

# Servitization in Germany: An International Comparison

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This paper is a working paper, prepared as a book chapter.

## Why this paper might be of interest to Alliance Partners:

Servitization is a global phenomenon. This paper presents data on the range and extent of servitization globally, contrasting levels in Germany with France, UK, US, as well as the BRIC countries - Brazil, Russia, India and China. The analysis is performed using a sample of over 42,000 firms. The paper explores the reasons why firms are servitizing, categorizing these drivers in terms of: (i) strategic; (ii) economic; (iii) technological and (iv) environmental. It presents data on the German economy, illustrating the range and extent of services offered by German firms and looks at the data on the German firms, contrasting them with data from other European countries as well as data on the US economy to enable international comparison. The paper then introduces data from the BRIC countries to illustrate emerging competitive challenges, and finally turns to the question of the future, asking what role services might play in the future of German manufacturing success. The paper will be of interest to those keen to understand more about the latest international developments and the extent of servitization across the world.

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## Servitization in Germany: An International Comparison

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Manufacturing is undergoing a revolution. Across many industries and countries we see manufacturing firms shifting their focus to services and solutions. Instead of selling products, they are seeking to sell the outcomes their products deliver. Apposite examples include “power by the hour” – selling thrust rather than airline engines in the aerospace industry; “yield by the field” – selling data on equipment positioning and harvesting rates in the agricultural industry and “data on demand” – selling access to movies and music in the entertainment industry.

The purpose of this chapter is to explore the phenomenon of servitization in Germany. Using secondary data we explore the extent and range of servitization, contrasting “pure” manufacturing firms with “servitized” manufacturing firms. This analysis is performed using data drawn from the CapitalIQ database. The master sample is constructed using three criteria. First, all firms included are classified as manufacturing firms, according to their SIC codes. Second, all firms included employ over 100 people. Third, all firms included are incorporated in either one of the traditional developed economies – France, Germany, UK and USA – or one of the emerging BRIC economies – Brazil, Russia, India and China. The complete sample includes 43,044 firms. 539 of these have declared bankruptcy, so the usable sample is 42,505 firms. Of these 67.30% are primarily located in the United States (28,606 firms), 9.60% in Germany (4,080 firms), 8.16% in the UK (3,467 firms), 5.20% in China (2,210 firms), 5.06% in France (2,149 firms), 3.23% in India (1,375 firms), 0.90% in Brazil (384 firms) and 0.55% in Russia (234 firms). The data are analysed at both the international and, for Germany specifically, the regional level.

The chapters consists of five main sections. The first explores the reasons why firms are servitizing, categorizing these drivers in terms of: (i) strategic; (ii) economic; (iii) technological and (iv) environmental. The second section presents data on the German economy, illustrating the range and extent of services offered by German firms. In the third section the data on the German firms are contrasted with data from other European countries - the UK and France, as well as data on the US economy to enable international comparison. The fourth section introduces data from the BRIC countries to illustrate emerging competitive challenges. Finally, in the fifth section the article turns to the question of the future, asking what role services might play in the future of German manufacturing success.

### **Factors Driving the Shift to Services:**

At the outset it is worth considering the reasons why manufacturing firms are said to be servitizing. Typically these are categorised under three main headings - economic, strategic and environmental – although a fourth heading “technology” is also worth including.

#### *The Economic Reasons for Servitizing*

In terms of the economic rationale for servitization, the first reason people offer is the *challenge of competing on cost*, a rationale often cited by Governments in developed



economies. The challenge is simple – there are many sources of low cost products around the world and so manufacturers in developed economies, with their high labour costs, have to seek new and innovative ways of competing. One option is to shift the focus of competition, away from the product towards new, valuable and innovative solutions – including services. Hence servitization is proposed as a way for manufacturers in developed economies to compete.

