

In this first part we review the broader business environment supporting servitization. Processes of market-pull and technology-push are interplaying to favour increasing servitization within those manufacturers based in industrialized nations. Five themes stand out. Here, we consider each of these and take a look at evidence and arguments that begin to explain a growing interest in servitization. In summary, we reveal a picture where:

### **From an economic perspective:**

- *Production is moving away from western industrialized nations.*
- *Competition from low-cost economies is intense and intensifying; labour rates are a fraction of those in the West while productivity is improving faster.*
- *Services and the aftermarket represent an alternative strategy; the installed base of products (those already in the field) is significant.*
- *The commercial benefits can be significant; profit margins for services are potentially 2–3 times greater than those for products.*

### **From an environmental perspective:**

- *There are global concerns about population, resource exploitation and consumption.*
- *Developed economies can set an example by doing more with less.*
- *Services enable dematerialization (reducing embodied energy and materials) and can positively impact environmental sustainability.*
- *There are also opportunities to improve 'green' credentials through services.*

### **From a market and social perspective:**

- *Desires for increased ownership, hyper-consumption and the disposable society can challenge servitization.*

- *Traditional 'collective' services (e.g. launderettes and TV repair shops) have suffered and declined.*
- *Products and services, however, don't necessarily compete; rather products can create platforms for new services (e.g. Apple's iPad, iTunes and apps).*
- *Also many services already exist, but it's now the manufacturer who is offering to deliver these.*
- *Fundamentally, extent of services activities is directly linked to the wealth of an economy.*

### **From a technology innovation perspective:**

- *Information and communication technologies enable many services.*
- *Technologies are accessible and affordable.*
- *To a large extent, it's simply a case of the manufacturer extending their ICT network into their products.*

### **From a knowledge perspective:**

- *The idea that value is co-created with customers, rather than being embedded in products, is gaining traction.*
- *Differences between services and manufacturing operations are better understood.*
- *We are gaining insight into the organizational structures, principles and processes that can deliver effective and efficient product-centric services.*
- *There is growing recognition that product-centric services have the potential to create sustainable business models and reduce the impact of material and energy use on the environment.*
- *We need to look at service as a system of interacting parts that include people, technology and business.*

# Chapter 2

## BUSINESS CONTEXT FOR SERVITIZATION

The strategies that organizations adopt are largely a reflection of their business environment. The genesis of Lean production, for example, is rooted in the business conditions prevailing in Japan in the 1950s and 1960s. At the outset we clearly need to understand the extent to which the conditions in the current business climate are indeed conducive to manufacturers competing increasingly through services.

Establishing a broad and fully embracing picture is difficult. Quite simply, business conditions differ from sector to sector, and to a lesser extent from company to company. There are, however, five themes that recur in discussions about servitization. These range from statistics about the physical environment, through to trends in knowledge production. Collectively these themes paint a picture of business conditions, against which the adoption of a servitization strategy appears to be a sensible response. In this chapter we examine these themes and the arguments they offer.

First, a word on scope. Here, our focus is exclusively on the external business environment at a macro-level. We will avoid discussing the particular motives of individual organizations, or the benefits that



have resulted from their strategies. These internal factors will be explored separately in Chapters 4 and 5.

## 2.1 An Economic Perspective

Over recent decades the economic centre of gravity for production has been steadily shifting away from the (mainly western) leading industrialized nations. In the USA, for example, growth has dropped from an average annual rate of 7% in the 1960s to 4.2% in 2010.<sup>1</sup> Figure 2.1 shows how the world's principal economies are currently aligned and how they are expected to change in the foreseeable future.

In this global picture emergent economies are expected to expand significantly. China, for example, is predicted to overtake the USA as the 'world's largest economy' by 2025.<sup>2</sup> Others will also push ahead. Although markets for new product offerings will remain substantial in Europe and North America, they will no longer expand at the rate that they once were.

At the level of individual industries the picture is complex and there are mixed fortunes for western manufacturers. For instance, the value of output of the USA's pottery, ceramics and plumbing fixture manufacturing industry almost halved between 2000 and 2010 (from \$4bn to \$2.1bn), while that of the mining and oil and gas field machinery manufacturing industry more than doubled (from \$7.4bn to \$18.5bn over the same period).<sup>3</sup>

<sup>1</sup>US Department for Commerce, Bureau of Economic Analysis, [http://www.bea.gov/industry/gdpbyind\\_data.htm](http://www.bea.gov/industry/gdpbyind_data.htm)

<sup>2</sup>PWC, referenced in The Guardian data blog, January 2011.

<sup>3</sup>US Bureau of Economic Analysis, 2011.

### Rise and fall

GDP at purchasing power parity (PPP) rankings

2009 rank	GDP at PPP*
1 US	\$14,256bn
2 China	\$8,888bn
3 Japan	\$4,138bn
4 India	\$3,752bn
5 Germany	\$2,984bn
6 Russia	\$2,687bn
7 UK	\$2,257bn
8 France	\$2,172bn
9 Brazil	\$2,020bn
10 Italy	\$1,922bn
11 Mexico	\$1,540bn
12 Spain	\$1,496bn
13 South Korea	\$1,324bn
14 Canada	\$1,280bn
15 Turkey	\$1,040bn
16 Indonesia	\$967bn
17 Australia	\$858bn
18 Saudi Arabia	\$595bn
19 Argentina	\$586bn
20 South Africa	\$508bn

### Economic growth

Projected average annual real growth in GDP, 2009-2050

Projected average annual real growth in GDP, 2009-2050	
Vietnam	8.8%
India	8.1%
Nigeria	7.9%
China	5.9%
Indonesia	5.8%
Turkey	5.1%
South Africa	5.0%
Saudi Arabia	5.0%
Argentina	4.9%
Mexico	4.7%
Brazil	4.4%
Russia	4.0%
Korea	3.1%
Australia	2.4%
US	2.4%
UK	2.3%
Canada	2.2%
Spain	1.9%
France	1.7%
Italy	1.4%
Germany	1.3%
Japan	1.0%

SOURCE: WORLD BANK ESTIMATES FOR 2009; PWC MODEL ESTIMATES FOR 2050

Constant 2009 US\$

SOURCE: PWC MODEL ESTIMATES

Figure 2.1: Possible scenario for the re-ranking of the world's economies<sup>4</sup>  
(Source: The Guardian data blog/PWC, January 2011)

<sup>4</sup><http://www.guardian.co.uk/news/datablog/2011/jan/07/gdp-projections-china-us-uk-brazil>; \*Purchasing Power Parity

Least affected are those industries where product 'identity' is closely associated with a particular country or region. The brand values of Harley Davidson Motorcycles are intrinsically linked to manufacture in the USA, and the same is true for Lotus and Morgan cars in the UK. Similarly there are some products, such as nuclear medicines, that have an extremely short shelf-life and have to be produced in the same location as they are used. In the same way some products are too large and heavy to transport economically, or there may be regulations affecting their importation (e.g. military aerospace).

