problem areas, and methodically generating process improvement alternatives.

PCN Analysis begins by documenting an interactive business process. This includes identifying which aspects of the process contribute to:

- customer value,
- customer costs (including psychological costs of effort, waiting, etc.),
- provider costs (labor or other resources),
- provider revenue potential,
- risks of process failure, including identifying potential causes of process failure.

---

[1] The American Customer Satisfaction Index, http://www.theacsi.org/

PCN Analysis evaluates the current process configuration and identifies means for process improvement. The goals of PCN Analysis include:

1. Provide a **lean** process that delivers maximum value at minimum costs.
2. Provide a **robust** process that has a low likelihood of failure even when faced with unusual customer variability.
3. Provide an **agile** process that efficiently and effectively accommodates varying customer needs, so that individual customers are neither over-served nor under-served.
4. Provide a **feasible** process that can be implemented with the resources and skill sets of both the provider and the customers.
5. Provide an **understandable** process that can reasonably be communicated to employees and customers.

In summary, PCN Analysis is a process diagramming technique coupled with principles and methods for analyzing processes and systematically identifying improvement opportunities. PCN Analysis is founded in state-of-the-art science of service design based on the work of leading management researchers.

Preface to the Fourth Edition

In undertaking this work, I stand on the shoulders of giants. There have been many service researchers who have provided us with tremendous insights over the years. People like Richard Normann, Christopher Lovelock, and others. I cite many specific references to the work of others, but that does adequately represent my appreciation for their work.

This fourth edition contains various improvements over the third edition. It contains a new chapter: Chapter 8 – Customization and CRM Systems. The chapter on Conducting a Service Process Audit was moved earlier (now Chapter 6). The discussion of interactive marketing issues in Chapter 7 was expanded significantly. Chapter 11 was augmented with a section on Unconditional Service Guarantees. Other useful changes and clarifications were made throughout the book.

Foundational material is covered in Chapter 1 through Chapter 5. Chapter 7 through Chapter 12 review major service design issues and managerial issues. Chapter 13 through Chapter 17 discuss ways PCN Analysis can be used to provide strategic advantage through process improvement and innovation. Illustrative case studies are provided in Chapter 18 through Chapter 22. The final chapters cover some advanced topics.

The last two chapters are admittedly a bit esoteric. In Chapter 23, I demonstrate how PCN Analysis relates to and draws upon some of the major frameworks of service management from recent years. It is, of course, not at all exhaustive, but meant to show how PCN Analysis subsumes many of the major features of other important models. Chapter 24 in an expansion of some material that a journal editor did not allow me to publish, but which I think is a cool way of thinking about PCN Analysis.

Some of the text came directly from some of my previously published articles. In some instances I directly quoted my prior articles as allowed by the journal copyright policies. That quoted text is spread throughout the book, making it difficult to identify specific passages. In particular, Chapter 5, Chapter 10, and Chapter 12 largely came from the following three published articles (respectively):

Sampson, Scott E. "Visualizing Service Operations." *Journal of Service Research* 15, no. 2 (May 2012): 182-98.

Sampson, Scott E, and Martin Spring. "Customer Roles in Service Supply Chains and Opportunities for Innovation." *Journal of Supply Chain Management* 40, no. 4 (October 2012).

Sampson, S. E. (1999). An Empirically Defined Framework for Designing Customer Feedback Systems. Quality Management Journal, 6(3), 64-80.

Dedicated to my wonderful students and my wonderful family.

PART I: SERVICE ANALYSIS BASICS

In this first part we will review foundations of service design and innovation. This includes clarifying fundamental concepts pertaining to design, service, and value. We will introduce the basic tool of PCN Analysis: the PCN Diagram.

My students tell me that their favorite parts of my courses and my book are the later chapters. However, I must emphasize that we cannot delve into the awesome power of the PCN Analysis tool without first understanding the foundational concepts.

Chapter 1 – The Importance of Service Design

Have you ever had an off-the-chart service experience? Can you think of a recent experience with a service provider that either left you in awe or, conversely, left you cringing with disgust? Do you find that you have been disappointed so often that you have lowered your expectations for service delivery? Could it be possible that the customers of your firm are having similar experiences? Would you believe that even world-class firms often struggle with service delivery?

Do you get the sense that many services are poorly designed and shoddily delivered? Do you have the feeling that service providers hardly know what they are doing, and respond to even tepid customer requests with confrontational chagrin or apathy? Have you ever found yourself on the phone with a “customer service” employee whose job description seems to include giving customers the runaround?

And, are you slightly worried that this may somewhat be describing your company?

One last question for now: Do you mind if I share a handful of my own experiences? (If so, skip the next section.)

The good, the bad, and the ugly

I like Walmart—many products, great prices. But there was the time that I went to Walmart to have the battery replaced in my minivan. My old battery from Walmart was under warranty but had been discontinued. As a result, they could not figure out how much to charge for the replacement. After more than an hour of painful interactions with Walmart employees and managers, including my offer to pay any price to get out of there (with my four upset children under the age of 10), I left. I told the police officer who met me in the parking lot that I offered to pay but they would not take it. The manager finally cut me a deal to let me take my kids home.

I was in Europe giving seminars and had my wife and four of our children with me. At the end of the six-week trip they were to fly home through Paris on a day that I had one last seminar in Cardiff, UK. Later that day I found out that Air France had cancelled their flight to Paris. After waiting in the Bristol airport from 4:00 am until noon, the Air France representative told them that they would have to try again the next day. After some threatening my wife got Air France to put them up in a hotel in Bristol. The next day I was flying on a set of flights back to the U.S. that were different from the flights my family was taking, and was only able to get help aligning our flights by calling up Delta Airlines and reminding them of my “Medallion” frequent flier status.

I like Target. Except for their pharmacy. There was the time that I took a prescription to the nearby Target pharmacy. The physician had made an error on the prescription, and the pharmacy manager threatened to report me to the police, insinuating that I had doctored the prescription. Aghast at the false accusation, I suggested they phone the physician and get clarification. A few days later I got my prescription, vowing never to return.

A few years ago I purchased an HP computer from a local retailer. When I got home I found that the computer inside of the box did not have the SD memory card reader that was pictured on the outside of the box. So, I called HP customer service. The HP rep told me that the box label was a printing error, but I still wanted the memory card reader I thought I had bought. The rep finally agreed to send me one, but only on the condition that it would not be covered under warranty, since I would be installing it myself.

Some time ago I was eating at a department business dinner with some colleagues at an Olive Garden restaurant in Tallahassee, Florida. My pasta, unfortunately, had a small round piece of cardboard in it. I discreetly pointed it out to the waiter, who profusely apologized and offered to bring me more cardboard, I mean pasta. The waiter also offered to take my meal off of the bill, which did not matter to me since it was charged to my department anyway, and it did not make up for the fact that my replacement food came after everyone else had finished eating.

On another occasion the battery in my Toyota Camry had died and would not hold a charge. I jump-started the car and drove it to Walmart. Instead of checking in at the auto service desk I drove to the service bay and honked, declaring "I cannot stop the car or the battery will die." The employee motioned for me to come in to the edge of a bay so that they could replace the battery immediately. Happy day.

On other occasion I had given a presentation in Southern California and was scheduled to subsequently give some seminars in Australia. My son was going to accompany me to Australia and was to meet me at the Los Angeles LAX airport, but his Delta Airline flight was snowed in in Salt Lake City. My son told me that the customer service desk at the Salt Lake City airport was clogged with stranded passengers, so I asked someone at the Delta desk at LAX what could be done. They handily put my son on a later flight, rescheduled our United Airlines flights to Sydney for the following day, and put us up in a nearby hotel—no haggling involved.

Last year I was at a department business dinner with some colleagues at a local restaurant called La Jolla Groves. The nice tablecloths hid the fact that two adjacent tables were not the same height. A piece of stemware placed on the ridge fell and shattered. The employees cleared the table and replaced all nearby food before anyone could practically lift a fork. At the end of the dinner an exuberant toast also resulted in a broken glass, with similar response by the restaurant staff. This is not a pricy restaurant, but well run.

What is it that makes customer service be sometimes a taste of heaven and other times the pains of hell? Why is it that even world class firms seem to have a difficult time maintaining consistency in the delivery of service? Why do minor variations in customer requirement send some services into confusion? Do you ever have the feeling that any variation from normal operating conditions leads many service providers to flounder?

Enough of the questions—let's get to the answers. I am going to address those questions in this book, and show how you and your firm can systematically design and deliver services that shine under all types of conditions, build customer loyalty, reduce cost of delivery, and improve competitiveness.

Good design is crucial

Much of what has been published on the topic of service excellence focuses on service delivery issues such as motivating front-line employees and effectively responding to service failures. The thought is that is you can just get your employees to be customer focused they will make good decisions about how to meet customer needs.

An area that gets much less attention in published literature is service design, which includes figuring out what resources should be included in a service system and how those resources should interact. Service design includes defining the procedures that are involved in service delivery.

Despite less attention in the literature, I assert that service design is as important as service delivery. Good service design will allow effective service delivery even with marginally capable employees. McDonalds and other fast food chains provide examples. McDonalds arguably does not hire the most skilled and motivated front-line employees, yet the service delivery is practically flawless anywhere in the world. The “secret sauce” so to speak is phenomenal service design that anticipates the complexities of service delivery and leaves little to chance.

One way to understand the importance of service design is to consider the parallel concept in movie entertainment. Two major ingredients of a great motion picture are (1) a great script (screenplay), and (2) great acting (or animation). Think of the script as the design component of the movie. The script tells what will happen and how pieces of the story fit together. The acting, directing, and special effects are analogous to service delivery, where we turn the script into a deliverable product.

What makes truly great movie? Probably great acting and great special effects, but that is usually not sufficient. Even big-name movie stars in big budget movies fail on a regular basis. And, how many times have you seen the sequel of a great movie that is a bomb, despite having the same characters, actors, and directors. Arguably, the difference between good movies and great movies is the story—the design element. As Director Stephen Spielberg reportedly said, “Audiences are harder to please if you're just giving them special effects, but they’re easy to please if it’s a good story.”[2]

I am not suggesting that acting, or good service delivery, is unimportant. Rather, I will suggest that even great acting and great service delivery is unlikely to compensate for a bad script or bad service design. I will even go so far as to suggest that excellent design can actually compensate for inadequacies in delivery, as the McDonalds example illustrates.

One might ask why so much attention is paid to service delivery and so little to service design? To answer that question I will introduce you to my son, Ryan.

Becoming a Design Engineer

My son, Ryan, has a penchant for designing new and interesting devices. Even though he is only in the fifth grade, he has already expressed interest in becoming a design engineer, perhaps a mechanical engineer. He has asked me what it will take to succeed as an engineer. Here is my response.

---

[2] Internet Movie Data Base: Steven Spielberg (http://www.imdb.com/name/nm0000229/bio)

First, he will need to graduate from high school with good enough grades to be admitted to a reputable university. At the university he will apply for admission to an engineering program. Admission will require good grades in calculus and other math classes, since engineering draws on those skills.

In the engineering program he will take courses on various topics. He will learn about the characteristics of materials that are used to build products. He will learn how products operate under specific design conditions. He will learn about fluid mechanics, thermodynamics, and kinematics.

Ryan will learn to use powerful design tools such as Computer-Aided Design (CAD) systems. With CAD tools he will learn how to develop and prototype products digitally, allowing him to explore design alternatives before actually investing in physical prototypes. He will learn how to design products that can be actually delivered, the so-called Design for Manufacturability (DFM). And that is just the undergraduate program.

Hopefully, Ryan will desire to pursue a postgraduate degree in engineering. There, he will hone his product-design skills. He might take advanced courses on plasticity, structural vibrations, microelectromechanical systems, biomechanics, metallurgy, acoustics, and composite structures. An advanced CAD course might teach him about "parametric surface and solid modeling, associativity, numerically-controlled tool path generation, etc."[3]

When he graduates he will likely get a job working in the engineering department of a product manufacturing company. He will look for positions titled "engineer," which will subsequently be printed on his business card. On the job, he will be responsible for using his expertise to create designs and specifications for products that will rock the world!

However, I must point out that product manufacturing is only a small portion of the U.S. economy. As of 2010, manufacturing accounted for only 11.7% of GDP, down from 14.2% in 2000.[4] I am sorry to report that the U.S. manufacturing sector has been on a steady decline, with many jobs going overseas, including engineering jobs.

Conversely, from 2000 to 2010 the finance and insurance sector grew by 10%, the healthcare sector grew by 27.4%, and the education sector grew by 28.5%.[5] The future of the U.S. job market seems to be in services. Perhaps Ryan could pursue a career as a design engineer in the service sector.

Further, there seems to be great need for improvement in the delivery of services. The American Customer Satisfaction Index (ACSI) is an annual survey of customer satisfaction developed at the University of Michigan. ASCI researchers conduct more than 70,000 customer interviews each year involving a wide variety of companies, industries, and economic sectors.

---

[3] From the course description for the BYU graduate course ME EN 578: CAD/Cam Applications.

[4] From The 2012 Statistical Abstract, U.S. Census Bureau, Table 670 - Gross Domestic Product in Current and Chained (2005) Dollars by Industry.

[5] ibid.

Figure 1 shows recent ASCI scores for economic sectors as of July 2012.[6] Note that customers seem quite satisfied with manufactured goods and e-commerce firms. Satisfaction with hospitality and healthcare services is a bit lower. Then there is a serious drop off to financial services and retail services, and an even bigger drop off to transportation services and information services (telephone, cable TV, etc.). Industries within these sectors showed some disparaging ASCI scores. For example, hospitals (in the healthcare sector) got score of 76 and airlines (in transportation sector) got an unimpressive 67. The government sector (not shown in Figure 1) also got a paltry score of 67.

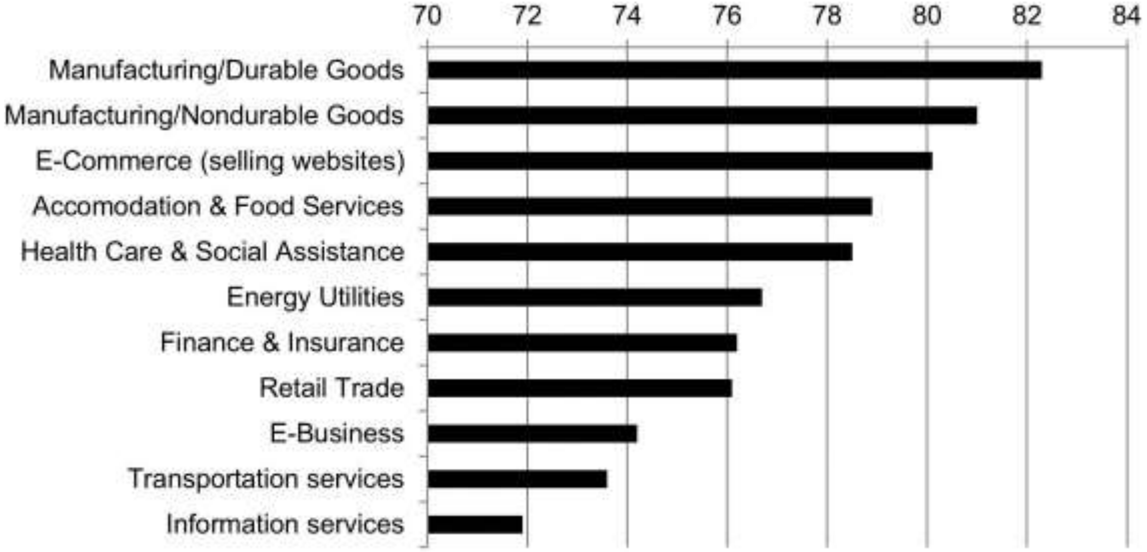

Figure 1: ASCI scores by economic sector (July 2012)

In other words, it appears that the manufacturing sectors are doing quite well right now, as least in terms of customer satisfaction. The bigger weaknesses of our economy seem to involve services. There seems to be a great need for improving the design and delivery of services if we are to see the same high standards of quality we see in manufactured products.

Perhaps Ryan could apply his analytical bent to help with this problem. Maybe he could become a Service Engineer and design exceptional and innovative services that could please customers and win increasing profits for his employer. But, what is the path to becoming a Service Engineer?

Becoming a Service Engineer?

I recently wrote a chapter for a book titled *Introduction to Service Engineering* (Sampson, 2010b). However, I up to that point I had never actually met a person with a degree in Service Engineering. Nor had I ever seen that title on anyone's business card.

Surely, someone is responsible for designing innovative and well-crafted services, but who would that be? Service firms such as hotels and hospitals have "Engineering" departments, but they are primarily concerned with the operation of the building's air conditioning, electrical wiring, plumbing, etc., not the design of service offerings.

---

[6] From The American Customer Satisfaction Index, http://www.theacsi.org/, retrieved August 9, 2012.

I have asked my professional seminar attendees the question, "who is responsible for service design at your firm?" The response I get is something like, "oh, marketing, since they are closest to the customer." But, are they trained in service design? What would happen if we let the marketing department design automobiles at GM or computers at IBM, instead of the trained engineers? The product engineers would revolt, since engineering is clearly difficult enough to require advanced degrees. Product engineering is not something you normally just pick up on the job.

Unfortunately, marketing degree programs and business schools have weakly addressed the issues of service design. Government statistics show that services represent 70 to 80 percent of GDP and employment in the U.S. and other developed nations. However, service businesses represent only cursory coverage in typical business school curriculum. The tradition of business management is in the so-called "industrial sector" that is preoccupied with manufacturing and selling physical products. Manufacturing management is a precise science with rigorous tools and techniques. Service management, on the other hand, is often considered to be unscientific and lacking strong methodologies.

