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The Business Case for Translation of Transportation Documents

J. B. Metcalf, Freeport-McMoRan Professor, Louisiana State University

This paper is concerned with the impediments to the recognition, selection, and implementation in the United States of technologies developed and applied in non-English-language countries. One particular example, input to the 1985 AASHTO Highway Capacity Manual from German studies in 1972, indicates a thirteen-year delay in transfer of the technology due in large part to lack of translation. Clearly the potential for discovery of relevant material in these foreign sources is huge, but to locate, select, translate, and distribute pertinent publications is a complex problem.

The hypothesis is that an innovation adopted in the United States can be traced, in the English-language literature, to an earlier point at which the documentation language changes to that of the origin of the "foreign" process/practice/policy, etc. While the "research-based" and strictly "technical" publications (papers, reports, journal articles, etc.) may be traceable, this is less likely to be so for manuals, specifications, policy statements, and engineering practices. Such "fugitive" documentation is typically in national or provincial government publications not usually accessed as "technical" literature and not catalogued as such in many library collections.

An overreaching issue is that many innovations may not be adopted because of political, social, or economic factors specific to a local situation but not documented in any technical publications about the technological practice developed.

Due to time and resource constraints, only a small sample of the public domain documentation of transportation technologies was examined. Thus, though the results are considered to be robust, they should be regarded as strongly indicative rather than comprehensively proven.

Scanning Tour Reports

The study looked at the reports of the Federal Highway Administration (FHWA) Scanning Tours and attempted to link the recommendations of a scanning tour report to the supporting documentation and then to prior non-English publications.

An "imported" technology, and thus the related publication(s) for investigation, were identified from the reports' conclusions and then traced from the Tour report reference(s) to other publication(s) by the same author(s). The fifteen reports selected listed 187 references, not all cited in the texts. The online database sources searched were the Transport Research and Information System (TRIS; www.trb.org); COMPENDEX (www.engineering village2.org), available through the LSU library; and the International Transportation Research Database (ITRD; www.stn-international.de), available by courtesy of the Transportation Research Board and the host organization(s) of the author(s) where possible. Only innovations derived from non-English language sources are considered.

The traces of earlier work by authors cited in the Scanning Tour reports cannot be precise but should be enough to reveal major trends. The fact that many foreign-language references were revealed (1) illustrates the need for translation and (2) underscores the argument that earlier non-English publications do exist and are not often referenced.

There is a broad pattern among the references cited in the selected scanning tour reports and among the reference traces developed. First, there is a heavy reliance on English-language publications by foreign authors or organizations, with an emphasis on material published by the Transportation Research Board or presented at its annual meetings and, even more, on material in the proceedings of international specialty conferences. Second, the bulk of the non-English references traced were from conferences, journals, and organization reports. Third, a substantial amount of organization policy, guide, manual, and standard documentation was accessed and cited.

Imported Technologies Studies

A second approach to determining the value of translations is to seek expert opinion of technologies imported to the United States, the English documentation that initiated the transfer, and the earlier documentation in the language of the technology's origin. Some of the technologies suggested (e.g., SMA) were described in sufficiently explicit terms to allow a literature search for related publications; others (e.g., road design) were of a generic nature such as to be difficult to isolate, identify, and trace.

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Now you know.
SMA, introduced in the United States in the early 1990s, is being widely adopted for pavements where high stability under heavy traffic is required. Brown (1992) noted that SMA was already in use in Germany in the 1970s as a surfacing resistant to damage by studded tires and, later, in the 1980s to counter the effects of increased truck traffic volumes, higher axle loads, and higher truck tire pressures. The interest in the United States seems to have developed from, and after, the 1990 Asphalt Scanning tour [1] with work by Shercoman (1991) and several others in 1992 (Figure 1). The keyword search of the TRIS online database yielded eight hits from 1991. COMPENDEX gave twenty-one references dated from 1993. All these references were to English-language publications. A search of the ITRD database gave 169 references for the 1988–2002 period. It seems likely that other non-English publications would have occurred in this period (the 1980s) as European countries developed this SMA technology.

No patent application has been filed for this technology.

Much of this early SMA work apparently was unknown in the United States, so a "translation" delay of up to ten years could have existed.

The business case for translation of non-English publications rest on three propositions: (1) that the translation will add value, (2) that the material is accessible, i.e., that it is readily located and obtained in full text in a timely and economic manner, and (3) that the volume and distribution of material for translation is manageable.