Other industries are more exposed. Many of the emerging economic powers were simply not open as international traders in the 1960s; it was only in the 1990s that countries such as China, India and Brazil began to compete seriously. Their competitive advantages are significant. To illustrate, Table 2.1 shows the vast differences in rates of pay and output for a cross-section of economies.

**Table 2.1** The growth in international competition

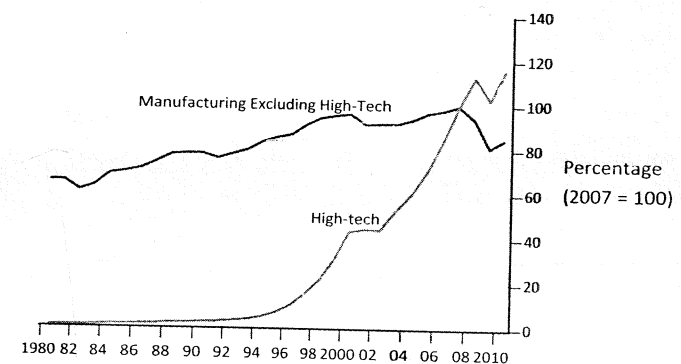
Country	Hourly compensation costs in manufacturing in USD		Increase in output per manufacturing employee (index, 2002 = 100)		
	2010	% change (USD) since 1997	1997	2010	% change in output since 1997
USA	34.74	3.2	76.1	149.8	197
UK	29.44	3.6	83.1	128	154
Germany	43.76	3.2	90.5	112.9	125
France	40.55	3.8	88.4	120.9	137
China*	1.36	2.19	NA	NA	NA
India*	2.3	1.44	NA	NA	NA
Singapore	19.10	3.5	78.4	143.7	183
Taiwan	NA	NA	78.7	176.9	225
PR Korea	NA	NA	66	160.7	243
Japan	NA	NA	91.5	134.9	147

(Source: US Bureau of Labor Statistics, 2011); \*Estimates

The differences in labour rates are substantial. Employee costs in China, for example, are only 4% of those in the USA, while employee costs in India are only 8% of those in the UK. Most worryingly for western manufacturers, the trend is for these gaps to widen in the near future. In China, rates are only increasing at 70% of those in the USA, and for India this is 40% of those in the UK.

Emergent economies are also sustaining productivity improvements. Table 2.1 shows how the output per employee in Taiwan, Korea and Singapore is improving faster than that of the UK, Germany and France. Of western manufacturers only the USA comes close to matching the productivity improvements of emergent economies.

A frequent response to such data is to suggest that western manufacturers can compete by focusing on higher-value products. Intriguingly, this was the strategy of the British motorcycle industry in the late 1960s and early 1970s, which subsequently disappeared as Japanese competitors also followed this strategy. Nevertheless, as Figure 2.2 illustrates, the USA is, for the moment, managing to sustain such a strategy.

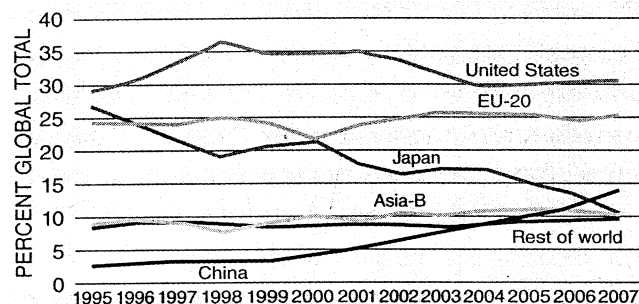


**Figure 2.2:** High-technology manufacturing versus production excluding high-technology in the USA

(Source: US Department of Commerce, January 2012)<sup>5</sup>

<sup>5</sup> 'The Competitiveness and Innovative Capacity of the United States', page 6-5.





**Figure 2.3:** High-technology manufacturing value-added share by country/economy: 1995–2007  
(Source: National Science Foundation, 2010)<sup>6</sup>

Not surprisingly the emerging economies are following a similar strategy. Initially they favoured producing high volumes of less complex products, but then they set about developing capabilities to produce higher quality products. This is illustrated by comparing the changing share of medium–high tech exports by country in the world market (Figure 2.3).

A rather bleak picture therefore emerges for western companies competing on the basis of new product sales alone, especially for low-tech products with a high-labour content and long shelf-life, and which are easily imported. Taking this challenge head-on requires radical new product innovation and aggressive cost reduction programmes. In some industries this is viable.

Many new opportunities for sales are also opening up as lower-cost economies themselves become richer. Demand is rising for niche western products with high-brand values. For example, luxury car manufacturers such as BMW and Mercedes are experiencing significant growth in China's markets. By 2015, it is projected that demand

<sup>6</sup><http://www.nsf.gov/statistics/seind10/tables.htm>

for luxury cars in China will surge to 800,000 cars annually.<sup>7</sup> Yet for those without strong brands the situation is more concerning.

Exploitation of services and the aftermarket is an alternative strategy. The extent of the opportunity is driven by the size of the 'installed product base'. This term refers to the number of products that are out in the field and is typically an order of magnitude greater than the number of products sold annually. Take the United States as an illustration. The number of automobiles sold in 2009 was 5.4 million vehicles,<sup>8</sup> yet the total number of registered vehicles was 134.9 million<sup>9</sup> – a ratio of 25:1. In other words, for every new vehicle sale, 25 were already in use.