The second economic rationale for servitization is the *installed base* argument. This is particularly important in capital goods industries, where products have long-life cycles, for here the installed base can be significant. In 2010, for example, Boeing had 19,410 commercial planes in operation and delivered 462 new planes, giving a ratio of 42 operational planes for every new plane delivered. Given that planes have an operating life of thirty- forty years, providing maintenance and support service through the entire product life for the installed base is a significant market opportunity. Indeed generally, people quote a ratio of 4:1 in terms of lifetime product value. If a piece of capital equipment sells for €1 million then typically it will consume around €4 million in spares and consumables through its working life. To ignore this market opportunity would be very short sighted for any manufacturer.

The third economic rationale – and one that has been particularly important in recent years given the relatively sluggish European economy – is *stability of revenue*. In many capital goods industries product revenues can be lumpy. Significant revenue is gained when products are sold and delivered, but this doesn't happen every day. Ongoing service and support activities provide a more stable revenue stream, which can smooth the effect of lumpy product sale revenues.

The fourth economic rationale is *service as a pre-sale activity*. Most organisations see service as a post-sale activity – we service and maintain assets once they have been purchased – but some recognize service is a pre-sale opportunity. Indeed Caterpillar talk about the first sales being made by the sales department and every subsequent sale being made by the service department. Likewise Volvo Cars runs an active programme with their dealers where they seek to persuade them that every service encounter is also an opportunity to build customer loyalty and hence secure a repeat purchase - hence service as a pre-sale. Data from Volvo are illuminating. They clearly show that, at least for Volvo Cars, repeat business is a function both of product quality and service quality. Even when customer rate the product quality highly their likelihood of repeat purchase is significantly adversely affected by poor service quality.

#### *The Strategic Reasons for Servitizing*

In strategic terms there are four key reasons for servitization. The first is to *lock in your customers*. In many ways this is a traditional business model that has been used for years. Products are sold at or slightly above cost, but money is made on the provision of spares and consumables. Think of razors and razor blades; printers and ink cartridges; even cars and the spares used in service. A related rationale is *locking out competitors*. This is especially important in industries with a high installed base. As demand for high margin service and support grows, new entrants are attracted to the services market. Many original equipment manufacturers are choosing to make strategic moves to partner with their customers and in doing so seek to lock out potential new entrants to the services market.



The third strategic rationale is *increasing differentiation* - some customers value the stability that service and support contracts offer. A fixed price can mean predictable maintenance costs and a transfer of risk from the customer to the service provider. These benefits provide a differentiation advantage to original equipment manufacturers. And the final strategic rationale is *customer demand*, in the sense that customers demand that their providers offer service based contracts. In public procurement, particularly the defence sector, this is becoming an increasingly important trend. Government Departments are asking original equipment manufacturers to contract for capability. The Government Departments are willing to buy the right to use the assets (ships, ground vehicles and planes), rather than taking ownership of them. An interesting by-product of this is that the incentives of the original equipment manufacturers are now aligned with their customers. It is in everyone's interest for the asset to be available and working as the provider of the asset only gets paid when the asset is being used.

#### *The Environmental Reasons for Servitizing*

A potentially increasingly important, rationale for servitization is the environmental rationale. Here the idea is to question whether transfer of asset ownership is necessary. Think of car sharing schemes, such as StreetCar and ZipCar, or DVD sharing schemes, such as Netflicks. Do consumers really need to take physical ownership of assets or can we share access to them, thereby reducing the environmental impact of production. Indeed one can argue that, especially for assets that can be digitized, there is no need to produce a physical asset anymore. We don't need to print books, create DVDs, or manufacturer CDs. Instead the data that enables people to access to content can be shared electronically, thereby eliminating the need for production and the costs of physical distribution.

#### *The Technological Reasons for Servitization*

A final set of reasons for servitization lie in technology. At one level technology is simply an enabler of servitization, but as with many technological innovations - the mere existence of the technology means that people will seek to exploit it. As the world becomes more instrumented and ever greater volumes of data are collected on assets remotely, the potential for new and innovative services grows. Construction equipment is remotely monitored and the data used to make predictions about engine wear and the need for service and support. GE has models that allow it to recommend to customer the routes their airplanes should fly so they extend engine life. When planes fly over deserts the sand causes pitching in the engine, but a different form of wear and tear occurs when planes fly over oceans. So GE now recommends to its customers how long their planes should fly to the Middle East and when they should switch routes and start flying over the ocean to the US. These predictive analytic models are becoming more and more widespread in industrial circles, as well as healthcare, insurance and finance. The technology - and particularly the ability to capture and analyse "big data" opens up some new opportunities for service innovation.

