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# Industrial Research in Switzerland

by Eduard Fueter

Switzerland is one of the most highly industrialized countries in the world. Its products compete successfully on all world markets, and the little country itself enjoys a high standard of living, although it has practically no raw materials. What, then, is the basis of this "economic miracle"?

In a highly informative study "Switzerland and Industrial Research", Prof. R. S. Edwards, who has specialized in problems of industrial organization at the University of London, took up this very question a few years ago. He proceeded from the fact that Great Britain has to find those forms of industrial activity that offer the greatest possible chances of success. In his opinion, the U.S.A. is hardly suitable as a model, since that vast country possesses an extraordinary wealth of raw materials and an equally gigantic internal market; therefore the U.S.A. does not depend in any vital way on the export of industrial products. He then has this to say: "For guidance on this, it is necessary, instead, to examine the experience and behaviour of countries which sustain their people largely by the sale of manufactured products abroad. Switzerland is the best example."

Now then, what actually goes to make up the Swiss "solution" to the problem? Prof. Edwards himself warns against any simplification and stresses that the success of the Swiss high-quality industries rests on a convergence of many factors, or to put it in other words, that the union of various kinds of endeavour leads to success. It is impossible to mention all of them in this brief study. Some fundamental facts, however, can be referred to, though we shall have to extend the scope of the argument beyond what Prof. Edwards was talking about.

The first cause for the success of the Swiss was their will to work hard. This was occasioned no doubt by lack of raw materials and shortage of foodstuffs over the generations. In the last few decades, the rapid progress of scientific research in the service of industry has become a very important factor too. It has helped to bring about a silent revolution in the production process, whereas formerly it was thought that vocational efficiency and technical skill alone were decisive factors. The modern formula: Quality plus Research dates only from about 1930. In general, this formula means a combination of industrial research leading to pioneer achievements and a high level of mechanical and manual workmanship.

To carry on such research, private enterprise spend even larger sums of money in their own laboratories, experimental stations, plants for testing and developing new materials, etc. The amount spent may seem rather modest if you compare them with American figures. Nevertheless, their utility is considerable, because the exerted by the outward migration of qualified Swiss personnel.

Swiss lay great emphasis on "rational" research. Even in the planning stage the economy factor is given careful attention. In spite of this evident handicap, there is no lack of boldness and initiative. A convincing proof of this is what happens in the Swiss chemical and pharmaceutical industry, which considers the outcome very satisfactory if 500 experimental tests produce two technically or industrially useful results. Other prerequisites for high-quality planning and production are: a high level of general and technical education, provided by a good system of elementary and secondary schools, technical schools, universities and vocational and scientific institutes, above all, the Swiss Federal Institute of Technology in Zurich; great importance also attaches to the wise use of licences, i.e., either assumption of promising licences or, much more frequently, the turning over of discoveries to appropriate foreign concerns via licence agreements. Also important is the good spirit of cooperation in Switzerland among industrial management people, engineers, technicians and workers, and also that existing between industrial researchers and those engaged in pure scientific work at the Universities. This cooperation is more easily achieved in Switzerland than in larger countries, as most Swiss firms are small or merely of medium size.

Along with the general principles described above, there are a good many special considerations which have to be mentioned. In research as well as in production, private firms will not allow themselves to be beaten, not even by American competition, not in the lines of production they have once marked out for themselves. Their struggle for mere existence is often a very hard one. Wherever the Swiss have been able to achieve success, two factors have proved helpful to them. The first is intelligent use of construction types and styles which have stood the test of experience and practice. The second is careful study of the varying needs and wishes of clients in foreign countries. The satisfaction of clients is considered more important than standing orders or mass production. This conception is confronting the manufacturing industries with another series of problems. They are pioneering not so much in order to make great scientific discoveries as to produce improvements on details. Sometimes they will combine research, experiments and tricks. Although the above-mentioned "methods" led to outstanding successes up to 1964 in the export sector and in the country itself. It must be noted, however, that there is a growing sense of uneasiness with many industrialists and technical men regarding the future. The fear is mounting that in many vital new branches of industrial production—nuclear and space engineering, transistors and possibly biochemical production as well—the Swiss are no longer able to cope with the massive competition from foreign large-scale concerns, in either the capital or the labour sector. It is also feared that a negative influence will be

For this reason, an appeal is being made for government aid,



which has hitherto been lacking, and for intensified collaboration within industry. The latter has been greatly promoted spontaneously by national or international cooperation among research and development bodies attached to private firms in similar lines of industry, management being kept strictly separated. Also, the sale of licences, etc., was greatly stepped up, in some cases through the agency of licence-and-patent-exploitation companies. Also, within the strictly private sector, there has been some development of commission research and a promotion of joint laboratories, e.g., in the watch industry. Mention should also be made of government and private testing of materials. Finally, the greatest attention has recently been devoted by Swiss industry to automation and rationalization. It should be borne in mind that 30-38 per cent of industrial workers and office employees, engineers and technicians come from abroad. Internal rationalization within firms has scored notable successes even in small-scale enterprises. The employment of computers and other control systems has been so much increased that an international study has shown that Switzerland has now moved into second place, i.e., it is outranked only by the U.S.A. Nevertheless, all are agreed that priority in the competitive struggle continues to be a challenge to enterprise and engineers, implemented by concerted research, development and construction projects.

Along with increased efforts for "Research and Development", the Swiss Federal Council beginning of 1965 decided to institute a scientific council of thirteen men, representatives of universities, industry and Government, Cantons respectively. One of the main tasks of this new body consists in working out an overall survey—in so far as it does not yet exist—covering the work done by academic, industrial and governmental research laboratories and by the international joint research centres. This body intends to submit proposals for further development and possible intensified coordination to the top authorities of the country. As consulting body to the Federal Council the scientific council in its proposals should consider all aspects of a scientific, economic, financial and political nature. It is also entitled to consult experts on the matter.

These summary remarks are far from exhausting the subject. We ought as well to enlarge on the importance of good management and personal leadership. We could also go into the questions of general commercial policy, sound government, and social harmony. Industrial research must not be developed for narrow-minded or selfish interests. It must keep in close touch with basic science. The study of the foundations of science as well as scientific research must be able to rely on the assistance of flourishing universities, a uniformly high level of civilisation, all-round prosperity, and on a sufficient amount of wealth to make possible investments for research in all directions.

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