Evidence is growing around the economic benefits to manufacturers of servicing this installed base. An indication of this opportunity is illustrated in Table 2.2. This shows how the profit margin for services

**Table 2.2** Illustrating a potential opportunity for profit from services in 2010

Industry	Margin in product manufacture	Margin in services	Margin leverage (service/product)
Paper machines	3.4%	13.1%	3.8
Power equipment	7%	9.9%	1.4
Instruments	4.9%	12.3%	2.5
Machine tools	5.3%	8.9%	1.67
Rail	6.3%	12.6%	2

(Source: <http://money.cnn.com/magazines/fortune/fortune500/2009/performers/industries/profits/> (10 January 2010))

<sup>7</sup>[http://www.etftrends.com/2010/07/consumer-etfs-going-global-find-strength/referenced-in-BIS-Economics-Paper-10A-\(op-cit\).](http://www.etftrends.com/2010/07/consumer-etfs-going-global-find-strength/referenced-in-BIS-Economics-Paper-10A-(op-cit).)

<sup>8</sup>US Bureau of Transportation, National Transportation Statistics – [http://www.bts.gov/publications/national\\_transportation\\_statistics/](http://www.bts.gov/publications/national_transportation_statistics/) (11 January 2011).

<sup>9</sup>US Bureau of Transport National Transportation Statistics – [http://www.bts.gov/publications/state\\_transportation\\_statistics/state\\_transportation\\_statistics\\_2010/html/fast\\_facts.html](http://www.bts.gov/publications/state_transportation_statistics/state_transportation_statistics_2010/html/fast_facts.html) (11 January 2012).

is presently higher than for products in many industries. Again, such general statistics are fraught with limitations, but evidence is growing that services are a sound business proposition for manufacturers.

Recent studies in the UK reinforce this evidence. They show that of manufacturers adding a service proposition to their offerings, the majority of businesses (almost 60%) report revenue growth over the last five years. Indeed, 24% reported an increase of between 25% and 50%.<sup>10</sup> Similar indications are apparent in the USA, Finland, and Singapore.

A move into services is not a panacea and improvements in profits are not automatic. Much depends on the type of services being offered, the extent to which product and service innovation is complementary, and the capabilities that the manufacturer has in place to deliver such services. We will explore these topics further in the following chapters.

To summarize this economic perspective; in western economies especially, new product sales are tending to reduce and competition for those sales is increasing. Yet the installed base of products is high, and the potential profitability in servicing these is significant. It's not surprising, therefore, that policy makers in developed economies are encouraging manufacturers to explore servitization.

## 2.2 An Environmental Perspective

At the outset of our programme two research communities stood out. The first consisted of researchers, mainly from the USA, who looked to servitization for the economic potential as discussed above. The second was the product-service systems (PSS) community, largely from Scandinavia, who looked to servitization largely for its potential benefits to environmental sustainability.

<sup>10</sup> Barclays Corporate 'Servitisation and the Future of UK Manufacturing: The power to help you succeed' (September 2011).

**Table 2.3** Population growth<sup>11</sup>

Country	Estimated population at constant fertility rates, millions	
	2010	2030
USA	310	361
UK	62	69
Germany	82	77
France	62	68
Brazil	194	227
India	1224	1610
China	1341	1407
<b>World</b>	6895.9	8700.3

(Source: United Nations)

The environmental argument is based on the premise that current patterns of human activity cannot be sustained. The current global situation is characterized by three critical trends:

- Overpopulation and continuing population growth, especially in developing countries.
- Accelerating resource exploitation, shortages and increasing pollution levels.<sup>12</sup>
- A need to reduce poverty and to improve living standards in the underdeveloped countries.

The extent of the challenge is illustrated by reflecting on expected population growth (Table 2.3). The United Nations predicts that world

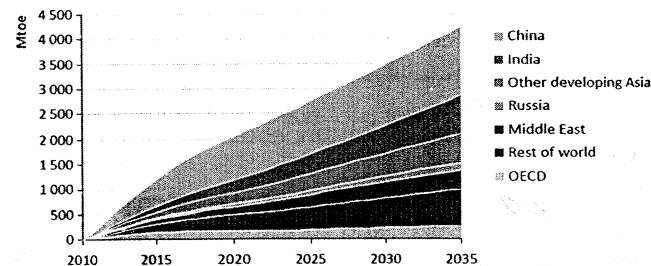
<sup>11</sup> <http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3a12> (10 January 2010).

<sup>12</sup> E.g. copper, platinum – Scientific American, 'Measure of Metal Supply Finds Future Shortage' by David Biello, 17 January 2006; and Bloomberg (2011) – <http://www.bloomberg.com/news/2011-09-05/copper-may-have-shortage-for-third-year-on-china-demand-pan-pacific-says.html>

population will grow from 6.9 billion in 2010 to 8.7 billion by 2030. This population growth, combined with increasing standards of living for many people in developing countries, will cause strong growth in energy demand.

The global situation with energy consumption is captured in Figure 2.4. Demand will increase by one-third from 2010 to 2035, with China and India accounting for 50% of the growth<sup>13</sup> – currently some two billion people have no access to electricity. By 2035, China will consume nearly 70% more energy than the United States. Even then, the energy consumption per capita in China will still be less than half the level in the United States. The rates of growth in energy consumption in India, Indonesia, Brazil and the Middle East are forecast to be even faster than in China.

Over the same period, energy-related CO<sub>2</sub> outputs could increase by 20%. Much depends on the speed at which industries are legislated. Figure 2.5 illustrates that the longer it takes for action to be taken, then

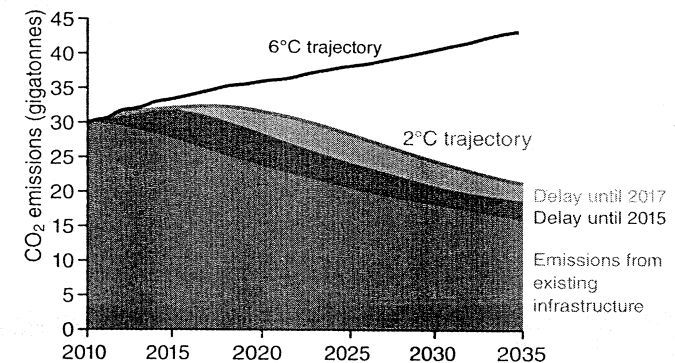


**Figure 2.4:** Projected growth in energy demand (Mtoe = Million tonnes of oil equivalent)

Source: International Energy Agency, 2011<sup>14</sup>

<sup>13</sup>International Energy Agency – World Energy Outlook 2011 – presentation and factsheets: [http://www.worldenergyoutlook.org/docs/weo2011/homepage/WEO2011\\_Press\\_Launch\\_London.pdf](http://www.worldenergyoutlook.org/docs/weo2011/homepage/WEO2011_Press_Launch_London.pdf)

<sup>14</sup>World Energy Outlook 2011, Presentation to the press (London, 9 November 2011).



