

# Development of Products for Manufacturing in High-Cost Countries

**Peter Leibl**

Munich University of Applied Sciences,  
Germany,  
peter.leibl@fhm.edu

**Rolf Pfeiffer**

Reutlingen University,  
Germany,  
rolf.pfeiffer@reutlingen-university.de

## **General description of the status of companies in high cost countries**

The manufacturing of products in low-cost countries has been popular for a number of years, resulting in the closure of many production plants in high-cost countries and the transfer of production to countries where the costs for labour are lower. The reason given for such moves is that they save costs. However, when total costs and benefits for the companies are taken into account, the savings are not as high as expected. In fact, only 20 per cent of companies actually benefit from moving production abroad [1]. Even in cases where costs could be saved by moving to low-cost countries, there are nevertheless opportunities to develop and produce in high-cost countries, if the strengths of these areas are utilised and the product is designed for high-level manufacturing.

This paper describes the restrictions and opportunities for development and manufacturing in high-cost countries.

## **General conditions in the market**

There is a very big difference between labour costs in Germany and China. In order for production in high-cost countries to be viable, labour costs must be a very small part of the overall prime cost. In order to achieve this objective, products must be developed for automated production. As the costs for raw materials, such as steel and oil, are similar for both high and low-cost countries, this factor is not of high significance.

Our argumentation deals in very general terms with costs for labour and raw materials. A more differentiated view would have to include all aspects of costs and prices, and the market situation for each product.

## **Labour and labour overhead cost for automated production**

To enable production in high-cost countries, the quantities produced have to be high in order to reduce R&D costs per unit, and to enable automation in the manufacturing process. Product development thus has to be for automated and highly-integrated production, in order to keep labour costs down to a low proportion of the overall prime costs.

A project in Dresden, recently reported in the Handelsblatt [2], deals with exactly this point. In this case, the operating costs for the manufacture of chips (wafers) in Germany are not higher than in Asia. The reasons for this are simple: 87% of costs are for buildings and technology, and only 13% for personnel and energy. Salaries for engineers and managers in Asia are also now similar to those in Germany. The results of the project also emphasise that

the developers need constant feedback from production; failure to control the whole production process will, in the long term, result in loss of competence in R&D.

If you take into account the fact that there are a lot of extra costs involved in relocating production to low-cost countries, such as travel expenses, building a new plant and so on, the prime cost of high-cost countries can be competitive. Of course, the level of automation needed reduces the number of workers in the first stage, but for high-tech production a lot of highly qualified people are needed. And there will be new jobs for example in design and manufacturing of the production equipment, which are mostly located in such high-cost countries.

Furthermore the suppliers will have better conditions to settle in these continents too. The alternative would be production in low-cost countries, which means, perhaps one person in the purchasing department will remain and all other workers will no longer be needed any in the high-cost countries.

Of course there are many further points which have to be taken into account, such as

- infrastructure
- taxes
- education and knowledge
- motivation of workers

These so-called location factors have been subjected to intensive analysis and regarded as highly significant in special location change models [3]. According to these it is important to consider the orientation for each company (e.g. orientation towards materials, work, taxes, energy, turnover, logistics) in order to identify and allocate weighting to the location factors. The location model is then used to reach the required optimisation. In this optimisation process, it is necessary to decide whether the model should be oriented to profits, costs, return on investment, or other criteria.

If the orientation is towards sales, costs and the quality of the product, and thus customer satisfaction, play a special role. Customer satisfaction should be the most important consideration, but is very difficult to assess (as shown in the recent discussion on Customer Relations Management).

Let us assume that the customer satisfaction with products from high-cost and low-cost countries is the same. We then come to the subject of the price calculation, or unit costs. We do not, at this point, want to go into the relative advantages and disadvantages of full costing or direct costing, just to point out that in comparing R&D and production in various countries, the “correct” allocation of unit costs and contribution to profitability in order to cover the overheads is decisive. An example of this is forgetting to add the costs for the headquarters (administration, finance, R&D, distribution, etc.) in the correct proportion to the costs of production removed to a low-cost country. This must be done according to a formula which properly takes into account the cause of the costs.

A further important point is to be identified in the ancillary wage costs. These are largely dictated by the laws of the country involved (health and pension insurance, social security payments, etc.) and can often be nearly as high again as the actual wages. This needs to be observed carefully in the comparison. The more units produced and sold, over which these overheads can be spread, the smaller the proportion of the price, thus maintaining the competitiveness of the high-cost country.

### **Consequences for the Product development and further departments**

The R&D department requires a sound knowledge of production processes in order to be able to create products for a suitable product price. Hence there is a close relationship between product engineering and manufacturing necessity, which will no longer be possible if production is re-located to a far-way low-cost country. As a consequence, the R&D and

related departments will also be moved to the low-cost country. The labour costs for these departments will also be lower, even if output is lower and there are additional costs for the coordination of the operation. The further question presents itself: Why not also move management to the low-cost countries. The labour costs would be lower. A counter-argument to this is always the claim that there are not enough highly-qualified people in these countries. This may sometimes still be true today, but standards of education and the relevance of education to the real needs of industry is growing too as transfer of knowledge to low-cost countries continues.

To avoid this, manufacturing (but not only manufacturing) should be continued in the high-cost countries, if this makes sense. R&D can also be kept in the high-cost countries, if its quality is higher than R&D in the low-cost countries. Thus the processes and the quality must be much higher in order to compensate for the difference in costs. If the products are designed appropriately for a high level of automation, it will be not easy to copy them cheaply with manual production processes.

Thus, it is essential to improve education, beginning at school, up through universities, going on with continuous further training on the job.

## **Conclusion**

It is possible to manufacture products in high-cost countries if the conditions are suitable and the product is designed for mass production. This is the way to preserve employment in these countries in the future, and to increase knowledge and competence in R&D. If this is not done, we will become a “third world” country in the future. It is not possible for a country to survive on services alone.

## **References**

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