What makes services so different—so lacking in formal mechanisms for design and innovation? The naïve have suggested that service design is "soft" and based on common sense, whereas product design is a hard science. I would beg to differ. Services can be very difficult to design and manage largely due to the onerous condition under which services are produced (discussed in Chapter 2).

Even if we did have formal programs to teach Service Engineering, what would we teach the students? What are the principles and tools that Service Engineers would use? Is there such a thing as a service CAD tool? I have seen computer simulations of service environments, but they are woefully imprecise and fail to account for the emotional response and personal variation that customers bring to service processes.

In Chapter 23 and elsewhere (Sampson, 2012) I review tools like Service Blueprinting and process design techniques such as Business Process Modeling Notation (BPMN) and the Integration Definition for Function Modeling (IDEF0), but show how they are all inadequate for capturing the true nature and complexity of service processes.

The lack of rigorous service design tools was my primary motivation for developing a new analytical tool called *PCN Analysis*. I will define PCN in Chapter 3 and explain PCN Analysis throughout the book. For now I will simply say that PCN Analysis provides structure and methodology for approaching the difficult task of service design. It will show the complexities of service businesses and how they can be clearly conceptualized and systematically improved.

Services are indeed different

There have been various streams of thought that have hampered the science and study of services. For example, some have rejected the idea that services can be studied as a cohesive discipline. For example, a survey of service researchers conducted by Edvardsson *et* *al.* concludes, “On lower abstraction levels a general service definition does not exist. It has to be determined at a specific time, in a specific company, for a specific service, from a specific perspective” (Edvardsson, Gustafsson, & Roos, 2005, p. 119). That idea suggests that services might be too diverse to study.

At the other extreme, some people have espoused a somewhat exaggerated concept that every business is a service business, and that everything is about service. Sometimes they couch this by saying that every business is in the business of satisfying customer needs, and they call that service. They do acknowledge that there are different models for satisfying customer needs, such as directly satisfying customer needs in interactive settings versus indirectly satisfying needs by providing customers with appropriate resources (that the customers can use to satisfy their needs). If every business offering were a “service” then generic business management should be sufficient—but it is not.

A related concept suggests that business is business, be it a service business, a manufacturing business, or whatever. However, it is easy to observe that traditional manufacturing management techniques function poorly when applied to services. For example, something as basic as identifying process bottlenecks on an assembly line becomes confounded when stations have arbitrary processing times due to the whims of customers at those stations, such as at a cafeteria line. Some may therefore conclude that services are a flawed form of manufacturing, which is like saying that a screwdriver is a flawed type of hammer. Flawed? Or different?

I strongly side with the camp that believes that services are operationally distinctive and managerially different. Some examples of the distinctiveness of service processes are shown in Table 1 (taken from Sampson, 2012), which is similar to a table provided by Richard Chase (1978, p. 138). Non-service processes such as make-to-stock manufacturing have facilities that are organized to enhance process flow, focus employees on efficiency and consistency, and so forth. Conversely, service processes demand a customer-friendly layout, workers with interaction skills, and so forth.

Table 1: Managerial distinctions of services

Managerial issue	**Non-service process**	**Service process**
Facility layout	Organized to enhance process flow	Accommodate customer needs and expectations
Worker skills	Focus on efficiency and consistency; Rote training	Focus on interaction skills and responsiveness
Job design	Tightly defined with precise steps and cycle times	Broadly defined
Sales opportunity	Mass marketing	Personal selling
Quality control	Based on formal specifications	Based on variable standards from customers
Asset utilization	Schedule assets for maximum utilization (ROI)	Balance asset utilization with customer responsiveness

Managerial issue	Non-service process	Service process
Use of technology	Cost/productivity issues dominate	Customer acceptance issues dominate

My previous book, “Understanding Service Business: Applying Principles of the Unified Service Theory,” outlined 50 major areas of service distinction relating to strategy, operations, quality management, human resource management, and marketing. This book will integrate an essential set of service management principles in a new and powerful tool.

We need a service design tool

The progress and development of services has been hampered by the unscientific and undisciplined ways in which they have been approached. This is evident as we have contrasted the systematic way that products are designed with the flippant way services are designed. Product design is rigorous. Service design is not—until now.

The need for better ways of designing and analyzing services has also been emphasized by leading researchers. Menor, *et al*, pointed out that the design of services is “among the least studied and understood topics in the service management literature” (2002). Bitner, et al, observed that “innovation in services is less disciplined and less creative than in the manufacturing and technology sectors” (2008, p. 66). Nie and Kellog asserted that services “must be studied in different ways, using different theories, skills, competencies, and language” than traditional manufacturing-oriented management research (1999, p. 352).

In other words, service design and innovation needs an analytical design tool that is more suited to the task. After years of research and development I am pleased to present a tool that addresses these concerns: PCN Analysis. This tool is uniquely suited to studying what is unique about services. To proceed, we need to clarify what makes services unique, which is the topic of Chapter 2.

Chapter 2 – Understanding Services

Before I introduce the powerful PCN Analysis tool, we need to discuss the fundamental nature of services. Few terms in business and economic parlance have been convoluted more than the term “service.” We must begin by establishing an accurate understanding of what service businesses are.

Sometimes I get the feeling that defining services is like describing love—it may be hard to describe but we all think we know it when we see it. We define services as a set of industries—banking, hospitality, consulting, healthcare, garbage collection, etc.—which is what Judd called a “definition by listing” (1964, p. 58). Unfortunately, such an approach provides little intuition about what they have in common.

Or, defining services can be like describing salt. Try describing the taste of salt without using the word “salty.” To be more precise in our understanding of services, we can consult a dictionary. The following are the first four definitions of “service” from the Merriam-Webster online dictionary:[7]

1. “the occupation or function of serving”
2. “the work performed by one that serves”
3. “a form followed in worship or in a religious ceremony”
4. “the act of serving”

Except for number 3, this seems like describing salt as “salty.”

Government economists have not provided us with any clearer depiction of services. They assert that services are part of the “service sector” as distinct from the manufacturing sector and the extractive sector (agriculture and mining). Then, they have referred to services as “non-manufacturing,” implying that services can be defined by what they are not, with little indication of what they are (Morey, 1976; R. W. Schmenner, 1995).

That is like describing salt as being “not sugar,” or describing night as being “not day,” or describing men as being “not women.” Judd astutely asserted that defining services by what they are not is inherently defective, in that “from the definition itself, nothing can be learned about what are the essential characteristics of a service” (Judd, 1964, p. 59).

Two “services”

One source of confusion about services is that the term has been used ambiguously. The term “service” has been used in at least two distinct contexts in business parlance. The first and most common use considers “services” to be “intangible products.” Numerous textbook authors and others have suggested that services are somehow intangible and fleeting, as opposed to “goods” that are tangible and durable. This is sometimes accompanied by an astute but confusing perception that “services are processes” whereas “goods are resources.” True, but what is the point?

---

[7] http://www.merriam-webster.com/dictionary/service retrieved 12/9/2013.

Some would suggest that the point is that firms that sell services sell processes, but firms that sell goods do not sell processes. That perspective is both naïve and myopic. Goods do not come out of nowhere, *ex nihilo*. So, where do goods come from? They come from processes! Processes are employed to produce goods. Customers buy goods. Processes are employed to use the goods and realize the benefits of the goods. Goods are enveloped in processes. Goods cannot exist without processes, and goods provide no value without processes including processes of use. When you buy goods you are buying an implied process of use.

Further, all services include goods and other tangible elements. Services cannot function without physical resources of some type. Psychiatry is considered a service, but it would not function very well without a comfortable couch for the patient and a pencil and notebook for the psychiatrist (or, perhaps an iPad running the "Psychiatrist helper" app). Banking would not function without computer equipment; the computer equipment may be located far from customer view, but is nonetheless essential for a positive customer experience. Where would hospitality services be without hotels and beds? Where would healthcare be without needles and MRI machines?

The naïve would argue that the distinction between "goods and services" is along the lines of ownership. With goods-producing industries the customer purchases and takes ownership of the goods, but it has been suggested that with services the customer does not take ownership of the goods (Judd, 1964; Lovelock & Gummesson, 2004). True, psychiatry customers do not get to keep the couch, bank customers do not get to keep the bank's computers, hotel customers do not get to keep the beds, and healthcare customers do not get to keep the MRI machines. Yet there are equally numerous examples of services where customers take ownership of tangible items: restaurant customers get to keep the food they order, retail customers get to keep the items they purchase, auto repair customers get to keep the replaced parts, knee replacement surgery customers get to keep the artificial knee, and so forth.

I call into question the traditional assumption that there is a dichotomy between goods and services (Greenfield, 2002; Hill, 1977; Zeithaml, 1981). That assumption contributes to the service confusion (Sampson & Froehle, 2006). A service is a type of process, and a good is a type of resource. All businesses involve both resources and processes that act on those resources, and, as mentioned above, it would be difficult to find a service process that does not involve goods. The bottom line is that defining services as "intangible goods" is inaccurate and a poor basis for analysis.

Service operations

The second way that the term "service" has been used in business parlance is to describe an operational process that involves a provider doing something productive in conjunction with resources that come from a customer. More precisely, services are business processes that act with or on customers, their belongings, or their information (Lovelock, 1983; Sampson & Froehle, 2006).

For example, the surgery process acts on customers' bodies, thus is a service. The auto repair process acts on customers' cars, thus is a service. The classroom process acts on customer's minds, thus is a service. The tax accounting process acts on customers' financial records, thus is a service. The business consulting process acts on customers' business problems, thus is a service.

What about the auto manufacturing process? What customer resource does the auto manufacturing process act with or on? Auto manufacturing is a fascinating process that typically involves procurement of parts and materials from suppliers, fabrication and assembly of components, inspection and control of quality, and delivery of finished goods. At no point do the customers, meaning the individual auto purchasers, need to be involved in the manufacturing process. In fact at this very moment an auto manufacturer could be producing a car that you might buy three months from now, and they are doing it without anything from you! They do not even have your permission!

Granted, you may have completed an auto manufacturer's customer feedback survey or attended one of their new product focus groups. However, the information you gave in those settings was not for your individual production; it was market segment data that would assist in understanding and meeting the needs of other future customers.

On the other hand, when you go to the dentist you will find that the dentist is waiting for you because the dentist cannot proceed with the dentistry process (cleaning teeth, filling cavities, etc.) without a key customer resource: the patient's teeth! Sure, the dentist can *prepare* for that productive dentistry process by procuring equipment, hiring staff, cleaning tools, and so forth. But the dentist cannot actually produce in the key value sense without those facial customer resources.

In other words, unlike the auto manufacturer, the dentistry process as defined (cleaning teeth, filling cavities, etc.) is dependent upon individual customer resources. This defining condition has various implications for the service provider that will be explained later. For example, the quality of dental work is extremely dependent on the processes and resources of customers, including eating and brushing habits. Conversely, auto manufacturers typically define production quality according to their own engineered design specifications, which are based on their expectation/hope that the specifications match future customer needs.

Unlike the "intangible goods" perspective on services, this second perspective on services is both universally valid and insightful. The name given to this enlightened perspective is the *Unified Service Theory*, but do not be dismayed by the reference to theory. As Kurt Lewin, the father of modern social psychology, reportedly declared, "There is nothing so practical as a good theory." The Unified Service Theory (or UST) is a very practical theory and simply states that *the defining characteristic of all service businesses is process dependency upon customer resources*—that the provider's processes are dependent upon resources that come from each individual customer. As we will see, this process dependency forms the basis for our ability to analyze and improve service businesses.

Service Supply Chains

The Unified Service Theory depicts services as a unique type of supply chain.[8] Supply chains are traditionally depicted as a series of firms that work together in a production of goods. Some firms provide and refine raw materials. Some firms fabricate components. Some firms assemble products. Some firms store and distribute goods. And so forth.

An example of a traditional supply chain is shown in Figure 2, where we have a focal firm that receives resources from suppliers who in turn receive resources from still other suppliers (so-called "second-tier suppliers"). The focal firm has customers, who may themselves have customers. In this model the suppliers are considered to be "upstream" meaning that they ship goods down towards the focal firm. Customers are considered to be "downstream" meaning that the focal firm ships goods down to the customers. As such, the use of the terms "supplier" and "customer" in supply chain parlance is relative to whatever firm is considered the focal firm. However, that perspective does not hold true for Service Supply Chains, where customers are suppliers and suppliers can be customers! (I will provide alternate definitions for "customer" and "supplier" in Chapter 3.)

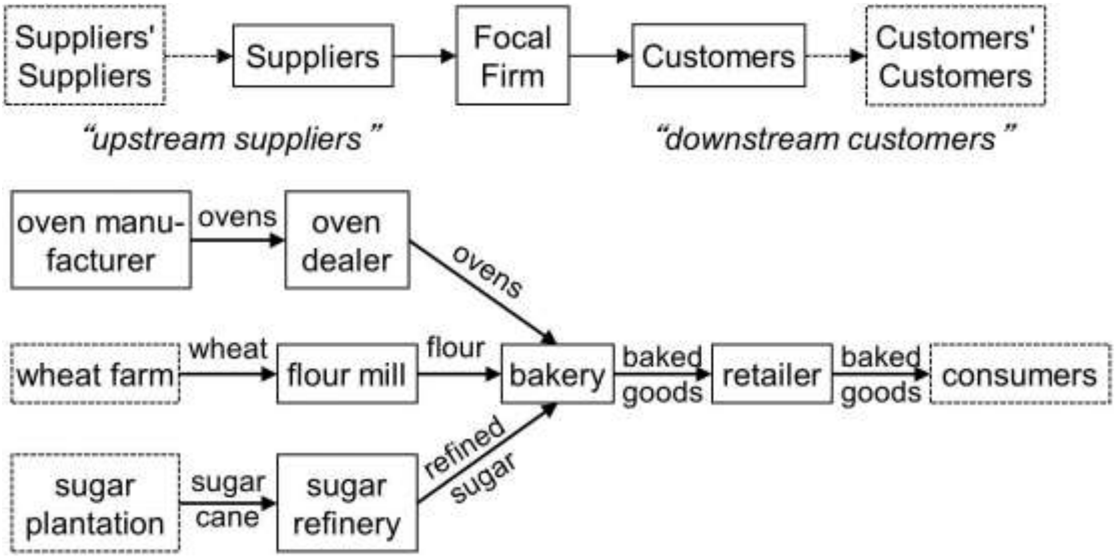
Suppliers' Suppliers
Suppliers
Focal Firm
Customers
Customers' Customers
"upstream suppliers"
"downstream customers"
oven manu-facturer
ovens
oven dealer
ovens
wheat farm
wheat
flour mill
flour
bakery
baked goods
retailer
baked goods
consumers
sugar plantation
sugar cane
sugar refinery
refined sugar

Figure 2: Traditional supply chain with bakery example

Service Supply Chains are different from traditional supply chains in that each customer provides resources to the service provider for use in that customer's production. As mentioned above, those resources may be their selves (possibly including their effort), their belongings, or their information. Examples were given in the prior section. The customer resources are processed in conjunction with resources from other suppliers in order to meet customer needs. As such, customers are both upstream (meaning they provide input resources) and downstream

---

[8] Major portions of this section are from (Sampson & Spring, 2012).

(meaning they receive output resources). From the process perspective, they are two places at once, as depicted in Figure 3.

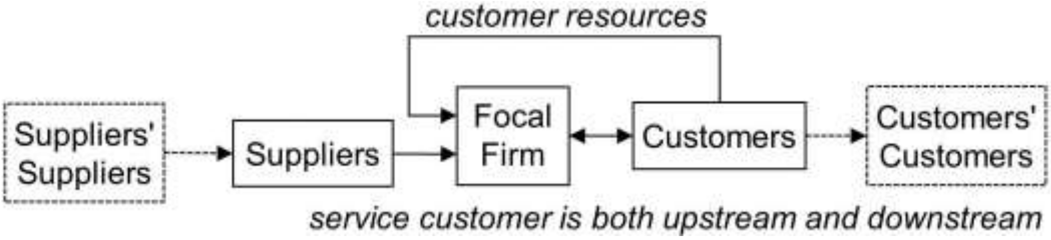

Figure 3: A Service Supply Chain

This Service Supply Chain relationship is *bidirectional*, meaning that resources move in both directions between the provider and the customers. The UST points out that services are, in fact, bidirectional supply chains. The bidirectional nature of Service Supply Chains has various implications, including the following: (Sampson, 2000; Sampson & Spring, 2012)

1. Service Supply Chains are generally shorter than product supply chains, meaning that customer resources pass between relatively few companies before getting back to the customer. For example, the product supply chain for a plastic door handle on a car begins with drilling for crude oil that is refined into plastic resin and shaped into pellets that are melted down and injection molded into a door handle that is assembled to a car that is shipped to a dealer—dozens of companies could be involved in producing and delivering that door handle. Compare that to the bidirectional supply chain of taking your car to the dealer to have the broken handle replaced.
2. Service providers typically do not pay for customer-provided resources. In the dentist example, the dentist does not have to pay the patient for providing his or her teeth. It is as though service providers receive customer resources on consignment, with the expectation that they will ultimately be returned to customer use.
3. Service providers inherently produce just-in-time (JIT), meaning producing according to demand, since the dependency on customer-resources precludes producing the service to inventory. (This will be explained in detail in Chapter 7.)
4. Services include implicit customer expectations for the value added by the service provider, since the customer sees both ends of the service process. In other words, service customers can compare what comes out of the service process to what they put into the process and thereby judge whether the provider is adding value.

Although Service Supply Chains are relatively short, they still can be quite complicated. Figure 4 shows a dry cleaning Service Supply Chain. This is what has been a “two-level bidirectional supply chain” (Sampson, 2000, p. 352). In that example, the dry cleaning firm receives a damaged garment from a customer, but outsources the repair of garments to a seamstress. The end customer only interacts directly with the dry cleaning firm. The repair offering is provided by using the seamstress as a service supplier, meaning that the seamstress processes customer inputs coming from the dry cleaning firm, only interacting with the end customer by way of the garment. (In Chapter 3 we will call this "surrogate interaction.")

