Overview of the HPM (High Performance Manufacturing) Project

Tomoaki SHIMADA
21/March/2014
Objective of the HPM (High Performance Manufacturing) Project

To comparatively analyze the requirements for competitive manufacturing and the linkages among various decisions, systems, and practices in operations function, based on the data collected from manufacturing companies through questionnaires and the relevant measurement scales.
History of the HPM (High Performance Manufacturing) Project

- Round 1 (started in 1988): 45 plants in U.S.A.
- Round 2 (started in 1993): 164 plants in Germany (33), Italy (34), Japan (46), U.K. (21), and U.S.A. (30).
- Round 3 (started in 2002): 339 plants in 11 countries of Austria (21), Brazil (22), China (51), Finland (30), Germany (41), Italy (27), Japan (35), Korea (31), Spain (28), Sweden (24), and U.S.A. (29)
- Round 4 (started in 2012/2013): More than 500 plants in 18 countries of U.S.A., Canada, Brazil, Japan, South Korea, India, China, Taiwan, Germany, France, Spain, Italy, Sweden, Finland, Switzerland, Turkey, Israel, and Southeast Asia (Singapore, Malaysia, Thailand, Indonesia, Philippines, and Vietnam) <EXPECTED>.
### Top 15 Countries by Share of Global Nominal Manufacturing Gross Value Added

<table>
<thead>
<tr>
<th>Rank</th>
<th>Year 1980</th>
<th>Year 1990</th>
<th>Year 2000</th>
<th>Year 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>United States</td>
<td>United States</td>
<td>United States</td>
<td>United States</td>
</tr>
<tr>
<td>2</td>
<td>Germany</td>
<td>Japan</td>
<td>Japan</td>
<td>China</td>
</tr>
<tr>
<td>3</td>
<td>Japan</td>
<td>Germany</td>
<td>Germany</td>
<td>Japan</td>
</tr>
<tr>
<td>4</td>
<td>United Kingdom</td>
<td>Italy</td>
<td>China</td>
<td>Germany</td>
</tr>
<tr>
<td>5</td>
<td>France</td>
<td>United Kingdom</td>
<td>United Kingdom</td>
<td>Italy</td>
</tr>
<tr>
<td>6</td>
<td>Italy</td>
<td>France</td>
<td>Italy</td>
<td>Brazil</td>
</tr>
<tr>
<td>7</td>
<td>China</td>
<td>China</td>
<td>France</td>
<td>South Korea</td>
</tr>
<tr>
<td>8</td>
<td>Brazil</td>
<td>Brazil</td>
<td>South Korea</td>
<td>France</td>
</tr>
<tr>
<td>9</td>
<td>Spain</td>
<td>Spain</td>
<td>Canada</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>10</td>
<td>Canada</td>
<td>Canada</td>
<td>Mexico</td>
<td>India</td>
</tr>
<tr>
<td>11</td>
<td>Mexico</td>
<td>South Korea</td>
<td>Spain</td>
<td>Russia²</td>
</tr>
<tr>
<td>12</td>
<td>Australia</td>
<td>Mexico</td>
<td>Brazil</td>
<td>Mexico</td>
</tr>
<tr>
<td>13</td>
<td>Netherlands</td>
<td>Turkey</td>
<td>Taiwan</td>
<td>Indonesia²</td>
</tr>
<tr>
<td>14</td>
<td>Argentina</td>
<td>India</td>
<td>India</td>
<td>Spain</td>
</tr>
<tr>
<td>15</td>
<td>India</td>
<td>Taiwan</td>
<td>Turkey</td>
<td></td>
</tr>
</tbody>
</table>


**NOTE:** Based on IHS Global Insight database sample of 75 economies, of which 28 are developed and 47 are developing. Manufacturing here is calculated top-down from the IHS Global Insight aggregate; there might be discrepancy with bottom-up calculations elsewhere.

**SOURCE:** IHS Global Insight; McKinsey Global Institute analysis
Manufacturing Categories

Manufacturing is diverse: We identify five broad groups with very different characteristics and requirements.

Our Focus

Target Manufacturing Categories

Each country will collect at least 10 samples from the following three categories. *Ideally*, 5 should be world-class and multi-national manufacturers with "high performance reputation", and the other 5 should be traditional and local manufacturers as "general industry plants":

- **Machinery manufacturers**
  
  (e.g., manufacturers of precision machine, manufacturers of assembly equipment, manufacturers of process equipment, manufacturers of metal cutting tools, manufacturers of measuring instruments, etc.)

- **Auto suppliers (or vehicle components suppliers)**
  
  (e.g., automobile manufacturers, manufacturers of automobile components such as screws, connectors, batteries, and car audio, train manufacturers, manufacturers of train components, airplane manufacturers, manufacturers of airplane components, etc.)

- **Electronics manufacturers**
  
  (e.g., audio/visual equipment manufacturers, manufacturers of audio/visual equipment components, IT equipment manufacturers, manufacturers of IT equipment components, electrical parts manufacturers, electronics parts components, contract manufacturers, etc.)
Questionnaire Survey

• We can study cause-effect relationships of different practices/concepts using statistical tools.

  Cause A
  (e.g., practices)

  Effect
  (e.g., performance)

  Cause B
  (e.g., environments)

• However, the data are perceptional (i.e., subjective). It is because we cannot obtain objective data. For example, quality. There are no standard measurements across the countries.
Issues in Questionnaire Survey

• Biases
  – Cognitive Bias
  – Selection Bias
  – Non-response Bias
  – Common Method Bias

• Reliability
  – Cronbach's Alpha

• Validity
  – Convergent and Discriminant Validity
Areas of the Questions in Round 4

Compared to the question sets in Round 3, the information systems section and the supply chain management section are expanded, and the environmental sustainability section is newly added.