#### **What Do We Know About Servitization in Germany?**

So let us turn to Germany and ask what we know about servitization in the German economy. The CapitalIQ database contains data on registered companies around the world. For the purpose of this study we selected companies with manufacturing SIC codes, employing over 100 staff, with both their country of incorporation and their



primary location identified as Germany. This sampling strategy yielded 4,067 separate German manufacturing firms. For each of these firms we downloaded and analysed the “business description”, a short textual summary of the main activities of the firm. We searched for keywords that related to services and when these were found in the business description we categorised the firms as servitized, as long as there was also evidence that the firms were still involved in manufacturing. In those cases where there was no evidence of manufacturing activity we classified the firms as “pure service” and in those cases where there was no evidence of service activity we classified the firms as “pure manufacturing”.

This analysis revealed that of the 4,067 German firms, 71.23% (2,897 firms) were identified as pure manufacturing firms; 25.35% (1,031 firms) as servitized firms; and 3.42% (139 firms) as service firms. Table 1 breaks down the data by state/region, with Figure 1 highlighting the proportion of servitized firms in each region.

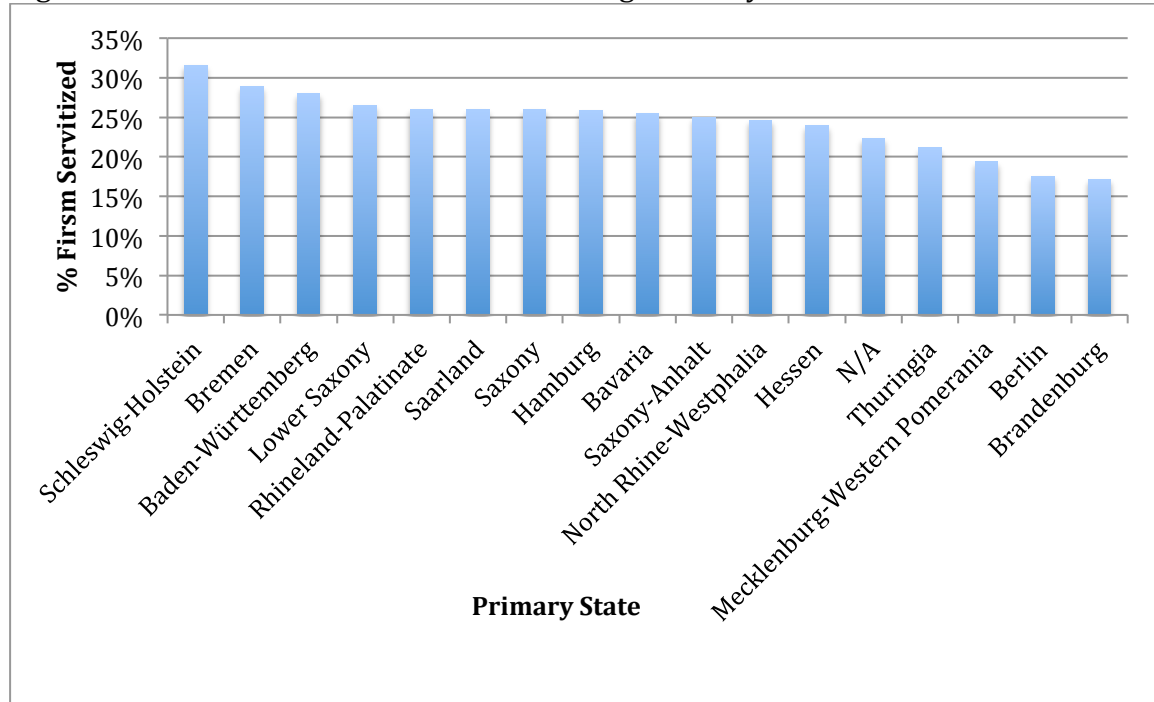
Table 1: Overall Sample of Firms Broken Down by State

