

The Ins and Outs of Keeping US Service Jobs at Work

by

Eric D. Gorney

B.S., Operations Research
United States Air Force Academy, 2004

Submitted to the Engineering Systems Division
in Partial Fulfillment of the Requirements for the Degree of

Master of Science in Engineering Systems

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 2006

© 2006 Massachusetts Institute of Technology
All rights reserved

Signature of Author.....

Engineering Systems Division
May 12, 2006

Certified by.....

Yossi Sheffi
Professor of Civil and Environmental Engineering and Engineering Systems
Director, Center for Transportation and Logistics
Thesis Supervisor

Accepted by.....

Richard de Neufville
Professor of Engineering Systems
Chairman, Engineering Systems Division Education Committee

Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 14 JUN 2006		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE The Ins and Outs of Keeping US Service Jobs at Work				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Massachusetts Institute of Technology				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) AFIT/CIA, Bldg 125 2950 P Street WPAFB, OH 45433				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 94	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

The views expressed in this article are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government.

The Ins and Outs of Keeping US Service Jobs at Work

by

Eric D. Gorney

Submitted to the Engineering Systems Division on May 12, 2006
in partial fulfillment of the requirements for the degree of
Master of Science in Engineering Systems

ABSTRACT

The purpose of this research is to discuss employment in the United States (US) service sector. The main concern is not pinpointing numerical estimates, but instead identifying trends which lead to job growth or job loss. Like manufacturing jobs that have been lost to offshore locations or productivity gains, so too are service jobs at risk. Offshoring – the outsourcing of business functions overseas – and automation have the same effect of displacing workers. What keeps a service job in the US and what makes it ideal to ship overseas or replace with a computer?

Consumers have several choices between different product and service offerings. And, different products need varied levels of aftermarket service. What makes customers go out and spend money rather than completing tasks themselves?

This thesis attacks these questions by outlining characteristics of products, services, and consumers which could help label jobs as “safe” or “at-risk.” First is a discussion of these characteristics. Then, the range of product and service alternatives that consumers have to choose from is presented and applied to examples.

Overall, jobs which may be at-risk are those occupations that can be offshored, automated, or easily performed by consumers themselves. On the other hand, jobs that may prove safer are those with high barriers to self-service, those that offer a customized service or experience, and those that require physical contact to be performed.

Thesis Supervisor: Yossi Sheffi

Title: Professor of Civil and Environmental Engineering and Engineering Systems
Director, Center for Transportation and Logistics

THIS PAGE INTENTIONALLY LEFT BLANK

Contents

Chapter 1: Introduction	11
1.1 Project Background	12
1.2 History of Economic Evolution	16
1.3 Dealing with Change	21
1.4 Preparing the Framework	22
 Chapter 2: Characteristics of Goods and Services	 25
2.1 Service with a Smile	26
2.2 Do-It Yourself	28
2.3 Automation	31
2.4 Customization and Experiences	35
2.5 No Service	37
2.6 Policy	38
2.7 Security	39
2.8 Time Critical Services	40
2.9 Nature of Goods	40
2.10 Summary	42

Chapter 3: Product and Service Offerings	47
3.1 Services that Augment Products	51
3.2 Services that Replace Products	52
3.3 Product Life-Cycle	54
3.4 Customer Decision Process	56
 Chapter 4: Examples at Work	 65
4.1 Clean Clothes	67
4.2 Shelter	70
4.3 Food	72
4.4 Mobility	76
4.5 Other Examples	79
 Chapter 5: Conclusion	 85
5.1 The Way Now	85
5.2 The Way Ahead	86
 Appendix A	 89
 Appendix B	 91
 Bibliography	 93

List of Figures

1-1 Research Project Components	12
1-2 Postponement	14
1-3 Service Varieties	16
1-4 Economic Development	17
1-5 Service Sector Growth in Dollars	18
1-6 Service Sector Growth in Percent of GDP	19
1-7 Evolution of Tradeable Goods	21
1-8 Market Space Diagram	22
2-1 Service Trade-off	26
2-2 Economic Offerings	35
2-3 Characteristics of Risky Jobs	43
2-4 Natural Reduction of Safe Zone	44
2-5 Characteristics of Safe Jobs	45
3-1 Product-Based Services	47
3-2 Consumer Alternatives	49
3-3 Consumer Alternatives Revised	47

3-4 Product Life-Cycle	54
3-5 Product Life-Cycle Expanded	55
3-6 Customer Value Equation	58
3-7 Customer Value Equation Repeated	61
4-1 Customer Chain of Tasks	73

List of Tables

3-1 Customer Value Equation Outcomes	61
4-1 Service Scenarios Explanation	66
4-2 Service Scenarios for Clean Clothes	68
4-3 Service Scenarios for Home Improvements	71
4-4 Service Scenarios for Food	74
4-5 Service Scenarios for Mobility	77
4-6 Service Scenarios for Cleaning a Car	80
4-7 Service Scenarios for Fueling a Car	82

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 1

Introduction

The purpose of this research is to discuss employment in the United States (US) service sector. The main concern is not pinpointing numerical estimates, but instead identifying trends which lead to job growth or job loss. Like manufacturing jobs that have been lost to offshore locations or productivity gains, so too are service jobs at risk. Offshoring – the outsourcing of business functions overseas – and automation have the same effect of displacing US workers. What keeps a service job in the US and what makes it ideal to ship overseas or replace with a computer? Are there jobs, because of their very nature, that will always be completed in the US by a US worker? What makes customers go out and spend money rather than completing tasks themselves? The aim of this thesis is to identify the characteristics of such jobs and help workers avoid the effects of a restructuring economy. Answers to these questions will be examined by reviewing foundational information, outlining a framework, and using that framework to analyze examples.

1.1 Project Background

The United States is part of a global economy. This worldwide market is constantly changing and evolving because the pieces that make up the puzzle – materials, labor, capital, customers, etc. – are constantly changing and evolving. Companies are able to source supplies from all over the world and also reach consumers all over the world. The question becomes how the US workforce will play a role and how jobs will be affected.

Beginning in 2004, The MIT Center for Transportation and Logistics sponsored a research group to analyze the movement of goods, services, and jobs. Figure 1-1 shows the organization of the project. The generalized assumption of the project is that services will happen close to the customer and the manufacturing of goods will be far away. Postponement is considered the practice that links manufacturing and service. This is an oversimplified view; however, it provides a foothold for further examination.

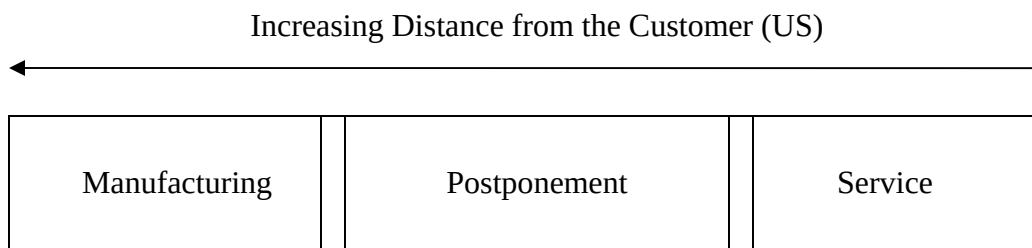


Figure 1-1: Research Project Components

This “state of the world” would feature goods produced at lower costs remotely from the customer. Then, service providers would bring the goods to the customer and perform final customizations, installation, or other service offerings. The product is continued to be supported in the aftermarket with services near the customer. There are several counterexamples to the construction of this diagram, but overall the concept is novel.

To fill the left end box of the diagram, one portion of the research presents macro-level economic views of the change in manufacturing jobs in the United States. The work considers the elements of offshoring, productivity, and regulations. Overall, this part looks at the global effects on manufacturing employment in the United States.

In general, the kinds of manufacturing jobs that have left the US and continue to be offshored are those with high labor content (Bartolin, 2006). Manufacturing jobs in textiles, electronics, and raw material processing, for example, are cheaper to employ where labor is cheaper. For more information please reference the MIT Thesis *Offshoring Is Not the Panacea: Ensuring Sustainable Employment in the US Manufacturing Industry by Leveraging Demand Proximity* by Alexandre Bartolin (2006).

The second part of the research considers characteristics of manufactured goods and processes that would require jobs to stay in the United States, such as response time to orders or customization. Specifically, it analyzes examples of Postponement in the supply chain.

The principle of Postponement is to delay the commitment of specific features of a product as late as possible in the production process (Rietze, 2006). Manufactures use this concept by first creating a “vanilla” or generic product. Then in a second phase, the

manufacturer adds features to the product. These features could include functionality upgrades, different colored exteriors, or market specific characteristics. Figure 1-2 below shows this point of Postponement.

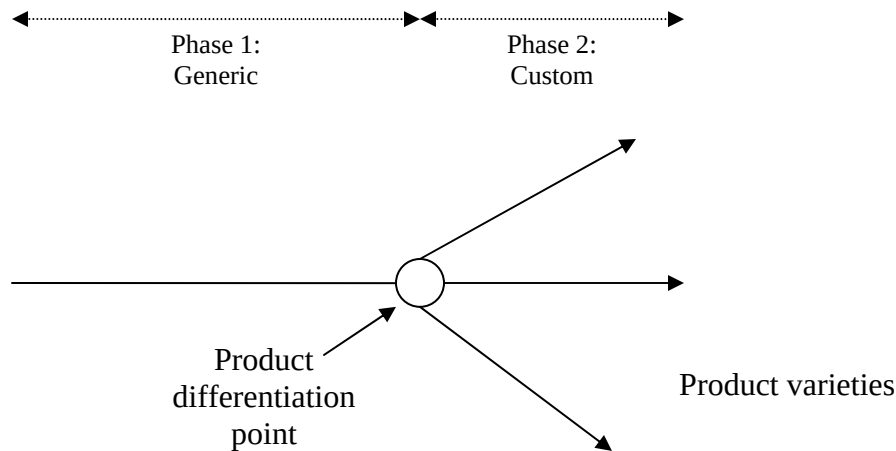


Figure 1-2: Postponement

A well-known example of Postponement is in Hewlett-Packard's (HP) line of DeskJet Printers which are used by customers all over the world (Shen, 2005). These customers speak different languages and the power systems that they plug the printers into are different. HP reworked the process of making printers into two phases like in the preceding diagram.

In the first phase, a generic printer is produced without a power supply and without language specific decals or printed materials. Then, the "box" is shipped to regional distribution and finishing centers closer to the final customers. The printers then receive a power supply and printed material appropriate for that region. Thus, the

commitment of the printer to a final finished product is delayed until the product is actually in the region and an order is received.

Susan Rietze (2006) cites the benefits of Postponement as plentiful.

Manufacturers realize a risk pooling benefit in detaching the generic product from the finished product as in the HP example. The generic product demand estimates are easier to forecast than the individual variety estimates. Users of a Postponement approach also identify savings in inventory, because the generic product that is stored carries less value than the final product. For more information on Postponement practices please see the MIT Thesis *Case Studies of Postponement in the Supply Chain* by Susan Rietze (2006).

The last section of the research and the topic of this thesis is the extension of some of the principles of Postponement to the realm of services. Like Postponement in manufacturing, there is an ability to add “features” to products at a later time through a service. An extreme example of this is pushing the customization of a product to the very last stage, that is, in the presence of the customer. A product may involve installation requirements or special configuration. These instances cross the line from being parts of the product to being a value-added service.

Figure 1-3 below shows that like in Postponement, service offerings can add variety. In this case, though, the varieties can become infinite as each service encounter with a customer is unique. Also like in Postponement, some services benefit from, or require, proximity to the customer. This indicates how Postponement may link manufacturing and services. Postponement can take a good from anywhere and bring it close to the customer for final customization.