• Accounting
• Constraint Management
• Environment
• Human Resource Management
• Improvement
• Information Systems/Information Technology
• JIT

• Manufacturing Strategy
• New Product Development
• Performance
• Quality Management
• Supply Chain Management
• Sustainability
• Technology
• Total Productive Maintenance
Respondents for the Round 4

12 respondents in each plant:
• Plant Account Manager
• Downstream Supply Chain Manager
• Environment Affairs Manager
• Human Resource Manager
• Information Systems Manager
• Plant Manager
• Process Engineer
• Product Development Manager
• Production Control Manager
• Quality Manager
• Supervisor
• Upstream Supply Chain Manager

If the company does not have anyone in each of the management positions, an individual who is the most qualified on that topic should complete the form.
Questionnaire Survey

• Most questions were asked using Likert scales (i.e., 1: strongly disagree; 2: disagree; 3: slightly disagree; 4: Neutral; 5: slightly agree; 6: agree; and 7: strongly agree).

• To measure “customer satisfaction”, 5 direct laborers, a quality manager, and a superintendent answered the following 6 questions.

QSCSN01 Our customers are pleased with the products and services we provide for them.
QSCSN02 Our customers seem happy with our responsiveness to their problems.
QSCSN04 We have a large number of repeat customers.
QSCSN05 Customer standards are always met by our plant.
QSCSN06 Our customers have been well satisfied with the quality of our products, over the past three years.
QSCSR07 In general, our plant’s level of quality performance over the past three years has been low, relative to industry norms.
Questionnaire Survey

• To measure “continuous improvement”, 5 direct laborers, a quality manager, and a superintendent answered the following 5 questions.

QSVIN01 We strive to continually improve all aspects of products and processes, rather than taking a static approach.

QSVIN02 If we aren’t constantly improving and learning, our performance will suffer in the long term.

QSVIN03 Continuous improvement makes our performance a moving target, which is difficult for competitors to attack.

QSVIN04 We believe that improvement of a process is never complete; there is always room for more incremental improvement.

QSVIN05 Our organization is not a static entity, but engages in dynamically changing itself to better serve its customers.
High Performance Manufacturing Project

Sample Questions for Plant Manager

This questionnaire is part of a study of global high performance manufacturing practices in your industry being conducted by researchers at universities around the world, including Canada, England, Finland, Germany, Italy, Japan, Korea, Spain, Sweden and the United States. By participating in this project, you will help us to provide your organization with important information, allowing comparison of practices in your plant to other plants in your organization and to other organizations in your industry, throughout the world. Our goal is to determine which key practices are related to high performance.

Please respond to the following questions, to the best of your knowledge. When you have completed the questionnaire, please put it into the enclosed envelope, seal it and return it. You may leave any items that you do not wish to answer blank. Your answers will remain confidential and will be reported back to your organization only as part of summary data, such as averages. If you choose not to participate in this project, please notify us immediately, so that an alternative participant may be selected.
What are the benefits for the participating manufacturers?

• We will issue a benchmarking report of each company against all the other companies participating in the HPM Project.
• Each participating manufacturer can obtain feedback on what items are better/worse than other companies in the same industry in the world. Therefore, the management can assess the company's performance (e.g., productivity), and improve weaknesses and/or enhance strengths.
## Sample Benchmarking Report

### Quality Practices Ratings

<table>
<thead>
<tr>
<th>Code</th>
<th>Item</th>
<th>Your Company</th>
<th>The Industry Average</th>
<th>The Whole Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>QSCS</td>
<td>Customer Satisfaction</td>
<td>4.92</td>
<td>4.86</td>
<td>4.80</td>
</tr>
<tr>
<td>QSTP</td>
<td>Top Management Leadership for Quality</td>
<td>6.00</td>
<td>6.05</td>
<td>5.94</td>
</tr>
<tr>
<td>QSPW</td>
<td>Cleanliness and Organization</td>
<td>5.80</td>
<td>5.35</td>
<td>5.31</td>
</tr>
<tr>
<td>QSTC</td>
<td>TQM: Top Management Leadership for Quality</td>
<td>4.64</td>
<td>5.08</td>
<td>4.94</td>
</tr>
<tr>
<td>QSCO</td>
<td>Customer Involvement</td>
<td>5.87</td>
<td>5.47</td>
<td>5.38</td>
</tr>
<tr>
<td>QSFB</td>
<td>Feedback</td>
<td>5.69</td>
<td>5.28</td>
<td>4.88</td>
</tr>
<tr>
<td>QSVO</td>
<td>Organization-Wide Approach</td>
<td>5.29</td>
<td>5.27</td>
<td>5.28</td>
</tr>
<tr>
<td>QSVM</td>
<td>Prevention</td>
<td>5.51</td>
<td>5.47</td>
<td>5.38</td>
</tr>
<tr>
<td>QSPS</td>
<td>Process Control</td>
<td>5.40</td>
<td>5.02</td>
<td>4.70</td>
</tr>
<tr>
<td>QSSU</td>
<td>Supplier Partnership</td>
<td>5.00</td>
<td>5.11</td>
<td>4.98</td>
</tr>
<tr>
<td>QSSP</td>
<td>Supplier Quality Involvement</td>
<td>5.14</td>
<td>5.00</td>
<td>4.86</td>
</tr>
<tr>
<td>QSVC</td>
<td>Customer Focus</td>
<td>5.49</td>
<td>5.36</td>
<td>5.34</td>
</tr>
</tbody>
</table>
Sample Benchmarking Report

Green indicates your company
Red indicates the industry average
Blue indicates the whole average
So we are looking for manufacturers that would like to participate in the 4th Round HPM Questionnaire Survey Project!!!
Thank you for your attention.

Q&A