<b>Primary State</b>	<b>Freq.</b>	<b>Percent</b>	<b>Cum.</b>
N/A	327	8.04	8.04
Baden-Württemberg	812	19.97	28.01
Bavaria	682	16.77	44.78
Berlin	74	1.82	46.59
Brandenburg	35	0.86	47.46
Bremen	38	0.93	48.39
Hamburg	89	2.19	50.58
Hessen	296	7.28	57.86
Lower Saxony	309	7.60	65.45
Mecklenburg-Western Pomerania	31	0.76	66.22
North Rhine-Westphalia	890	21.88	88.10
Rhineland-Palatinate	146	3.59	91.69
Saarland	27	0.66	92.35
Saxony	108	2.66	95.01
Saxony-Anhalt	56	1.38	96.39
Schleswig-Holstein	76	1.87	98.25
Thuringia	71	1.75	100.00
<b>Total</b>	<b>4,067</b>	<b>100.00</b>	





Figure 1: % Servitized German Manufacturing Firms by State



Given the strength of the Middlestand in Germany, it is worth exploring the relative size of these servitized firms. The total sample includes firms employing between 100 to 552,425 people, with a mean number of employees of 1,585. As expected the distribution of firm size is heavily skewed towards smaller firms, with less than 2.5% of firms employing over 10,000 people and 64% employing 500 people or less. To explore the relationship between firm size and the extent of servitization, the sample was split into 10 segments, each containing around 10% of the total number of firms. Table 2 summarises the results of this analysis, clearly showing a spike in levels of servitization amongst the largest 10% of German firms.

Table 2: % Servitized German Manufacturing Firms by Size

Number of employees	Number of firms	Servitized (%)
100-133	409	21.76%
134-170	447	17.23%
171-205	366	19.40%
206-260	405	23.21%
261-340	411	24.33%
341-447	402	26.12%
448-607	408	24.75%
608-1,000	420	27.86%
1,001-2,074	393	28.50%
2,074-552,425	406	40.64%

As well as firm size it is interesting to explore which of the subsectors of manufacturing are most prone to servitization.



Table 3: Overall Sample of Firms Broken Down by Sector<sup>1</sup>

Primary Sector	Freq.	Percent	Cum.	Servitized (%)
N/A	215	5.29	5.29	0.00
Consumer Discretionary	726	17.85	23.14	12.95
Consumer Staples	294	7.23	30.37	9.52
Energy	22	0.54	30.91	13.64
Financials	17	0.42	31.33	23.53
Healthcare	269	6.61	37.94	25.65
Industrials	1,424	35.01	72.95	40.03
Information Technology	416	10.23	83.18	37.74
Materials	676	16.62	99.80	15.68
Telecommunication Services	3	0.07	99.88	
Utilities	5	0.12	100.00	
Total	4,067	100.00		

Unsurprisingly, we see the highest levels of servitization in the industrials sector. This sector consists of 1,424 firms, spread across 21 separate primary industries. Seven of these primary industries have over 50 firms in their respective sub-samples. The data suggest that levels of servitization are highest in: (i) construction and engineering (56.30% servitization, sample size = 135 firms); (ii) construction and farm machinery (50.88%, sample size = 114); (iii) heavy electrical equipment (49.25% servitized, sample size = 67 firms); (iv) aerospace and defense (49.09% servitized, 55 firms in sample); and (v) industrial machinery (42.37% servitized, 668 firms sample).

#### How Does this Contrast with France, the UK and the US?

To contrast the levels of servitization in Germany with other countries, we created a second sample using the CapitalIQ database. This sample included all firms with manufacturing SIC codes employing 100 or more staff, with a primary country of incorporation being Brazil, China, France, Germany, India, Russia, UK or USA. This sampling strategy produced a database of 42,505 firms. The database is dominated by US and Western firms - US firms form 67.30% of the total sample and Western firms 90.11% of the total sample. So this section compares the levels of servitization seen in Germany with those seen in France, the UK and the USA. Table 4 provides summary statistics for the sample.