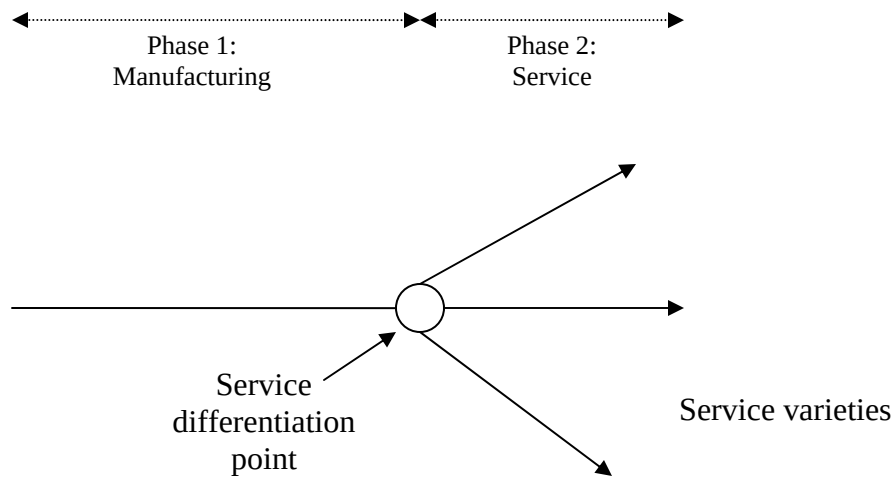


Figure 1-3: Service Varieties

1.2 History of Economic Evolution

The United States has undergone several stages of economic development throughout its history; from agricultural self-sufficiency to participation in the global economy. Fundamental changes occur in the structures of a country's economy as it evolves from stage to stage.

Economists in literature generally agree on three overall stages of economic growth. First, agricultural societies rely solely on their abilities to produce food and raw materials for their own consumption. Second, industrial societies begin producing manufactured goods. Third, societies transition from primarily making goods to primarily providing services. Figure 1-4 below shows these stages.

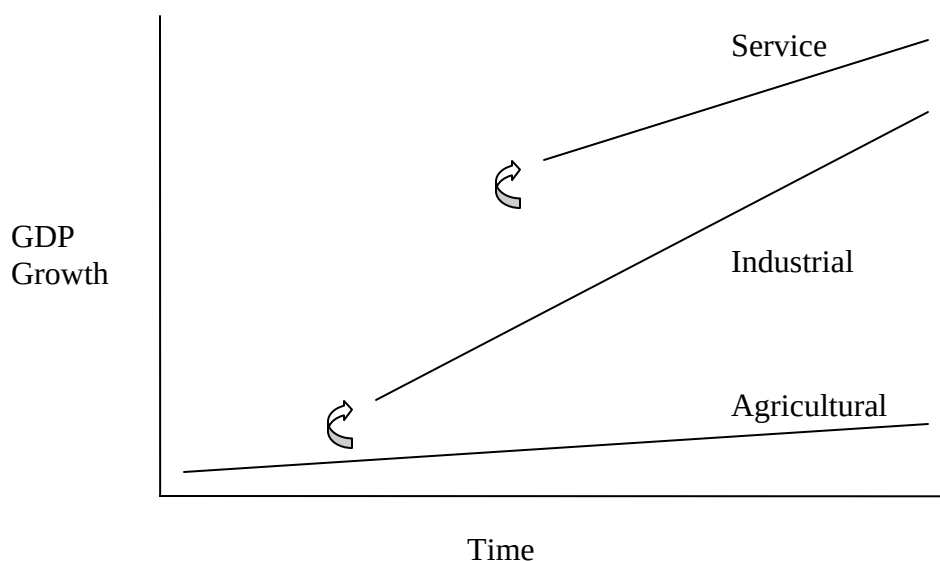


Figure 1-4: Stages of Economic Development

Over time countries evolve from one stage to another as indicated by the arrows. The slope of the lines arbitrarily represents the rate of growth in Gross Domestic Product per Capita during that phase. According to the following examples, industrializing economies may grow faster than an agricultural economy or a service-based economy. Between 1980 and 2002, service economies like the United States and most of Western Europe grew at a rate of one to three percent. However, China, a country that is characterized as industrial, grew at a rate of eight percent. During the same time period, Sub-Saharan Africa experienced little or negative growth as a basic agricultural society (Sachs, 2004).

In the United States in 1950, manufacturing captured 34% of all jobs in the US, while fifty-three years later in 2003 only 12% of the workforce was employed in manufacturing industries. This timeframe shows the transition of the US into a service-based economy (Karmarkar, 2003).

The Bureau of Economic Analysis (BEA, 2005) separates the US economy into goods-producing and service-producing segments for data collection. The service sector consists of utilities; wholesale trade; retail trade; transportation and warehousing; information; finance, insurance, real estate, rental, and leasing; professional and business services; educational services, health care, and social assistance; arts, entertainment, recreation, accommodation, and food services; and other services, except government. Consider the following charts detailing service sector growth from 1987 to 2004 in dollars and as a percentage of US GDP.

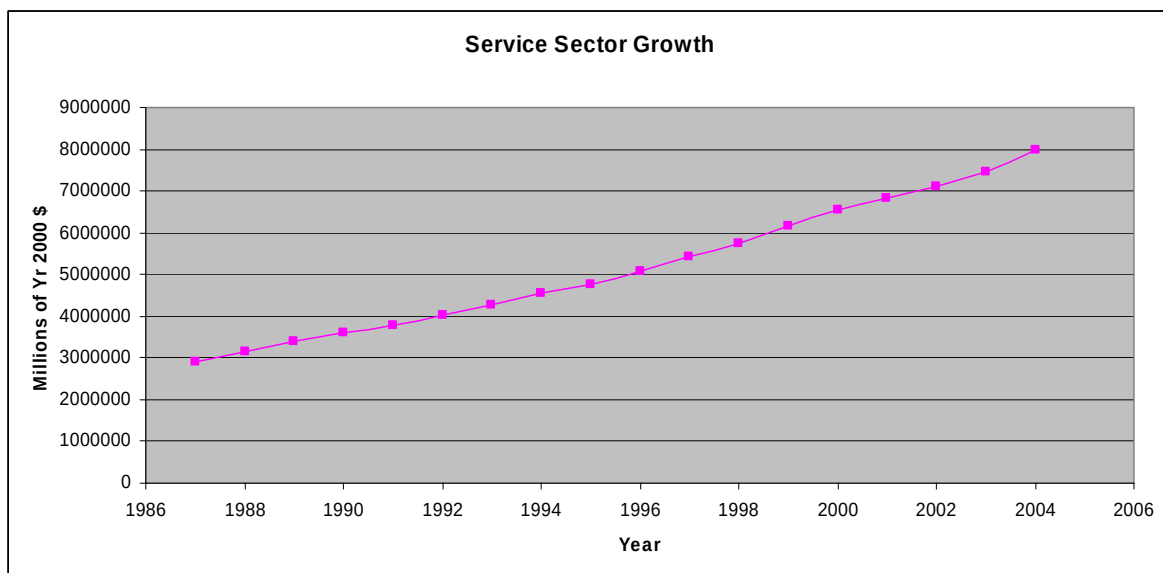


Figure 1-5: Service Sector Growth in Dollars (created with data from BEA, 2005).

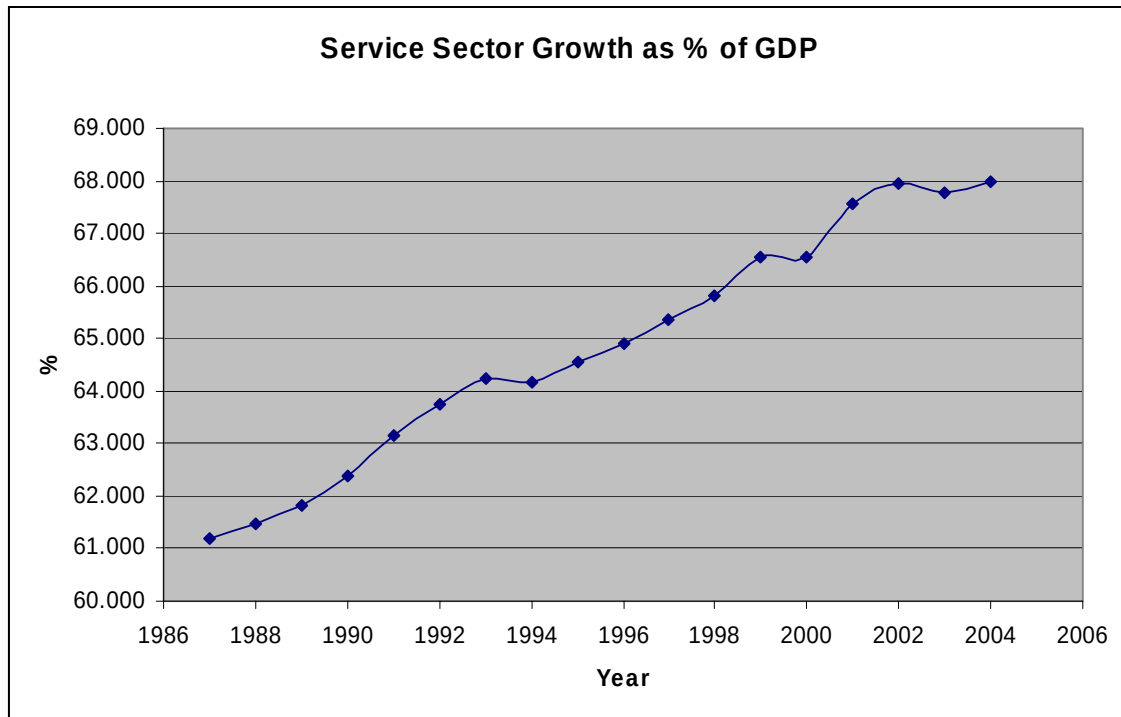


Figure 1-6: Service Sector Growth in Percent of GDP (created with data from BEA, 2005).

The second chart is quite telling, showing how service industries are becoming a larger and larger part of GDP, up to 68% in 2004 (BEA, 2005).

According to Jeffrey Sachs (2004), the important points are the restructuring process between phases and the general increase in wealth as evolution continues. Structural changes in the US economy create misalignments in the supply and demand of labor. That is, worker skills and job availability do not match up. Just as manufacturing jobs fight with offshoring and automation, so do service jobs have to endure those battles. What does all this change mean to US workers?

1.3 Dealing with Change

This paper takes the position that restructuring is a natural process and that offshoring and automation are part of those steps in normal economic transition. It goes back to Adam Smith (1776) and his *Wealth of Nations* (Blinder, 2006): A person or country with a comparative advantage in one good should focus on producing that good. A person or country with a comparative advantage in producing another good should focus on producing that good. Then, the two parties should trade. That way, the minimum cost and maximum benefit are realized.

Alan Blinder (2006) provides the following example. The United Kingdom used to have a comparative advantage in textiles, then that advantage shifted to New England in the United States, where labor was cheaper. Then, the production center shifted to the Carolinas and the Southern US where cotton was cheaper. Finally, textile manufacturing moved out of the US and into Mexico, Honduras, and eventually Asia.

Gregory Mankiw, former Economic Advisor to the President, in 2004 said, “More things are tradeable today than were tradeable in the past, and that’s a good thing” (Blinder, 2006). This was his explanation for the growth of offshoring; something that should boost productivity, lower cost, and increase well-being for all parties involved.

Previously, economists determined what was “tradeable” by determining if one could put it in a box (Blinder, 2006). Manufactured goods, for example, can be put in a box and shipped, and are therefore tradeable. Services and things like houses (that are too big to put in boxes) are not tradeable. As technology changes and transportation becomes cheaper and easier, this boundary shifts as Mankiw indicated and more things

become tradeable. Consider Figure 1-7 below. The arrow shows the boundary moving as more and more goods can be constructed overseas and moved to the US.

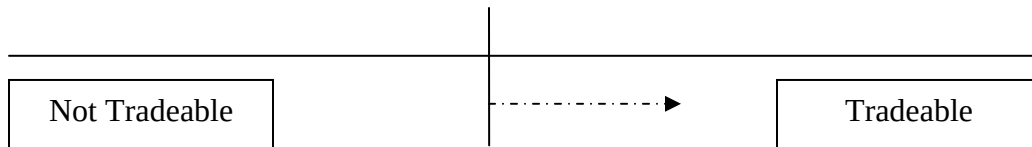


Figure 1-7: Evolution of Tradeable Goods

However, this taxonomy does not work as well today when businesses are more concerned with bits and bytes than boxes (Blinder, 2006). For example, many services are now “tradeable” because of the ability to digitize information and transfer it with information technology. The tradeable and non-tradeable designations are less clear cut with services than they are with manufacturing. The purpose of this paper is to do just that: create guidelines to predict which services are becoming tradeable and which continue to employ local US workers.

1.4 Preparing the Framework

The global market and subsequently that of the United States is made up of different agents (players). To simplify them into a manageable model, we assume that customers and businesses (providers) interact through goods and services within some

space. This space (environment) has operating rules and regulations given by a governing body. Consider figure 1-8 below.