**Figure 2.5:** Projected growth CO<sub>2</sub> emissions and global warming (Note: 6°C/2 °C trajectory refers to worst case/best case scenarios for global warming by 2035)

(Source: International Energy Agency, 2010<sup>14</sup>)

the greater the burden of power plants, factories, buildings, etc., that simply don't comply with regulations. This will inevitably push forwards the extent of global warming.

Excessive demands on resources are linked directly to trends in consumption. Our ideas of wealth, lifestyle, personal development and economic prosperity are built upon an excessive use of non-renewable energy and natural resources.

Scandinavian researchers emphasize that this is compounded by a willingness of people to accept ecological degradation in exchange for a small and short increase in economic and personal well-being. They highlight how developing countries, in particular, will exploit all forms of opportunities to tip the present economic unbalance in their favour. The consequence is an acceleration of the destructive competition for resources.

The challenge for developed economies is to set an example by doing more with less. Unfortunately consumption is prolific. Table 2.4 illustrates as an example the trend for increasing ownership in the United States, impacting on all kinds of unsustainable resource



**Table 2.4 Consumer durable ownership in USA (measured in terms of billions of dollars)**

Line	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<b>Consumer durable goods</b>	<b>1</b>	<b>2,720.9</b>	<b>2,837.0</b>	<b>2,996.2</b>	<b>3,196.0</b>	<b>3,359.4</b>	<b>3,524.7</b>	<b>3,682.0</b>	<b>3,894.1</b>	<b>4,098.0</b>	<b>4,293.6</b>	<b>4,468.3</b>	<b>4,566.8</b>	<b>4,581.8</b>
Motor vehicles and parts	2	870.9	917.1	980.2	1,041.5	1,105.2	1,162.0	1,210.4	1,268.4	1,302.1	1,395.9	1,317.5	1,260.5	1,274.2
Autos	3	500.2	505.2	518.2	536.2	547.8	547.6	540.8	544.9	553.9	557.0	552.0	540.3	532.2
Light trucks	4	362.2	403.2	452.9	495.9	548.0	604.9	660.0	713.6	737.7	737.9	754.1	708.6	731.0
Motor vehicle parts and accessories	5	8.5	8.7	9.0	9.4	9.4	9.5	9.5	9.9	10.4	11.0	11.4	11.6	11.2
<b>Furnishings and durable household equipment</b>	<b>6</b>	<b>845.6</b>	<b>882.2</b>	<b>923.0</b>	<b>977.4</b>	<b>1,015.8</b>	<b>1,062.2</b>	<b>1,100.7</b>	<b>1,170.4</b>	<b>1,242.4</b>	<b>1,317.1</b>	<b>1,364.7</b>	<b>1,414.7</b>	<b>1,372.6</b>
Furniture and furnishings <sup>1</sup>	7	517.7	544.2	569.8	604.6	624.3	655.1	678.1	718.5	760.6	806.6	830.2	859.0	834.3
Household appliances <sup>2</sup>	8	145.8	147.9	153.4	159.4	168.8	175.0	177.8	186.9	204.7	221.7	231.5	242.4	234.7
Glassware, tableware, and household utensils <sup>3</sup>	9	117.7	124.5	130.0	139.4	145.7	152.6	161.5	174.3	179.3	184.8	196.1	203.4	202.7
Tools and equipment for house and garden	10	64.4	65.6	69.8	74.0	77.0	79.5	83.3	90.7	97.9	104.0	107.0	109.9	108.4
<b>Recreational goods and vehicles</b>	<b>11</b>	<b>602.3</b>	<b>631.7</b>	<b>668.8</b>	<b>727.8</b>	<b>771.7</b>	<b>820.3</b>	<b>867.7</b>	<b>923.8</b>	<b>985.9</b>	<b>1,033.6</b>	<b>1,086.4</b>	<b>1,136.8</b>	<b>1,119.9</b>
Video, audio, photographic, and information processing equipment and media	12	272.0	283.4	300.8	328.9	345.0	367.8	388.2	417.4	445.8	462.9	489.7	502.2	489.9
Sporting equipment, supplies, guns, and ammunition	13	128.3	130.9	135.3	146.3	156.4	167.4	181.7	190.8	204.5	217.3	230.0	256.3	255.1
Sports and recreational vehicles <sup>4</sup>	14	104.8	113.1	122.9	134.3	141.9	148.7	156.0	167.3	182.7	194.4	200.9	205.4	200.4
Recreational books	15	84.6	91.0	95.4	102.2	110.6	117.5	121.8	127.0	131.0	136.2	142.4	148.6	150.0
Musical instruments	16	12.6	13.4	14.4	16.2	17.7	19.0	19.9	21.2	22.0	22.9	23.5	24.4	24.6
<b>Other durable goods</b>	<b>17</b>	<b>402.1</b>	<b>405.9</b>	<b>424.2</b>	<b>449.4</b>	<b>466.9</b>	<b>480.2</b>	<b>503.3</b>	<b>531.5</b>	<b>567.6</b>	<b>636.9</b>	<b>699.8</b>	<b>754.7</b>	<b>780.9</b>
Jewelry and watches	18	191.6	195.3	205.4	219.2	226.5	230.3	239.3	254.1	268.7	301.8	330.7	355.9	360.1
Therapeutic appliances and equipment	19	70.8	75.9	82.1	88.7	92.8	96.3	101.9	108.5	117.1	125.0	134.6	141.1	146.5
Educational books	20	40.1	42.7	45.0	48.8	52.2	55.7	58.6	61.0	64.8	69.6	74.9	79.4	82.9
Luggage and similar personal items	21	83.1	76.0	75.6	75.9	77.4	79.0	82.9	84.3	90.6	110.2	123.8	136.8	145.6
Telephone and facsimile equipment	22	16.4	16.2	16.1	16.8	17.9	18.9	20.6	23.6	26.4	30.3	35.7	41.5	45.9

<sup>1</sup> Consists of furniture, clocks, lamps, lighting fixtures, and other household decorative items, carpets and other floor coverings, and window coverings.