<sup>1</sup> Note small sample size for Telecommunication Services and utilities, so % servitization figure not included for these sectors.



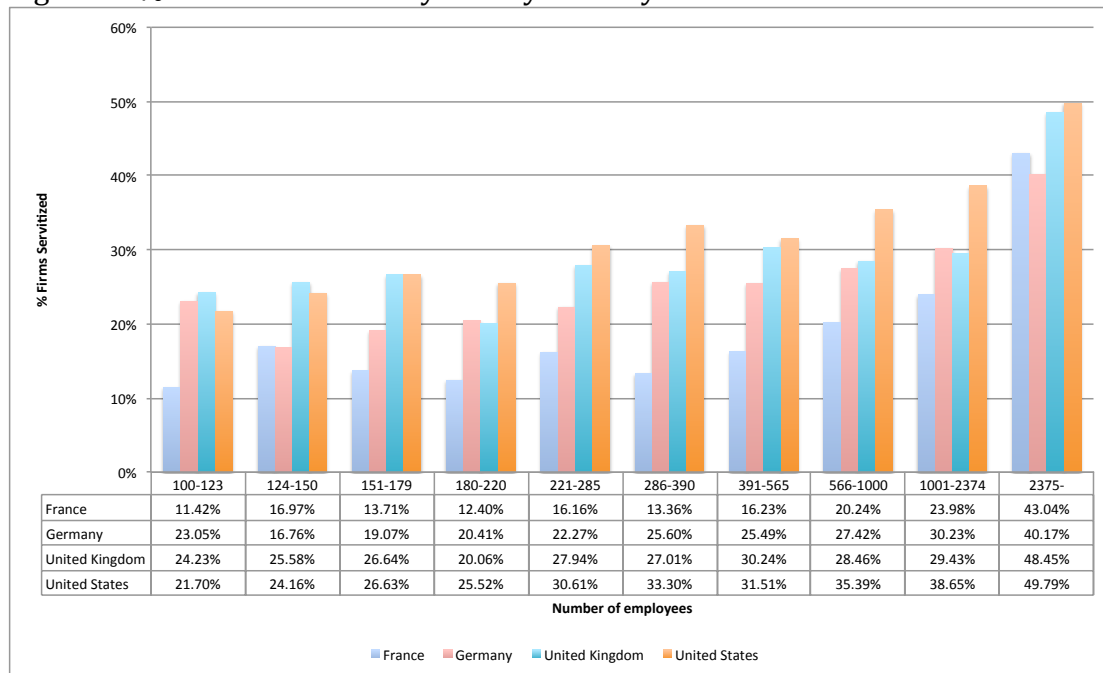
Table 4: Overall Sample of Firms Broken Down by Country

Primary country of incorporation	Manufacturing Firms (%)	Servitized firms (%)	Service firms (%)	Total firms
France	1,638 (76.22%)	387 (18.01%)	124 (5.77%)	2,149
Germany	2,907 (71.25%)	1,034 (25.34%)	139 (3.41%)	4,080 <sup>2</sup>
UK	2,189 (63.14%)	986 (28.44%)	292 (8.42%)	3,467
USA	18,436 (64.45%)	8,765 (30.64%)	1,405 (4.91%)	28,606
Total	25,170	11,172	1,960	38,302

As table 4 shows the levels of servitization are slightly lower than the UK and the USA, although significantly higher than in France.

An interesting question is whether the level of servitization varies by company size within countries. To explore this issue the sample was split into ten equal sized segments, based on numbers of employees. Figure 2 shows the percentage of servitized firms in each size category by country.

Figure 2: % Servitized Firms by Size by Country



As might be expected the levels of servitization increase with firm size. 49.79% of the largest US manufacturing firms, for example, have servitized. The comparable figures for the UK and Germany are 48.45% and 40.17% respectively. Interestingly, the levels of

<sup>2</sup> When the primary country of operations is included this figure drops to 4,067 firms as 13 firms are incorporated in Germany, but have their primary country of operation elsewhere.





servitization amongst the largest German firms (40.17%) are lower than amongst the largest French firms (43.04%). A reversal of the pattern observed at all other levels of firm size.