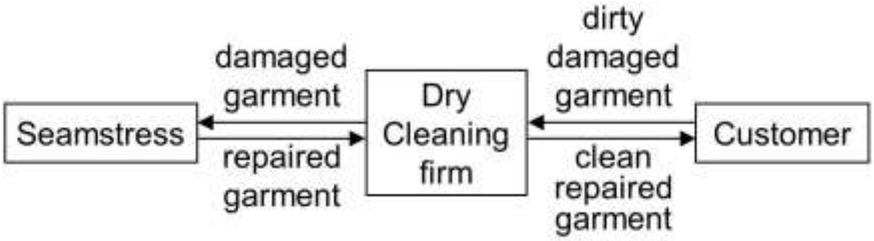
damaged garment
Seamstress
repaired garment
Dry Cleaning firm
dirty damaged garment
Customer
clean repaired garment

Figure 4: A dry cleaning Service Supply Chain

The auto insurance example shown in Figure 5 is the type of Service Supply Chain that later will be described as a Service Value Network. An insurance client (an individual or a firm) owns a car. The client provides the insurance company with risk that is based on the value of the car, the age and record of the driver, and so forth. The insurance company provides the client with assurance of mitigated risk. Insurance companies often employ reinsurance companies to take on some of the aggregate risk. Clients with questions about insurance coverage may call a company phone number that is routed to an outsourced call center. If the client has an auto accident, the client will likely go to an auto body shop that has contracted to do repairs on behalf of the insurance policy. Auto body shops do not usually do mechanical repairs, but outsource mechanical repairs to specialists like radiator shops.

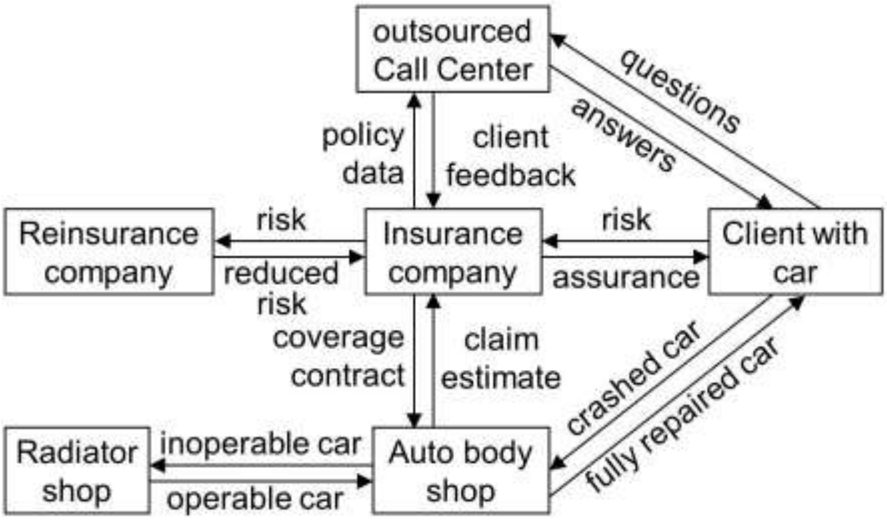
outsourced Call Center
questions
answers
policy data
client feedback
Reinsurance company
risk
reduced risk
Insurance company
risk
assurance
Client with car
coverage contract
claim estimate
crashed car
fully repaired car
Radiator shop
inoperable car
operable car
Auto body shop

Figure 5: An auto insurance Service Supply Chain

An important issue we see from these examples is the complexity of relationships that can exist in Service Supply Chains. This points us to the fundamental underlying construct of PCN Analysis: interactions between entities. In one sense, PCN Analysis is a systematic way of studying and designing effective interactions.

Services are interactive processes

The term "service" has been used as an adjective to describe things of varying scope. We have already talked about how economists refer to the "service sector" which is comprised of "service industries." But again, they have been imprecise in telling us what constitutes a service industry, other than some vague idea that they "provide services." That classification is even more complicated by the variety of activities within the service sector. For example, education has been included in the service sector. Education includes firms that produce educational materials and firms that deliver education to students. Producing educational materials seems more like manufacturing, which contradicts referring to that aspect of education as "non-manufacturing."

Even classifying *firms* as "services" is dubious, since firms also have a variety of operations of different types. For example, IBM used to focus on designing and producing computer hardware, and was considered to be a manufacturing firm. In 2002, IBM acquired the consulting arm of PricewaterhouseCoopers to bolster their information technology consulting business: IBM Global Services (IGS). According to recent financial reports, 60 percent of IBM's revenues come from their service operations. So, does that make IBM a service firm? Or just 60 percent of a service firm?

It makes much more sense to classify *individual processes* as being service processes or not service processes. The Unified Service Theory says that a service process of a firm is one in which the firm's customers, or beneficiaries of the process, each provide essential input resources to the process. A "non-service" process of a firm is one that the firm can perform *before* receiving resources from individual customers; after production is complete the customer may provide financial resources to the firm (e.g., pay for the goods), but those financial resources are used to meet the needs of *future* customers.

As suggested previously, dentistry operations include cleaning teeth, filling cavities, and so forth, which are service processes (dependent upon current patient inputs). Dentistry also includes procuring equipment, hiring staff, cleaning tools, and so forth, which are non-service processes (from the perspective of the patient). In fact, *all firms have both service processes and non-service processes*.

Granted, we *could* categorize businesses or industries according to the percentage of their processes that are dependent upon customer inputs, and maybe say that a firm with more than 50 percent of processes being service processes qualifies for being called a "service business." That may help the calculation of government economic statistics, but is a convoluted way to study services.

In this book we are going to treat service as a process, or more specifically an interactive portion of a process. We will see that all businesses have interactive service processes, as well as non-interactive processes that are not service processes. From this point forth, we will only use the term "services" to describe *customer-provider interactive processes*. In Chapter 4 (section starting on page 36) this type of processes will be described as being "co-productive."

Visualizing interactive processes

If services are interactive processes then analyzing services means analyzing interactive processes. Processes are traditionally represented by flowcharts. Flowcharts, or "flow process charts," date back to at least 1921, when Frank Gilbreth gave a presentation titled "Process Charts—First Steps in Finding the One Best Way" at the annual meeting of the American Society of Mechanical Engineers (Graham, 2004). Flowcharting and the various flowcharting tools have been useful in their own right, but they are limited in depicting distinguishing elements of interactive service processes.

Initially, flowcharts were primarily used in repetitive manufacturing processes, but they have since been adapted to other contexts, such as data processing and services. The original process charts included symbols for operation (i.e., processing step), transportation, inspection, delay, and storage. Process chart paper came pre-printed with all five symbols down the left side and room for writing process steps to the right, and symbols were connected with lines to represent process flow. Subsequently, instead of list form, the process charts were drawn on blank paper with annotated process symbols connected by arrows, which allowed for easier representation of non-linear processes. For example, the diamond represented decision steps with arrows pointing to different steps for different decision outcomes.

Figure 6 shows a simple flowchart for a pizza restaurant. In usual flowchart manner, the sequence of a process chain is indicated by arrows that connect one process step to another. The arrows generally represent a state dependency, meaning that one process step depends on some resource being in a state provided by another process step. For example the restaurant must first develop recipes before identifying ingredients, which is to say that "identify ingredients" is dependent upon the completed state of "develop recipes."

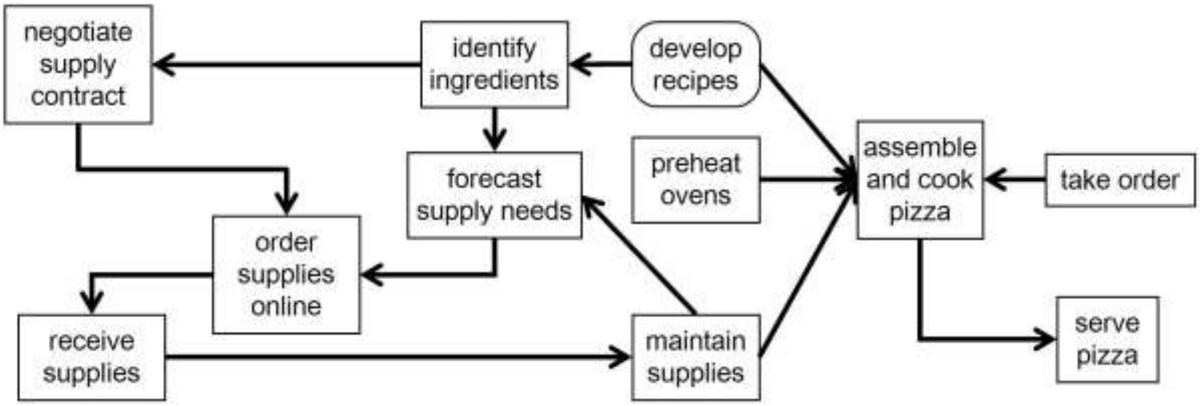

Figure 6: A simple restaurant flowchart

The arrows on flowcharts are different from the arrows on supply-chain diagrams such as was shown in Figure 2. Arrows in supply-chain diagrams often represent the flow of materials or information. Arrows on flowcharts represent state dependency, although movement of materials and information is an example of a state change. However, the arrows on flowcharts do not necessarily imply any flow of materials.[9]

Over the years, people have come up with new and more advanced forms of flowcharting, each being suited to analyzing particular types of processes. Unfortunately, prior flowcharting techniques have been inadequate at depicting interactive service processes and facilitating analysis. Chapter 3 will introduce the new PCN Analysis technique, which draws on key features of other flowcharting techniques.

For example, computer scientists use a tool called an Event-driven Process Chain (EPC), which is a flowcharting method used in business process modeling and is often used in enterprise resource planning (ERP) implementations. EPC flowcharts are valuable in representing not only processes but also events that precipitate process execution as well as entities responsible for specific processes (van der Aalst, 1999). However, they are not particularly good at capturing processes that involve interaction between entities or the networks in which entities exist.

Another flowcharting tool used primarily in computer science is Business Process Modeling Notation (BPMN), which uses flowcharts that are similar to activity diagrams of the Unified Modeling Language (UML). BPMN organizes flowchart elements (process steps) into “swim lanes” that represent the entity that is performing the particular process step. A similar approach is used in “deployment flowcharts” of the Six Sigma tool set. For example, a sales process might be divided up into customer, salesperson, fulfillment, and billing swim lanes. However, by convention, each process step exists within one and only one swim lane, although it is conceivable that a step could span the border between adjacent swim lanes. Instead, interaction is depicted by dashed lines connecting corresponding steps in different swim lanes, which are referred to as cross-entity “messages” (White, Miers, & Fischer, 2008).

A flowcharting technique that has been used for studying interactive service processes is Service Blueprinting, which will be discussed in Chapter 23. Service Blueprinting is helpful for studying interactions, but less helpful in showing how interactions fit within a broader picture of processes that are performed and shared by multiple entities.

PCN Diagrams build on the strengths of other flowcharting techniques, while emphasizing the unique conditions and design opportunities for interactive service processes. Chapter 3 will introduce PCN Diagrams through a simple example, and subsequent chapters will provide richer and more insightful examples.

---

[9] Flow of information is more complicated. It turns out all resources are information laden, meaning that all state changes imply a flow of information. However, that information may be embodied in some resource. For example, the “preheat ovens” step causes the oven to have implied information about its temperature.

Chapter 3 – Creating PCN Diagrams

The approach we will use for effective service design is PCN Analysis. The foundation of PCN Analysis is PCN Diagrams. PCN Diagrams will form the basis for analyzing service processes, networks, strategies, innovations, and other managerial issues. To proceed with this we need to first review the appropriate grammar and structure of PCN Diagrams, which will allow us to be precise in our subsequent discussions. This chapter may seem a bit mechanical, but is essential to unlocking the power of PCN Analysis.

The basics

A **process** is a sequence of steps. The base grammatical identifier of a process step is a verb. Process steps involve entities acting on resources, often multiple resources from multiple sources. Resources and entities are identified by nouns. In the PCN framework we use the term "resource" in a general sense, including physical items, knowledge, energy, and so forth. Even entities such as people or machines can be resources.

For example, the following are process steps from the pizza restaurant example of Figure 6:

- "develop recipes"
- "negotiate supply contract"
- "order equipment and supplies"
- "preheat ovens"
- "cook a pizza"

Notice that these process steps each have a verb followed by one or more nouns. You may notice that these process steps do not have a subject noun to identify who is performing the step, which will be explained below.

A PCN Diagram is a flowchart that exists within an analytical structure. PCN stands for Process Chain Network. A **process chain** is simply a sequence of process steps with an identifiable purpose. Chapter 2 described supply chains as sequences of companies that participate in the development of a product. For example, Figure 2 (on page 14) shows a simplified supply chain for a bakery.

Process chains, like supply chains, span and tie together multiple entities, although a service process chain may or may not result in the production of a physical good. However, all process chains have an identifiable purpose. In general, the purpose of process chains is ultimately to improve the well-being of some entity or set of entities, which is the concept of **value** (see, e.g., Grönroos, 2008, p. 303). This concept of value will be expounded in Chapter 4.

Figure 7 shows a process chain with the purpose of serving pizza. Note that it has the same flowchart steps as Figure 6 (page 18), but it is structured within the framework of a PCN Diagram.

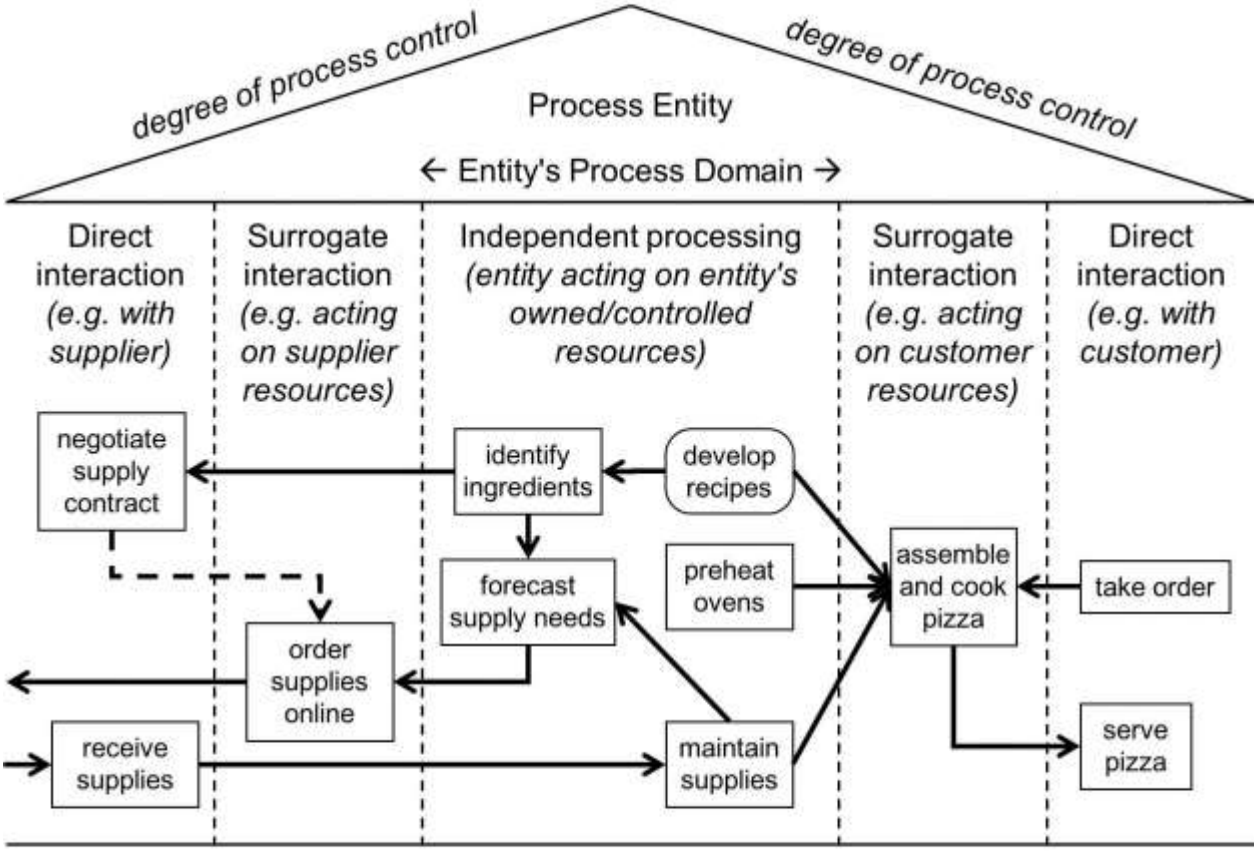
degree of process control
Process Entity
degree of process control
← Entity's Process Domain →
Direct interaction (e.g. with supplier)
Surrogate interaction (e.g. acting on supplier resources)
Independent processing (entity acting on entity's owned/controlled resources)
Surrogate interaction (e.g. acting on customer resources)
Direct interaction (e.g. with customer)
negotiate supply contract
identify ingredients
develop recipes
forecast supply needs
preheat ovens
assemble and cook pizza
take order
order supplies online
receive supplies
maintain supplies
serve pizza

Figure 7: A simple restaurant PCN Diagram

As with a traditional flowchart (e.g., Figure 6), PCN Diagrams use arrows to indicate process step dependency. PCN Diagrams sometimes use dashed lines to represent a loose temporal dependency (i.e., one step may happen quite a while after the prior step). For example, the dashed line between "negotiate supply contract" and "order supplies online" implies that the supply contract could have been negotiated a long time before an instance of ordering supplies.

