Product-related Services: Operator Models in German Mechanical Engineering Firms

A growing number of industrial companies are now looking to product-related services to increase the attractiveness of their present range.[1] Their aim is to become more competitive, create more value added and open up new markets. The development goes 'from the product to problem-solving' and the potential is still far from fully exploited.[2] As a sector, mechanical engineering has traditionally relied on technical advances to remain competitive, but often has to cope with rationalisation effects. There is certainly scope here for companies to improve their market position by offering product-related services, and operator models are a particularly progressive solution.

The German economy is one in which manufacturing has a relatively high share of total value created. However, an analysis of the economic development by sectors shows that here, as in other industrial countries, most of the new jobs in the 1990s were created in the knowledge and production-based services sectors, while the share of manufacturing in both value creation and employment declined (cf. figure 1).

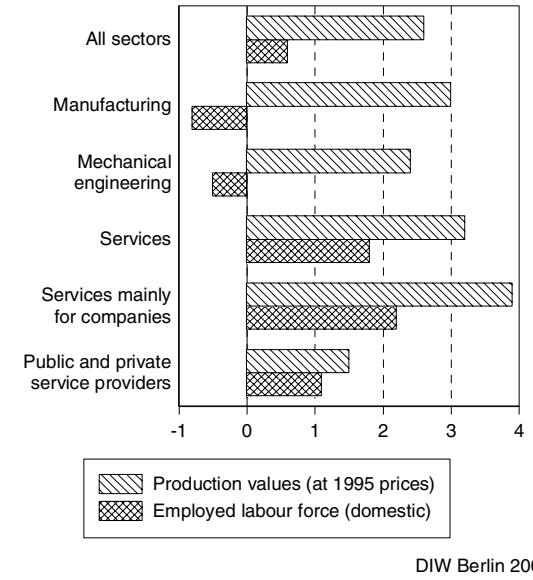
In the context of the transition from the industrial to the services society the high share industry still maintains is often seen as a sign that Germany has not fully coped with structural change. However, the problem is actually that the German economy as a whole is not succeeding in creating enough jobs, and the scope for services, in interaction with industrial products as well, is not being sufficiently utilised.[3] One obstacle is that companies continue to focus single-mindedly on traditional industrial production, where they may be very successful, and this also determines the orientation of economic policy. However, research has shown that there are shortcomings in the development and provision of services; in particular, an increase in the capability to innovate and in innovation dynamics appears to be necessary.[4]

Services make an industrial company more competitive

Even high-quality products are now being produced in a growing number of places in the world. So – very much in the sense of Schumpeter's innovator[5] – particular efforts are needed if German industry is to maintain its competitiveness and ensure that enough efficient and strongly growing companies are producing in Germany. The same applies, one may say, to the efficiency of regions and individual locations.

Services have an important part to play here. For a long time it was enough for an industrial company to offer high-quality products to remain competitive. Today – and probably even more in future – it is the

Figure 1
Changes in Production and Employment in Germany 1994 to 2003
(%)



Sources: Federal Statistical Office.

[1] Extensive research on production related services has been provided by the Fraunhofer Gesellschaft. Their view on operator models will be presented in the March edition of the *DIW Economic Bulletin*.

[2] Cf. Gunter Lay and Petra Jung Erceg (eds.): 'Produktbegleitende Dienstleistungen – Konzepte und Beispiele erfolgreicher Strategieentwicklung', Heidelberg 2002.

[3] Cf. Frank Stille, Brigitte Preissl and Jürgen Schupp: 'Zur Dienstleistungslücke'. *DIW Berlin Sonderheft,* no. 175, Berlin 2003; Frieder Meyer-Krahmer and Gunter Lay: 'Der Stellenwert innovativer Dienstleistungen in der Modernisierungsdebatte', in: *WSI Mitteilungen,* no. 8/2001, pp. 395-400.

[4] Cf. Martin Baethge: 'Sind wir schon in der Dienstleistungsgesellschaft angekommen?' In: ifo Schnelldienst, no. 18/2003, pp. 3-10.