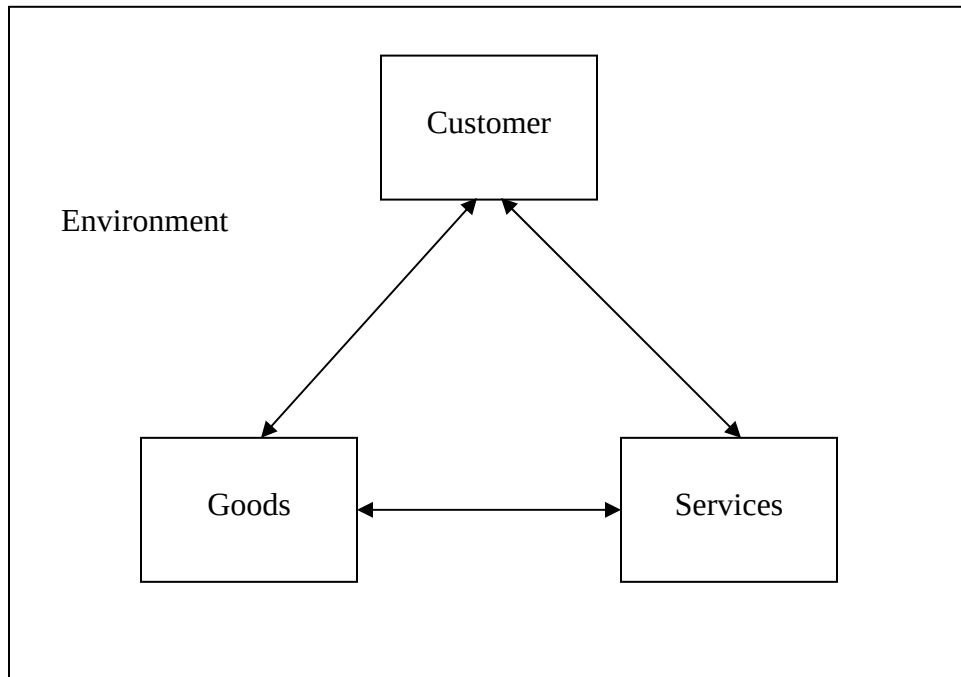


Figure 1-8: Market Space Diagram

This diagram depicts interactions between the players. For example, the goods and services are provided within the boundaries of the environment. In any instance, a customer may interact with a provider through a good, a service, or both. Work (jobs) corresponds to these interactions and is represented by the arrows.

The more frequent the interactions or the stronger they are, the more jobs are likely to be created. If there is less demand for a certain product or service (or combination) then less jobs are likely created or some jobs may be lost.

The purpose of this model is to document the major changing parts of the equation. It is the characteristics of goods and services, the decisions of the customers,

and the rules of the environment that influence the interactions in the model. To simplify the conclusion:

1. People can affect the demand for work.
2. The nature of products can affect the demand for work.
3. Services themselves can affect the level of work.
4. Regulations can affect the level of work.

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 2

Characteristics of Goods and Services

The following subsections will build upon the interaction model presented in the market-space diagram by outline characteristics of jobs. This includes jobs lost to offshoring, automation, technology, productivity increases, etc. Also, when customers choose to do work themselves rather than hiring someone else, they decrease the demand for services. These jobs may be referred to as “at-risk” throughout this thesis. On the other hand, jobs that might be called “safe” mean that they have one or more characteristics that would promote growth in that area or prevent them from being lost to one of the aforementioned causes.

The examples will not outwardly recommend a profession. This is because a computer programmer could face substantially different futures depending on the nature of his or her job. In some cases, one characteristic is enough to promote job growth. Sometimes, a certain job must match several characteristics to prevent it from being lost. Using a characteristic based approach also recognizes the impact of time. As economies continue to change, jobs may shift from one area to another in these groupings.

2.1 Service with a Smile

Popularized in current literature, one common concern of service jobs is whether or not the job requires physical interaction with a customer in order to take place. The assumption is that those jobs that require physical touch, such as massage therapy, landscaping, or snow removal are safe because a worker must be physically present to complete them. On the other hand, there are services that do not need physical touch, such as telephone customer service operations or online tax preparation. In these cases a worker does not have to be physically near a customer for the encounter to occur. Consider Figure 2-1 below.

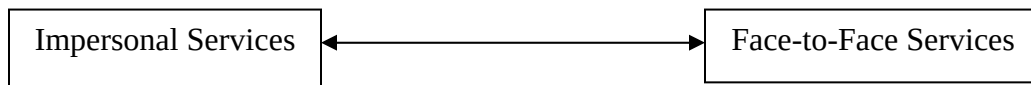


Figure 2-1: Service Trade-offs

Face-to-face services occur when there is direct interaction between a customer and provider. On the other hand, impersonal services occur anytime direct contact with the customer is avoided (Blinder, 2006). This could be through internet web site interfaces, for example, or over the phone.

Blinder (2006) separates the two extremes with the concept of distance. He considers a service to be face-to-face, or “personal,” when a distance placed between the customer and provider makes the service impossible or the quality diminishes enough to

render the service undesirable. For example, consider listening to a symphony orchestra in person, then having to listen to the same orchestra over a cell phone connection. The quality of the audio through the phone would be presumably so poor that the listener would certainly not pay the same price as hearing the symphony in person. In this case, people would generally demand to see the performance in person, rather than over the phone.

The definition of distance can be expanded to include several kinds of barriers. A customer may have a negative service experience when they call to ask questions about his or her credit card and the call is routed to a center in India. The distance between the customer and service representative shows itself in the form of a language barrier. If the customer cannot understand the service representative or if the service representative cannot understand the customer, the quality of the encounter is lowered and becomes unfavorable.

Usually, distances or barriers put between the service provider and the customer negatively affect the quality of the transaction. However, there are times when this distance or barrier does not reduce the quality of the exchange. These are the instances where impersonal services will win. In the previous example, as Indian call centers continue to improve on quality, customers will be more willing to use that form of impersonal service as long as the distance does not create a barrier.

Now consider sitting in an uncomfortably warm, cramped lecture hall listening to a speaker. While physical contact may be present, the conditions may not be ideal. Now consider listening to the same speaker from your comfortable couch at home, watching the lecture on your internet capable television. In this case, even with a barrier, i.e. the

internet video channel, the encounter may be more desirable than in person. In this case, there is not a loss of quality to prompt the service to be in person.

In addition, the cost of the online course would be presumably less than listening to the teacher in person, thus making it even more attractive. In general, the cost of providing a service from a remote location will be lower than in person. As more affordable impersonal versions of normally personal services become available, like online education, consumers will be more willing to try those alternatives with sufficient quality levels.

“College tuition has risen faster than the consumer price index for decades” (Blinder, 2006). With the cost of higher education a serious consideration for some consumers, cheaper online classes that are more convenient to attend from home on the computer make sense. However, what they do not make are jobs, as one online professor might be able to replace several live professors.

Some services can increase quality by becoming more personal or by becoming more impersonal. Impersonal services offer lower costs because of consolidation or cheaper locations and labor. A worker looking for a job with qualifications in a field that includes examples of personal and impersonal services is best protected by choosing a job that relies on proximity to the customer to provide a quality service experience.

2.2 Do-It Yourself

Another set of characteristics that affect the creation or elimination of service jobs is the choices of the consumer to hire a worker to complete the task or to do it

themselves. Several factors may come into play when a customer makes this decision. The customer may choose the option that is cheaper, easier, less time consuming, more interesting, or offers the highest quality result.

In some cases, customers may choose to complete tasks on their own, like painting a room in their house or cutting their own lawn. Sometimes, though, there are barriers to self-service. For example, painting a room requires specific knowledge of the tools, paint, and process. Mowing the lawn requires ownership of a mower and knowledge of how to use it. In both of these instances the consumer needs time to complete the task and a desire to complete the task. Consider the following list of barriers to self-service:

1. *Cost.* It could be cheaper to pay someone to perform the service than doing it yourself.
2. *Time.* A consumer must have time to wash his or her car or clean the house. Some tasks may be time intensive and others short in duration.
3. *Desire.* A consumer must want to complete the tasks themselves.
4. *Ability.* A consumer must physically have the ability to complete the task.
5. *Knowledge.* A consumer must have the knowledge of a process to complete it or the ability and desire to attain the necessary knowledge required to complete the task.
6. *Tools and equipment.* A consumer must possess or have the ability to obtain all necessary tools and equipment to complete the task.

7. *Regulations.* A rule or regulation must not prohibit the consumer from completing the task themselves.

In order to apply these barriers to an example, consider building a house. A consumer may have the time and desire to construct an entire house themselves. However, extensive knowledge is required of the process along with many tools and special equipment. Also a consumer may not physically have the ability to lift the frame or trusses of the house themselves. Local building codes could require that the consumer have inspections or certain work performed by a certified professional. These barriers would lead the consumer to seek help and thus create a demand for work because there are some things that cannot be done by the consumer alone.

A federal regulation may require that a hazardous chemical be disposed of properly. For example, a consumer that changes his or her own motor oil would still need to take the used oil to an auto supply store or service center for disposal.

The separation between self-service and these barriers is fluid and changes from person to person and from instance to instance. For example a person may sew a button back on a shirt but take the shirt to a seamstress for larger rips or tears. A person may wash his or her car in one instance but may not have time the next week and visits a car wash center on that occasion. These points will be developed later in the text.

Another concept which plays into the consumer's choice is frequency. If a person is considering completing a task that will be done over and over again, investing in the knowledge and tools or equipment required may be worth it. The consumer may realize some economies of scale and make it more likely that they will perform the tasks

themselves. For example, purchasing a lawn mower and mowing the lawn oneself may become cheaper than using a landscaping service over time.

Sometimes products are being designed for easier aftermarket customer self-service. For example, many MP3 players have a user-replaceable or disposable battery. However, the Apple iPod's battery must be replaced by a technician. These design differences show how products can be built for service or built to be self-serviced by its owner.

Self-service trends among consumers would tend to limit services growth. For example, if everyone cleaned their own house and repaired their own car then none of those service jobs would exist. Therefore, safe jobs are those which have high barriers to self-service. That is, jobs that have specialized knowledge, require expensive or specialized tools and equipment, or by regulation require someone with special training to complete them will be the jobs performed by paid workers. However, with the growth of extensive information resources available on the internet, consumers are better able to gain the knowledge required for self-service.

2.3 Automation

The next characteristic that a worker should consider when looking for a safe job is how prone the work is to automation. A job lost to an overseas competitor is the same as a job lost to a computer.

A vending machine is a prime example. Instead of a person on site to sell drinks and snacks, a computer in a box takes their place. The machine is capable of making

exactly the same transaction as the person. The machine costs far less and does not care if it is raining or cold outside and can stay on duty continuously because it does not need sleep.

How can a worker compete with that? A worker can customize the delivery of the service, include other add-on services, or incorporate an experience. These concepts will be discussed more completely later, but take Starbucks as a quick example.

The chain of Starbucks coffeehouses are a considerably different service than a vending machine. The servers at Starbucks can engage in conversation, customize the mix of flavors in the drink, or provide directions to nearby attractions. Starbucks offers a unique environment to sit and enjoy one's coffee. These are reasons a customer may choose Starbucks over the vending machine. Starbucks coffee may be known to the consumer to be of high quality compared to the vending machine as well.

Next, online and ATM banking have removed bank tellers from people's lives. The digitization and automation of the banking processes removes that face-to-face contact and replaces it with a computer screen.

Toll collectors on toll bridges and toll roads can also be replaced by machines. Coin collecting and electronic toll collectors automate the process without involving people in the transaction. Automated coin collecting booths require passengers to deposit exact change. However, if a customer needs change or is driving a large truck and cannot use the automated lane, a worker is required to fulfill that service.

Small radio tags affixed to the inside of vehicle windshields alert the electronic readers in toll lanes when a vehicle is passing through. Then, the reader uses the information gathered from the tag to debit the driver's account for the appropriate fee; no

digging for change and no stopping at a window. Electronic toll users enjoy faster, more convenient automatic service that is also cheaper to provide.

Instead of hiring a cleaning service to clean their house, consumers could use the Roomba or Scooba cleaning robots from iRobot, Inc. The Roomba is an automatic vacuum which deploys itself to track down dirt around the house. After finishing a room or floor, the Roomba knows how to return to its base for recharging. The Scooba uses the same processing technology to scrub floors with its built-in mop. Perhaps robots to mow the lawn or shovel the snow could be next.

How can a worker identify a job which may be vulnerable to automation? Considering the maturity of technology in that area is the first step. Second, is addressing how easily the process can be reduced to a set of rules (Levy and Murnane, 2004). When a task is outlined with clear rules there are a finite number of possible scenarios to handle; chances are a computer or machine can be programmed to do it.