<sup>2</sup> Consists of major household appliances and small electric household appliances, except built-in appliances, which are classified as part of residential structures.

<sup>3</sup> Consists of dishes, flatware, and non-electric cookware and tableware.

<sup>4</sup> Consists of motorcycles, bicycles and accessories, and pleasure boats, aircraft, and other recreational vehicles.

Source: <http://numbrary.com/sources/d79390ddb-table-13-current-net> (10 January 2010)

consumption. To take an example, an average car today is lighter, more fuel efficient, and emits less pollution per kilometre travelled than a car from the mid-1970s. But, the total number of cars has increased to an extent that these technical achievements have been outweighed. Today, transport accounts for up to 70% of all CO<sub>2</sub> emissions.

Various concepts have emerged to help address these issues. Some advocate naturalistic approaches, others suggest dematerialization of present economies and eco-efficiency. Eco-efficiency is largely a technological solution, and based on the premise that societies can largely continue to behave as they have if they do everything much better. Dematerialization refers to the absolute or relative reduction in the quantity of materials required to service the economic functions in society.

Servitization is conducive to dematerialization. It encourages manufacturers to be more responsible for their products and engaging directly with services such as take-back, recycling and refurbishment. Consequently, it encourages them to use their technical knowledge to find ways to deliver the same 'outcome' from a product while using less energy and material, and so reduce cost and environmental impact. Xerox illustrates how this can occur in practice. Through their managed print services they have helped Fiat Group to reduce print operations costs by an estimated 30%, and also assisted its sustainability agenda by reducing energy use by up to 50%.

The resulting green credentials are themselves valuable to the associated organization. Companies that are pursuing environmentally and ethically friendly strategies may well offer significant strategic opportunity for the wider economy in the longer term. Many opportunities exist for companies to gain competitive advantage through such green credentials. As society becomes increasingly concerned with environmental issues, those companies with more adventurous

'green' strategies are likely to be leaders in the development of new products and businesses opportunities and will have excellent growth potential.

## 2.3 A Market and Social Perspective

Servitization offers economic and environmental benefits, but are consumers ready to abandon products and ownership in favour of services?

As people we appear to have strong desires to own, possess and consume. Ownership provides more than simply utility of a particular product. It is widely seen as a vehicle for reinforcing an individual's identity, expressing values, or stressing an affiliation with a particular group or lifestyle. Product ownership also provides the consumer freedom to customize products as they wish, and gives them the rights to control use. For some, ownership is also a form of compensation for their perceived inadequacies. They accumulate and use products in order to expand their sense of control over their environment and increase their perceived power.

The urge to own an increasing number of objects results in 'hyper-consumption', in which the division between needs and wants becomes progressively blurred. This can be fuelled by advertising and the media. A partial consequence of this is a move towards cheaper, less durable products. This is accompanied by a gradual acceptance of disposability, and a stigma attached to second-hand products, repair and thrifty behaviour.

Hyper-consumption is also fuelled by ever-increasing manufacturing productivity keeping costs down, and the influx of cheaper goods from emerging economies. As an example: from 2001 each year sales of footwear and clothing in the UK have risen sometimes by as much as 12%. Yet from 2003 to 2007 average prices have fallen by 10%, and

the trend continues. Quite simply we are buying more and spending less (*Sunday Observer*, 8 May 2011).

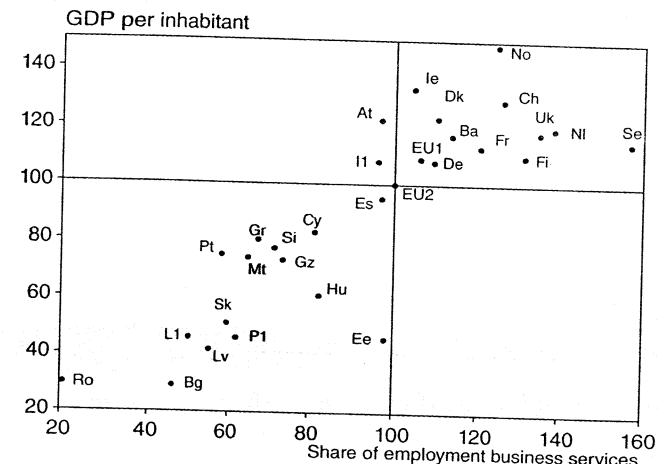
These demands for ownership have an adverse impact upon some services. Where product ownership has risen, there has been a corresponding decline in the number of products under rental agreements and the amount of repair work undertaken, especially for low-tech, low-risk products in the business-to-consumer sectors. Also, many products are simply more reliable and require less maintenance than they once did. Finally, some traditional 'collective' services have been supplemented by personally owned labour-saving appliances; the movement away from launderette to washing machine, from cinema to television, from train to car and so on.

On the other hand, the growth of innovative services through digital technology is becoming increasingly significant in the development of the economy. The improved communication provided by such technology enables the rapid transmission of data and offers new opportunities for service innovations such as telephone and internet banking.

Additionally, the services that manufacturers offer with servitization are not necessarily new innovations. Frequently, these services are already being carried out either by competitors (via pure-service providers) or the customers themselves (via their own operations).

Indeed, the extent of services business activity within an economy can be directly linked to wealth. Figure 2.6 illustrates the relationship between Gross Domestic Product per Capita and the share of employment in business services across European states. This helps to illustrate that as the business services sector develops, the average income in an economy goes up. Such evidence shows both the opportunity of services in developed economies and helps to explain why less developed economies look to develop services sectors.

All this goes to show that products and services don't necessarily compete. The desire for ownership does have an adverse effect upon



**Figure 2.6:** Correlation between GDP per capita and the share of business service in total employment

(Source: Ecorys Research & Consulting/2008<sup>15</sup>)

some services, but this also brings opportunities for others. Most telling, developed economies are services-based demonstrating that markets for services are significant. One way or another, society is increasing its appetite for services.

## 2.4 A Technology Innovation Perspective

So far we have examined the 'pull' for services. Economic, environmental, market and social factors that all indicate opportunities for the services that manufacturers can provide. Here, and in the following section, we take a 'push' perspective. We explore the development of technologies and knowledge that is equipping manufacturers to exploit this opportunity.

<sup>15</sup> 'Study on Industrial Policy & Services' for the European Commission.