In the TRB annual meetings, most papers came from Japan, the fewest from Germany. All three foreign author sets quoted extensively from English publications and sparingly from technical literature in their own language. It would seem that the selection of references is in part driven by the perceived audience. The inference is that a large proportion of the technical professionals in the academic and research fields in these countries have an excellent command of English as a second language and ensure that their work is published in English to achieve international exposure and recognition.

A review of the tour references and papers traced from them shows that a small number of journals carry a large proportion of significant, cited technical papers. A search of American library holdings was therefore made in the WorldCat (Table 1).

Note: The numbers do not necessarily mean the holdings are current or complete.

The inference must be that two simple and relatively inexpensive steps could materially improve U.S. access to foreign transportation technologies: (1) the creation of a "library of last resort" holding preferably complete but certainly

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**Figure 1. SMA Development Chart**

- 1960: late 1960s – Early studies in Germany and Sweden
- 1970: early 1970s – Development of SMA in Germany and Sweden
  - Asbestos prohibited
  - Studded tires prohibited in Germany
- 1980: early 1980s – Fibers introduced instead of asbestos
  - 1984 - SMA standard specification in Germany
  - Spread around Europe (Sweden, Denmark, France, Italy)
  - 1988 - SMA standard specification in Sweden
- 1990: 1990 – European Asphalt Study Tour
  - 1991 – European Asphalt Study Tour Report
  - 1991 – Test Project in Michigan
  - 1991 – Projects start in US

Different designs in Europe

20 yrs gap from first application

8 yrs gap from first spec

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current copies of the principal journals and major conference proceedings and (2) the establishment of ready access to the ITRD database.

In the course of the project, input was sought from a cross-section of individuals whose comments provided insight into the transfer process. Contact with previous scanning tour members proved elusive; many had changed jobs, moved, or retired. Much of the study tour material is thus effectively beyond retrieval. About half of the material considered by the tours was internal documentation, guides, manuals, etc.—the “fugitive” literature not in the usual public domain.

A difficulty often encountered was a perception that the cost of translating technical terms was too high. This seems strange considering the total cost of the tours and could be reviewed for future tours, including consideration of having an information specialist attached to scanning tour teams.

One trend noted by most respondents was that the degree of “loss” from lack of translation was decreasing quickly because (1) English has become so widely used in technical publications and conferences and (2) the increasing participation of many countries in international conferences has led to closer personal contacts in which language difficulties can frequently be overcome by use of pencil and paper. It also appears that many of our foreign counterparts have an adequate working knowledge of English.

Similarly, ready access to electronic media is facilitating closer and more frequent contact and broadening knowledge of current work in other countries, especially those that support English-language versions of organizational Web pages.

Overall, the deficiency for the United States is perhaps more one of knowledge of what is going on and what has been done—through full international database searches and with use of government Web sites—rather than a lack of translation of specific articles.

There are still some constraints on access to “fugitive” literature, but more and more government organizations are allowing access to documentation through Web sites. This should be encouraged.

Defining a value for translation of non-English technical publications is extremely difficult due to the very many factors influencing the adoption of a foreign technology. Not least among these factors are the social, economic, and environmental constraints that differ among regions in the United States as well as between the United States and other countries. The route to a business case must perfce lie in demonstrating that (1) some imported technologies have resulted in savings to the United States, (2) these savings could potentially have been greater had the technologies been adopted earlier, and (3) this delay in adoption was at least partially due to lack of translation of appropriate technical documentation. NCHRP (2001) provided a first estimate of potential economic benefits, suggesting a range of $10 million to $1 billion per year (0.01 to 1 percent of surface transportation disbursements).

In this study, the approach has been to seek some imported technology for which demonstrable benefits are claimed and to attempt to place a value on those benefits.

Stone mastic asphalt (SMA) performed efficiently in Europe for more than twenty years, with enhanced resistance to rutting and damage from studded tires (Pierce, 2000). Germany reported 25 percent longer service than with traditional dense HMA, and Sweden 20 percent longer service (Scanning Tour [1] 1990). The time scale for transfer of this technology is shown in Figure 1.