[5] Cf. J.A. Schumpeter: 'Theorie der wirtschaftlichen Entwicklung, 8th edition', Berlin 1993.

Box

Successful operator models in German mechanical engineering

Some recently published cases prove that mechanical engineering firms really can achieve the advantages outlined at the start of this article by offering a wider range of services, right through to operating their products in the customer's premises or for the customer. Under the heading '10% of personnel in tool management – 8% growth in 2002' one machine tool manufacturer[1] reported it was one of the few big firms in its branch in Germany to achieve 8% growth in turnover. This was mainly due to its extensive services range. The company is offering to draw up production plans for its customers, purchase all the means of production, provide support in their use, deliver and install tools on the machines and undertake continuous optimisation of the tools in the customer's premises. As a result 20% of its personnel are now engaged on customer services and around 10% are already working on tool management. The aim is to offer a complete service package on metal cutting tools in the customer's factory.

A manufacturer of soldering plant for the automotive industry is the second example.[2] The current tendency in automotive firms to hold back on investment has hit the suppliers in the mechanical engineering sector so badly that many have had to cut back production and some have actually faced closure. This company responded by setting up a service company to offer complete packages, from designing parts through start-up operations to spare parts management. The services extend to plant made by other firms, not just the company's own models, and include plant conversion as well as maintenance and the operation of repair workshops. Operator models and making components for customers were also under discussion for the new field of business. The new activities are intended to alleviate the current poor earnings situation in the branch and increase turnover. Some positive effects are already evident, and two major projects are nearing completion; the contract has been signed for another in Mexico.

[1] Cf. 'Präzisionswerkzeuge – Mapai verstärkt Dienstleistungen', in: Produktion no. 40/2003, p. 7.

[2] Cf. Kuka-Schweissanlagen: 'Mit Full Service aus der Preisspirale', in: Produktion no. 40/2003, p. 4.

ability to offer problem-solving solutions that will cover a wider range of the customer's needs that counts. The package should include service, finance and personnel training.[6] A particularly advanced way of combining production and product-related services is the operator model, in which industrial companies manufacture production plant for their customers, then operate the plant themselves and are paid according to its output.

The operator models in the German mechanical engineering sector discussed here are one example of the way industrial companies can improve their competitiveness by including more services in their range, and in doing so open up new markets.

New sales areas for mechanical engineering firms

Besides the automotive and chemical industries, mechanical engineering is one of the central pillars of the producing sector in the German economy. With an export ratio of nearly 60% it makes a major contribution to Germany's foreign trade balance.

The main strength of the German mechanical engineering sector in national and international markets is the technological and innovative expertise in its products. These companies are developing increasingly productive plant and machinery and so offering their customers possibilities for rationalisation. However, there is a disadvantage to this competitive strength: if the customers of the mechanical engineering firms are operating in markets that are growing at only a limited rate, stagnating or maybe even shrinking, the advances in engineering techniques are enabling them to produce the same volume with fewer and fewer machines. As a result the quantitative demand for mechanical engineering products is falling.

In the past companies could compensate for this effect by opening up new markets, at least sufficiently to maintain their output on roughly the same level. But as productivity in the sector advanced the number employed in Germany shrank, from around 1.4 million in 1991 to just under 1 million in the mid-1990s and to around 0.9 million today.

Companies can achieve growth mainly by opening up new areas of business. This not only increases turnover, but also helps to secure jobs. On principle there are two possibilities for the mechanical engineering sector here:

– Firstly, the firms can try to develop their innovative products into complete problem-solving packages for their customers. The central element in a strategy of this kind is to offer those services which the customers need to operate the plant and machinery the company is selling. These product-related services, which include, for example pre-sales services such as

[6] Cf. Frank Stille: 'Product-related Services – Still Growing in Importance', in: *DIW Economic Bulletin,* vol. 40, no. 6, June 2003.

consultancy and engineering, and after-sales services such as maintenance, repurchase or general management, have hitherto generally been performed by the customers themselves, or purchased by them from specialised firms. In taking on these services mechanical engineering firms can actually develop whole systems right round the core product, and so position themselves as competent systems integrators in the relevant value creation network. They can do this, for example, by setting up and managing complete factories, which is already being practised in the printing industry. This may enable even well-established customers to increase the volume of their business, although their need for mechanical engineering products is stagnating or actually shrinking.