As mentioned above, process steps involve entities acting on resources. We define a **process entity** as any entity that participates in a process. Examples of process entities include firms, departments within firms, customers, agents of customers, and so forth. The key feature of a process entity is the ability to make decisions about the initiation or progress of some portion of the process. Process entities can perform process steps through the use of machines or automation, but the process entity still has cognitive control over the performance of the process steps.

The process entity in Figure 7 is a pizza restaurant, meaning the manager and employees of the restaurant. Alternatively, it could be depicted with two process entities, one for managers and one for employees, or the waiters could be considered one process entity and the cooks could be considered another. However, the decision making throughout the restaurant is probably unified, meaning that the pizza restaurant could be depicted as a single process entity.

Nevertheless, a PCN Diagram with only one process entity (like Figure 7) is illustrative but neither interesting nor realistic. Subsequent examples will be more useful by describing how process chains span multiple process entities with different decision perspectives. As will be discussed below, the "N" in PCN stands for Network, reminding us that process chains tie together a network of entities (to accomplish an identifiable purpose).

There are some useful ways of characterizing process entities. Some process entities *control* certain process steps—functioning as "operant resources" that act on other resources (Constantin & Lusch, 1994), such as a surgeon, who acts on a patient. Other process entities function as "operand resources," meaning they are acted upon, such as the surgery patient. It is common for an entity to be an operant resource during some parts of a process chain and an operand resource in other parts of the same process chain.

All entities participating in a process chain—producers and consumers—are beneficiaries of the process chain, meaning that they participate with the expectation of value (see Sampson, 2001, p. 330). We do not advocate eliminating the distinction between consumers and producers as some others have done (Stephen L. Vargo & Robert F Lusch, 2008, p. 257; Vargo & Lusch, 2010, p. 146), but instead recognize that entities engage in interaction with two distinct types of value (i.e., benefit) motivations. Process chains tend to be configured to accomplish one or more specialized purposes. Entities that stand to benefit from a specific purpose of the process chain are **specific beneficiaries** of the process chain, and are generally called *customers* or *consumers*.

Other process entities participate in a given process chain in order to be able to subsequently meet well-being-improvement needs by other process chains. Usually, these process entities benefit from the given process chain by receiving a generic resource—money—that can be subsequently deployed to meet specific needs from other process chains. Firms such as "manufacturers" and "service providers" often fall into this category. They participate in a process chain not so much for specialized benefits of the process, but for the generic resource that can be used in other process chains, and as such are considered to be **generic beneficiaries** of the process.

For example, some employees of a deck and fencing company have been in my backyard installing a deck. I hired the deck company because of their apparent competencies in deck construction. These employees associate with the deck company not because they need decks, but because they need money for use in process chains that are outside of the deck company's process domain, covering things such as food, housing, entertainment, etc. These employees are generic beneficiaries of our relationship, since I provide money. I, however, am associated with the deck company because I specifically need a deck (which meets some relaxation or social need), so I am a specific beneficiary.

Of course, hybrid entities exist—being both a specific beneficiary and a generic beneficiary. For example, consultants are paid to engage in consulting projects (thus being generic beneficiaries), but also may desire to gain expertise in the business of a given client (thus may also be a specific beneficiary), and may therefore be willing to reduce the consulting fee charged that client. Another example is the teenage friend of one of my kids who was at our house recently. She mentioned she works as a lifeguard at the public swimming pool. When I asked why she works there she said it was because she likes swimming (thus a specific beneficiary), but I am pretty sure lifeguards also get paid (a generic beneficiary).

Business relationships general involve both specific beneficiaries and generic beneficiaries. An exception would be a barter system, where the distinctive competencies of one entity are traded for the distinctive competencies of another entity. This is rare in modern economies because it requires finding a compatible match of competencies to needs. For example, the local newspaper reported that there was a "woman hoping to trade face painting services for lawn care or handyman work."[10] The ideal trade would be with a landscaper or handyman who has a side job as a carnival clown. But, often it is not easy to find people who have the competencies you need at time they need your specific competencies.

As shown in Figure 7, each process entity has a **process domain**, which is the set of process steps that are initiated, led, performed, and, to some degree, controlled by the process entity. In other words, an entity is an operant resource for process steps that fall within its process domain. A driving construct of a process domain is control, as symbolically noted by the triangle at the top of Figure 7. Entities can and do influence process steps outside of their process domains, but do not lead or directly control those process steps.

Three regions of a process domain

In a study of various ways for classifying service processes, Urban Wemmerlöv observed that "contacts between a service system and a customer/client can be of three basic kinds": direct contact, indirect contact, and no contact (1990, p. 28). He gave an example that "a restaurant faces direct contact with its patrons in the dining area, has only indirect contact with them during the food preparation processes in the kitchen, and has no direct contact with them during its purchasing and maintenance activities" (1990, p. 29). These three types of processes are depicted in Figure 7.

At the extreme edges of the process domain in Figure 7 are process steps that involve **direct interaction** with other entities, such as suppliers and customers. This direct interaction means that people are interacting with people in some way, negotiating contracts, taking orders, and so forth. An example of a direct-interaction step in manufacturing is a salesperson negotiating the sale of a manufactured resource. An example from a hospital is drawing blood from a patient or consulting with the patient about the need to draw blood.

Adjacent to the direct interaction regions are areas of **surrogate interaction**, meaning that an entity is performing process steps that involve a non-human resource of another entity (see Chase, 1978, p. 139). Examples are ordering supplies via a supplier website and assembling a pizza according to a customer order. The website is not the supplier and the order is not the customer, but are surrogates of those other entities. A manufacturing example is make-to-order production, where the order is a surrogate representation of the customer preferences (Sampson, 2001, p. 142-144). A hospital example is analyzing a patient's blood in a laboratory.

---

[10] Caleb Warnock, "Want to trade? Bartering makes gains in Utah Valley," *Provo Daily Herald*, June 15, 2013, p. A1.

At the center of an entity's process domain is the region of **independent processing**, which means processing that does not involve either direct or surrogate interaction with other entities. Make-to-stock manufacturing is a common example of independent processing. An independent processing example from a hospital is cleaning the facility, assuming that the person cleaning the facility is part of the hospital process entity. However, if the hospital cleaning has been outsourced to a separate entity, such as a janitorial firm, the cleaning function would be surrogate interaction in the janitorial firm's process domain. This idea will make more sense as we proceed to other PCN Diagram examples.

In Figure 7 it just so happens that the supplier-facing processes are shown on the left and the customer-facing processes are on the right, but it does not have to be that way. PCN Diagrams differentiate suppliers from customers according to beneficial relationships, not by relative positioning in and between process domains. In barter arrangements (see Normann, 2001, p. 36), for example, both entities may be suppliers and/or customers, and either can be on either side of the diagram.

As suggested previously, the triangle at the top of the entity's process domain symbolically represents the **degree of process control**, with less control occurring with more direct interaction (Morris & Johnston, 1987). Gary Thompson (1998) explained this concept by distinguishing between "uncontrollable work" such as "when customers and employees interact," and "controllable work", which "does not require the presence of customers" and therefore "management has some degree of temporal control" (p. 23). He described how service processes (i.e., process chains with interactive elements) contain both types of work, and managers can leverage the characteristics of each in order to improve labor utilization while meeting customer needs. Design issues pertaining to process control will be expounded in Chapter 9.

Multiple entities

A single-entity PCN Diagram like Figure 7 is not much more than an entity's process flowchart with categories. As mentioned above, it is much more interesting to study process chains that involve multiple entities, as shown in Figure 8 and subsequent figures. The essence of PCN Diagrams is documenting the interactive steps between the process domains of multiple entities in a service system, which will lead us to PCN Analysis.

Figure 8 includes two process entities: a provider and a customer. In that PCN Diagram the provider is on the left and the customer is on the right, but it could have been the other way around. The diagram only shows one side of the process domains, and we assume each entity has other related parts of the process domain that are not included in this simple diagram. For example, the pizza restaurant has some process for procuring supplies that involves interaction with suppliers.

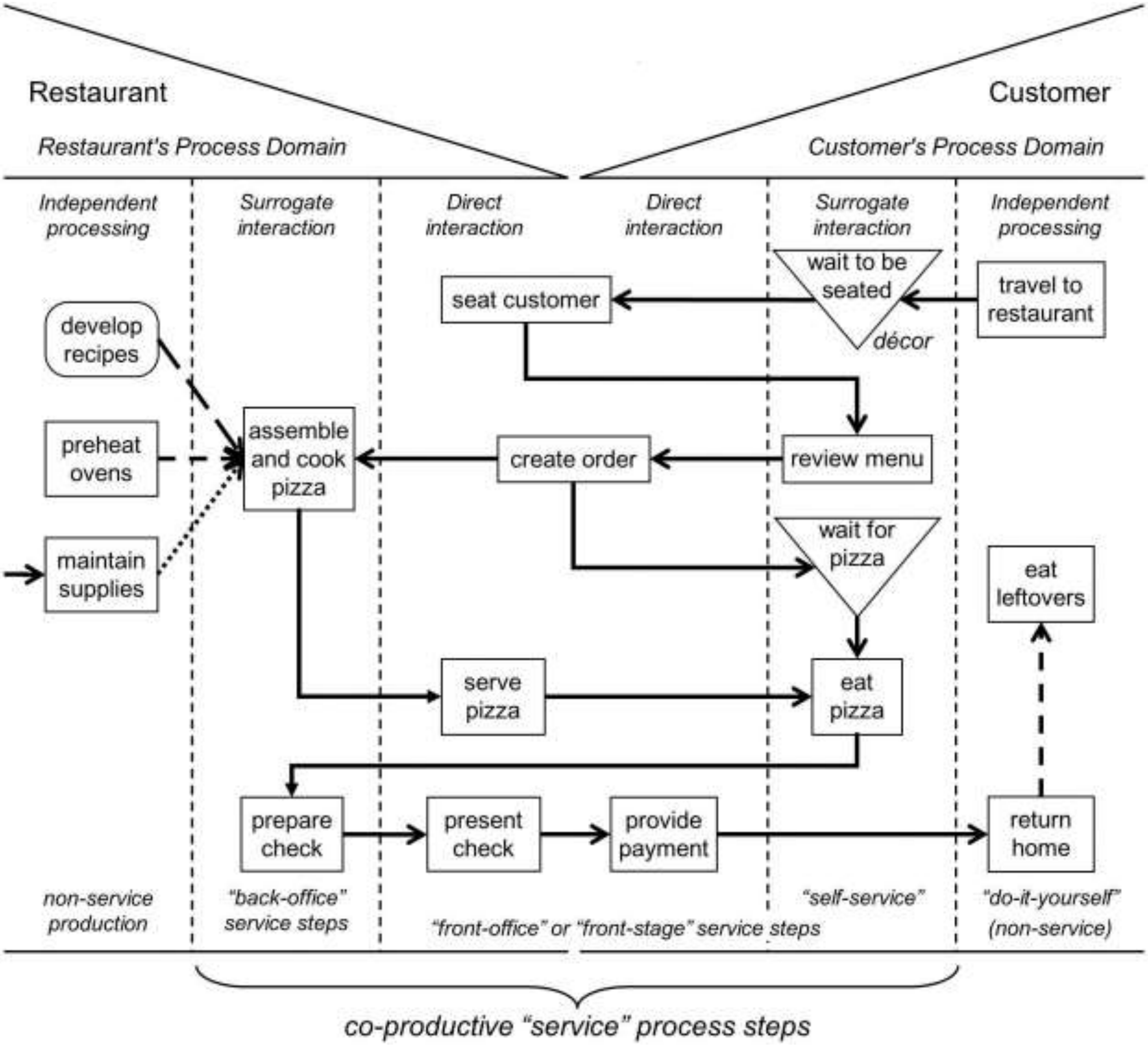
Restaurant
Customer
Restaurant's Process Domain
Customer's Process Domain
Independent processing
Surrogate interaction
Direct interaction
Direct interaction
Surrogate interaction
Independent processing
wait to be seated
décor
travel to restaurant
seat customer
develop recipes
assemble and cook pizza
preheat ovens
create order
review menu
maintain supplies
wait for pizza
eat leftovers
serve pizza
eat pizza
prepare check
present check
provide payment
return home
non-service production
"back-office" service steps
"front-office" or "front-stage" service steps
"self-service"
"do-it-yourself" (non-service)
co-productive "service" process steps

Figure 8: A PCN Diagram with two entities

Notice in Figure 8 how some steps occur between the direct-interaction regions of the entities. Seating customers involves direct interaction, but the step is executed primarily by the restaurant employee, and is therefore more within the restaurant's process domain. In this example, creating the order is led jointly by the employee and the customer. Serving the pizza and presenting the check are led by the employee, and the customer leads the step of providing payment. Each of these direct interaction steps are, by our definition, "service" steps. Further, all surrogate interaction steps are considered "service" steps. Note that both entities in Figure 8 are also engaged in some independent processing steps, which are "non-service" steps in this analysis. Were one to ask, "Is a restaurant a service?" the answer would be, "No, a restaurant is an organization that is engaged in both service (i.e., interactive) and non-service (i.e., independent) processes."[11] This emphasizes that the focus of analysis is the process segment[12], not the firm and certainly not the industry (see Chapter 2 and Sampson & Froehle, 2006, p. 333-334). Firms are aggregations of resources and processes, including some service (i.e., interactive) process segments and some segments that are independent processing.

It is important to understand the use of grammatical constructs in a PCN Diagram. The subject, or predicated noun, of any step is always assumed to be the entity or a representative of the entity whose process domain the step falls under. In Figure 8, "develop recipes" is under the restaurant's process domain, implying that "restaurant employees develop recipes." If the recipes are developed by customers, then the box should be under the customer's process domain. If an outside entity like a cookbook publisher develops the recipes, then the process step should be under the publisher's process domain.

The interactive steps in Figure 8 are *co-productive*, meaning they involve both entities as operant and/or operand resources. The word co-production means "producing together." Chapter 2 described services as interactive processes, which could also be described as being co-productive processes. Co-production will be explained further in Chapter 4 (in the section starting on page 36). Figure 8 also depicts so-called "front-office" steps that are seen by customers and "back-office" steps that are out of customer view.

Since the subject of each process step is implied by the position on the diagram, the process steps can and should always start with verbs, reminding us that we are studying chains of process steps. The action verbs are followed by one or more object nouns, which are the resources being acted upon. Note that, by definition, object nouns under independent processing are normally resources owned and controlled by the given process entity.

However, for simplicity we allow steps that are outside the scope of the current analysis to be considered "independent processing," even if they are interactive. For example, Figure 8 shows "travel to restaurant" in the customer's independent processing, even though the travel may have involved a bus or a taxi. In that example, the interaction between the bus or taxi provider is outside of the scope of the pizza restaurant interaction being studied. At the end of this chapter we will review steps to create a PCN Diagram, including (1) identify the process to be analyzed and (2) identify the entities participating in the process. Those steps define the scope of analysis.

PCN – The N is for Network

A key feature of PCN Diagrams is that they can easily include multiple process entities in a network. Traditional service analysis techniques, such as Service Blueprinting, are useful for studying processes that involve two entities – a producer and a consumer – but limited in the ability to depict a full network.

---

[11] Elsewhere, I have advocated only using the term "service" as an adjective to qualify a specific noun, such as a service process, a service business, etc. Use of "service" as a noun is ambiguous, since it could refer to a service process, a service product, a service business, or a church meeting.

[12] A process segment is simply a part of a process. See (Sampson, 2001, p. 38) .

For example, Figure 9 depicts a simplified PCN Diagram for a medical diagnosis process involving a patient who feels weak and needs a prescription based on a blood test. This example illustrates a process chain network involving four process entities: (1) a health clinic, (2) a patient, (3) an insurance company, and (4) a pharmacy. Standard flowchart connector symbols are used to show process dependencies that might span different pages or parts of the PCN Diagram. (Each connector has a letter followed by a number representing either the page, or in this example the entity number, where the step continues.) These and other flowcharting techniques can be used to depict PCN Diagrams of various levels of complexity.