Take online tax preparation for example. Calculating taxes at a basic household level is not difficult for a software application because of the generally limited scenarios. The program asks for all the necessary financial information and can take care of the math. Because the nature of calculating taxes is rule bounded, it is a perfect candidate for automation. In addition to simplifying the process, using a web based tax preparation service is cheaper than using an accountant and the tax software does not care if it is running at one o'clock in the morning.

TurboTax, the leading online tax service provider, stated that 3.6 million people submitted their returns online in 2003, compared with only 1.4 million in 2000. Also,

using H&R Block's online service in 2004 cost \$80, compared to the \$130 charge on average to visit an H&R Block office (Lima, 2004).

What is different between workers and automation? Workers have the ability to respond to special needs and circumstances. A vending machine cannot go a little light on the vanilla with a double-shot espresso. ATMs cannot approve a mortgage. Online tax software may not be able to handle complex tax situations. These examples have a high degree of uniqueness in each customer encounter.

Automation may replace some service jobs and it can also change the nature of other service jobs. For example, with the extensive use of flight check-in kiosks at airports, a smaller number of service representatives are on site. Instead of checking in passengers - which the computers can do - the service representatives become exception handlers. They may reroute passengers who have had a change of plans or need to check extra luggage. Maybe the passenger is in need of some special assistance. The check-in kiosks are not capable of handling any of these tasks outside of their programmed rules. Even grocery store self-checkout counters still need a worker to supervise and handle problems with the processing.

These examples show how service providers are continually trying to streamline processes like account management, check-in, or registration. Consumers are constantly being asked to take over more and more steps in several service processes (Honebein, 2006). This reduces that face-to-face service and eliminates the need for extra paid employees.

2.4 Customization & Experiences

One characteristic of services that can counteract the effects of automation and self-service is when they create a custom service encounter or a memorable experience. Attending a sporting event rather than watching it on television puts a consumer nearly in the game. Concierge service at an apartment or hotel can provide specific, custom advice for each individual. Fancy dinner shows or elegant restaurants create memories, something consumers are willing to pay for.

Pine and Gilmore (1999) explain that experiences will be the next major economic offering in the US after the trend towards service. The authors indicate that experiences will respond to a new customer need – the need to group products and services in a way that engages the senses (Rietze, 2006). Figure 2-2 below shows how the core product can be built upon with services and then experiences.

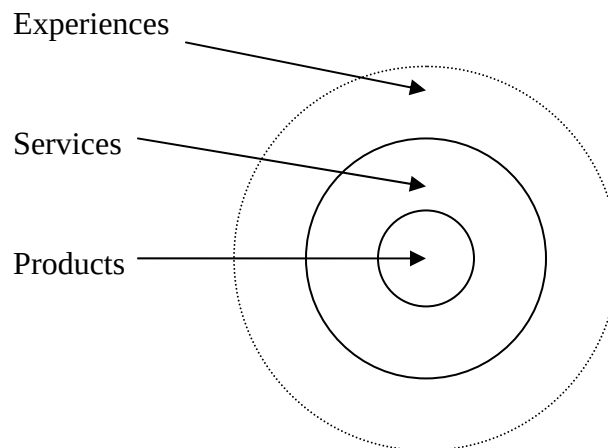


Figure 2-2: Economic Offerings

For example, the La Casita chain of Mexican restaurants uses all three rings in the diagram. They take the basic product they are offering, food, and couple that with a service offering like any other restaurant. Then, the restaurant incorporates an experiential factor. They offer a show every thirty minutes with actors, costumes, and cliff divers who somersault off of a twenty foot ledge into a small pool inside the restaurant. Parties not lucky enough to sit within view of the stage eat dinner on tables nestled in a mysterious cave shaped room and can then watch the show after eating. Experiences like these give consumers more reason to go out and pay for dinner rather than eating at home.

The Dave and Busters line of restaurants and entertainment complexes do something similar. This business couples food and video games in a family friendly location by day and upscale adult arcade by night. Kids can enjoy the games and prizes after eating. Adults can meet friends for a drink and then act like kids playing the games. Dave and Busters offers a full restaurant, several bars, and extensive gaming midway.

Next consider the chain of Build-A-Bear outlets. These stores allow children to create their own custom made teddy bear from separate parts that are sewn together at the store. This store concept takes what is normally a manufacturing process (assembly of the teddy bear) and turns it into a co-produced service (Honebein, 2006). In this case, Build-a-Bear actually uses a Postponement strategy to bolster its service offering. Instead of a customer shopping at a store to pick-up a pre-made bear, the customer now spends more time in the store creating a custom product. Build-a-Bear offers up a unique experience.

Consider Starbucks again as another example. What is it that Starbucks offers that brings people into the store to pay several times the cost of the coffee to make it at home? Starbucks drinkers may prefer the gourmet blends, but they also may be attracted to the experience of sitting down in the comfortable lounge with a book, their laptop, or a friend.

Adding an experience to a service offering or customizing a service to provide a highly tailored result draws consumers in. Experiences and customizations are difficult, if not impossible, to automate or receive over the internet and thus promote service job growth.

2.5 No Service

The next characteristic is when products are developed for no service or when the trend moves towards products with no service component. For example, disposable items or one-time use items prevent service providers from interacting with consumers during the lifecycle of the product.

In addition, with the pace of technology and plummeting prices of some consumer goods, disposable begins to mean more. Oftentimes it is more expensive to repair or service an electronic device than to buy a new one. Digital cameras, camcorders, and DVD players may prove less of a hassle to consumers to throw away and purchase new upon malfunction. These instances eliminate the need for service technicians.

Consider mail and newspapers as examples. Both of these items usually have delivery services attached. However, with the wide availability of internet connections

and email, receiving letters and printed newspapers is not required. In this case, a physical product that requires a provider to come face-to-face with a customer for delivery of the product can be replaced with an online subscription to the New York Times or Wall Street Journal. These instances show how service can be removed from a product.

What concept combats the no-service trend? Designing products for service. Some providers create packages of goods and services. Sometimes referred to as product-based services, these bundles offer the functionality of a product along with a cooperative service to enhance some dimension of the product's consumption. Product-based services will be discussed later in the text.

2.6 Policy

Another characteristic that can affect service employment levels are regulation and policy related. Sometimes the government may mandate certain laws or regulations that require additional employment for reasons of safety or the common welfare.

For example, The Commonwealth of Massachusetts requires that a uniformed police officer be on site at any city, county or state construction project. The officer directs vehicle and pedestrian traffic if necessary and oversees safety in general. The State of New Jersey prohibits motorists from pumping their own gas, forcing all gas stations to employ extra workers to provide full fuel delivery services.

By law, US Federal, State, and Local employees must be legal US workers. A state would not hire a politician from another country to represent them. Government work are examples of jobs, which by their very nature, will be performed by US workers.

Sometimes, however, inefficient policy may lead to job loss. Illegal immigration, for instance, does not reduce the number of jobs or amount of work being done in the US. It reduces the officially recorded amount of work done by US workers. Workers not in the system skew labor data and make it difficult to predict the extent of the issue. Also, illegal immigrants may take jobs that could go to US citizens.

2.7 Security

Some jobs will prove to be safe from the effects of restructuring because of concerns over security. The US Department of Transportation and Federal Aviation Administration will not bring in cheap foreign labor to replace the Transportation Security Administration agents who perform airport security tasks.

Consider the report in early 2006 that Dubai Ports World was set to take over operation of several major US seaports. The potential loss of employment was not clear in the deal. The new controlling authority probably would not have fired all the US workers and brought in middle-eastern workers to fill their places, although this was a real concern for society. Perhaps some management jobs would have been lost.

The main concern was over security. In the midst of the Global War on Terror, the US population would not have approved of a middle-eastern company taking control

of one of the country's life lines. Access to major shipping channels, for example, will remain in the hands of US companies and US workers because of security.

2.8 Time Critical Services

Some services are time critical, a characteristic that may keep jobs safe. The local convenience store provides something that any online retailer cannot; proximity to the customer. If a consumer needs a snack or a drink, he or she generally wants it now. The customer would not go home and order the drink online and wait for its delivery. The person would go to a store and fill their need on the spot.

Next, a local community would not outsource their fire protection or other emergency services to Eastern Europe, for instance. While the cost may be substantially lower than employing a fire station in the town, the outsourced option would never be able to respond in time. Emergency services are staffed locally in the US because of the time sensitive nature of the service. A job will prove to be safer if it helps fulfill an immediate need.

2.9 Nature of Goods

Lastly, several characteristics of products make the services around them ideal to promote job growth. This section will discuss primarily the value of retail sales along

with other services that must be completed in proximity to the customer because of the nature of the product attached to the service.

Consumers oftentimes have the choice to shop from home on the internet or visit a retail outlet. Other than the previous characteristics, like experience or time criticality, what makes people visit a retail outlet when they could normally shop from the comfort of their home?

The nature of some products makes the services needed to supply them require face-to-face contact. Retail stores exist and will continue to thrive as long as people need to see, touch, or smell a product before they buy it. Measuring a desk or bed to see if it will fit in a room or checking the color of wallpaper in real life instead of on a computer screen means that service people at retail shops will need to be employed.

Some customers may be averse to shopping for clothes or shoes online and some may have no problems. Some consumers may like to try everything on to test the fit before purchasing. Companies like Zappos.com and Shoebuy.com are making that task easier to do at home. The online shoe outlets offer free shipping on their products and free return shipping if the customer does not like the product for any reason. Normally, the ability to return an unwanted item (without the cost of shipping) is a benefit to customers afforded by retail stores.

Zappos.com gives customer up to 365 days to decide if they like a particular pair of shoes. Customers can order several sizes, have the items shipped for free, and then only keep the one that fits the best. Meanwhile, the entire decision process and fit testing takes place at home instead of at a store. Business models like these stores breakdown the face-to-face contact that some products can generate with their attached service.

They reduce the uncertainty involved when a consumer cannot touch, see, or try on an item before purchasing.

Infrastructure and construction are prime examples in this space. Although the account management, customer service, and payment processing functions of cable television, cellular phone, and internet service providers can be carried out anywhere in the world, the installation and maintenance of the products that bring the service to their home must be completed exactly there, in the home.

Also, even as computers replace humans in several service tasks because of automation, the equipment still needs to be repaired. Computer technicians and repair workers will be needed to setup, repair, and upgrade the electronic components. These repair jobs that have to be done on-site will promote job growth as long as computers are

1. Not able to fix themselves or be fixed remotely; and,
2. Expensive enough to be repaired instead of discarded if there is a problem.

2.10 Summary

Each of these characteristics may prove valuable in determining if a job is safe or at-risk because of specific aspects of that work. Sometimes jobs are safe if they match one criteria while others need to match several. For instance, consumers may hire a lawn maintenance or snow removal service rather than do the work themselves. However, with new cleaning robots, people may start using that automated device instead of hiring house cleaners. This is an example of how a service that needs physical touch can be eliminated through automation or technology.

Figure 2-3 shows the criteria overall which may put jobs at risk. The shaded region in the center is the “safe” zone where jobs are performed by paid workers in the US. The outside region is where work exists and does not have its value captured by a job. This could mean that the work is done by a consumer themselves or by machine. Each of the characteristics tend to pull jobs out of the center region.

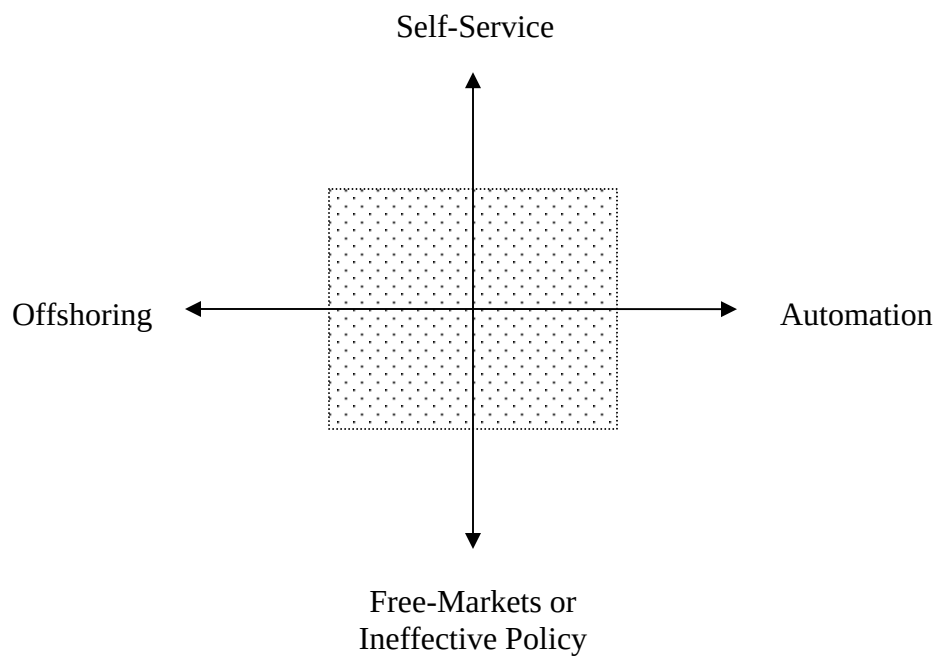


Figure 2-3: Characteristics of Risky Jobs

Because of technology improvements over time, the safe region of jobs will decrease as more and more service become tradeable as mentioned in the introduction. More things will be able to be done remotely from consumers at lower cost. Advanced

robotics and artificial intelligence will take over more and more complicated work.