In the United States, Brown et al. (1997) summarized 140 projects reporting that most SMA had been laid as overlays, with an overall performance ranging from very good to excellent. It seems that costs may be 10 percent higher, but if an increase in life of 20–25 percent can be

<table>
<thead>
<tr>
<th>Journal</th>
<th>Language</th>
<th>Number of USA Libraries</th>
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<tbody>
<tr>
<td>Review General des Routes et Aerodromes</td>
<td>French</td>
<td>16</td>
</tr>
<tr>
<td>Routes/Roads</td>
<td>French/English</td>
<td>7</td>
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<td>German</td>
<td>13</td>
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<td>Autostrade</td>
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<tr>
<td>Beton</td>
<td>German</td>
<td>4</td>
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<tr>
<td>Forschung Strassenbau und Strassenverkehrstechnik</td>
<td>German</td>
<td>5</td>
</tr>
<tr>
<td>Bitumen</td>
<td>German</td>
<td>8</td>
</tr>
<tr>
<td>Strassen und Tiefbau</td>
<td>German</td>
<td>14</td>
</tr>
</tbody>
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Table 1. Foreign Transportation Journal Holdings in American Libraries
achieved, there is real economic benefit. If we assume 1 percent of the $25 billion maintenance expenditure is for asphalt and this can be reduced by 20 percent by using SMA, then an annual benefit of $50 million is predicated. Even assuming only 0.1 percent of the annual maintenance costs can be saved, the value of earlier use of the technology is $5 million a year.

Set against these benefits, the costs of an "information clearing house" (NCHRP 2001) do not seem excessive. Given that translation software is independently and rapidly developing, it would seem that a foreign language literature translation service could be added to the proposed national transportation library for a relatively modest cost in software and multilingual personnel.

Conclusions

This study of technologies imported from non-English language sources has yielded evidence that the limited availability of translations of non-English documentation of foreign technologies, policies, practices, and products has delayed their adoption in the United States.

The routes by which a technology is detected, imported, and implemented are complex. Therefore, it is not possible to present a series of specific conclusions as to those routes and, thus, a specific, dollar-quantified "business case" for translations of non-English documentation, especially where the technology is not a specific method, process, or product but a more diffuse policy or practice. However, an estimate of the value for specific technical innovations lies around $100M per year. Advances in road design and traffic calming, for example, have been adapted or developed from overseas innovations, but the specifics are impossible to isolate and identify as to source. The Seattle traffic-calming experience alone showed reduced overall accident costs estimated at $2M per year.

It is important to recognize that this short-term study is based principally on the published technical literature. It recognizes the importance of documentation such as government policy and procedure publications, but does not analyze in depth and can only partially identify such "fugitive" material. Nor does it deal with "commercial" or "trade" reports not generally accessible to the public.

Within the above limitations, it is possible to draw some strong inferences about the role of documentation and to formulate initial recommendations in regard to access to foreign sources.

The transfer of technologies from Japan requires further investigation and evaluation. Clearly, in some fields, such as bridges, tunnels, and advanced traffic management, there is much to be learned. This study also has not considered material now developing in newly industrializing regions, such as Asia and Latin America, where some further study may be warranted. China, for example, is not considered.

Throughout the study, it has been very evident that direct observation "on site" and personal contact between professionals is a most effective technology transfer route.

Recommendations

The actions necessary to eliminate, or at least substantially reduce, this delay in implementation of foreign transportation technologies include:
—developing a "library of last resort" (or a group of libraries) for foreign-language transportation literature to develop and maintain a comprehensive collection of foreign journals across the appropriate fields;
—introducing a mechanism to provide and encourage access to the ITRD database, possibly with a requirement that all NCHRP proposals include an ITRD search and all NCHRP proposals document and translate the relevant foreign literature;
—encouraging access to foreign transportation Web sites by linking at the ITRD Web site access point;
—linking to the library a "translation on demand" service at subsidized cost to encourage ready access to the non-English material for interested/qualified researchers/professionals;
—disseminating translated material widely;
—linking to the collection an abstracting/ translating service of (at least) titles and, preferably, abstracts, in English, of the principal technical papers in these journals. This approach could also include consideration of some mechanism to encourage publishers of significant foreign-language journals to include such English language abstracts at source;
—encouraging document exchange processes with major transportation authorities overseas to create and implement access to "public" documentation, such as departmental guides to practice, manuals for design, etc. (note: this could involve copyright and access issues);
—providing a "monitoring" service of journals, projects, etc., possibly through FHWA/TRB/universities/embassies;
—continuing the Scanning Tours, with closer attention to collection, translation, and dissemination of the relevant foreign-language documentation. Assignment of an information expert to assist each tour leader and more detailed reporting of discussions and observations could be to advantage;
—continuing support to and participation in the major international organizations, e.g., PIARC, OECD, etc., and, specifically, distribution/provision of the PIARC technical dictionary;
—developing/expanding exchanges between professional staff of the federal and state transportation organizations and universities and overseas organizations;
—actively encouraging personal professional contact;
—further evaluating the publications emanating from Japan and the newly industrializing countries of Latin America, Eastern Europe, and Asia.

References