– Secondly, mechanical engineering firms can try to open up new groups of customers by offering the appropriate complete packages to customers they were not able to reach before by offering high-quality German plant and machines alone. Offers of finance, training or guarantees can help to reduce obstacles in personnel qualification or finance. This option is especially important in opening up markets in catching-up economies. These markets offer the biggest future growth potentials, but they are short of capital.

The most advanced form of this approach is the operator model. Here the company installs the machines it has developed and manufactured in the customer's premises, operates them and is paid according to the units produced (pay on production).

These models are creating new sales markets, as the growing complexity of modern machines and their design make it increasingly difficult for many customer firms to utilise the full earnings potential of the plant and machinery with their own personnel.

Operator models are particularly attractive to customers who cannot finance the purchase of complex plant themselves. 'Pay on production' helps to overcome financial obstacles and wins new customers. Firms that do not have the skilled personnel needed to operate the technologically challenging plant themselves are also a big target group.

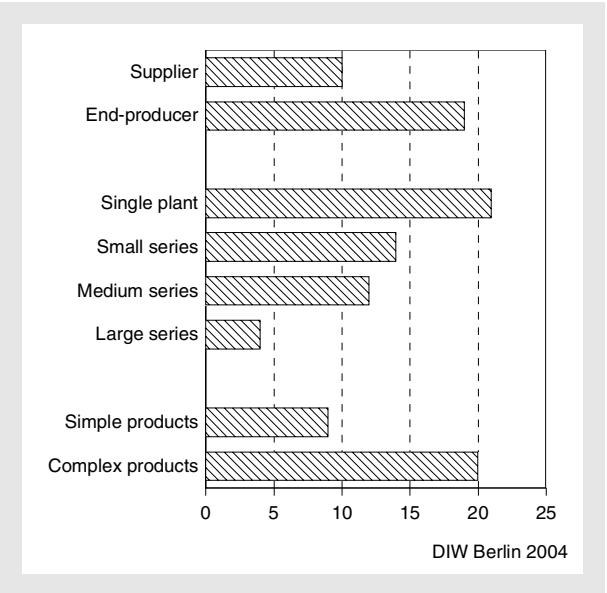
How widespread are operator models in the sector?

Operator models are now being offered by 16% of German mechanical engineering firms. In one study[7] mechanical engineering firms are differentiated according to type of product (delivery, end-products), type of production (single plant or machines, small, medium or large series) and the complexity of their products (cf. figure 2). Among companies making end-products the share offering operator models has already reached just under 20%. Mechanical engineering firms that manufacture complex plant as individual items are particularly intensively concerned with developing operator models. Hence the share of operator model suppliers rises to 21% as the series size falls, and to 20% as the complexity of the products grows. These high shares should also induce other companies producing in similar market segments to consider whether these models would be likely to improve their competitive position.

Whether a company will offer operator models also depends on its corporate strategy. An above-average share (19%) of companies that rely particularly on innovation and technology are offering operator models, while the share is below average (8%) among companies that see their main competitive advantage in the price of their product.

Although bigger firms are theoretically in a better position to realise operator models, these models are also being developed by smaller firms. Possibly they

Figure 2
Operator Models Offered by German Mechanical Engineering Firms by Category of Producer
Shares (%) of company turnover



Source: Fraunhofer-ISI: Erhebung Innovationen in der Produktion 2001.