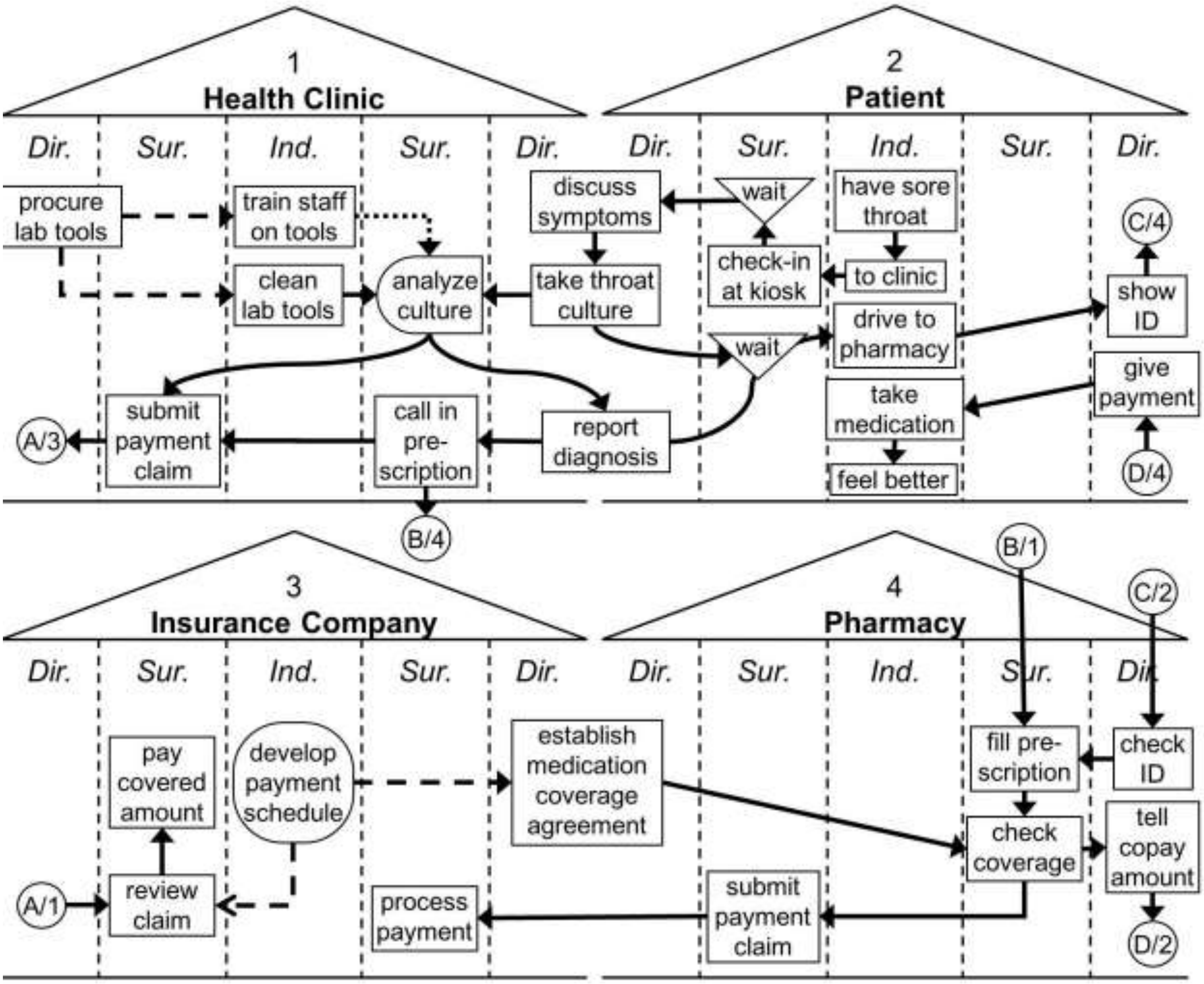
1
Health Clinic
Dir.
Sur.
Ind.
Sur.
Dir.
procure lab tools
train staff on tools
clean lab tools
analyze culture
submit payment claim
call in pre-scription
report diagnosis
A/3
B/4
2
Patient
Dir.
Sur.
Ind.
Sur.
Dir.
discuss symptoms
take throat culture
wait
check-in at kiosk
wait
have sore throat
to clinic
drive to pharmacy
take medication
feel better
C/4
show ID
give payment
D/4
3
Insurance Company
Dir.
Sur.
Ind.
Sur.
Dir.
pay covered amount
review claim
A/1
develop payment schedule
process payment
establish medication coverage agreement
4
Pharmacy
Dir.
Sur.
Ind.
Sur.
Dir.
B/1
C/2
fill pre-scription
check coverage
check ID
tell copay amount
D/2
submit payment claim

Figure 9: Healthcare PCN Diagram example

Again, PCN Diagrams can be used to visualize and analyze processes of varying levels of complexity and involving a wide variety of process entities. Chapter 16 will discuss the configuration of multi-entity process chain networks in greater detail.

Identifying the appropriate region

Summarizing, the three process regions of a process domain are:

- **Independent processing** steps are performed by a process entity acting on resources owned and controlled by that same entity.
- **Surrogate interaction** steps involve a process entity acting on the belongings or information of another process entity, but not with the person of the other entity.
- **Direct interaction** steps involve a process entity working in conjunction with one or more other process entities—people to people.

It turns out almost all process steps fit into one of these three process regions[13]. The initiator (operator) of the process step is the entity whose process domain the step falls within, or, in the case of direct interaction, jointly falls within. In the process step, the process entity is acting on, or integrating, resources. If the entity is acting on or with the person of another process entity, then the step falls in the domain of direct interaction. If the process entity is acting on the resources (belongings or information) of another process entity without direct interaction, it is surrogate interaction. If we have neither direct nor surrogate interaction, then the process step is independent processing—acting only on resources owned/controlled by the process entity.

Some processes may include composite steps that occur simultaneously in different process regions or domains. For example, an instructor may be giving a lecture as students are listening. Both are part of direct interaction, but the "give lecture to students" step is in the instructor's process domain and the "listen to instructor's lecture" step is in the students' process domain, with the latter being dependent upon the former. Or, an airline may be transporting passengers and their baggage at the same time: the "transport baggage" step is surrogate interaction and the "transport passengers" step is direct interaction, both in the airline's process domain, while "ride airplane" step is in the passenger's surrogate interaction region. It is helpful if the level of detail of analysis is fine enough to delineate the categorization of each step.

Some processes may have steps that involve three-way interactions or even more complicated interactions. Sometimes three-entity interactions can be broken down into sub-steps that only involve two-entity interactions. We can depict three-way interactions by annotating steps to show the other entities. A healthcare example is shown in Chapter 19.

It is easy to recognize that every interactive process step, direct and surrogate, involves acting on customer-provided information. This is because people and belongings are always information laden. For that matter, every resource is information laden (Normann, 2001, p. 29), meaning that every process step is, at some level, an information processing step. Information availability is the universal resource that ties process steps together in dependent relationships.

---

[13] Machine-to-machine interaction can sometimes be represented in the surrogate interaction process region, even though it may not currently involve humans. (Of course, humans had to set up the machines and make decisions about how they would operate.)

For example, an auto repair shop may receive some information about needed car repairs from a customer, but also receives information about the needed repairs from the customers' car by studying the car and performing diagnosis tests. The information coming from the car may actually be more accurate and informative than the information reported by the customer. The job of the auto mechanic is to use information coming from the customer and the customer's car to develop an appropriate plan of repair. Again, every customer-interactive process step involves acting on some information received from either a customer or from a customer-provided resource.

The functional and managerial distinction of these three elemental process step regions will be discussed in the subsequent chapters. In a nutshell, there are major differences in operating characteristics of the three regions, and, therefore, major differences in knowledge and skill requirements, even for process steps that exist within the same process chain.

PCN Analysis summary

This chapter introduced the concept of Process Chain Networks (PCN), which are networks of entities that are tied together by a process that accomplishes an identifiable purpose. The chapter also introduced foundational concepts of PCN Analysis, including:

- process chain – a sequence of steps with an identifiable purpose.
- process entity – an entity that participates in and makes decisions about steps of a process chain.
- value – the satisfaction of process entity needs (more on this in Chapter 4).
- specific beneficiary – an entity that participates in a process chain to have needs met by the specific competencies in the process chain.
- generic beneficiary – an entity that participates in a process chain to acquire generic resources (money) to meet needs from other process chains.
- process domain – portion of process chain that falls under an entity's control and responsibility.
- process regions – areas of a process domain for steps of a particular type…
- direct interaction – steps involving person-to-person interaction between entities.
- surrogate interaction – steps involving interaction with non-human resources of another entity (e.g., technology or information).
- independent processing – steps that are performed independent from other entities in the process chain network.

The foundation of PCN Analysis is a PCN Diagram that describes a process chain according to process entities, process domains, and process regions. The following is a summary of basic steps for creating a PCN Diagram:

1. Identify a process to analyze. As explained in Chapter 2, the appropriate unit of analysis is a process or process segment, not a firm. PCN Analysis takes place at the process level.
2. Identify the process entities that participate in the given process segment. This usually includes a focal firm and an immediate customer or customer segment. In many cases,

especially B2B processes, the PCN Diagram should include the immediate customer's customer, so as to visualize how the focal firm facilitates the immediate customer accomplishing its customer-serving business objectives. The diagram might also include suppliers, partners, and others involved in the value network.

3. Record the steps that mark the start and end of the chosen process segment. Process segments often start with an identified customer need and end with the fulfillment of that need.
4. Fill in intermediate steps, showing which process domain and region each step occurs in, as discussed in the prior section. This may include steps in the process domains of the focal firm, customers of the focal firm, suppliers of the focal firm, and other entities in the process-chain network. As mentioned, the arrows between process steps indicate state dependencies (which may or may not involve product flows).

These steps to create a PCN Diagram can be accomplished by you, the Process Analysis, perhaps with the assistance of someone who is familiar with the process being studied. For an even more accurate depiction of the chosen process, I suggest you conduct a Service Process Audit, as described in Chapter 6. A Service Process Audit is a technique for documenting a process and key process characteristics based on surveys of employees and customers experienced with the process. Surveying multiple participants helps provide more accurate depictions of how a process works and how it can be improved.

Creating a PCN Diagram is the just the beginning of PCN Analysis. The real power comes from understanding what goes on in various regions of process domains and how process chains can be configured and managed to provide superior value to customers and providers. The remainder of this book will show how to use PCN Diagrams to analyze interactive service processes and identify strategic opportunities for process improvement—in other words provide increased value to customers and providers. Chapter 4 will expound the concept of value and show how value is depicted in PCN Diagrams.

Chapter 4 – Identifying the Value Proposition

PCN Analysis proceeds by identifying the value proposition and elements contributing to that value proposition. A **value proposition** is a formal or implied proposal about why any particular entity should participate in a particular process chain. The basis of a value proposition is an expectation of benefits.

We briefly introduced the concept of value and benefits in Chapter 3. That chapter also described interactive entities of two types: generic beneficiaries and specific beneficiaries. The following is a brief review.

Generic beneficiaries (providers) participate in process chains with the intent of obtaining a generic resource, typically money, which can be subsequently used to acquire specific resources from other entities and other process chains. Specific beneficiaries (customers) participate in process chains to receive benefit coming from the specialized competencies of that process chain.

For example, a plumber repairs the pipes in a doctor's home. The doctor needs to take a shower, wash the dishes, etc. The doctor is a specific beneficiary (customer) of the plumbing interaction, receiving plumbing repair that meets his or her needs. On the other hand, the plumber goes to the doctor's home to fix plumbing, not to receive medical treatment or any other specific benefit. Instead, the plumber receives a generic resource, money, which he or she can subsequently use to buy food, go on vacation, buy a yacht, or whatever. As such, the plumber is a generic beneficiary of that plumbing interaction. Of course, some plumbers may plumb for the joy of plumbing, in which case they are also specific beneficiaries.

Despite the fact that generic beneficiaries and specific beneficiaries have different reasons for participating in a process chain, at the core they all have the same ultimate goal, which pertains to value.

The common goal

I often begin my professional seminars by asking participants to write down their answers to the following four questions:

1. What department do you work for in your organization?
2. Who are your primary customers?
3. What do your primary customers want from you?
4. What do you want from your primary customers?

Sometimes I pick a random volunteer to share his or her answers. The answer to the first two questions depends on the audience and individual. However, the answers to questions 3 and 4 *always* end up the same, *regardless* of the organization, the department, or the customer. How can that be? The answer is in the whys.

Here is a typical dialog, where the hypothetical participant is a manager at an auto dealership:

Me	Participant
What department do you work for in your organization?	the sales department – I am the sales manager
Who are your primary customers?	individuals looking for a new car
What do your primary customers want from you?	a car
Why do they need a car?	to get to work
Why do they need to go to work?	to get paid
Why do they need to get paid?	to pay their mortgage, etc.
Why do they need to pay their mortgage?	so they have a place to live
Why do they need a place to live?	so they are comfortable
Why do they need to be comfortable?	they're happier when they are comfortable
Why do they need to be happy?	I don't know. They just do.

It does not matter what organization/department/customer/whatever – it *always* ends the same. The ultimate reason customers participate in any business interactions is because they want to be happy. Happiness and related concepts of "well-being" or "quality of life" is the fundamental goal of all human existence. It is correspondingly the fundamental basis for participating in any and all business interactions.

This may sound like a rhetorical exercise, but it has major implications for why we make any business decision pertaining to customers. Ultimately, the success of a business is defined in terms of its ability to contribute to the happiness of customers – and others. I hear some of you saying "no, the success of a business is in its ability to provide an adequate return to stockholders, adequate wages to employees, etc. Success of a business is about sustained profitability." But you simply need to consider question 4: What do you want from your primary customers?

As suggested above, the answer to question 4 always turns out exactly the same as the answer to question 3. Here is the continuation of the above example:

Me	Participant
What do you want from your primary customers?	their business buying cars
Why do you need their business?	so that we can pay our employees and stock holders
Why do you need to pay you employees?	so that they will keep coming to work
Why do you need them to come to work?	so that our company will continue to make money
Why does your company need money?	so that I can be paid (among other things)
Why do you need money?	so that I can go on vacation
Why do you need to go on vacation?	so that I can relax
Why do you need to relax?	relaxing makes me happy
Why do you need to be happy?	I don't know. I just do.

If at this point you doubt that this is true, just try it. I have challenged my students and seminar participants on this for years, and have never, ever, come across a counter example. (Although I have had some people try to find one.) You can even try it in monopolistic situations – the result will be the same. Try some of these:

- Why do you pay taxes to the Internal Revenue Service?
- Why do people work for the Internal Revenue Service?
- Why do people run for political office?
- Why do bank robbers rob banks?
- Why do authorities put bank robbers in jail?
- Why do people eat hot dogs? (That one stumps me.)
- Why do terrorist terrorize?
- Why does anyone do anything?

If you follow the question with enough "whys" the answer will always end up being "because [I believe] it leads to happiness [or well-being or quality of life]." (Actually, it does not matter if the action is a business interaction, an interpersonal interaction, an individual action, or whatever. Since this book is about business interactions we will keep our focus there.)

We see a couple of tremendous principles come out of this exercise. As mentioned, we see that the fundamental basis of all business activity and interaction is to lead to the happiness of individuals. In addition, we see that the quest for happiness is universal, and must be sufficiently *mutual* in order for the business to function. In other words, there is a great symmetry in business interactions. Businesses exist to promote the happiness of customers, stockholders, employees, and others. The ultimate goal of all business activity is to promote the happiness of entities in the Process Chain Network.

This oversimplification is tempered somewhat by considering the complexity of happiness:

1. Happiness is a multidimensional construct. Individuals can be happy in different ways at different times. For example, after running a marathon a runner can be happy about the accomplishment and unhappy about the exhaustion at the same time.

2. Happiness is contextual. A person's frame of mind has major implications for their propensity for happiness. Sometimes happiness is easily achieved. In other cases, such as medical depression, the potential for happiness is limited even if all environmental conditions would favor happiness.

3. Happiness exists on a continuous scale. We sometimes treat happiness as a dichotomous state – something we either have or do not have. However, it is quite clear that happiness exists in degrees.

4. Happiness is relative to some baseline, and thus can occur in the negative region. There is probably not an absolute scale for happiness, but it is more practical to consider a degree of happiness relative to some alternative. This is important in PCN Analysis where we cannot measure happiness but we can estimate the impact a process change has on happiness.

5. Happiness is an emotion. Happiness is therefore latent, meaning that it is unobservable and not directly measurable. At this writing we can only estimate the existence of happiness by self-reported measures.[14]

The fact that happiness is difficult to conceptualize does not detract from its centrality in the occurrence of all human action. The popularity of attributing business success to financial profitability can largely be explained by the easy quantification of financial measures. However, we must not forget that money itself is only a surrogate measure of happiness potential. Overreliance on monetary measures of business success can lead to missing opportunities for providing happiness to various stakeholders, i.e., missing opportunities for value.

Happiness based value

The term “value” has been used and abused in academic discussions. Financial experts are concerned with the “valuation” of assets and organizations – such as used in determining whether to invest in a company’s stock. Conversely, marketers may desire to provide value to customers in the form of benefits. Or, human resource professionals may desire to promote the culture of an organization by communicating company values.

I would argue that “financial value” and “customer value” and “organizational values” are all manifestations of the same core concept – individual happiness. Money only has value when it has the potential to satisfy needs and therefore promote happiness. We just discussed how customer value is ultimately rooted in providing happiness to customers. The values of an organization, as perhaps expressed in a mission statement, are simply a statement of things that the organization believes will lead to happiness.

Value, ultimately, is derived by an ability to provide happiness. Happiness comes from the satisfaction of needs, wherein I define needs as “conditions for happiness.” This leads us to consider an important temporal element of happiness – present happiness versus future happiness.

Co-production and the timing of value

Reiterating, value pertains to satisfying needs, which are conditions for happiness (or well-being or quality of life). Value exists in two ways. A **value potential** is an ability to satisfy needs in the *future*. Value potential can be embodied in knowledge or other resources. An automobile has value potential because it has the ability to satisfy the transportation needs of a driver, which ultimately lead to increased happiness.

Value realization is the actual satisfaction of needs in the *present*, meaning that some knowledge or other resource is used to benefit some entity and increase their happiness. When an automobile owner actually drives the automobile to a destination, and is happier as a result, that value potential of the automobile is seen to enable a value realization to the owner.

---

[14] Of course, psychologists have attempted to measure emotional states by measuring electromagnetic brain waves. However, that is simply a surrogate measure of the emotional state.

Ultimately, value realization is or should be the goal of all organizations and individuals, but that can only be achieved by appropriately providing value potential. Usually, value realization occurs outside of providers' process domains. A goal of providers should be to provide value potential in a way that allows customers to have value realization in their own process domain. *This emphasizes the need for understanding what goes on in the customers' process domains.*

Some important concepts from the service literature are co-production and value creation (for example, see, Vargo & Lusch, 2010, p. 143). Co-production was introduced in Chapter 3. The concept of value co-creation will be described below.

The PCN framework considers "production" in a traditional value-adding sense: preparing resources so that they can subsequently be used to meet needs, which means the prepared resources have value potential (Grönroos, 2008, p. 299). The prefix "co-" means "one that is associated in an action with another" (Merriam-Webster, 2014). Therefore, **co-production** means two (or more) entities producing value potential together.

