Comparison of Marketability Reinforcement Between the Japanese and German Machine Tool Industries

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This paper describes a comparison of marketability reinforcement approaches in both the Japanese and German machine tool industries. The study has been conducted using questionnaire and interview investigations, and in contrast to traditional comparative studies performed from the statistics aspect, stress is placed on the culture of the manufacturing point of view. The paper reveals the differing attitudes to the determination of design specifications intended to enhance marketability, and also to the choice of the reinforcement remedies based on the production morphology in both countries. Of these, the most marked finding is that international comparison should be carried out using a hierarchical methodology to guarantee authentic and reliable analyses, because a mono-layered interpretation is liable to provide only surface knowledge.

Keywords: Culture of manufacturing; Design specification; Hierarchical comparative methodology; International comparison; Machine tools; Marketability reinforcement; Production morphology

1. Introduction

In general, it has been believed that a technology system itself is applicable everywhere in the world without changing anything. In contrast, certain products, i.e. outcomes of a technology system, have been modified in their dimensional and functional specifications in accordance with the requirements of people, and also according to the technological, economic and social environments of each region. The shipping destination-oriented product has already become a reality, however, this product is regarded as being only a variant of the original. In addition, a considerable number of the products of already industrialised nations retain their basic features when they are exported to the industrialising nation. With the advance of globalisation in the production activity, however, universal applicability of a technology system appears to be a myth. This suggestion is supported by the following evidence:

1. The root cause of difficulty in technology transfer is, to some extent, derived from the reliance of the production technology on the cultural and mind-set aspects within each region.
2. The foreign transplant producer can raise achievement considerably, provided that the due amalgamation with social, cultural and racial facets of each region is successfully performed.

Furthermore, globalisation has a large effect on the concept of the product; a regional and racial trait-harmonised product, is appreciated. This product has recently been proposed along with some interesting trials [1], and is designed to be fully compatible with the technological, economic and social circumstances of each region in the world. Beside the proposal of the regional and racial trait-harmonised product, cultural difference-based manufacturing has already been conceptualised to develop such a product concept [2,3].

In addition to such influences of globalisation on the technology as mentioned above, the traditional method or methodology for international comparison is now required to change sufficiently, so that detailed discussion can be carried out for gaining an authentic and reliable understanding for the objective technology. International comparison for a technology system and/or product has so far been carried out by people belonging to the economics, social science, labour science and/or geopolitics disciplines, and emphasises their viewpoints. For instance, certain Japanese industrial sociologists have been very keen to analyse and predict the present and future trends of the marketability of a product using statistical data for its production, and import and export volumes. The engineer has not been interested in the research into the international comparison of product marketability, even though he or she is involved deeply in the design and manufacture of the product itself. In other words, international comparison must now involve a better understanding and reliable interpretation from the technology-based point of view. Because of the lack of technology-oriented consideration, the value of the outcome of the international comparison is reduced, sometimes giving, for example, the
incorrect result for the technology transfer. Neglect of engineering expertise is thus one of the serious faults in the traditional comparison methodologies used in economics and sociology. In short, with the advance of globalisation, a novel comparative methodology is required to improve and enhance those so far used, and the culture of manufacturing is considered to be one of the effective tools to respond to such a requirement. The culture of manufacturing is a synergy of production technology and the culture of each region, where the culture involves the historical and geopolitical backgrounds, racial traits, and mentality and appears to be a new academic area within the sphere of production technology. At present, a widely acceptable definition for the culture of manufacturing is not fixed; however, its future potential is forecast [3]. For instance, international comparison for a technology system can be carried out effectively, comprehensively and rationally, and also a new technology transfer methodology may be established, when incorporating certain viewpoints of the culture of manufacturing.

Thus, an international comparison has been carried out in this paper to provide evidence of what we can expect from the culture of manufacturing. The paper deals with marketability reinforcement in both the Japanese and German machine tool industries by comparing marketability from the facets of:

1. The determination of the design specifications.
2. Difference in the production flow, i.e. morphology in the production.
3. Remedies employed in each process of the production flow.

In this case, a small number of Japanese and German machine tool manufacturers have been chosen as representatives.

2. Traditional Methods for International Comparison and the Necessity of Developing a New Approach

When discussing the marketability of a product, the traditional method has so far emphasised economics, industrial sociology, labour science and work science aspects rather than the technology-based aspect. The following two methodologies have generally been employed.

1. The analyses of the present and future trends are carried out on the basis of the statistics related, for instance, to the change of the production volume, and also to the import and export volumes.
2. Based on the results obtained from the literature survey, and questionnaire investigations and interviews, the marketability is qualitatively investigated, emphasising international comparisons.

These traditional methods have been and are effective in certain cases, and have provided powerful remedies to enhance international competitiveness. In this context, Gordon and Krieger [4] have reported a typical result (Table 1), emphasising the marked difference in the objective product, manufacturing system and concerns in the Japanese, German and American machine tool industries. It is, for instance, obvious that the American manufacturer is facing serious problems related to the advance into the international market within the already industrialised nations, i.e. acute deficiency in international competitiveness. Tables 2 and 3 are the results of another case study, placing the main stress on the economical and sociological superiority, and also on advantageous and disadvantageous factors in the Japanese machine tool industry, respectively [5]. These suggestions are from the German industrial sociology point of view, and in turn have a considerable effect on the determination of the strategic guidelines to enhance the international competitiveness of the German machine tool industry. Table 4 summarises such guidelines for reinforcing the marketability of German machine tools.

As shown in these examples, the traditional method can be effective and can provide noteworthy remedies, to some extent, according to the value of the information, even when including some wrong information. In Table 2, for instance, Moritz and Moldaschl stated that the expanding market in neighbouring countries is one of the major cost-effective factors for the Japanese machine tool industry; however, this is no longer valid. In fact, the Taiwanese and Korean machine tool manufacturers have, at present, enough capacity to fulfil the inland requirement, and thus Japanese manufacturers can only export their products as mother machines.

In addition, these marketability analyses and international comparisons appear unsatisfactory from the technology-based point of view. For instance, Fig. 1 demonstrates the recent

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<tr>
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