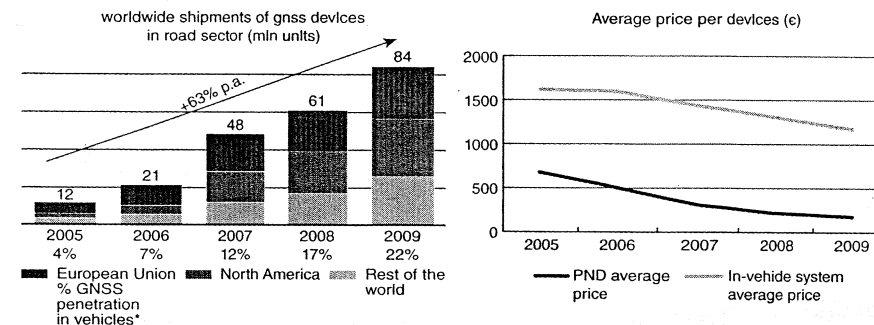
Information and communication technologies (ICTs) are key enablers of servitization. Leading manufacturers are developing significant ICT capabilities that give them information about the 'visibility' of their products in the field – in particular, where they are located, how they are being used, and their condition and performance. We explore such systems in detail in Chapter 8.

Here, we simply set out to illustrate broadly how the world of ICTs is rapidly evolving. In doing so, we show that the relevant ICT capabilities, demanded by servitization, are becoming readily accessible to many manufacturers. In particular, that the step-up in technology knowledge is not too dissimilar to that needed during the implementation of computerized production planning systems. To a large extent, the manufacturer is simply extending their ICT network into their products to monitor how they are used and how they perform.

Sophisticated services often require ICT to 'sense' products. These sensing or monitoring parameters vary to reflect the form of the service offering. For example, a services contract that guarantees reliability of a Rolls-Royce aircraft engine may require bearing vibration data, whereas an offering focusing on the economy of a MAN truck may require data from the fuel pump.

The accessibility of such sensing technologies is exemplified by the readiness of Global Navigation Satellite Systems (GNSS). GNSS can be used to locate vehicles (e.g. trucks, buses, police cars, taxis) in order to optimize resource management, reduce travel time, increase security and reduce fuel consumption. In 2009 the number of vehicles equipped with fleet management and vehicle tracking systems was six million in North America and roughly five million in the EU. Almost 30% of road vehicles in the EU have a GNSS device on board and 22% worldwide.

The rate at which these GNSS technologies have become available is illustrated in Figure 2.7. The average growth over the past five years has been over 60%, much of which has been in Europe and North



**Figure 2.7:** Indicating the accessibility of ICT capabilities: availability and pricing of GNSS

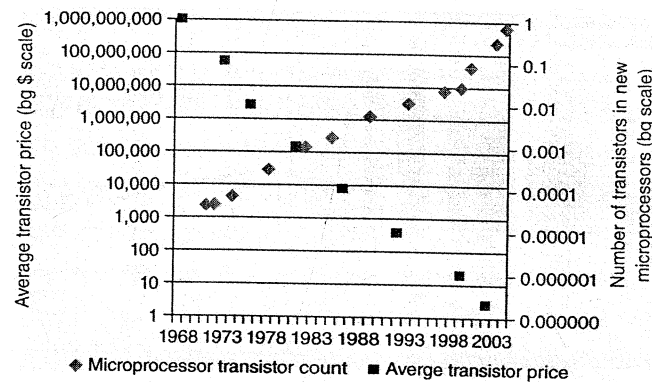
(Source: European GNSS Agency, 2010<sup>16</sup>)

America. These are the very markets that many manufacturers would target with servitization. The average price of such units has also decreased significantly. In 2009 this was less than 500 Euro, and the trend continues downwards.

In addition, the ICT capabilities associated with sophisticated services often require a wide array of microprocessor technologies. These may be within on-board sensors, or used in the localized analysis and recording of faults, making the acquisition, communication and storage of data on a product relatively straightforward. Similarly they may be applied to analyse the data at the manufacturer's home, helping to turn this into information that facilitates effective service delivery.

Again the price/performance ratios are increasingly attractive. Figure 2.8 uses Moore's law to illustrate the increasing affordability of microprocessor technologies. Intriguingly, charts such as this were readily available during the 1990s and early 2000s. More up-to-date ones are elusive. *Why is this?* The cost of these technologies is simply no longer the issue that it once was.

<sup>16</sup> [www.gsa.europa.eu](http://www.gsa.europa.eu)



**Figure 2.8:** Moore's law and the affordability of powerful computing  
(Source: Intel/BERR Economics Paper 2, 2008)

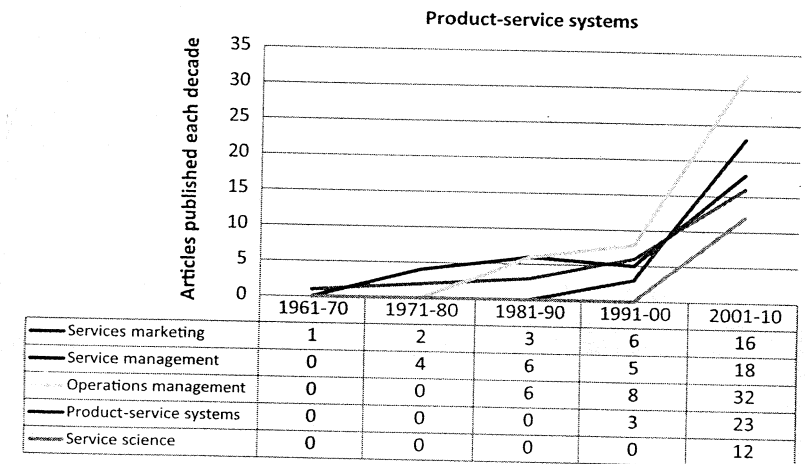
The technologies in Figures 2.7 and 2.8 are only examples of the increasing accessibility of ICT. They paint only part of the picture. We could have given similar evidence for information transaction rates, or the penetration of the internet into the workplace. The message is quite simple. ICT capabilities are available, accessible and affordable.

## 2.5 A Knowledge Perspective

Our knowledge of servitization has evolved significantly in recent years. While there is still much to be learnt, there is now a burgeoning research base that manufacturers can call upon for insight into servitization and related topics. In this section we take a look at this knowledge base.

