Faculty of Technology Management and Technopreneurship

FACTORS INFLUENCING IMPLEMENTATION OF ADVANCED MANUFACTURING TECHNOLOGY IN MALAYSIAN AND INDONESIAN SMALL AND MEDIUM ENTERPRISES

Jani Rahardjo

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FACTORS INFLUENCING IMPLEMENTATION OF ADVANCED MANUFACTURING TECHNOLOGY IN MALAYSIAN AND INDONESIAN SMALL AND MEDIUM ENTERPRISES

JANI RAHARDJO

A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy

Faculty of Technology Management and Technopreneurship

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2015
DECLARATION

I declare that this thesis entitled “Factors Influencing Implementation of Advanced Manufacturing Technology in Malaysian and Indonesian Small Medium Enterprises” is the result of my own research except as cited in the references. This thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature : 

Name : Jani Rahardjo

Date : May 2015
APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Doctor of Philosophy

Signature : 

Supervisor Name : Prof. Dr. Salleh Bin Yahya

Date : May 2015
DEDICATION

I would like to dedicate this dissertation to my family and my parents in peace. There is no doubt that without their continual support and counsel I would not have completed this piece of work.
Small and Medium Enterprises (SME) play a vital role in boosting a country's economic development. While a huge number of SME have been founded, the total contribution to the Gross Domestic Product (GDP) is considered to be small compared to the contribution of large companies. In this sense, one way to boost competitiveness is through implementing Advanced Manufacturing Technology (AMT); whereas large companies have no issue in implementing it, it is not the case for SME. This study then examined the prospect of implementing AMT in Malaysian and Indonesian SME. Structural Equation Modeling was arranged for analyzing variables covering Critical Success Factors (CSF), Obstacles, Organizational Characteristics, Strategic Alliances and Monitoring in every stage of the implementation. An approximately 535 samples of data used in this study were SME in food, herbs, and craft industry in Malaysia and Indonesia. Smart Path Least Square (PLS) was used to analyze the model. In conclusion, it was found that the AMT implementation had a significant impact on the performance of Malaysian SME but it did not have any significant impact on the performance of Indonesian SME. This might be due to the fact that AMT implementation in Indonesian SME was generally low. Also, Indonesian SME used hard AMT more than soft AMT. The hard AMT was used as the substitution for labor functions such that AMT has not been optimized the support from soft AMT. Next, the factors that gave significant impacts on the AMT implementation were Strategic Alliances, Monitoring, and Critical Success Factors while the others, namely Obstacles and Organizational Characteristics, gave no significant impact on the AMT implementation. For the Malaysian SME, good leadership was the critical success factor for the AMT implementation, while for Indonesian SME it was organizational culture. Several Strategic alliances significantly affected the success of AMT implementation; they were strategy alliances with vendors, universities and government for Malaysian SME, and strategic alliances with vendors, customers, and government for the Indonesian SME. Monitoring also gave a significant impact on the success of AMT implementation, especially monitoring in humanware for AMT implementation in Malaysian SME and monitoring in technoware for AMT implementation in Indonesian SME. The strategic alliances had a particularly different level and priority in every stage of the AMT implementation. At the early stage of AMT implementation, Malaysian SME needed to make an alliance with university, while the Indonesian SME needed to make an alliance with vendor. At the installation phase, Malaysian and Indonesian SME needed to collaborate with vendors and the government. Furthermore, at the growth stage, Malaysian SME needed to make an alliance with the university, while the Indonesian SME needed to make an alliance with the government. Monitoring of the AMT implementation in every stage was different for both Malaysian and Indonesian SME. For Malaysian SME, monitoring at the pre-installation and installation stage was mainly important on orgaware and humanware, while monitoring at the growth stage was on orgaware. For Indonesian SME, monitoring every stage was relatively at the same level, which was mainly on technoware. This research then gave Malaysian and Indonesian SME new insights into the implementation of AMT. In short, to be successful in
implementing AMT as an attempt to boost SME’s performance, SME should take into account the strategic alliances and monitoring factors.
UKM Indonesia, pemantauan di setiap peringkat lebih kurang sama, melibatkan 'technoware'. Hasil kajian ini telah memberikan senario baru dalam pelaksanaan IKS di Malaysia dan Indonesia, selain dapat merumuskan bahawa kerjasama strategik dan faktor-faktor pemantauan adalah penentu kejayaan kepada pelaksanaan AMT di IKS.
ACKNOWLEDGEMENT

While writing this dissertation, I was fortunate enough to have a supervisor whose support and involvement took many forms.

Prof Dr. Salleh Yahya, my supervisor from the beginning of my doctoral program, has been unfailingly supportive. He has provided me with insight and motivation necessary for the completion of this dissertation. He has also made major stylistic and editorial contribution to this dissertation for which I am grateful. I was lucky to have the opportunity to work closely with him.

Dr. Budi has been supportive on my effort to take the doctoral program. His generous involvement has encouraged me to take doctoral program in Malaysia. I thank him for his friendship throughout the years.

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<td>Activity Based Costing</td>
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<td>AMT</td>
<td>Advanced Manufacturing Technology</td>
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<td>ANOVA</td>
<td>Analysis of Variance</td>
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<td>AVE</td>
<td>Average Variance Extracted</td>
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<td>BC</td>
<td>Bar Coding</td>
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<td>BSR</td>
<td>Buyer-Supplier Relationship</td>
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<td>CAD</td>
<td>Computer Aided Design</td>
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<td>CIM</td>
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<td>CNC</td>
<td>Computer Numerical Control</td>
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<td>CSF</td>
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<td>EDI</td>
<td>Electronic Data Interchange</td>
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<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<td>FMS</td>
<td>Flexible Manufacturing System</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>HACCP</td>
<td>Hazards Analysis Critical Control Point</td>
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<td>HVAC</td>
<td>Heating Ventilation and Air Conditioning</td>
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<td>IMP</td>
<td>Industrial Master Plan</td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
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<td>JIT</td>
<td>Just In Time</td>
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<td>LAN</td>
<td>Local Area Network</td>
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<td>Medium Enterprise</td>
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<td>MIES</td>
<td>Micro Enterprises</td>
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<td>MIS</td>
<td>Management Information System</td>
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<td>MITI</td>
<td>Ministry of International Trade and Industry</td>
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<td>MP</td>
<td>Malaysia Plan</td>
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<td>NIES</td>
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<td>OSHAS</td>
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<td>PCA</td>
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<td>PLS-SEM</td>
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<td>OEE</td>
<td>Overall Efficiency Equipment</td>
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<td>QC</td>
<td>Quality Control</td>
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<td>QFD</td>
<td>Quality Function Deployment</td>
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<td>RFID</td>
<td>Radio Frequency Identification</td>
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<td>R&amp;D</td>
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<td>SCM</td>
<td>Supply Chain Management</td>
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<td>SE</td>
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<td>SME</td>
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<td>SMIDEC</td>
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<td>SPC</td>
<td>Statistical Process Control</td>
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<td>SQR</td>
<td>Square Root</td>
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<td>TLC</td>
<td>Technology Life Cycle</td>
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<td>TQM</td>
<td>Total Quality Management</td>
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