Figure 2-4 shows this transition over time.

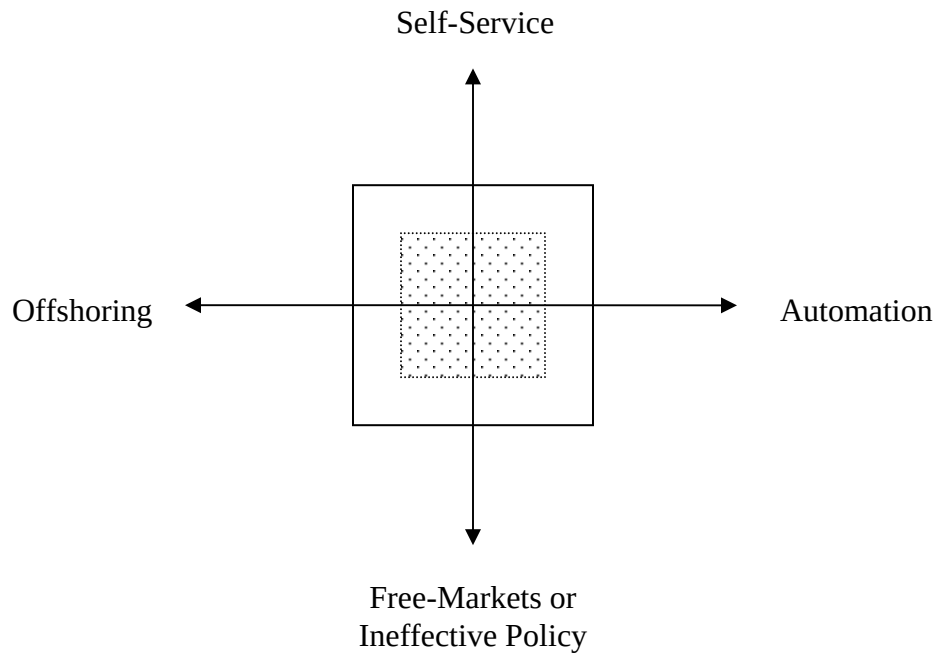


Figure 2-4: Natural Reduction of Safe Zone

However, some aspects of jobs may keep them in the safe zone. Jobs that are highly customized or whose performance heavily deteriorates with distance are examples. Time sensitivity and consumer willingness to wait may keep employment closer. Figure 2-5 summarizes the criteria from this chapter which may pulls jobs back in the safe zone.

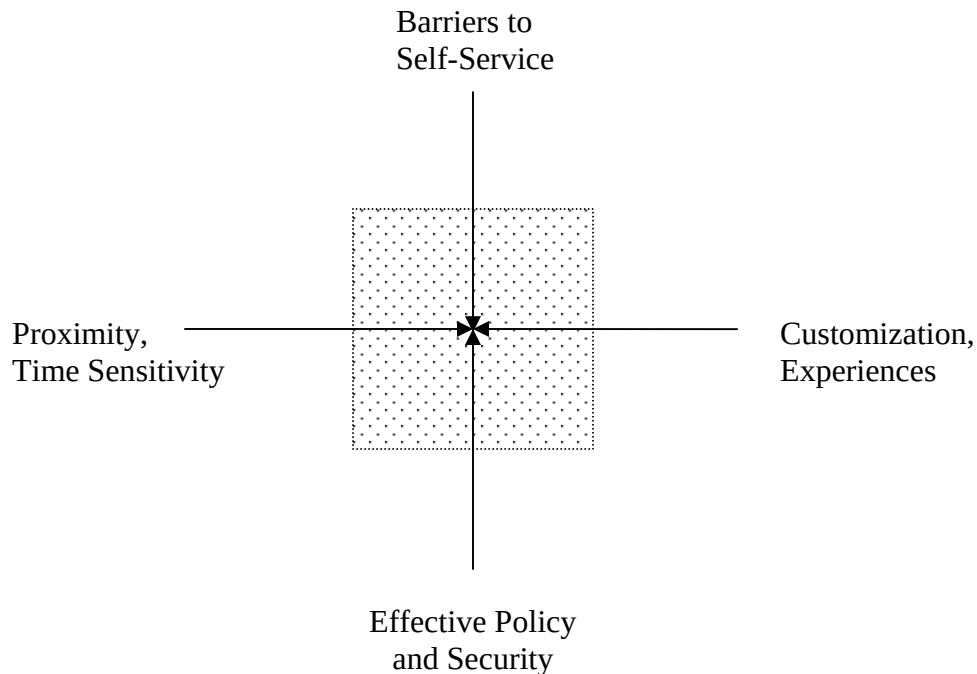


Figure 2-5: Characteristics of Safe Jobs

Blinder (2006) points out that some services may also be resistant to productivity increases. Productivity increases in manufacturing can lead to the elimination of jobs as less people are capable of doing more work. However, this is not always true with services.

Some services suffer from Baumol's Disease (Blinder, 2006). For example, to increase the productivity of a teacher, one would stuff as many students as possible into the classroom. However, this negates the quality of the experience, thus making the service less desirable. The way to increase the productivity of a restaurant server is to give them more tables. However, this again makes the service less appealing because of

longer waits and less personal attention. Thus, some natural tendencies will help preserve service jobs.

These characteristics summarize the ins and outs of keeping US service jobs at work. Next, these aspects are coupled with the range of produce and service offerings consumers have to choose from to see what actual happens in practice.

Chapter 3

Product and Service Offerings

This chapter takes what was learned in the previous section and marries that with further analysis of the interactions between people, goods, and services. For example, if jobs that require physical touch are considered safe, but a customer has the choice of paying for the service or performing self-service, which does he or she choose and why?

Sometimes value is provided through a good and sometimes through a service. Consider the following diagram.

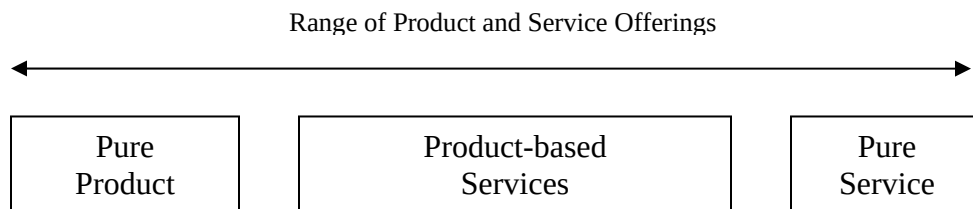


Figure 3-1: Where Product-Based Services Fit (Cohen, 2006)

The offering on the left end of the diagram would be something like a pencil or pen. This product is used or consumed and does not require any interaction with a third

party. A consumer's experience with the product depends on how that specific unit performs or operates.

The right end would be something like a hotel stay, a pure service. The quality perceived by the customer is based highly on the experience of the service encounter, that is, attentiveness of the hotel staff, cleanliness of the room, or additional offerings such as internet access.

The middle area is a combination of a product and a service, like a car that requires maintenance or can be customized. This is a product-based service (Cohen et al, 2006). Product-based services are a blanket title and vary greatly depending on types of customers, services, and products.

For example, one automobile owner may be capable of performing all necessary maintenance him or herself on the vehicle. Another owner may perform oil changes at home but use an auto repair facility for more complicated issues. Yet another vehicle owner will have all worked performed at the dealer. Finally, some people do not own cars and use public transportation or taxis for mobility.

These examples show the wide range of service possibilities for this given situation. Changing some of the elements of the previous diagram, consider figure 3-2 below which shows the full spectrum of consumer alternatives.

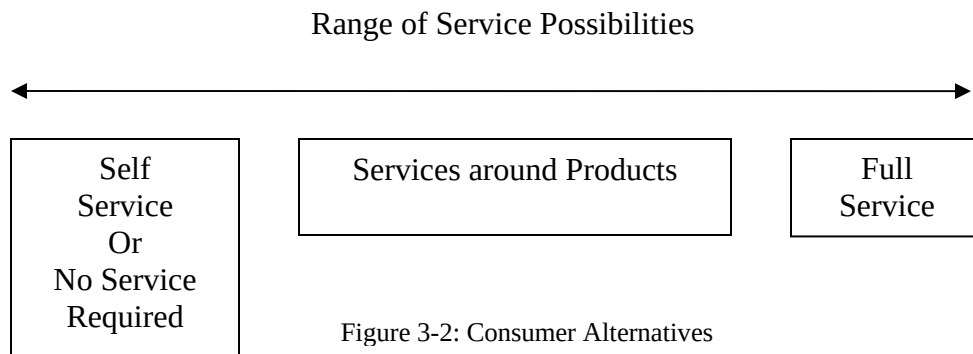


Figure 3-2: Consumer Alternatives

A person may be fully capable of washing his or her car, but would gladly pay for the service and not be bothered with the hassle. Maybe the car is very expensive and the owner prefers a professional job. Making a repair on a car may require special tools or knowledge. Sometimes an overworked business executive does not have time to get to the dry cleaners and needs a pick-up and delivery service. Sometimes a mother of four young children simply does not want to drag her children through the grocery store when online ordering and home delivery is much easier. Perhaps law or regulations require a dangerous chemical to be disposed in a certain way that requires a specialized service.

All of the previous scenarios list some reason why a customer would be willing to pay to have something done. Customers have options and make choices. Whether it is not having the time, ability, or equipment to complete a task, or regulation prohibits one from doing it him or herself, there is a need for service. When the service offering is attached to a product that the customer owns or buys, such as groceries, cars, or clothing, it becomes a product-based service.

When a customer decides to buy a product or use a service, several alternatives are available as outlined in Figure 3-2. A customer can buy a product and get service as needed if it breaks or needs an upgrade. Perhaps this service can be performed by the owner. Lastly, a customer could use a service that would replace having to own the product.

For example, a customer buys a portable music player. The user may need repairs completed on the music player or need batteries changed. This case shows services that *augment* the product. The user may forego buying CDs or MP3s from the internet and decide to purchase a monthly subscription to download music or receive streaming audio. Here, the subscription service *replaces* owning CDs.

Another consumer may want a certain vehicle because the brand, performance, or specific function is important. The person is willing to pay for the product and the service to maintain it. Thus, the service augments the product. On the other hand, a college student may not be able to afford to buy or physically fit a washer and dryer in his or her room. Thus, he or she uses a laundromat or shared laundry facility, a service that replaces owning a washer and dryer. Figure 3-3 below summarizes these concepts.

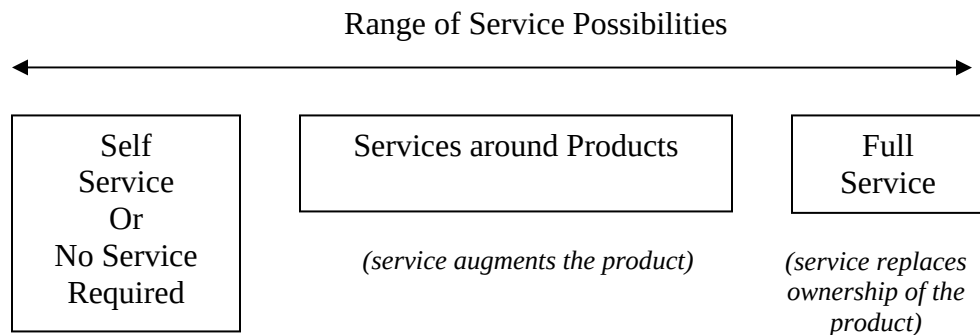


Figure 3-3: Consumer Alternatives Revised

3.1 Service Augments Product

This section expands upon the middle area in figure 3-3 above. Services that accompany products come in four flavors.