In common use, co-production is where customers participate in the development of the core offering of the provider firm, presumably in conjunction with the firm (Stephen L. Vargo & Robert F. Lusch, 2008, p. 8). Co-production generally means that the customer and the provider both assume some responsibility for the execution of the production process, which may be working together (direct interaction) or may be one of them acting on the other's resources (surrogate interaction).

Subsequent process steps in the customer's region of independent processing are not co-production in the strictest sense, but may involve **value creation**, a phrase that has been used broadly to describe a realization of value by customers (Grönroos, 2008). Although co-production always takes place in regions of direct or surrogate interaction, the realization of value can occur in interactive (service) process steps or independently (such as when a customer uses a product that was purchased from a firm to meet his or her own needs).

The phrase "co-creation of value" is often used in a confusing manner because it conflates both value potential and value realization. In a precise interpretation, "co-creation of value" would mean that multiple entities are simultaneously realizing benefit. However, what really happens is that the formation of value potential is done independently by providers and jointly between providers and customers. The realization of value on the part of providers and customers rarely happens simultaneously, therefore implying that "co-creation of value" is often a misnomer. "Co-creation of value" only makes sense if one ignores the temporal distances between value potential and value realization.

These manifestations of value are depicted in Figure 10. The operations of the auto manufacturer create value potential. The operations of the auto dealer provide both value potential and some value realization—by providing information that helps the customer make a selection decision. However, the primary value realization for the customer comes from the customer driving the car and thus satisfying his or her transportation need.

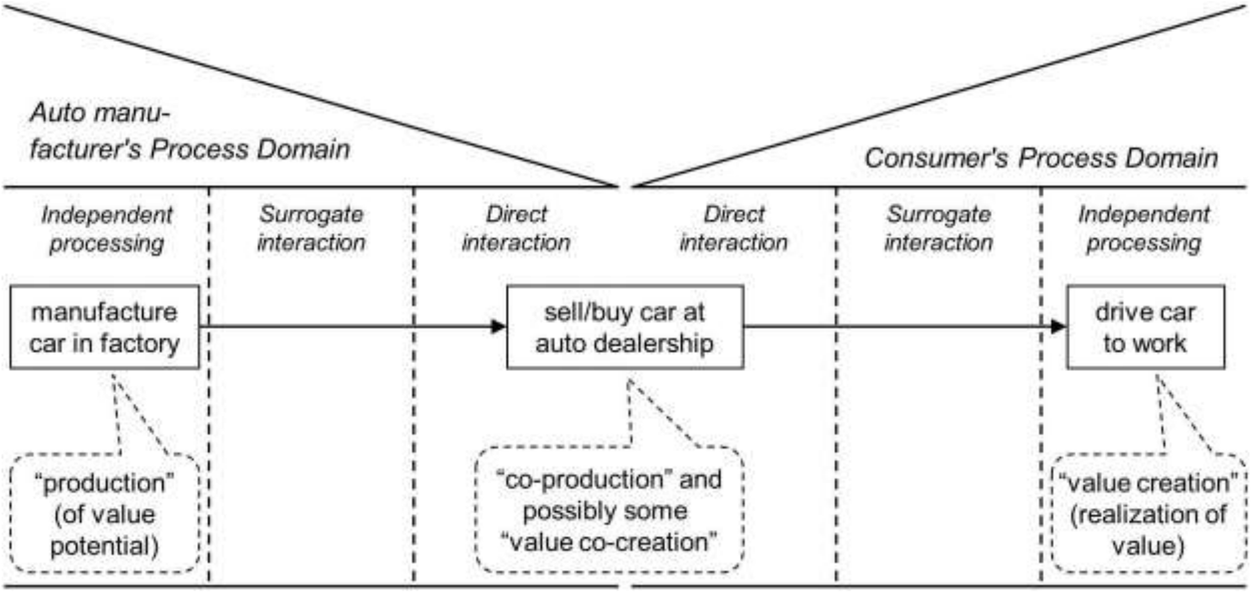
Auto manufacturer's Process Domain
Consumer's Process Domain
Independent processing
Surrogate interaction
Direct interaction
Direct interaction
Surrogate interaction
Independent processing
manufacture car in factory
sell/buy car at auto dealership
drive car to work
"production" (of value potential)
"co-production" and possibly some "value co-creation"
"value creation" (realization of value)

Figure 10: Value manifestations in automobile production and use

Value speculation and loyalty

There is a certain amount of speculation in creating or acquiring value potential. The owner may buy a car with the expectation of driving it, but for some reason may not wind up driving it. Still, the driver may realize value simply by owning the automobile, especially if it is a collector's edition.

Entities will enter into a process chain relationship only if they perceive that the relationship will ultimately lead to value realization. Therefore, the entities must speculate about the benefit potential of the other party or parties. For generic beneficiaries (providers) this speculation is a relatively straightforward, and includes assessing whether the other entity will provide the required generic resource (money) in a timely manner, which risk can be mitigated by enforceable sales contracts. It also includes guessing that the customer will not consume more provider resources than would be economically practical, which can be mitigated by pay-as-you-go requirements.

Interestingly, a local buffet restaurant had a problem at the height of the Atkins Diet craze. The restaurant charged a fixed fee to eat, even though some food items were more costly than others. Apparently a couple of Atkins Diet followers ate at the restaurant and consumed eighteen servings of roast beef and were told they could not have any more.[15] The company had to explain the difference between "buffet-style" and "all you can eat."

For specific beneficiaries (customers) the task of assessing a value offering is more difficult. Information about the value offering that comes from the provider may be biased. Information from other sources varies in reliability. Chapter 7 describes the ultimate source of information about a value offering: the customer's past experience. Still, customers take on a significant amount of risk by entering into a process chain relationship with a provider.

---

[15] Lisa Riley Roche, Chuck-A-Rama offers apology, Deseret News, April 30, 2004.

Therefore, we see a certain degree of risk asymmetry between providers and customers. Since customers bear the lions' portion of risk, they tend to be the decision makers in effectuating a process chain relationship. Providers will typically take generic resources (money) from any customer, but customers will not take specific resources from just any provider.

The key to sustainable process chain relationships is **trust**—the belief that the other entity will meet needs (i.e., provide value) in a way that is superior to alternatives (Sampson, 2001, p. 303-304). This type of trust leads to **loyalty**, which is the propensity for one entity to make decisions that are in alignment with the other entity. Customer loyalty is an emotional response to available information about the provider, including about the provider's propensity and ability to act in the best interest of the customer. I like to think of loyalty as the selection emotion—the motivation of an entity, particularly a specific beneficiary, to choose to continue participation in a process chain relationship.

The reason loyalty is important is that, in my opinion, it is the most reliable indicator of a *sustainable* process chain relationship, as discussed in the next section. Reichheld and Sasser (1990) showed how loyal customers are more profitable over time. Later, Reichheld (2003, p. 48) asserted that "the only path to profitable growth may lie in a company's ability to get its loyal customers to become, in effect, its marketing department."

Sustainability

Value, or happiness potential, is the underlying root basis of all decisions. Value has dimensions of time and scope. The time dimension can be thought of in terms of what I will call "Net Present Happiness" (NPH). NPH is the perceived happiness coming out of an interaction and series of events relating to the interaction. For example, enrolling in a college course may result in some degree of happiness during the semester, coupled with some possible pain and discomfort from quizzes and exams. The net benefit *during* the course might be negative. However, the student certainly perceives that the course will provide abilities that will lead to future happiness, such as by allowing better employment. The student consciously or subconsciously weighs out the overall benefit and costs of taking the course (the NPH) in deciding to enroll.

In calculating NPH, each individual has, in essence, a happiness time-discount rate. The discount rate tells how much less future happiness is to present happiness. A high discount rate causes decision makers to favor immediate happiness. For example, someone deciding to take up smoking may only be concerned about present benefits (in terms of popularity or whatever), and discount future costs (such as health problems). Conversely, someone who decides to take up strenuous exercise may have a low discount rate, making future health benefits worth the present pain and exhaustion that comes from exercising.

Value also has a dimension of scope, meaning how the entity defines the bounds of system that is impacted by the interaction. A narrow scope might only consider the costs and benefits of the immediate parties involved in an interaction. A broader scope might consider a myriad of related interactions and entities. For example, local politicians might only be concerned about the happiness of their local citizens, and allow a local business to engage in polluting activities. However, decisions made by that one community might affect the well-being of neighboring communities. Allowing the business in one community to engage in polluting activities might provide a net benefit to that community but a net cost to neighboring communities.

An important axiom of value is that *the only sustainable interactive relationships are those that are mutually beneficial to the entities involved*, according to the time and scope dimensions of value. If a relationship is not mutually beneficial, eventually the non-benefiting entities will opt out of the relationship.

Value is segment-based

Since value is the satisfaction of individual needs it stands to reason that value is customer specific, or more reasonably customer-segment specific. Customers can be grouped, or segmented, based on various factors: age, income level, gender, etc. Ultimately, the most relevant way to segment customers for service design purposes is according to their **value function**, which represents their needs and responses to a particular service offering. Segmenting customers according to their needs is very difficult, so we typically segment customers according to more observable factors that correlate with their needs.

For example, a restaurant may provide an offering that includes a large amount of food for a relatively low price, with little attention to other factors such as nutrition, facility décor, customer comfort, and so forth. The offering may be targeted at a custom segment with minimal financial resources and a voracious appetite. An identifiable segment that exhibits that value function might be students. Different customers segments might find the offering ill-suited to their needs.

It is important to remember that any estimation of customer value implies the value function of a given customer segment (i.e., a group of customers with similar conditions for happiness). Before we are able to estimate or identify customer response to a service design configuration we need to consider what customer segment we are addressing.

The B2B myth

This discussion of value is intuitive for business-to-consumer (B2C) services, where the customers are individuals that make decisions based on their emotional response. Some may assume that business-to-businesses (B2B) services may be different since the customers are firms and not emotionally-driven individuals. While it is true that business customers are bound by company policies and procedures for making purchases, it is incorrect to assume that B2B purchases are devoid of emotional effect. At the end of the day, B2B purchase decisions are made by individuals or group of individuals who are driven by emotional value functions.

One distinction of B2B services is that the individual making the purchase decision may not be engaging the service provider on their own behalf, but instead on behalf of some other individual or group. As such, the need satisfaction of the purchasing decision maker is largely indirect, depending upon how well the service provider meets the needs of the intended recipient. However, it may also be direct in the way the process engages and facilitates necessary interactions with that decision maker.

An illustration of this point is the old adage "no one was ever fired for buying IBM equipment." This adage referred to B2B purchasers selecting IBM equipment instead of equipment from less-known providers that may provide better equipment at a lower price. The adage recognizes that B2B equipment purchasers may tend to be risk-averse, with the risk of getting fired over a bad purchase having more emotional weight than the possible accolades and rewards for saving the company money.

The point is that even for B2B offerings we still must consider the emotional response of the purchasing decision makers. Value in B2B settings is, ultimately, the satisfaction of stakeholder needs that improves their happiness and wellbeing (or decreases the unhappiness potential of getting fired).

PCN depiction of value

Value propositions for generic beneficiaries can be represented on PCN Diagrams by placing -$ symbols by steps in which the generic beneficiary incurs monetary costs and +$ symbols by steps where generic beneficiaries receive monetary compensation. The magnitude of the costs and compensation can be depicted by the number of $$$ signs by each step, or omitted if the costs are trivial.

We recognize that compensation means receiving funds that represent value potential. Costs, on the other hand, represent giving up value potential. Financial profitability is the idea that the organization has a net increase in value potential, at least as far as measurable monetary instruments goes. Some nonprofit organizations may seem to have a net decrease in value potential, however if one takes into account the nonmonetary benefits, even nonprofits need to have a net increase in value (potential and realization).

The value to specific beneficiaries is usually emotional or attitudinal, since the satisfaction of needs leads to a positive emotional effect: increased happiness (or decreased unhappiness). This is true if the specific beneficiary is an individual or even if the specific beneficiary is a firm (as in B2B interactions). As discussed above, every individual or individual within a firm makes interaction decisions based on expectations for an emotional benefit.

In PCN Analysis we identify steps where specific beneficiaries (customers) receive specific benefits (i.e., need-filling value that provides motivation to compensate a provider) with ☺ symbols. We identify where the customers incur non-monetary costs (such as inconvenience) with ☹ symbols. These ☹ symbols mark what has elsewhere been referred to as "customer pain points" (Furr & Alhlstrom, 2011; Kahn, 2012).

The ☺ and ☹ symbols can represent value realization, or can represent value potential that is directly perceived by the beneficiary. In the auto example from Figure 10 the customer may find happiness not only in driving the car, but also in buying a car that he or she believes will lead to future happiness. The ☺ and ☹ symbols depict the specific beneficiaries' (i.e., the customers') perspective on value. The easiest way to determine that customer perspective on value is to ask customers what parts of the process they are happy ☺ about or unhappy ☹ about. Chapter 6 describes a tool for gathering that information called a Service Process Audit.

This combination of tags therefore represents the value proposition to the various beneficiaries involved in a given interactive process. For example, Figure 11 shows the value proposition for a furniture retailer. In this situation, the furniture retailer designs, procures, and ships the furniture independently from customers. The customers recognize the need for furniture independently from the retailer. The customer browses the retailer's showroom and may ask a salesperson for purchase advice. (We sometimes place steps requiring judgment in rounded boxes, as discussed in Chapter 9.) The customer makes a selection, and the salesperson determines if the item is in stock. If the item is not in stock it is backordered. Eventually, the purchased item will be delivered to the customer, who can use the item.

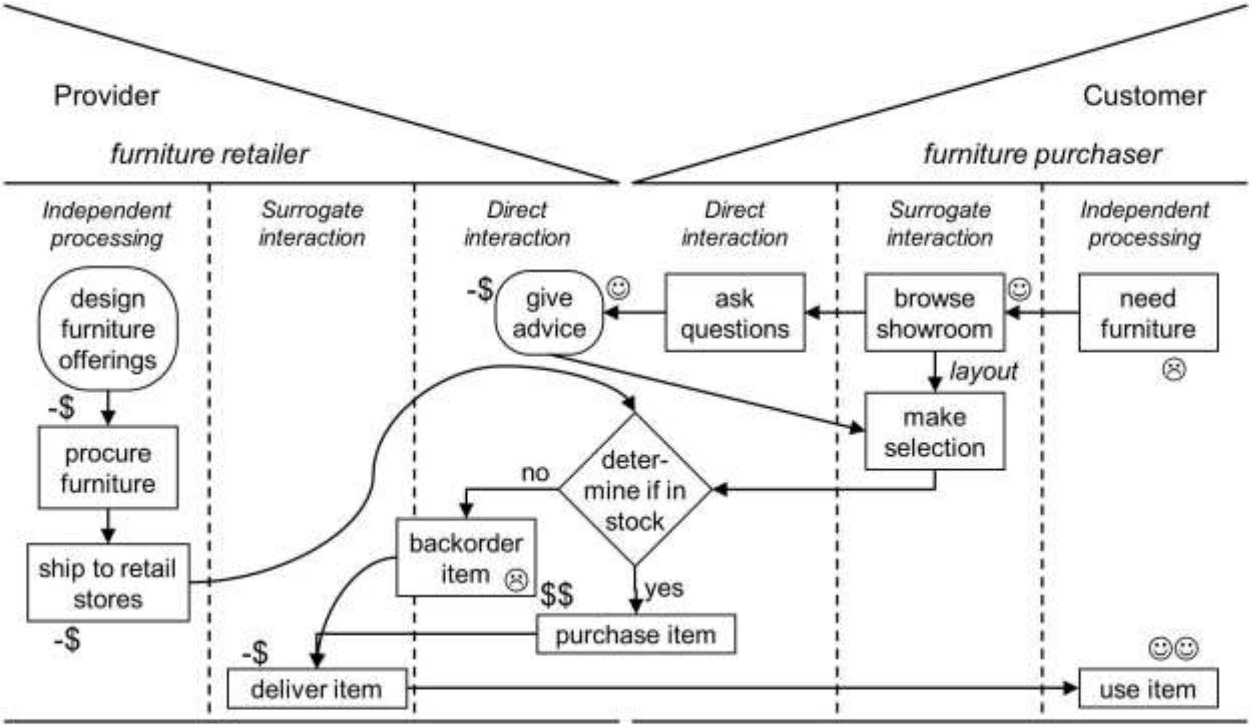
Provider
Customer
furniture retailer
furniture purchaser
Independent processing
Surrogate interaction
Direct interaction
Direct interaction
Surrogate interaction
Independent processing
design furniture offerings
-$
procure furniture
ship to retail stores
-$
-$
give advice
☺
ask questions
browse showroom
☺
need furniture
☹
layout
make selection
no
deter-mine if in stock
backorder item ☹
$$
yes
purchase item
-$
deliver item
☺☺
use item

Figure 11: Value proposition of furniture retail

The furniture retailer receives value potential when the customer purchases an item. This value is a generic resource – money – that the retailer can use to meet various needs such as paying for labor, inventory, facilities, cleaning of facilities, and so forth. The retailer incurs costs in procuring inventory, shipping inventory, and delivering advice through qualified labor. Although labor is also involved in backordering items and handling purchases, those steps are not nearly as labor-intensive as giving advice. (Whether or not to flag costs of a given step is up to the judgment of the person conducting the PCN Analysis.)

Figure 11 depicts two steps of non-trivial customer cost: needing furniture and the need for an out-of-stock item to be backordered. The need for furniture is a happiness deficiency due to lack of furniture. If that need is not filled, the customer may be disappointed in having to wait for the item to be backordered. Customer psychological costs are factors of reduced happiness, which means decreased value.