[7] Cf. Gunter Lay: 'Betreiben statt Verkaufen – Häufigkeit des Angebots von Betreibermodellen in der deutschen Investitionsgüterindustrie', in: *Mitteilungen aus der Produktionsinnovationserhebung,* no. 29/2003, pp. 1-13.

have to react more to pressure of competition, and this may be easier for them as they can respond more flexibly than big firms.

Comprehensive changes to internal production processes needed

The development of a mechanical engineering firm into a manufacturer of machines that also operates these products for its customers has far-reaching consequences. Systems innovations of this kind require activities in a variety of fields.

Customers need solutions that will keep life cycle costs as low as possible. Experience has shown that in many cases the acquisition costs only account for around one third of the total life cycle costs.[8] The modular design of the product may have to be fundamentally revised, for instance to make modernisation easier, facilitate servicing, minimise consumption and permit recycling.

Since in the case of an operator model the purchase contract is replaced with a pay on production contract the companies have to draw up new model contracts. To keep the liability within acceptable limits the risks have to be analysed and calculated before the contract is drawn up.

As the manufacturer cannot cover the cost of producing the machines by selling them immediately after they are made and only gradually recovers his outlay through the pay on production earnings, financing models adapted to the particular conditions need to be developed and tested.

Costs and earnings control in mechanical engineering firms is traditionally designed to cover the sale of plant and machinery. Overheads are calculated as a percentage that is added to production costs and recouped through the product price. By contrast, operator models require project-related controlling concepts that cover the entire expenditure on an operator model project, from developing the product through manufacture and operation to disinvestment. These models must allow the expenditure to be adequately set against earnings.[9]

The organisational structure in a mechanical engineering firm is usually based on 'research and development', 'production' and 'sales', and this needs to be changed to suit the operator model. Depending on the objective and individual circumstances the appropriate steps can range from internal restructuring through setting up separate specialised operating companies to new joint ventures to ensure and maintain the operation of the plant and machinery within a flexible competence network.[10]

An agreement by a manufacturing company to operate the machinery it has made for a customer also creates new challenges for its personnel, and the company's personnel development concepts have to take account of this. The company will need to take on staff with more experience and competence in handling the machines than its customer's personnel have. However, many mechanical engineering firms that are still working in their traditional business are short of such personnel. Last not least, the task of operating plant in the customer's premises is also new ground in labour law for the manufacturer.

Making better use of potentials

Industrial companies can open up additional markets not only with new or technically better products but also by adding services to their range. For companies that have hitherto secured their competitive positions mainly through technological competence this change in market orientation requires new and extensive coordination of engineering knowledge with commercial know-how.

As markets become increasingly internationalised and as demand changes new hierarchies are also developing in supplier/customer relations. Companies have to adapt to these and rethink their range as well as their desired market position. Smaller industrial companies in particular often have to decide whether to give up part of their present independence and join a network. It is an open question how far this will enable them to improve their market position by adding services to their range. The operator models discussed here in mechanical engineering are a very advanced solution, and they are not suitable for every firm. But companies that adapt too late to the changing conditions on the market and ignore the possibility of offering services to improve their competitiveness may find themselves facing a very difficult situation.

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[8] Cf. Frank Scheinschedt, Claudia Rainfurth and Gunter Lay: 'Life Cycle Costing als Instrument der Preisfindung für produktbegleitende Dienstleistungen', in: Steffen Kinkel, Petra Jung Erceg and Gunter Lay (eds.): 'Controlling produktbegleitender Dienstleistungen', Heidelberg 2003, pp. 91-100.

[9] Cf. Martin Reckenfelderbäumer: 'Die Kalkulation von Betreibermodellen als zukünftige Herausforderung für das Controlling produktbegleitender Dienstleistungen', in: Steffen Kinkel et al. (eds.): loc. cit., pp. 169-179.

[10] Gunter Lay, Horst Maier, Jürgen Schramm and Arndt Werding: 'Stand und Perspektiven neuer Geschäftsmodelle für den Maschinen- und Anlagenbau', in: *Industrie Management,* no. 4/2003, pp. 9-14.