The other way of looking at the data is to contrast levels of servitization within different sectors within countries. As table 5 shows, the highest level of servitization occurs in the US information technology sector (where 53.41% of manufacturing firms have servitized). The lowest levels of servitization occur in the French consumer staples and discretionary sectors - 5.56% and 8.78% of firms respectively. Within Germany the highest levels of servitization occur in the industrials sector (39.99% of firms having servitized) and the information technology sector (37.80% of firms having servitized).

Table 5: % Servitized Firms by Primary Sector by Country

Primary Sector	Country			
	France	Germany	UK	USA
Consumer Discretionary	8.78%	12.89%	20.10%	16.60%
Consumer Staples	5.56%	9.52%	19.95%	29.47%
Energy	38.46%	13.64%	32.06%	36.74%
Healthcare	17.27%	25.65%	30.94%	33.68%
Industrials	32.81%	39.99%	41.89%	35.93%
Information Technology	31.76%	37.80%	37.97%	53.41%
Materials	12.14%	15.76%	20.45%	27.01%

### How Does Germany Compare with the BRIC countries?

As mentioned previously, data were also gathered on the BRIC countries – Brazil, Russia, India and China. While the sample size is smaller here it is still interesting to contrast the German position with the BRIC countries. Table 6 provides summary data for the overall sample, highlighting that

Table 6: Overall Sample of Firms Broken Down by Country

Primary country of incorporation	Manufacturing Firms (%)	Servitized firms (%)	Service firms (%)	Total firms
Brazil	331 (86.20%)	42 (10.94%)	11 (2.86%)	384
China	1,875 (84.84%)	316 (14.30%)	19 (0.86%)	2,210
Germany	2,907 (71.25%)	1,034 (25.34%)	139 (3.41%)	4,080 <sup>3</sup>
India	1,026 (74.62%)	333 (24.22%)	16 (1.16%)	1,375
Russia	182 (77.78%)	45 (19.23%)	7 (2.99%)	234
Total	6,321	1,770	192	8,283

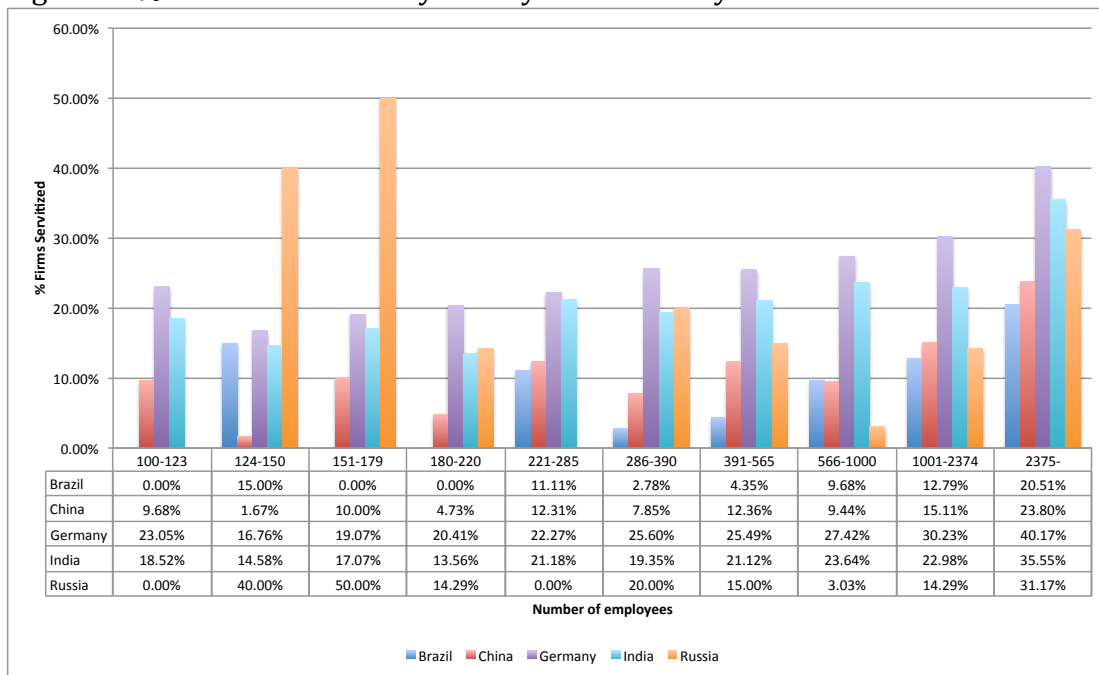
<sup>3</sup> When the primary country of operations is included this figure drops to 4,067 firms as 13 firms are incorporated in Germany, but have their primary country of operation elsewhere.



