

Cultural Aspects of the Power System Automation Development

M. Kezunovic
Texas A&M University
Department of Electrical Engineering
U.S.A.

Abstract- This paper discusses the cultural impact on the power system automation development. A case study is presented for the U.S.A., Japan, England and Yugoslavia. An attempt is made to identify a pattern of some of the cultural influences on the power system automation industry.

I. Introduction

The power system automation industry covers devices and systems for data acquisition, control and protection used in the electric utility applications. This field has seen major changes in the past 20 years due to the introduction of computers and the VLSI technology (Kezunovic, 1988).

The power industry is well known for its conservative posture developed under a stringent requirement to supply electric power to the public and industries providing high quality and reliability of the service. Adapting the new technologies and solutions for the power automation equipment is not easy in this conservative industry since it has a good record of the service using the conventional technologies. The cultural aspect of this problem may give some clues in understanding the existing and future trends.

This paper concentrates on the case studies for various countries. The aim of these studies is to describe the author's impressions about the power system automation industry development in a given country or region. As a result, an attempt is made to recognize some basic patterns of the cultural influences on the industry development.

2. Case Study for Developed Countries

2.1. United States of America

The U.S.A. manufacturers and utilities have been pioneers in the research and development

activities in the power system automation industry. Some of the initial concepts for energy management control center and digital relaying development were introduced by the U.S.A. manufacturers and demonstrated by the utility pilot projects. However, the initial developments did not succeed in attracting the industrial support needed to introduce the new technology at a wider scale. This was primarily due to the lack of competition in the power automation industry in the U.S.A. which caused the manufacturers to rely primarily on the existing technology to increase the profits while the promotion of the new products was left for the future. This situation has been drastically changed by a recent appearance of some new small U.S.A. companies and by the acquisitions of the existing major U.S.A. equipment suppliers by the foreign companies.

2.2. Japan

The Japanese have a very recognizable behavior of taking some of the new technologies and perfecting them in a relatively short time. The power system automation industry is not any different. The Japanese have developed the greatest variety of power system automation products using microprocessor technology and their utilities have the largest number of these devices installed. The main obstacle to a world-wide distribution of these products is their high cost and the lack of features specific to different utility practices found in various countries. This is primarily due to the fact that the Japanese manufacturers are still not able to fully accept and understand the cultural aspects of the business in other countries.

2.3. England

England is known for its long tradition and leading role in the power industry. A cautious approach to introduction of new technologies has led to slow acceptance of the new ideas due to a conservative thinking that the computer technology may have major problems in surviving the harsh power system environment. As soon as this doubt was alleviated by various practical experiences, the introduction of microprocessor based devices was rather quick. However, the new concepts of device and system designs are still being evaluated and the current design trends follow the proven concepts implemented using previous technologies.

3. Case Study for Developing Countries

3.1. Eastern Europe

Most of the East European countries were deprived from some of the new technologies for quite a long time. This was due to some known geopolitical factors. However, recent changes in these countries have opened new opportunities for the power system automation development. The main driving factors for this may be the present need for improvements in technical solutions for the power automation industry as well as the present attitudes of people being unhappy with the past and being open to new ideas.

3.2. Yugoslavia

This country was always in a unique position in the east-west relation. It was opened to new technologies by purchasing products and services in the west. Also, an intensive communication with the rest of the world has enabled rather extensive transfer of the knowledge through cooperation of the Yugoslav engineers and scientists with their counterparts in the west. This led to development of several big domestic companies in the power system automation area. The Yugoslav utilities have also embarked on major advancements in applying the new technology (Kezunovic, 1986).

4. Pattern of the Cultural Influences

4.1. Important Cultural Aspects

Some major cultural aspects analyzed in this paper are: acceptance of new technologies, attitude toward research and development work, experience in product development and application, and the importance of the educational system in a society.

4.2. Lessons Learned

As for as the acceptance of new technologies is concerned, it was reasonable to expect that the western countries will be in the forefront. However, only Japan has shown consistency in this case with the general cultural desire to be world leader in new technologies. The U.S.A. and England have shown relatively slow acceptance of the new technology which was rather typical indication of the technical and economic recession. Yugoslavia, on the other hand, has shown a tremendous desire to implement new technologies. This has been

illustrated by the utility industry through purchase of the latest power system automation equipment. This is also illustrated by a common trend in the manufacturing industry of extensive purchasing of licenses for the new technologies.

An interesting observation is that all the countries mentioned have shown great interest in research and development. This shows a cultural attitude towards technological development, which is viewed as one of the major benefits to the society. Particularly amazing are the levels of R&D investment undertaken in Yugoslavia and some other Eastern European countries (Kezunovic, 1986). These investments were far beyond the investments in other product development segments. Experience in product development is directly tied to the level of industrial development of a given country. Excellent examples in this respect can be found in Japan with a good representation in the U.S.A. and England. The East European countries have major misconceptions about this issue due to the lack of experience in developing advanced production lines. This problem has been underestimated in Yugoslavia where some major power system automation developments did not succeed as products due to the limited understanding of the product development requirements.

The educational system has played a very limited role in the power system automation area in the U.S. A. and Japan, while the European countries have shown close cooperation between the industry and academia. The situation in the U.S.A. can be attributed to the crisis of the educational system while the situation in Japan is again due to the difficulties in introducing new ideas originated abroad. The attitude in Europe is consistent with an important role given to the educational systems.

5. Conclusions

This discussion indicates consistency between the trends in the power automation industry and the general cultural characteristics of the mentioned countries. It is interesting to note that this consistency is demonstrated in a rather conservative industry, which shows how strong these cultural characteristics indeed are. The U.S.A. cultural characteristic of open-minded and inquisitory desire to investigate new ideas are only demonstration in the R&D and utility application areas, while the manufacturing industry is not showing this trend. The economic recession may be an answer for this reversal of the known cultural trends.

The Japanese are showing strong consistency between the acceptance of the new technical

trends and their general cultural goal for technical domination. However, the old cultural characteristic of being closed to outside influences and staying away from global thinking is still being preserved since the new outside ideas are only being replicated and very few original concepts are introduced.

The cultural behavior of the British industry, being conservative and yet quite competitive world-wide, is preserved in the power system automation industry as well. Their respect for tradition is maintained by introducing the new technology only when absolutely needed and justified. Relatively slow trends in introducing new power system automation concepts is an illustration of the reluctance to rush with the new ideas before a clear need is identified.

Yugoslavia has a very mixed cultural background which has been reflected in quite different approaches regarding utilization of the new technologies. The utility industry was open to new ideas and products. This resulted in the purchase of products from different manufacturers with a desire to try various solutions. As mentioned earlier, the domestic industry was quite successful in the R&D work but not very successful in the product development area. This can be attributed to cultural characteristics of the developing countries where the desire for progress results in underestimation of the production development problems. However, this has resulted in the development of quite high technical knowledge of the professionals in the power system automation field, which in turn identifies Yugoslavia as a very open minded environment for future developments in this field.

6. References

1. Kezunovic, M. and Russell, B. (1988). Microprocessor Applications to Substation, Control and Protection. In: IEEE Computer Applications in Power, Vol. 1 No. 4.
2. Kezunovic, M., et. al. (1986). Application of Digital Computer Technology to the Implementation and Testing of an Integrated Substation Protection and Control System. In: 1986 CIGRE Session, Paper No. 34-11, Paris.