The customer realizes value at three steps of this process. First, this customer finds value in browsing the showroom, exploring alternatives and considering personal preferences. For this particular customer segment the "browse showroom" step is a pleasurable experience. This emphasizes that when we specify a "customer" entity we are really specifying a customer segment, which is a group of customers with a certain set of needs (conditions for happiness) and thus an assumed emotional response to the offering. If you do not like browsing furniture showrooms you may not be in the customer segment being considered in Figure 11.

Second, the customer (from that customer segment) finds value in the advice coming from the salesperson. The knowledge imparted by the salesperson will help the customer feel more confident in making a selection decision. Third, the customer finds value in using the item. If it is a comfortable chair or couch, the customer realizes value each time he or she sits on the item.

What about all of the other steps that do not have ☺ benefit indicators? Are those other steps necessary? They may not produce a value realization (actually satisfying a customer need), but may provide important value potential. Value potential means that the steps enable subsequent value realization. The salesperson cannot give the best advice without some input from the customer, which takes place in the "ask question" step. The customer cannot use the item unless it has been purchased and delivered.

If any step of a process does not contribute to either value potential or a value realization, it should probably be eliminated. Some processes have steps that are followed due to habit or tradition or some other unjustified reason. Some steps might be performed in ways that are not very productive or efficient. Streamlining service processes will be expounded with examples in Chapter 13 – Improvement through Lean Services. Configuring or reconfiguring a process in order to improve the value proposition is the topic of Chapter 5.

PCN Analysis summary

This chapter discussed the foundational purpose of all process chains and process chain networks, which can be stated various ways such as:

- the provision of value
- the satisfaction of needs of process entities
- delivering benefits
- providing for increased happiness (or decreased unhappiness)
- improving the well-being of process entities

These ideas are all embodied in the concept of value, as the term will be used throughout this book. However, we must recognize that value within process chains is manifested in two ways. First, there must be value potential, which is typically a configuration of resources that is expected to be able to satisfy needs and improve well-being. However, value potential is not enough, since ultimately the needs will need to be satisfied (and well-being improved), which is value realization.

One surprising outcrop of this is the observation that value realization of necessity takes place in the customers' process domains. For this reason, PCN Analysis requires studying and analyzing processes that take place in customers' process domains. This is quite different from common practice wherein provider firms only study processes that are within the boundaries of their firm. PCN Analysis emphasizes that it is as important or even more important to study parts of the process chain outside of those boundaries.

It is relatively straightforward to identify and measure monetary costs and benefits experienced by a generic beneficiary in a given process. It is much more difficult to understand, much less measure, the psychological costs and benefits experienced by specific beneficiaries (customers). We will discuss customer measurement in Chapter 12, and introduce a Service Process Audit tool for documenting customer value in Chapter 6.

One reason to study and analyze the value manifestations in a given process is so that the value proposition can be communicated to customers and employees. If customers understand the capability of a process to fill needs, they will be better able to decide on entering into a process relationship. The alignment of process attributes with customer needs will be discussed in the Chapter 11 section titled "When does quality even matter?"

This chapter also emphasized the important concept that a successful PCN configuration is based on *mutual* realization of value, meaning that all entities that participate in a process chain do so because the participation somehow leads to improved happiness and well-being. As we analyze our process relationships with other entities we need to consider how value is realized by all parties, if we are to assure an optimal and *sustainable* process configuration. Attaining an optimal process configuration requires considering design alternatives, which is the topic of Chapter 5.

Chapter 5 – Strategic Process Positioning

Strategy is primarily about focus—about deciding what to focus on as well as what not to focus on. A firm cannot do everything for its customers, and those that attempt to are likely to dilute their competencies into obscurity. Therefore, firms need to decide what they intend to do and how they intend to do it, which defines their chosen offering. For interactive service businesses the offering is largely embodied in the business process design, and the strategy of a firm is primarily manifested by that process design. As we will see, deciding on a type of process design is a fundamental strategic decision.

One element of strategy is innovation. Business innovation is a decision leading to possible improvement. Improvement of what? Chapter 4 suggests that the ultimate goal of all business endeavors is improving the well-being (i.e., providing value) of stakeholders (customers, employees, stockholders, etc.). This implies that the focus of innovation should be centered on improving the value potential of a given offering, thus leading to increased value realization. In other words, the focus of all innovation is to meet more needs and enable more happiness of various entities. Richard Normann called this concept increased "density" (2001).

The PCN framework unlocks a powerful approach to service process design and innovation based on exploring process configuration alternatives. Innovation can be introduced into process chains by repositioning steps or sets of steps across the regions of a process domain or across the entities of a process-chain network. It should be recognized that there are always process alternatives, with some being more practical than others in terms of costs and benefits. It should also be recognized that in many cases, service (or interactive processing) is one option, and independent processing is another. *Service—interactive processing—is a strategic choice!*

Process Design Options

Process improvement and innovation will be expounded in Part III (Chapter 13 through Chapter 16). This chapter introduces the building blocks that will enable improvement and innovation.

Consider the process chain involved in providing sandwiches to hungry consumers. One key step in the process is "assemble sandwich" wherein an actual sandwich is created. Where can or should the "assemble sandwich" step fit in regions of a provider's or consumer's process domain? In fact, that step could be positioned about anywhere.

Figure 12 depicts positioning options for that "assemble sandwich" step. Option 1 performs the step in a factory, completely independently from customers. That step might be performed at a centralized location, perhaps far from customers both in time and space. (It is amazing what they can do with preservatives these days.) After that sandwich is assembled it is pushed down a supply chain through some logistical system until it gets at a point of purchase by consumers. In traditional manufacturing jargon this is called a "push" system or "make-to-stock" production.

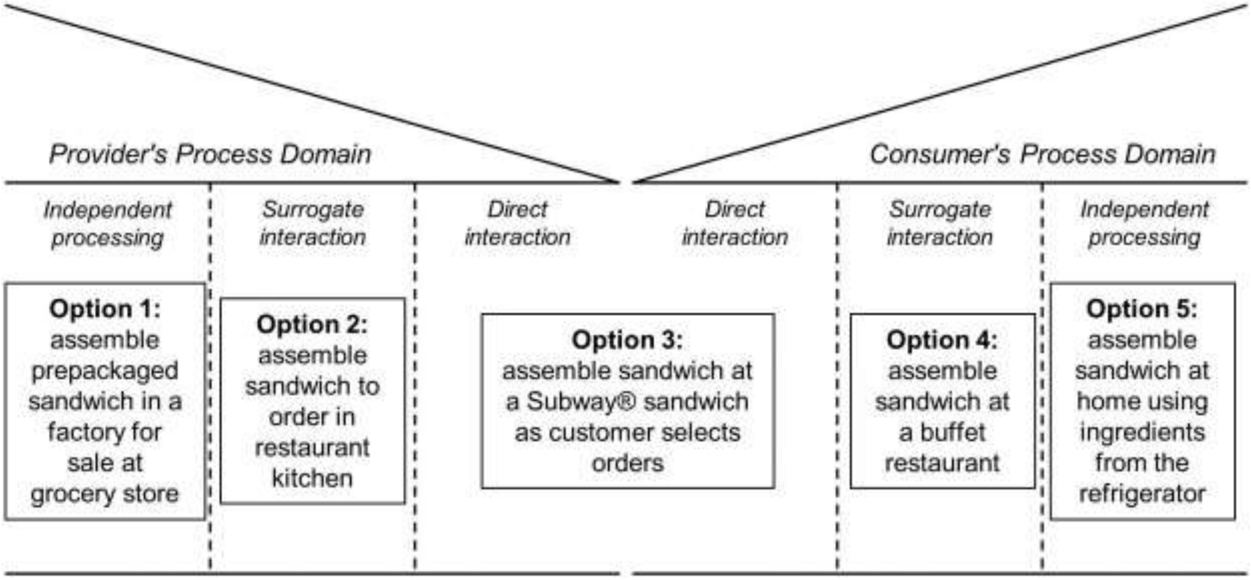
Provider's Process Domain
Consumer's Process Domain
Independent processing
Surrogate interaction
Direct interaction
Direct interaction
Surrogate interaction
Independent processing
Option 1: assemble prepackaged sandwich in a factory for sale at grocery store
Option 2: assemble sandwich to order in restaurant kitchen
Option 3: assemble sandwich at a Subway® sandwich as customer selects orders
Option 4: assemble sandwich at a buffet restaurant
Option 5: assemble sandwich at home using ingredients from the refrigerator

Figure 12: "Assemble sandwich" process design options

Option 2 has the firm assembling the sandwich based on a customer order, which order is a surrogate representation of a customer. The provider interacts with that customer resource (the order) which is surrogate interaction. With this option, the provider does not produce sandwiches to stock or inventory, but waits for an order before assembling a sandwich (i.e., "make to order"). In manufacturing language this is called a "pull" system, since each customer order pulls a quantity of production. Option 2 is more complicated than option 1 in that there must be a mechanism for receiving the customer order and for adjusting the process to accommodate the customer order.

Option 2 is also subjected to a serious time dependency. First, since the customer has already placed an order before production the step is very sensitive to time latency. In other words, the time from order to production and delivery must be quite fast, since the customer is waiting for the product. Second, it is difficult to manage the production schedule under option 2 since demand (customer orders) is likely to significantly fluctuate over time, whereas capacity of production might be relatively fixed. This means that the production capacity may be idle when there are no customer orders, such as in the middle of the afternoon, and then the sandwich production system may be stretched beyond capacity during times of high customer demand, such as lunchtime.

This challenging concept of "time-perishable capacity" means that (a) capacity utilization under Option 2 will likely be quite a bit lower than under Option 1, and (b) the producing firm needs to consider ways of making capacity more flexible and adjustable to fluctuations in demand. Under Option 1, capacity utilization is an internal decision based on process needs. Under Option 2, capacity utilization is limited by the availability of essential customer-provided resources. (This time-perishable capacity concept will be expounded in Chapter 7.)

Option 3 is an interactive assembly process, as has been popularized by the ubiquitous Subway® Sandwich chain. Here the customer is actually in the sandwich assembly process, working with the provider in directing the sandwich assembly process. We might call this co-productive option "make it together." In this Subway example the employee follows relatively standard procedures according to customer requests.

Option 4 has the customer initiate sandwich assembly at a provider's facility using resources owned by the provider. Here the customer has access to the provider's resources, including the facility (such as a buffet restaurant), equipment (forks and knives), and materials (bread and sandwich toppings). The customer uses those provider resources to assemble a sandwich that can meet the customer's specific needs. The firm is benefited by having the customer do much of the production work, assuming the customer is capable of performing that function. We often call this type of process positioning option "self service."

Option 5 has the customer assembling independently from the provider. In this example the provider is an ingredient provider, such as a producer of bread and sandwich toppings. The customer has taken ownership of those ingredient resources (i.e., purchased them) and likely kept them in inventory (e.g., the refrigerator) until the time of demand. The customer then performs the "assemble sandwich" step, followed immediately by consumption (yum!). This is a typical "do-it-yourself" (DIY) option.

Which of these five is the best process positioning option? That depends on the needs, expectations, interests, and skills of the customer segment, in conjunction with the capabilities of the sandwich firm. Although the five options each address the same hunger need of customers they are different operational configurations that provide different value propositions. The five process options each have different operating characteristics.

Principles of Process Positioning

The provider has specialized skills and performs specialized production. In other words, the provider is in the sandwich business. As such, the provider is willing to acquire specialized tools and competencies used in sandwich assembly, which represent a high fixed cost, but that cost can be spread over a lot of different customers. Therefore, the options in the provider's process domain are likely to provide superior economies of scale.

However, the customer may demand or desire control of the sandwich assembly process, making the provider's process domain less attractive. For example, the customer may desire to customize the sandwich assembly in strange and unique ways, which is easier to accomplish in the customer's process domain.

In some cases the customer only wants limited control, but wants the provider to assume much of the responsibility for the assemble sandwich step. Therefore, a more interactive option such as Option 3 might be desirable—letting the customer direct the assembly while the provider actually performs the assembly. However, this interactive co-production constrains the productivity of the provider and causes inefficiency. A surrogate interactive option might provide a better balance of efficiency and co-production.

These thoughts can be summarized in four basic principles that describe **operating characteristics** of alternate process configurations:

Principle #1: Economies of scale. High fixed costs favor processing by specialized providers who can spread those fixed costs across more units of production. As will be demonstrated in the next section, customers involved in interactive processes usually have the option of performing certain aspects of the process independently—so-called “do it yourself” (Lusch, Brown, & Brunswick, 1992). For example, a customer can hire a carpenter to build an addition onto his house or alternatively can purchase tools and attempt the project himself. Even though customers typically have a customization advantage by being their own providers (Principle #3 below), focused providers typically have a scale advantage. In particular, specialized providers can spread fixed costs across multiple customers, thus reducing the amount of fixed cost that needs to be allocated to each instance of production (service delivery). Fixed costs might include equipment and facilities. One of the most common fixed costs is obtaining expertise – the specialized skills and competencies that are required for the particular service.

Principle #2: Customization. Customization increases as process steps move closer to the customers’ independent processing region. A firm can provide customization by moving steps from independent processing (e.g., make-to-stock manufacturing) to surrogate or direct interaction (e.g., make-to-order manufacturing). However, firms can increase customization even further by moving steps into the customer’s process domain, allowing the customer to customize their execution of steps and use of resources. Indeed, the words “customize” and “customer” share the common root. Assuming they have sufficient skills and resources, customers can get more customized results by doing the task themselves since they are not constrained by practical or legal restrictions of hired service providers. (Customization will be expounded further in Chapter 8.)

Principle #3: Process inefficiency. In general, interactive processes are less efficient (from an overall system perspective[16]) than independent processing, with directly-interactive processes being the least efficient. As Chase (1978; 1981) identified, operating efficiency is an inverse function of the degree of customer interaction. This relates to the concept of “customer intensity,” which will be discussed Chapter 7 (page 61) and which is defined as the degree to which variation in customer input components causes variation in the firms processes (see Sampson, 2010a, p. 116; Sampson, 2010b, p. 38). Interaction leads to customer intensity, and the resulting variation hinders process efficiency. If efficiency is a goal, effort should be taken to reduce customer intensity by limiting how much of the process chain operates in the region of direct interaction.

---

[16] The system perspective makes it difficult to separate costs to the provider from costs to the customer. If the provider incurs inefficiencies, the costs are likely to be somehow passed on to the customer. If the customer incurs inefficiencies, the customer is likely to consider those costs in deciding whether to choose the offering of that particular provider. The point of Principle #3 is that, ignoring economies of scale, it is more efficient for customers to do things on their own, and more efficient for providers to do things on their own, than doing things together (direct interaction).

Principle #4: Surrogate positioning. Surrogate interaction is a tremendous tool for balancing the classic tradeoff between process efficiency and customization (Frei, 2006). Changing an independent processing step to an interactive step or vice versa can be disruptive; and firms can use the surrogate-process region as a less-disruptive alternative.

Figure 13 shows these four principles with regard to personal income tax return preparation process options. The provider is a tax firm with tax filing expertise. The customer is a client that needs a completed income tax return. Option 1 has the greatest economies of scale—the firm can sell the book to millions of customers at relatively low variable cost. However, the book is a standardized offering, and Option 1 is the least customized option. The most customized option is Option 5, since the client has complete control over the tax return process, and can use any approach they desire (including illegal approaches, if the client is willing to spend time in jail). A weakness of Option 5 is that the client may not have the skills necessary to complete the tax return, at least not to the degree of a specialized service provider. Option 3 provides a balance of customization and economies of scale (esp. specialized skills), but at a cost of efficiency. Options 2 and 4 are more efficient than Option 3, and leverage the hybrid benefits of surrogate positioning.

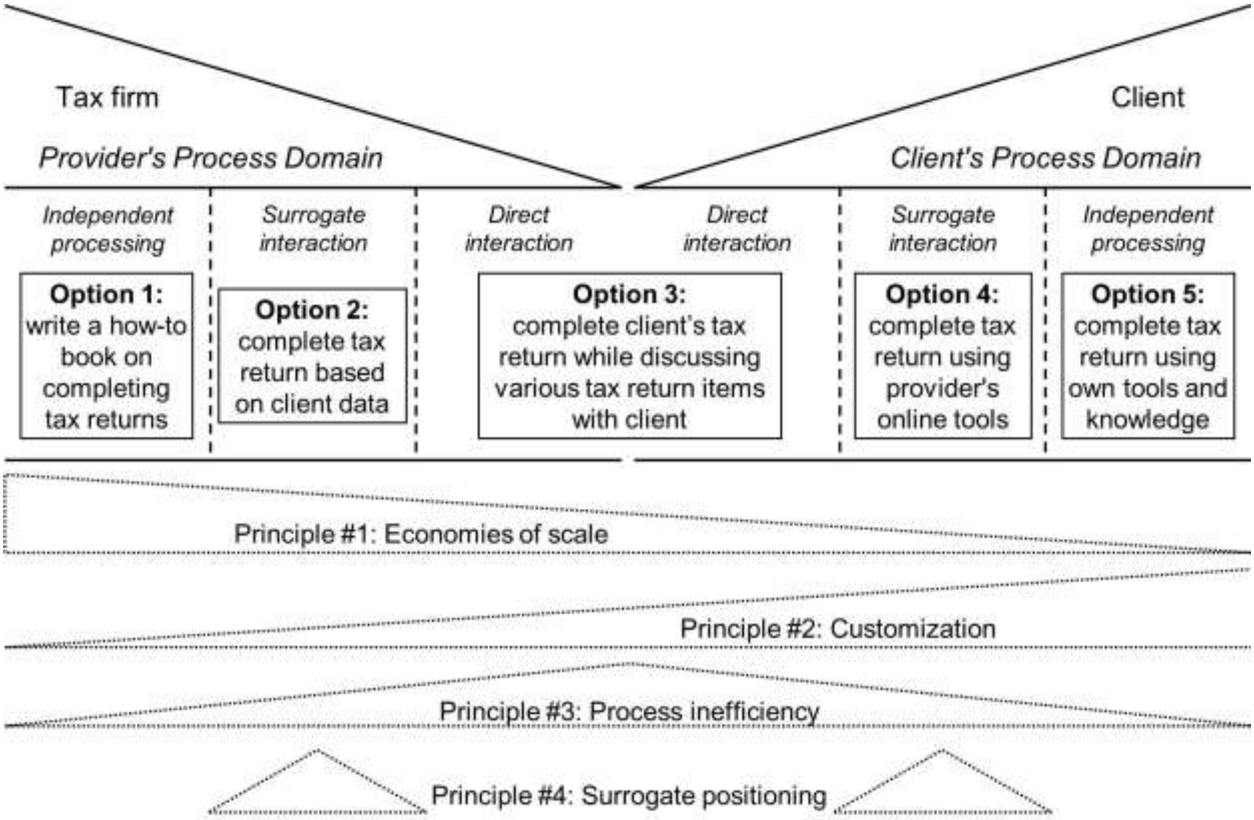
Tax firm
Client
Provider's Process Domain
Client's Process Domain
Independent processing
Surrogate interaction
Direct interaction
Direct interaction
Surrogate interaction
Independent processing
Option 1: write a how-to book on completing tax returns
Option 2: complete tax return based on client data
Option 3: complete client's tax return while discussing various tax return items with client
Option 4: complete tax return using provider's online tools
Option 5: complete tax return using own tools and knowledge
Principle #1: Economies of scale
Principle #2: Customization
Principle #3: Process inefficiency
Principle #4: Surrogate positioning

Figure 13: Personal tax accounting process options and principles

Strategic Process Positioning

The optimal processes positioning depends on what the provider is trying to accomplish in a particular offering to a particular customer segment (i.e., a group of customers with similar needs and potential for satisfying those needs). This process positioning is a strategic decision in that it defines what business the firm is in in terms of value proposition and requisite competencies. The process positioning also defines the relationship with customers in terms of roles assumed by the provider vis-à-vis roles required of the customers (which will be expounded in Chapter 10).