First, a consumer can pay per use. He or she pays for each repair event or each time he or she attends a training course, for example. This would be like purchasing a car and paying a service center to perform each oil change or buying a set of golf clubs and paying for a lesson on how to golf.

Services that augment products can come in the form of contracts or other extended warranty offerings that cover a certain time period of ownership. Instead of paying for each oil change, a customer could purchase oil change service for his or her new or used car. The plan may cover oil changes every 3000 miles for three years and the service center may even offer to remind you when service is due with a telephone call or email.

Service bundles are another type that offer (usually at the time of purchase) a discrete number of service events or type of service. For example, customers may purchase home installation of a garage door or windows (a one-time service affair) or three one-hour lessons and a round of golf bundled with their new golf clubs.

Lastly is a different kind of product-based service that relies more on the service than the product. The concept is to place a product of negligible value (compared to the value of the service) in the hands of the customer and generate revenue over an extended period of time. For example, cell phones cost very little to manufacture compared to the

monthly charge for the service to *use* the phone. Printer manufacturers can sell an inkjet printer for \$100 and then charge \$30 for a black and white ink cartridge and \$40 for a color cartridge that will be replaced several times over. Tire manufacturers may sell four or five sets of tires for a vehicle over its lifetime.

3.2 Service Replaces Products

It is easy to think about products as units in themselves. For example, a car is a car and a phone is a phone. People drive cars and talk on phones, but why? Because people use things to perform a certain function. Think of a car not as a physical vehicle but as transportation whose substitute is a bus, taxi, or walking. A phone is a method of communication, a substitute for talking in person.

Consumers want the *function* provided by the product. Sometimes, consumers separate the product from the function and consider all the possibilities. These consumers care more about the end result than the product (or method) used to attain that end result. Cleaning the house oneself or hiring a cleaning service both result in the same end product: a clean house. Driving a car to get to a destination or taking a taxi both result in getting to the same place.

The difference is the service element provided in each example. Paying to have the house cleaned or paying for taxi cab transportation employs another person to do the work. Also, a person living in a major metropolitan area could forego ownership of a car and rely solely on walking, public transportation, and taxis. In this case, those services

offer the same end result as owning a car without the *ownership* of the product. Services that replace a product come in three different types.

First is again pay per use: using a taxicab every time mobility is needed or using coins for each visit to the laundromat. The products in these cases become a shared resource, allowing several people to use the same product. The products that serve people in these cases have high utilization rate and can sometimes be used simultaneously by different users, like a taxi cab for instance.

A similar yet different offering is a membership type. For example, a laundromat may offer a monthly charge for unlimited use. A movie rental store may charge one flat rate for unlimited rentals.

Also, when a service replaces a product the customer can pay for performance (uptime). For example, a computer network solutions provider may sell hardware to a client and incorporate a monthly fee for maintenance or repair visits. The provider may quote different price premiums for different levels of performance. A higher price will guarantee 99% uptime while a slightly lower price may ensure 95%. A customer would decide based on value of information and criticality of the network.

Another example of this last type is selling airplane tires by the landing or semi-truck tires by the mile. For instance, a tire manufacturer could sell one thousand airplane landings or one million miles for a fixed cost. The manufacturer replaces the tires as needed through the end of the service commitment. In this case, the airline or the trucking company gets miles or landings, instead of tires.

3.3 Product Life Cycles

The reason product-based services are appealing from an employment perspective is because of the service being attached to products. In Chapter 2 of the thesis, the characteristics of goods and services are discussed. Section 2.9 indicated that because of the nature of some goods, physical contact with them is desirable prior to or at the time of purchase for a number of reasons. This section leverages some of those concepts.

When a service is attached to a product the assumption is that there is a better chance for work being needed. Products may help create the face-to-face contact that facilitates service jobs. However, this is not true in all cases. Sometimes products can be easily shipped for repairs or are sometimes disposed of rather than repaired.

More services might be needed around products because of product life cycles and because of all the opportunities for a service provider to interact. Consider the following diagram of a product's general life cycle.

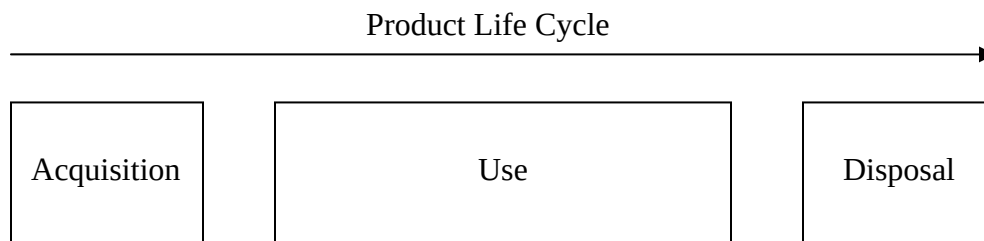


Figure 3-4: Product Life Cycle

First, products have to be acquired. Consumer may need assistance in choosing the right product or getting it delivered or installed. Next, products have a use phase. This is the largest part of the products life when it is actually put to work. Lastly, products need to be disposed of. Sometimes this is as simple as throwing the item away or it may include specific processes if the materials are hazardous, for example. The acquisition phase, use phase, and disposal phase each have several parts. Consider Figure 3-5 which breaks down each phase.

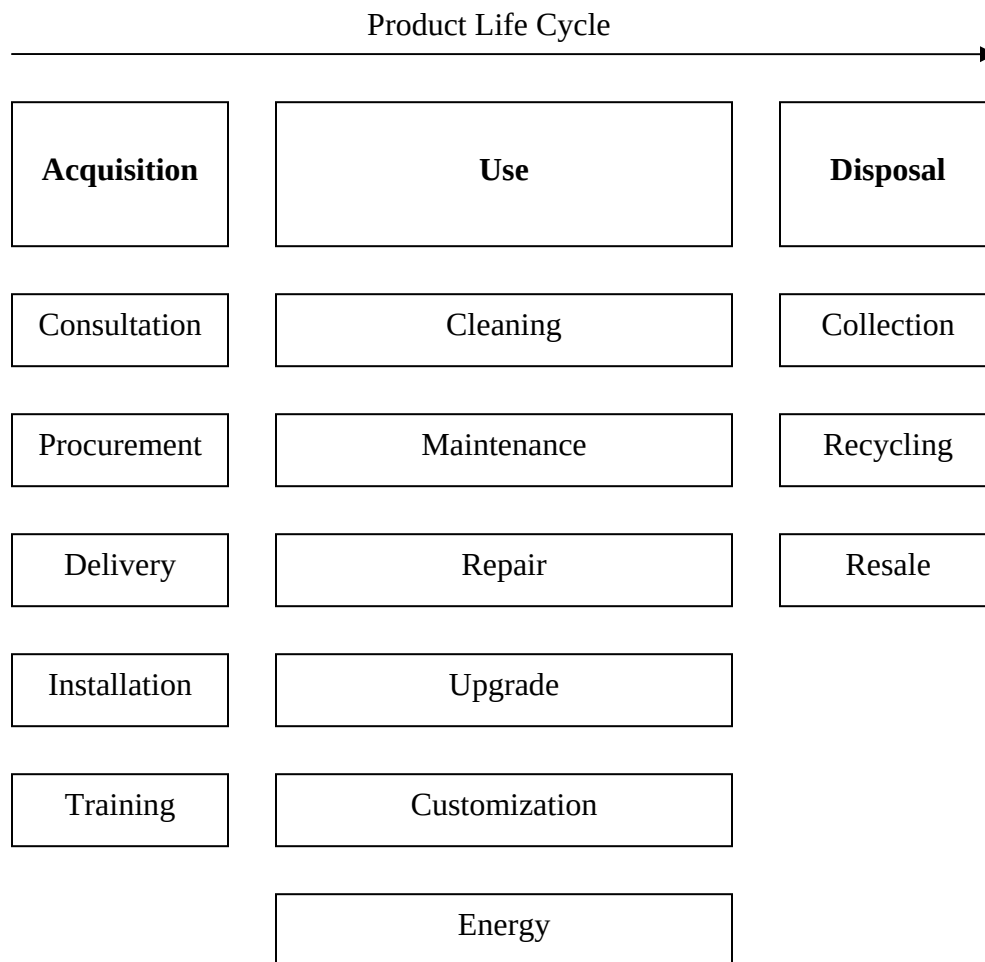


Figure 3-5: Product Life Cycle Expanded

The preceding diagram shows examples where service providers can interact with a customer and their product. It is estimated that consumers spend \$1 trillion annually on products they already own (Cohen et al, 2006). For example, companies spend nearly the same amount annually to maintain a major Enterprise Resource Planning (ERP) solution as it costs to initially install (Momma, 2000). Schmidt (1988) states:

- Simply more goods are being produced today than in the past because of technology and productivity increases. More goods require more varied services.
- The move towards goods with higher value-added resale involves more focus on aftermarket service.
- Some service offerings are moving towards greater convenience (longer hours, more locations, greater variety of services) and need larger workforces to provide manning.

Creating service jobs around products that match “safe” criteria from Chapter 2 may prove the best way to cash in on this demand while creating employment.

3.4 Customer Decision Process

This section has discussed how consumers have many choices when selecting a service alternative. They can complete the work themselves, have repairs made on products, or subscribe to services which replace the need for them to own products.

What are some of the thoughts and reasoning that go through people's minds when deciding which option to use?

Section 2.2 discusses the concept of self-service and lists several reasons why people may consider doing work themselves or sourcing it to someone else. Honebein (2006) states:

[Customers] often find that performing tasks themselves is faster and more efficient, affords a larger sense of control, and in some cases presents greater customization of the results. In other words, customers are able to unlock more value from purchased goods and services when they can successfully complete tasks themselves.

Consumers have a lot to think about and may not even realize it. A consumer may not even recognize the possibility of performing self-service because of some of the obstacles. They quickly dismiss the option, however, it still exists. Consider the following list of criteria reprinted from Section 2.2 that customers weigh when making service decisions:

1. Cost
2. Time
3. Desire
4. Ability
5. Knowledge required
6. Tools and equipment required
7. Regulations

Heskett (1997) outlines a model to analyze customer service experiences which can help organize the previous list. The Service Profit Chain uses a central concept called the Customer Value Equation. The Customer Value Equation is a benefit-cost ratio which compares the positive outcomes of a service encounter with the negatives. Figure 3-6 shows the Customer Value Equation.

$$\text{Customer Value} = \frac{\text{Results} + \text{Process Quality}}{\text{Price} + \text{Acquisition Cost}}$$

Figure 3-6: Customer Value Equation (Heskett, 1997)

The Customer Value Equation places the benefits, results and process quality, over the costs, price and acquisition. The following are the descriptions of these terms:

1. *Results.* Results pertain to the actual outcome of the service experience. That is, the quality of a car repair, the look and function of new kitchen cabinets, or the crispness of dry cleaned clothes. The results are part of the customers overall satisfaction.
2. *Process Quality.* This part refers to the actual experience of the service. This pertains to the friendliness of staff, the bumpiness of an airline flight, or the hassle involved with paperwork.
3. *Price.* Price is the actual cost paid for services rendered.

4. *Acquisition Cost.* This term is slightly refined for use in this case. Heskett intended this item to be the cost of acquiring the service; that is, travel time, waiting time, etc. For use in this discussion, acquisition costs refer to all the intangibles in selecting a service option. This will include acquiring knowledge, tools, and equipment for self-service.

The inclusion of acquisition cost is important because sometimes consumers may be making a wrong decision by focusing purely on price. “The cost of acquiring a service may, in some cases, outweigh price” (Momma, 2000). Momma (2000) calls this “convenience cost.” He notes that it can vary significantly from customer to customer and from situation to situation.

A customer makes a service decision by calculating the Customer Value Equation in his or her head. The customer may not realize they are even doing it and some may make a concerted effort to layout these variables. Again, the customer performs the mental math by comparing all the ratios of benefits to cost for each alternative. Consider the following example.

A consumer needs to change the tires on his or her motorcycle. The service options include:

1. Doing all the work at home. This requires stands for the motorcycle, tools to remove the wheels, and a tire mounter and balancer to replace the tire properly on the rim. The do-it-yourselfer can order the replacement tires on the internet.

2. Removing the wheels and taking them to a shop to have new tires installed. This mid-range example shows half self-service and half paid-service. The customer does some of the work and pays to have the other part done. This work requires stands to lift the bike and tools to remove the wheels.
3. Take the whole bike to a shop and have new tires installed. This option is when the customer pays to have all the work done.