Consistent with arguments that servitization might offer a route for manufacturing firms in developed economies to compete, levels of servitization are higher in Germany than the BRIC countries, with the closest being India (24.22% of firms servitized) versus 25.34% in Germany.

Figure 3 repeats the analysis, but this time controls for firm size. It is interesting to note the relatively high levels of servitization for Russian firms with between 124-179 employees, although it is worth noting this may be a function of the sample size of Russian firms (as there are only 45 servitized Russian firms from a total sample of 234 firms). As with the developed economies, the levels of servitization tend to increase with firm size, although the pattern is not as pronounced.

Figure 3: % Servitized Firms by Size by BRIC Country



When looking at servitization by sector, it is again the information technology sector where we see the highest levels of servitization – particularly the Indian information technology sector, where 66.67% of firms have servitized. Again the lowest levels of servitization are seen in the consumer discretionary and staples sectors, with 4.08% and 5.77% of Brazilian firms in these sectors servitizing.

Table 5: % Servitized Firms by Primary Sector by Country

Primary Sector	Country				
	Brazil	China	Germany	India	Russia
Consumer Discretionary	4.08%	13.25%	12.89%	11.95%	5.26%
Consumer Staples	5.77%	8.19%	9.52%	11.35%	9.52%
Energy	45.45%	28.57%	13.64%	45.16%	26.67%
Healthcare	3.33%	18.12%	25.65%	34.51%	20.00%
Industrials	28.36%	18.38%	39.99%	43.77%	38.64%
Information Technology	13.33%	25.08%	37.80%	66.67%	25.00%
Materials	10.99%	9.72%	15.76%	13.37%	16.42%



### **What Are the Implications for Germany?**

So what are the implications of these data for Germany? Several points emerge from the analysis. First, the levels of servitization in Germany are higher than in the BRIC countries, but lower than comparator countries, especially the UK and the US. 25% of German manufacturers have servitized, compared with 28% of UK manufacturers and 31% of US manufacturers. This disparity is especially marked amongst the largest decile of firms. While 40% of the largest German manufacturers have servitized, the comparable figures for the UK and the US are 48% and 50% respectively. In fact, Germany lies below France in terms of servitization levels amongst the largest firms, as 43% of large French manufacturers have servitized.

The first question these observations raise is why is the level of servitization in Germany lower, especially amongst the largest manufacturing firms. A related question is how sustainable is the German position as levels of servitization increase amongst the BRIC countries. For while levels of servitization here are lower currently, data suggests that the BRIC countries, especially China, are making significant efforts to boost their service economies.

At the level of individual sectors, we see the highest level of servitization in Germany in the industrials (40%) and IT (37%) sectors. For the IT sector specifically, the levels of servitization observed in Germany are lower than the US (53%) and India (67%). Again this observation raises the question of how sustainable the German position is if IT firms elsewhere in the world are seeking to sell outcomes and solutions, rather than individual products.

The industrial heritage of Germany raises an interesting question. For years German manufacturers have been seen as high quality, prestige manufacturers. The machine tool, electronics and automotive sectors are all excellent examples where German firms have a reputation for product quality and engineering. As consumer attitudes change, however, and their emphasis shifts towards buying the solution or outcome, rather than owning the product, then does the traditional German heritage become a hindrance to business model innovation? One could argue that organizations honed and configured to deliver excellent products are not necessarily best placed to design and supply world-class services and customer solutions. It will be interest to see how German firms rise to this challenge and whether they decide to innovate their businesses towards services or continue to compete through excellence in product quality.