Five research communities have been especially active in this broad area, these are:

- Services marketing.
- Service management.



**Figure 2.9:** Growth of research outputs contributing to the knowledge of servitization

- Operations management.
- Product-service systems.
- Service science.

Collectively these span the disciplines of engineering and management, though they do tend to operate rather independently. The extent of their activities is indicated by the number of articles that they have published in research journals. Figure 2.9 illustrates this, and shows how research outputs have increased significantly from the 1960s through to the present day.

Overall our knowledge of servitization is still relatively modest. By comparison, the number of articles associated with 'Lean techniques in manufacturing' is an order of magnitude higher. Nevertheless the knowledge base is growing actively. We will now take a closer look

at the origin of key contributions, and insights emerging from each of these five communities.

### Services marketing community

Services marketing is a subset of the more traditional marketing community. It reflects a change in emphasis, from the exchange and distribution of commodities, to a focus on customer relationship management in the provision of services.

The first issue of the *Journal of Marketing* was published in 1936. This included a review by Howard Taylor of the research existing at that time, and in this he noted a focus on the exchange and distribution of commodities. It was only in the late 1970s that Glynne Shostack heralded an acknowledgement that the marketing of services was different to products.

Initially the marketing of goods and services was seen as different. Services were characterized as intangible, heterogeneous, inseparable and perishable (IHIP). In the early 2000s this idea was challenged. Researchers such as Chris Lovelock and Evert Gummesson identified shortcomings in the IHIP concept. They suggest that exchanges not resulting in the transfer of ownership from seller to buyer are fundamentally different from those that do. Also, that service provision offers benefits through access or temporary possession, not simply ownership.

At the same time a new service-centred dominant logic was being proposed by Steve Vargo and Bob Lusch. They introduced the notion that value is co-created with the customer rather than embedded in output. This service-dominant logic (SDL) marketing paradigm argues that all of marketing research and practice must break free from the manufacturing-based model of exchange of output. Not all marketing professionals necessarily accept this view, but it is clearly an alternative perspective on marketing to that of the 1930s.

### Services management community

The services management researchers have largely evolved from mainstream operations and strategy domains and tend to focus on the organization of service-based businesses and industries.

They began to coalesce around the late 1960s to recognize the importance of services to the economic output of many nations. A key milestone was in 1976 when Theodore Levitt produced a paper titled 'The Industrialisation of Services' where he pointed out that the service sector of industrialized nations had been in the ascent for almost three-quarters of a century. Simultaneously, Earl Sasser argued that immediacy makes service industries distinct from manufacturing.

During the 1980s services management established its own identity. Researchers such as Dick Chase and David Garvin introduced the 'Service Factory' concept. These contributions helped establish that operations that are appropriate for delivering services differ from those associated with more traditional manufacturing. This argument still stands. In 2007 Janelle Heineke and Mark Davis noted that applying manufacturing operations management concepts to service operations is limiting.

Our own research clearly supports this view. As later chapters of this book illustrate, the operations that support servitization differ markedly to those of production.

### Servitization community

This is largely a group of researchers, within the wider operations management community, that have chosen to focus their work on helping manufacturers to compete through services. The origins of this work lie principally in North America in the late 1980s. Authors such as Sandra Vandermerwe, Juan Rada, Richard Wise and Peter Baumgartner heralded servitization, the underlying motive being that services were a key opportunity for manufacturers to build their



revenue streams and deliver value-add by moving downstream towards their customers' area of business activity.

Since then there has been a growing number of articles and papers addressing the 'servitization of manufacturing'. The focus has largely been on product-centric services, where the manufactured product itself is central to the provision of an integrated set of services (e.g. through maintenance, repair, support, availability and capability contracts). Examples given frequently include Xerox's move from selling printers and copiers to delivering a 'Document Management Service' and Rolls-Royce Civil Aerospace's 'TotalCare' service.

In more recent years researchers in the UK have driven forwards our understanding of servitization. Andy Neely has helped to establish a much better understanding of the relationships between the adoption of services and economic success. Duncan McFarlane and Irene Ng have led consortia based out of Cambridge University to study the complexities of service delivery networks in manufacturing. Mark Johnson, Raj Roy, Steve Evans, and their colleagues at Cranfield University have sought to help manufacturers to design and manage product-service systems. Important contributions have also been made by Advanced Institute of Management scholars such as Martin Spring, Chris Voss and Veronica Martinez.

### Product-service systems community

The product-service systems (PSS) community has largely originated from Scandinavia and northern Europe. This is a relatively recent body of research that sets out to improve social, economic and environmental and industrial sustainability.

The foundational work on PSS is exemplified by Mark Goedkoop's report in 1999 on the ecological and economic basis (commissioned by VROM and EZ in Holland) and Oksana Mont in 2000 (sponsored by the Swedish Waste Research Council). Since then various models

and tools have been developed to help organizations to adopt PSS. Examples include the product-service spectrum and product-service development toolkit that can be found in Arnold Tukker and Ursula Tischner's book *New Business for Old Europe*, which discusses product-service development, competitiveness and sustainability.

A diverse range of PSS examples can be found in academic literature. Some of these demonstrate economic success, but most tend to emphasize the potential for significant environmental and social gains. Industrial PSS (IPS<sub>2</sub>) is a developing subset of PSS which focuses especially on business-to-business solutions. Although developed in unconnected research streams and coming from different points of departure, there is a striking overlap in concepts within the servitization and PSS communities.

### Service science community

The service science perspective has evolved largely from information systems (IS). It is a relatively new initiative that promotes interdisciplinary working to provide a better understanding of complex service systems. Fostered mainly within IBM, a service system is seen as a melding of activities that include people, technology and business. As such it draws on ideas and concepts from a wide range of disciplines including computer science, engineering, cognitive science, economics, organizational behaviour, human resources management, marketing and operations research.

Service science has become a fast-developing research theme. At the first International Symposium on Service Science in 2009 research on a variety of topics was presented from both academic and practitioner viewpoints. These included the modelling of service systems, services and customer orientation, service engineering, service-oriented software structures and hybrid products and services.