The decision process can be put into the Customer Value Equation. A person produces a value equation for each option he or she has available. Using the list above, the same customer who is in need of tires but does not have time, knowledge, or ability to perform the work would produce three value equations.

The value equation is replicated below. For the service options above, one through three, the consumer would estimate a value for each of the variables (LOW, MED, and HIGH). A customer would rate a price LOW, for example, if the price of the service is low. A HIGH rating in results means that the results are of high quality. Then, the equation adds the top values and divides them by the denominator. Table 3-1 shows the comparative values.

$$\text{Customer Value} = \frac{\text{Results} + \text{Process Quality}}{\text{Price} + \text{Acquisition Cost}}$$

Figure 3-7: Customer Value Equation Repeated (Heskett, 1997)

Option	Result	Process	Price	Aq Cost	Value
1	LOW	LOW	LOW	HIGH	LOW
2	MED	MED	MED	MED	MED
3	HIGH	HIGH	HIGH	LOW	HIGH

Table 3-1: Customer Value Equation Outcomes

Remember, the assumptions for this example are a motorcyclist that does not have the time, ability, knowledge level, or tools to complete the job. Table 3-1 shows how this rider rates option one, the do-it-yourself option. Not having the knowledge, ability, or time to do a good job would result in low quality and a frustrating experience. The price is low because the rider provides the labor him or herself. The cost to acquire the equipment, tools, and knowledge would be high. Substituting these values in the equation gives the overall value of this option as LOW (e.g. a small number divided by a large number yields a smaller number).

For the second option, each variable receives a score of MED because the rider does less work and the work requires less knowledge and fewer tools. The overall value is MED since this is a balance between self-service and paid-service.

For the last option, the rider is having all the work professionally done. Thus, the result and process are of high quality assuming that the technicians are knowledgeable and friendly. The price is higher than other options because more work is completed by other people. However, the acquisition costs are very low. The customer can ride the bike to the shop and leave with new tires. The customer is not bothered with the specifics of the process, the tools required, or the knowledge of how it was done. For this rider, in this instance, this results in overall HIGH value.

Different customers will consider these tasks differently based on the criteria list above. Some customers may not have the time or desire to perform the work. Others may get a sense of pride from completing all the work themselves or enjoy cost savings. The following responses indicate how the service criteria vary from person to person. An experienced rider, intermediate rider, and novice rider, respectively, could choose between the options above with the following logic processes:

1. “I can handle the entire process since I am an experienced motorcyclist and technician. I have all the tools, knowledge, and ability to perform a high quality repair. I can do this in my home where it is quick and convenient.”
2. “I have the basic knowledge of my motorcycle. I have stands and tools which allow me to take care of the tires and other basic maintenance

myself. However, I do not have the tools or knowledge to mount the tires on my wheels.”

3. “I do not have time to do this work myself.” Or “I am not comfortable with this work and I do not have the ability, knowledge, or tools to perform the work.” Or “I do not want to invest in the time and cost to acquire tools and knowledge to perform this work when I can pay someone else to do it.”

These are the kinds of choices and responses consumers make daily which affect the demand for work. More examples like this will be presented in the next chapter.

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 4

Examples at Work

After understanding the wide range of product and service offerings available to consumers, it is necessary to investigate more deeply why a consumer will choose a particular alternative. This is best illustrated with examples which show the complexity of the issue.

The following examples build on the premise that people have certain basic needs. It is reasonable to assume that a person would take care of such basic needs before spending money on more luxurious needs. The concept of looking at basic needs is useful because generally all people have to deal with these everyday yet necessary tasks.

The following table shows an example model of what each section will use. The model lays out several different product and service alternatives in numbered scenarios. Each scenario has a description of how the people, product, and service interact. Then, each scenario has a corresponding service component. The service component is the overall value in the scenario that could be captured by a paid employee.

For example, the service component in scenario one is low. This could indicate that the product in this scenario does not require much service or the service is easily

performed by the consumer. The second scenario shows a much larger service component. This case could indicate where the consumer is paying for an extensive or specialized service offering that has relatively high value.

Table 4-1: Service Scenarios Explanation	
Scenario 1: Description	
	
Scenario 2: Description	
	

4.1 Clean Clothes

Consider all the different methods available for attaining the basic need of clean clothes. One could wear clothes once and throw them away, eliminating any need for service. Also a person could use a laundry service with pick-up and drop-off; thus eliminating any self-service and paying for the entire function's value. The following table summarizes some scenarios. Each scenario also has a corresponding service component. As explained, this is the percentage of the overall effort of the task that results in a provider getting paid for the value of the service. That could be washing, folding, or ironing tasks associated with the product (clothes) or the pick-up and delivery service options of the offering.

The first scenario, as mentioned, details a product with no service. No employment is possible with this option because the product is considered disposable. Customers choosing this option would not be creating jobs because the product does not require service. This scenario is meant to illustrate a fundamental point that not every product requires service.

The second scenario shows what could be the traditional home setup with a family owning a washer and dryer and cleaning their own clothes. The family invests in the equipment to clean the clothes and performs the loading and operating of the washer and dryer themselves. The family realizes some economies of scale in this scenario because after the initial investment, the cost per load of laundry is lower than using a laundromat. Thus, the decision to use this method of service could be based on the convenience or lower cost of doing laundry at home.

Table 4-2: Service Scenarios for Clean Clothes

Scenario 1: wear clothes until dirty and throw away

no service component

Scenario 2: Own washer/dryer, wash own clothes, pay for repairs to washer and dryer as needed



Scenario 3: Use a laundromat



Scenario 4: Use a laundry service



The service component exists in the second scenario when the washer or dryer needs repairs or maintenance. Since the washer and dryer are heavy, bulky, and difficult to move, it is reasonable to assume that a service technician would have to be on site to make the repairs. This type of service necessitates physical contact to complete the task.

The next scenario might be the standard college student using a local laundromat. The laundromat may have varying degrees of services up to and including full-service washing. The service component in this scenario is higher than owning the washer and dryer at home because the laundromat is responsible for the service of the product if anything happens. If a washer and dryer fail at home, the family needs to fix it themselves or call a service technician. At the laundromat, the users pay for fully operational washers and dryers and are not bothered with repair tasks.

Finally, the last scenario shows the full-service offering. If the launderer offers pick-up and delivery, then a customer does none of the work him or herself and pays for all of the value of the service. This is an example of a highly customized, full service offering. Consumers pay for the convenience of having every step of the work completed for them, even the trip to and from the store to transport the clothes.

This service offering replaces the consumer having to own a washer and dryer to gain the end result of having clean clothes. The laundry service maintains the equipment and is responsible for the knowledge to operate the machines and the costs to maintain them. These aspects are transparent to the consumer. The consumer only sees dirty clothes leaving and clean clothes coming back.

4.2 Shelter

The next basic need is shelter. This example will compare several different home improvement options all available through the retail chain Home Depot. Home Depot advertises itself as the “Do-it Yourself Home Warehouse.” At the end of each television commercial The Home Depot salesperson repeats the slogan, “You Can Do It, We Can Help.” The Home Depot offers a wide range of product and service offerings that fit the needs of many different consumer segments. Table 4-3 below provides some example scenarios for rebuilding kitchen cabinets.

In scenario one, Home Depot plays its role as the product provider and that is it. The retailer offers raw materials on its shelves and the customer walks in to buy it and walks out. This scenario shows how little to no service can be attached to the product. The consumer simply purchases the materials and all other necessary equipment and does all the work themselves. Other than the value of the goods sold, Home Depot does not capture any additional value of the service chain.

Scenario two shows how Home Depot can interact more with the customer. Customers can rent tools from Home Depot Tool Rental Stations inside retail stores and use that equipment to perform the work themselves. This scenario does not offer a high service component because the customer provides the labor. However, what this example does offer is a service that replaces owning a product. Instead of buying a garage full of tools and handling the cost to maintain them, a customer can simply rent a tool whenever a job calls for it.

Table 4-3: Service Scenarios for Home Improvements

Scenario 1: Purchase all the raw materials, create, build, and install cabinets yourself

no service component

Scenario 2: Purchase a pre-made kit, rent the tools from Home Depot Tool Rental Stations, and perform the work yourself



Scenario 3: Hire a Home Depot Home Installation Contractor to do all the work.



Tools can be large, bulky, and heavy. Also, a customer generally needs a tool to complete a job in a timely manner. This creates a time sensitive nature for the product. An online mail-order tool rental business may not be feasible for these two reasons. Tools may be difficult to move safely over long distances and customers need them quickly. These characteristics combine to make the retail, face-to-face tool rental service a viable business which harbors safe jobs.

Scenario three is the full-service example. Instead of shopping for materials, purchasing or renting tools, and doing the work themselves, a customer can approach the service desk and setup a contractor to complete all the work. The contractor essential does all of the aforementioned tasks for the customer. The contractors create designs if necessary, get the materials, have the tools, and provide the labor. The customer sees the same result as if they had done the work themselves; however, this scenario shows the transfer of value to the service provider. Consumer choices like these generate jobs because work is demanded.

4.3 Food

The next basic need to address is food. People need to consume food for energy and life but have many, many options to attain it. People can make food at home or eat out at restaurants. Continuing, there are several ways to get the food, different ways to cook it, and numerous dining choices. Preparing food at home requires cooking utensils and cooking knowledge. Cooking one's own meal also requires time and a desire to

cook. Eating out at restaurants can provide added experiences and more service than eating at home. Table 4-4 shows several scenarios in regards to food preparation.

The first scenario, again, is the no service example. In this case, the consumer shops for his or her groceries and prepares his or her own food at home. No other value is extracted in this instance out of the consumer's need for food because they do everything themselves. However, sometimes people do not have the time or desire to cook at home and thus look to these other scenarios. A research effort by ConAgra Foods states that 70% of families experience elevated stress levels at home during mealtimes (Cooper, 2006).

The second scenario shows how a service provider can take over steps in the process for the consumer. In this case, the customer still cooks his or her own food, however, someone else completes the shopping and transportation tasks for them.

Peapod is a grocery delivery service available in several metropolitan markets. Peapod offers an online ordering interface with drivers who personally deliver the groceries to customers. Figure 4-1 shows where a service provider can step into the chain of tasks a consumer has to do and take over some of those tasks.

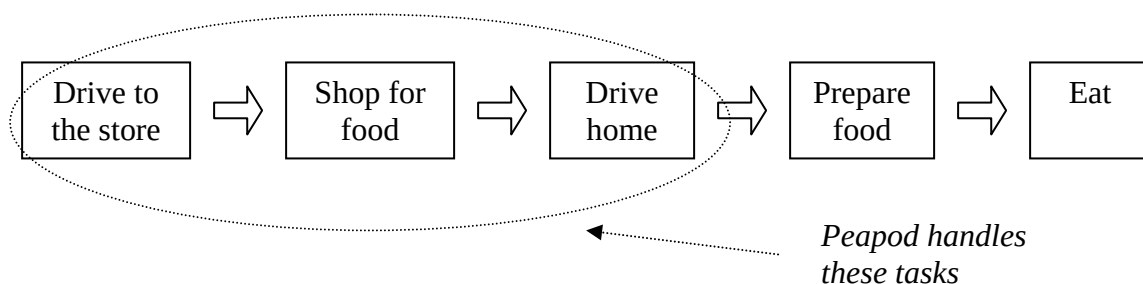


Figure 4-1: Customer Chain of Tasks

Table 4-4: Service Scenarios for Food

Scenario 1: Shop at a grocery store and prepare own food.

no service component

Scenario 2: Use a grocery delivery service, but prepare own food.



Scenario 3: Eat at a buffet or supermarket salad bar.



Scenario 4: Eat at a restaurant.



Scenario 5: Use a cooking service.



Scenario three shows another alternative of eating at a buffet or salad bar type establishment. With buffets, the restaurant still does their normal tasks of preparing the food and cleaning up the table. However, there is generally much less interaction with a server. The server may provide drinks or handle special requests, but does not take a food order, handle payment, or interact like a full-service restaurant server. The customer does the work of filling his or her plate and creating the meal. Buffet style restaurants require fewer employees per customer than a full-service location because of less provided service.

Scenario four is eating out at a restaurant. Instead of acquiring (raw) foods and cooking at home, a consumer can choose to eat out. In this case, a consumer pays for someone else to get the food, prepare it, serve it, and clean up after. Essentially, the service occurs as the restaurant staff takes over these tasks from the customer. Customers pay for convenience, quality food, or a special experience offered by the restaurant. Thus, this scenario has a larger service component.