In general, the best process positioning depends on the desired value proposition of a given process, as depicted by realization of costs and benefits in the process (for both the provider and customers). For example, moving a process step from direct interaction to surrogate interaction may allow an increase in efficiency but may also decrease the responsiveness of the system to varying customer needs and abilities. If customers value efficiency then this could be a good process repositioning. If customers demand high levels of responsiveness to their unique needs it could be a bad process positioning.

Therefore, firms must understand the needs of their chosen customer segments, understand their corresponding competencies, and position the process steps accordingly. Good process positioning can lead to significant competitive advantage, and bad process positioning can leave providers on a path to dissolution. Chapter 14 will show how markets evolve in ways that make good strategic process positioning turn into bad strategic process positioning. The remedy to such strategic disruptions is innovation.

Enabling and Relieving Innovations

As mentioned above, innovation is covered in Part III of this book. Here we will review basic concepts leading to innovation. Richard Normann (2001, p. 73-74) discussed two major categories of process innovations, or what he called “value-space reconfigurations”: **enabling innovations**, which enable customers to do things that were previously provided by others, and **relieving innovations**, in which a firm takes over activities that previously were done by customers. In the PCN framework, enabling innovations are visualized by moving process steps from the provider’s process domain to the customer’s process domain. Relieving innovations are visualized by moving steps the other direction (toward the provider).

Normann cites the Swedish retailer IKEA as an example of a firm that successfully executed an enabling innovation for strategic advantage (Normann, 2001; Normann & Ramírez, 1993). IKEA sells furniture in “flat packs” that are kits with materials and instructions that enable customers to assemble the furniture in their own homes with their own tools. Among other things, this allows IKEA to sell good-quality furniture at relatively low prices.

Figure 11 (from Chapter 4 page 42) showed a value proposition for a traditional “full-service” furniture retailer. Compare that with IKEA’s value proposition as depicted in Figure 14. That PCN Diagram shows how IKEA differentiates by repositioning the “assemble furniture” step from IKEA’s process domain to the customers’ process domain. (It is often helpful to highlight steps involved in an innovation with double-border boxes.) This shift has various implications for the operating characteristics and value proposition, including:

- Improved firm efficiency: It is less expensive for the firm to "outsource" the assemble furniture step to the customers, leaving the firm with simply assembling the furniture kits.
- Reduced economies of scale: customers are less capable at assembling furniture than a specialized factory employee. IKEA manages this by providing simplified assembly that can be performed with basic household tools.
- Increased customization potential: customers can assemble furniture as desired, including adding extra paint or stickers or even not following instructions.

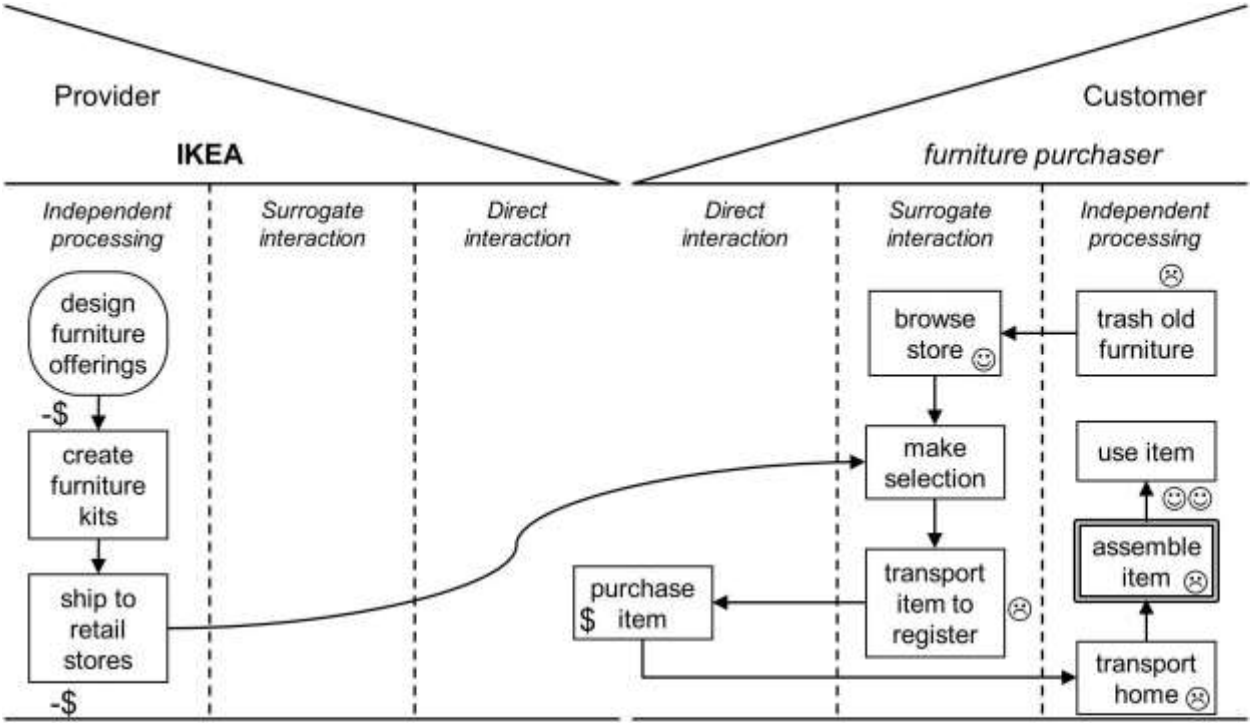
Provider
IKEA
Customer
furniture purchaser
Independent processing
Surrogate interaction
Direct interaction
Direct interaction
Surrogate interaction
Independent processing
design furniture offerings
-$
create furniture kits
ship to retail stores
-$
browse store ☺
trash old furniture ☹
make selection
use item
☺☺
assemble item ☹
transport item to register ☹
purchase $ item
transport home ☹

Figure 14: PCN Analysis for IKEA furniature retail

Another differentiating feature of IKEA is the decreased customer intensity from having less of the process chain in regions of direct interaction. The interactive firm shown in Figure 11 provides product advice that is valued by customers (☺) by employing experienced and costly (+$) labor. Compare that with IKEA's process shown in Figure 14, which has almost no steps in the region of direct interaction. In fact, by using self-check-out (surrogate interaction) the customer can avoid direct interaction altogether. Avoiding interaction further helps IKEA's efficiency and cost competitiveness.

Relieving innovations move steps the other direction, from the customer's process domain to the provider's process domain. Campbell, Maglio, and Davis (2011) describe relieving innovations in what they term *super service*, defined as providers performing tasks previously done by customers. They discuss home-delivery of groceries as a business-to-consumer (B2C) example, wherein the provider relieves the customer from having to travel to the grocery store. They describe vendor-managed inventories as a business-to-business (B2B) example, where producing firms manage inventories of products at their customer's locations.

Other examples of relieving innovations fall under the heading of **servitization**, which is when manufacturing firms (largely engrossed in independent processing) make a strategic process shift into related services (i.e., interactive processes). An example is a jet engine manufacturer, Rolls-Royce Aerospace, shifting from selling engines to leasing engines by the hour of use, and in the process relieving customers of engine maintenance and repair processes (Neely, 2008). Servitization will be discussed more in Chapter 14.

PCN Analysis summary

This chapter emphasized how much flexibility there usually is in process configurations. There are often various process options for delivering a value proposition, each of which can provide a different set of operating characteristics. The key is identifying which process configuration is optimal given the need requirements from customers and the capabilities of providers.

To help our PCN Analysis this chapter introduced four fundamental principles of process positioning:

- Principle #1: Economies of scale – Specialized providers generally have greater economies of scale than general customers.
- Principle #2: Customization – The potential for customization increases for process steps that are closer to the center of the customer's process domain.
- Principle #3: Process inefficiency – Interactive processes are less efficient than independent processes.
- Principle #4: Surrogate positioning – Surrogate interaction can provide hybrid characteristics between direct interaction and independent processing.

We also reviewed how process configurations can be modified through enabling and relieving innovations. The goal is to select a particular process positioning in order to provide a particular value proposition. Once that is determined, we need to manage that value proposition to assure it is realized, which is the topic of Chapter 7 and subsequent chapters.

Chapter 6 – Conducting a Service Process Audit

Subsequent chapters will explain various aspects of PCN Analysis that can be used in process design, management, improvement, and innovation. Process management and improvement requires understanding a base process, which is the process as it currently exists. This includes identifying costs and value associated with the process as well as possible fail points, which information is used to identify strategies for process improvement and opportunities for process innovation.

A thorough understanding of the base process can allow the Service Analyst to document the process with a PCN Diagram (Chapter 3), identify the value proposition (Chapter 4), and explore enabling and relieving innovations (Chapter 5). An assessment of the current process might indicate the need to manage process delays (Chapter 7), improve customization potential (Chapter 8), empower employees or customers (Chapter 9), change customer roles (Chapter 10) design failure-prevention mechanisms (Chapter 11), and so forth. The benefit of these various aspects of PCN Analysis will depend on having an accurate understanding of the base process. For this reason, where possible it is good to begin by verifying the base process with data from employees and customers, which can be gathered through a Service Process Audit.

A *Service Process Audit* is a simple technique for gathering and compiling information from employees and customers about a process. Human resource (HR) managers sometimes evaluate the performance of employees by surveying their managers, co-workers, subordinates, and even customers in what has come to be known as 360-degree evaluation. A Service Process Audit is similar in that we are documenting and evaluating a process from multiple perspectives.

A Service Process Audit assesses customer and employee perceptions about their experience with the given process being studied. Where possible, it should involve interviewing multiple employees and multiple customers. A Service Process Audit interview includes three parts:

1. Have them describe the given process from their perspective.
2. Have them identify parts of the process that they think customers would consider valuable.
3. Have them identify parts of the process that are burdensome or problematic.

The three parts are described below. These parts are embodied in the Service Process Audit interview form and analysis tool described on the book website. If you do not use that tool, it is probably still a good idea to use a computer to record the employee and customer responses.

Preparing for a Service Process Audit

Before conducting Service Process Audit interviews it is important to determine the process being studied and from whom the data will be collected. It is reasonable to study a part of a process that has 10 to 20 steps, although more complicated processes can be studied with more effort. The scope of the process is determined by identifying a starting step and an ending step. For example:

- The airline process from passenger arriving at the airport until boarding the airplane.
- The dental process from patient needing an appointment until having an appointment.
- The tax accounting process from a client engaging an accountant until filing a tax return.
- The entertainment process of a customer wanting to attend a concert until leaving the concert.

Often the starting step is a customer identifying a need, and the ending step is the customer having the need satisfied. Be careful about attempting to study a process that is very complicated, which can overwhelm those you are interviewing. Complicated processes can be broken down into smaller sub-processes for study.

Conducting a Service Process Audit interview

Once you have specified the scope of the process, you can identify appropriate individuals to interview. Often it is best to start by interviewing a manager who is familiar with the process from the provider's perspective. Subsequently you can interview one or more employees involved in the process, followed by customers who are familiar with the process. The following interview steps are include in the interview form on the book website.

Interview Part 1: Describe the process

We do not assume that the employees and customers being surveyed are familiar with PCN Analysis or even with basic flowcharting. Further, it would probably be burdensome to ask the subjects to construct some type of a flowchart.

Instead, it is easier to have them describe the process as a list of steps. If the process has decision points and contingent steps there may be more than one way the process can be executed. The goal is to get an understanding of the most common path or paths that the process takes.

Besides identifying the chosen process, it is helpful to tell the subjects the scope of the process in terms of beginning and ending points. The beginning point is usually realizing a need and the ending point is some satisfaction of that need.

For example, a health clinic may desire to audit the process of scheduling an appointment. The question asked of subjects might be worded as follows:

> "We request your help in assessing the process patients go through to make an appointment. Please list the steps you (a patient) would typically go through to make an appointment with our health clinic, beginning with the step 'need an appointment' and ending with the step 'have an appointment.'"

Record all of the steps into the computer, noting any steps that are decision points that determine subsequent steps and any steps that involve nontrivial customer waiting. Have the subject review the steps and provide any necessary adjustments.

To assist in creating a PCN Diagram, ask subjects to identify which steps involve interaction between the customer and the provider, and which steps involve interaction with the other entity's resources, such as technologies. For the health clinic example, customers might be asked, "Which steps in this process involve interactions between customers and health clinic employees?" Also, "Which steps in this process involve customers using resources (for example, technologies or facilities) that belong to the health clinic?" This information helps you identify the appropriate process region for each step.

Interview Part 2: Identify steps that are valuable

Once the subjects have determined the basic outline of the process, have them identify aspects of value in the process. For customers you might simply ask, "What parts of this process are particularly valuable?" For employees, you still want to know assessments of customer value, so might ask "What parts of this process do you think customers find particularly valuable?" Responses for each step might include:

- very valuable (☺ ☺)
- somewhat valuable (☺)
- necessary but not valuable
- not necessary nor valuable (☹)

The symbols shown in parentheses are what might appear on the resulting PCN Diagram. Although you will not have the subjects create a PCN Diagram, you will subsequently use their responses to create a diagram.

Interview Part 3: Identify steps that are problematic

The final part of a Service Process Audit is identifying the process steps that are considered to be inconvenient, confusing, difficult, or likely to fail.

Inconvenient steps are those that involve unwanted extra effort. If a step is inconvenient and also deemed "not necessary nor valuable" then the step either should be eliminated or the importance of the step should be communicated to customers.

Confusing steps are those that are unclear to customers (and perhaps unclear to employees). The steps might be unusually difficult, or simply not explained well. Confusion can cause anxiety and uncertainty about the expected performance of the process. Confusion can be reduced by simplifying the process or by clarifying the task.

Difficult steps might also be confusing, or might simply require excessive effort, knowledge, or ability to perform. The difficult steps might be valuable and/or necessary, and therefore should not be eliminated. However, the process might be reconfigured (see Chapter 13, Chapter 14, and Chapter 15) to relieve customers of the burden of those steps. The difficult steps might be moved to the provider's process domain, or perhaps simplified through automation.

Likely-to-fail steps are steps that have an uncertain outcome and a non-trivial likelihood of not producing the intended results. These steps are noted on a PCN Diagram with fail point markers (F). The likelihood of failure can be reduced by poka yoke mechanisms as will be discussed in Chapter 11 (page 105).

These issues can be assessed of customers (or employees) with the following requests:

1. Please identify any steps you (or customers) consider to be inconvenient.
2. Please identify any steps you (or customers) consider to be confusing.
3. Please identify any steps you (or customers) consider to be difficult.
4. Please identify any steps you (or customers) consider to be likely to fail.

For each step identified in one of the four categories, it is good to ask "What is it about [the given step] that you consider to be [inconvenient, confusing, difficult, likely to fail]?" This answers will help guide subsequent analysis and process improvement.

Summarizing data from a Service Process Audit

After the survey information is gathered for each of the selected customers and employees, the information is then used to create one or more PCN Diagrams.

First, organize the steps by placing them on a PCN Diagram. The website has a tool that can be used for this. There are no hard-fast rules for resolving conflicts in the reported perspectives, so you will need to use your best judgment (and perhaps the judgment of someone who is familiar with the process). A color-coded PCN Diagram can be used to compare process assessments from the employee perspectives with the customer perspectives.

Once the steps are represented on a PCN Diagram, annotate the diagram with value markers (☺) based on information gathered in Part 2 of the surveys. Psychological cost markers (☹) and fail-point markers (F) come from information collected in Part 3 of the surveys.

This is used to develop a base-line PCN Diagram that can be improved through the various aspects of PCN Analysis (strategic process repositioning, error prevention poka yokes, servicescape customer training, etc.). In the tradition of quality improvement, when any process changes are implemented you might re-do the Service Process Audit to determine if the changes lead to changed perceptions about the process.