**Table 2.5** Overview of contributions being made to our knowledge of servitization

Community	Has contributed to our understanding around:
Services marketing	Value being co-created with customer rather than embedded in products
Service management	Service operations differ in their configuration to manufacturing operations
Operations management	Establishing the organizational structures, principles and processes that can deliver effective and efficient product-centric services
Product-service systems	Product-centric services have the potential to create sustainable business models and reduce the impact of material and energy use on the environment
Service science	Applying a focus on service as a system of interacting parts that include products, people, technology and business

### Summarizing the knowledge base

Our summary of these five research communities simply represents a snapshot in their development. Table 2.5 captures, in brief, how these communities are contributing to our understanding of servitization.

The picture is still evolving. Although Figure 2.9 shows that growth has accelerated rapidly in recent years, how this may continue into the future is somewhat uncertain. In some areas enthusiasm has waned as researchers discover new directions while in others activity has intensified.

New communities are emerging and links to existing communities are strengthening. This is especially the case with the technology communities. Condition monitoring and remote product sensing have been active research topics for some time, but there is now much interest in their role in supporting servitization. Particular topics include Integrated Vehicle Health Management (IVHM),

Prognostics and Health Management (PHM) strategy, and Condition-based Maintenance (CBM).

Links are also clearer to research in supply chain, vertical integration and outsourcing. Indeed, researchers such as Roger Schmenner suggest that servitization is a special case in outsourcing/vertical integration. They see manufacturers as moving forwards in their supply chains to become providers in an outsourcing relationship with the customer.

## 2.6 Summarizing the Business Context

Innovations come about through an interplay of market-pull and technology-push. In this chapter we have examined five sets of factors that reflect this interplay in the case of servitization. The picture is broad and complex. Some manufacturers will inevitably succeed through product innovation, aggressive cost reduction programmes and exploitation of international supply chains. For others the arguments supporting servitization are compelling.

Servitization is conducive to economic sustainability. Production is moving away from western industrialized nations. The competition from low-cost economies is intense and intensifying, with labour rates being only a fraction of those in the West while productivity is improving faster. Services and the aftermarket represent an alternative strategy. The extent of the market is represented by the size of the installed base of products which, in developed economies, is often many times the annual sale of new products. The commercial benefits of servicing this installed base can be significant; revenue and profit margins for services can be 2–3 times greater than those for products.

Servitization is conducive to environmental sustainability. There are global concerns about population, resource exploitation and consumption. Developed economies can set an example by doing more

with less, and services are a way of demonstrating this. Services enable dematerialization (reducing embodied energy and materials) and can impact positively upon environmental sustainability. There are also opportunities for manufacturers to differentiate themselves through the 'green' credentials they can generate through service.

Market and social demand for services is strong. Products and services don't necessarily compete; rather products can create platforms for new services (e.g. Apple's iPad, iTunes and apps). Moreover, many services already exist, it's simply a case that the manufacturer is well positioned to deliver these.

Technological innovations needed to support servitization are already in place. The technological barriers are frequently much lower than expected and, to a large extent, it's simply a case of the manufacturer extending their ICT network into their products.

Our knowledge of how to compete through servitization is strengthening. Ideas that value is co-created with customers rather than embedded in products are gaining traction. Also, the differences between services and manufacturing operations are better understood, with increasing insight into the organizational structures, principles and processes that can deliver effective and efficient product-centric services.

Our conclusion from this is that it's hard to imagine why any manufacturer should ignore exploring some aspect of servitization.

## Part 2

# Competing Through Services



In this second part we explain what it means for a manufacturer to compete through services. We do this in two steps.

In Chapter 3 we focus on the offering itself. We first explain why it can be difficult to understand the concept of servitization, and then explain the process, and define different forms of services. We then focus exclusively on advanced services. We define these and introduce the features that are commonly coupled to these (life-cycles, risks and rewards). We conclude this chapter by consolidating our description of advanced services.

In Chapter 4 we focus on the potential business implications of advanced services. We first explain the difficulties of finding reliable indicators of success and how we have navigated these. We then examine the relationships between services, revenue and profit. In addition, we also examine the broader motives that are shared by manufacturers who are leading providers of advanced services, along with the equivalent motives that are shared by their customers. We conclude this chapter by providing a roadmap of the servitization landscape.

In summary, the picture that these two chapters reveal is:

### **Servitization process:**

- Occurs where a manufacturer develops its capabilities to compete through services.
- These manufacturers are seen as adopting a services-led competitive strategy.
- Some manufacturers follow a service-led strategy by offering a broader portfolio of conventional (base and intermediate) services.
- Other manufacturers largely abandon their design and production capabilities and become pure-services providers.

- Our focus is on those manufacturers that follow a services-led competitive strategy by delivering advanced services.

### **Advanced services:**

- The outcomes for the customer are the capabilities that arise from the use of the manufacturer's products.
- For the manufacturer they represent a significant organizational stretch from production-based competences.
- Advanced services commonly feature extended life-cycles, extended responsibilities (and so risks) and increasingly regular revenue payments.
- Companies who develop these advanced services are commonly setting out to:
  - Target customers' pains (costs) and gains (profits).
  - Grow through business process innovations.
  - Develop long-term relationships that lock out competitors.
  - Develop resilient cash flow and revenue streams.
- These advanced services deliver high value through their potential to:
  - Increase revenue.
  - Increase profits.
  - Smooth revenue streams.

On completing this part of the book, our intention is that the reader understands exactly what is being offered through advanced services and the likely business implications. Armed with this knowledge, our next part explains how organizations are configured to deliver these successfully.

# Chapter 3

## ELEMENTS OF SERVITIZATION

Servitization is an intriguing concept. As we have just seen, various factors are conducive to services forming the backbone of a manufacturer's competitive advantage. The challenge is to translate this idea into practice.

In 2006, at the start of our research programme, we set out to contrast the world of production to that of one where a manufacturer competes through services by carefully surveying as many manufacturers as possible and reviewing extensive work on servitization in the academic and technical press. We also engaged with Rolls-Royce Civil Aerospace in a significant in-depth study of their power-by-the-hour and TotalCare offerings, along with their journey to develop and sustain these. As a team we studied all aspects of their services design and delivery system, reaching out to their customers and suppliers, and systematically collecting information as we progressed. Ours would prove to be one of the most comprehensive studies undertaken of an industrial product-service system and its associated servitization process.

The differences we saw were not immediately striking. The physical buildings, technologies and products all looked like those we would find in production. The same seemed to be true for the information