Scenario five shows the full-service offering. A cooking service could be anything from a fully prepared home meal delivery service to an in-home chef. Perhaps a family on vacation does not want to be bothered by any hassles of cooking food or eating out at restaurants for every meal. A vacation home may offer a chef or a crew that handles all of these tasks. The family does not have to do any work and the total value of the task is captured in the service provided by the chef.

4.4 Mobility

Another example of a basic need is mobility. People need to move around and there are several ways to accomplish that end. People can walk, take public transportation, use a taxi, or drive their car. Each method has an associated cost, travel time, and convenience. A person carrying large bags or heavy boxes may be more inclined to drive whereas a person traveling someplace where parking is difficult may elect to use a taxi or public transportation. Table 4-5 shows these scenarios with their corresponding service components.

Scenario one shows how no service is created when people choose to walk. People are performing all of the work themselves, thus, no value is transferred to another party. However, when it comes to walking up stairs, people sometimes have alternatives.

Elevators and escalators are examples of how a process can be automated. Imagine for a moment that these machines were never created. Perhaps attendants would be available at the base of stairs to carry heavy objects; maybe these attendants could even carry *people*! This notion transfers the action from people moving themselves up the stairs with their own legs to someone else doing the work for them. This is a case of how the demand for work creates the opportunity for service, even though this example is unrealistic. Alas, people are not carried up stairs by other people. They walk under their own power or use an automated system, an escalator or elevator, to do the work.

Table 4-5: Service Scenarios for Mobility

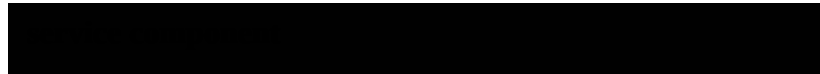
Scenario 1: Walk

no service component

Scenario 2: Drive



Scenario 3: Use Public Transportation



Scenario 4: Take a Taxi



Scenario two is when people drive their own cars. They perform the labor part themselves of operating the vehicle. However, the vehicle has several service needs where workers can interact. The car needs to be parked, cleaned, maintained, repaired, insured, etc. Parking a car could involve a valet, in which case a person is paid to park the car. In a parking garage, however, a customer may pay through a machine and never interact with another human. Cleaning a car also has a range of example service levels which will be explored shortly.

Car repair requires physical contact with the vehicle and thus must be performed within proximity to the customer. Cars are too big to cost-effectively ship them for repair away from the customer. Vehicle repair may prove to be a safe occupation until cars are capable of fixing themselves or being fixed remotely.

Insurance, on the other hand, may not require contact with the customer. A customer may be able to handle all of their insurance needs online and may never need to interact with a service provider. Quotes, rates, and account management can be performed electronically or remotely. However, if the customer were to have an accident, perhaps then an insurance adjuster or representative would need to see the vehicle.

In scenario three, the service component is increased because the consumer decides to use public transportation. In this case, someone else does the job of controlling the vehicle to move it from one point to another. The service replaces needing a car in that instance. People need this service if they do not own a car, do not wish to drive, or are traveling farther than it is reasonable to walk.

Scenario four is using a taxi cab which shows the highest service component. In this case, again, someone else is doing the work of driving instead of the consumer. However, a cab can take a passenger to more specific places than public transportation may be able to, thus adding value. Also, using a taxi replaces the need to have knowledge of where a destination is or the best way to get there. Part of the value of the service is paying for the local knowledge of the cab driver. The driver could also provide recommendations on where to dine or tourist attractions. The custom interaction drives the demand for this service.

4.5 Other Examples

Continuing with the theme of mobility and cars, consider some other interaction points that service providers can have with vehicles. Looking at a vehicle's life cycle and referencing the product life cycle chart from earlier, it is clear that providers can extract value out of consumers in several ways. However, applying the characteristics of safe jobs, which consumer options actually help employment?

Consider all of the options for cleaning a car. This could range from washing it at home in the driveway to paying for a custom detailing service. Table 4-6 covers the scenarios for this example.

Scenario one is the no service component option where the customer performs all the work him or herself. No value is extracted from the consumer and no work is demanded. The consumer requires time, a desire to wash the car, and cleaning materials.

Table 4-6: Service Scenarios for Cleaning a Car

Scenario 1: Wash vehicle at home

no service component

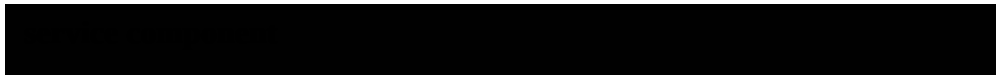
Scenario 2: Use a self-service wash facility



Scenario 3: Use an automatic car wash



Scenario 4: Pay for hand-washing service and detailing



Scenario two and three are similar. Scenario two is using a self-service washing center. These bays have coin-operated spray hoses and soap brushes which offer a place and the equipment to wash the vehicle. The consumer still provides the labor in this case and does not create demand for work. However, the self-service washing center still needs to be stocked with soap and quarters emptied. Service and maintenance are required on the building which does create demand for local work.

Scenario three is using an automatic wash. Similar to a self-service washing center, a paid person is still not doing the work. In this case, an automated machine handles the washing of the car. The process overall is simple and thus the machine can be programmed to complete the task. However, the machine still needs maintenance and service.

Scenario four is paying for a hand-washing service. This full-service options pays another person to complete the work. Also, a person in this case can do what a machine cannot. They can get every nook and cranny and even clean the inside of the car. Demand for this type of service creates work.

Next, cars need fuel. Consumers may not think about the options for getting fuel but they provide a good example. Table 4-6 shows the scenarios.

Scenario one is when customers use self-service pumps and a credit card to pay at the pump. Consumers appreciate the ease and convenience but may not realize it is an example of automation. Similar to online check-in for airline flights, paying at the pump simplifies part of the process and allows the consumer to do it themselves. Pay at the pump reduces the need for cashiers and eliminates jobs.

Table 4-7: Service Scenarios for Fueling a Car

Scenario 1: Fuel at self-service pumps and pay at the pump

no service component

Scenario 2: Fuel at self-service pump and pay a cashier



Scenario 3: Use a full-service pump



Scenario two brings back those cashier jobs. However, this scenario may be waning. This is an example where an automated process may be of higher quality. When consumers pay at the pump, they do not have to walk into the gas station store, wait in line, or deal with another person. The process is streamlined and more convenient. Thus, the natural tendency in this case would be towards scenario one.

Scenario three shows a full-service option. In this case, customers pull up to a pump. An attendant fills the vehicle with fuel and handles payment through the window. The customer is not bothered with pumping the fuel or processing a payment. He or she does not have to know how to operate the pump and does not risk getting dirty or smelling like gas. In this case, the customer may pay an extra premium for this service, but enjoys the value of remaining in the car. This service option creates jobs.

Also, this is a case where regulation can force the creation of jobs. As of 2006, it is illegal to pump one's own gas in Oregon and New Jersey. New Jersey passed the law in 1949 which banned self-service gas because of the fire hazard with such a combustible substance. Some New Jersey citizens like the full-service nature, while some think that prices could be lowered by paying fewer employees if they could pump their own gas (NJ.com, 2006).

THIS PAGE INTENTIONALLY LEFT BLANK

Chapter 5

Conclusion

As mentioned in the introduction, job markets are fluid. Some jobs that existed 50 years ago do not exist today and some jobs that exist today may be gone in 10 years. Paid service employment is lost due to automation, offshoring of jobs, or when consumers do more work themselves. Service employment grows whenever a job is resistant to automation, offshoring, or self-service and people demand more and more of that work. Consumers have several alternatives when it comes to choosing a product or service. The aim of this research is to identify those service offerings that are resistant to elimination and see why people choose to use them.

5.1 The Way Now

US consumers are getting older and wealthier. With that, US consumers are willing to spend more money on services rather than physical goods (Blinder, 2006). For instance, an elderly couple may have difficulties leaving the house and rely on several personal services for care or home-delivery of products such as medicine, groceries, or prepared food. As consumers have more disposable income, more and more of a

percentage of a purchase may be based on the service received; for instance, hiring a moving company to perform all the work rather than a do-it-yourself moving truck or eating out more rather than cooking at home.

There is also another side to the changing customer in the US. With the popularity of internet shopping, availability of information, and commoditization of products the customer can more easily compare prices and features and make purchases more quickly. This customer may be well informed and require special product differentiation to catch his or her attention. From a business standpoint, this is where service differentiation comes into play. Creating customized service experiences is one way to keep customers buying locally.

5.2 The Way Ahead

Overall, it is difficult to predict if more people are choosing to use personal service or impersonal services, or if people consistently choose services that are more custom. Each situation may be different for a customer; choosing a full-service application in one instance but self-service in another. All of these trends occur simultaneously in different directions with different magnitudes. It appears at least, that as people get older and wealthier, they tend to consume more services.

US consumers will not always buy from a local retailer just because their actions will promote jobs. US firms will not produce in the US what is cheaper to produce elsewhere, even if their actions result in job loss. In both cases, the buyer or the seller, are looking to minimize cost. What is necessary is to understand the characteristics of

those jobs, which because of their very nature, must be performed in the US by US workers. Then, US officials may be able to direct policy towards education, training, exposure, or relocation in those areas which match the characteristics of safe service jobs.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix A

Business-to-Consumer versus Business-to-Business

This thesis focuses on Business-to-Consumer (B2C) examples exclusively. This is because Business-to-Business (B2B) services may indicate a *transfer* of work rather than the *creation* of work. Consider the following examples.

If an OEM tire manufacturer provides the additional service of mounting the tires on vehicles at an automobile producer's line, then that is fewer workers that the automobile producer needs to employ.

A business can employ workers to handle building maintenance, landscaping, snow removal, cleaning, paper shredding, or uniform laundry. All of these workers would be on that business' payroll. However, the business could also outsource all of these functions to third-party providers. Then, the same amount of work is being done; however, the workers are employed by the contractors. In this example, no jobs were created. They were simply shifted around in the economy.

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B

Healthcare Out

This thesis does not present any examples from the healthcare sector. The consumption of services for the health and well-being of persons may operate by different characteristics than the ones explained in this research because of the value of life and complications with the affects medical insurance has on this behavior.

THIS PAGE INTENTIONALLY LEFT BLANK

Bibliography

Bartolin, Alexandre. *Offshoring Is Not the Panacea: Ensuring Sustainable Employment in the US Manufacturing Industry by Leveraging Demand Proximity*.

Massachusetts Institute of Technology Thesis. 2006.

Blinder, Alan. "Offshoring: The Next Industrial Revolution?" *Foreign Affairs*. Mar/Apr 2006.

BEA. United States Bureau of Economic Analysis. GDP Data. 2005.

<http://bea.gov/bea/dn/home/gdp.htm>.

Cohen, M.A. et al. "Winning in the Aftermarket." *Harvard Business Review*. Reprint R0605H. May 2006.

Cooper, Steve. "The Hot List." *Entrepreneur*. Dec. 2005.

Honebein, Peter. "Customers At Work." *Marketing Mangement*. Jan/Feb 2006.

Karmarkar, Uday. "Will You Survive the Services Revolution?" *Harvard Business Review*. Harvard Business School Publishing: R0406G. 2003.

Levy, Frank and Richard Murnane. "The New Division of Labor: How Computers are Creating the Next Job Market." 2004.

Lima, Tony. "Online Tax Preparation Takes Off." *PCWorld*. Mar. 2004.

<http://www.pcworld.com/news/article/0,aid,114515,00.asp>

- Momma, Atsuhito. *Value Delivery Through Product Based Service*. Massachusetts Institute of Technology Thesis. 2000.
- NJ.com. "Not For New Jersey." *The Times*, Ed. 1 May 2006 <http://www.nj.com/opinion/times/editorials/index.ssf?/base/news-0/114647121730820.xml&coll=5>
- Pine, Joseph and James Gilmore. *The Experience Economy*. Harvard Business School Press, 1999.
- Rietze, Susan. *Case Studies of Postponement in the Supply Chain*. Massachusetts Institute of Technology Thesis. 2006.
- Sachs, Jeffrey D. "Stages of Economic Development." Speech at the Chinese Academy of Arts and Sciences, Beijing. 19 Jun. 2004.
- Schmidt, Gregory. "Manufacturing the Key to Future Jobs." 1988. *Challenge*: 54-6.
- Shen, Ting. "A Framework for Developing Postponement Strategies." MIT Center for Transportation and Logistics. Postponement Project Working Paper. 6 Feb. 2005.