Alternative manufacturing developments from the semi-periphery: the case of human-centered manufacturing approach in Brazil

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ALTERNATIVE MANUFACTURING DEVELOPMENTS FROM THE SEMI-PERIPHERY: THE CASE OF HUMAN-CENTRED MANUFACTURING APPROACH IN BRAZIL

A thesis submitted in partial fulfilment of the requirements for the award of the degree

DOCTOR OF PHILOSOPHY

from

THE UNIVERSITY OF WOLLONGONG

by

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I declare that work presented in this dissertation is original, except where otherwise acknowledged.

June 1998

Gustavo A.C. Guzman
ABSTRACT

The key research question of this study is to determine if Brazilian firms are applying the human-centred manufacturing approaches and if so, to explore how and to what extent this is happening. From this, two related research topics emerge: (i) how macro contextual conditions support or constrain the implementation of the HC model; and (ii) which are the main technical and organisational features of a 'tropicalized' (adapted) HC model in Brazilian firms. In order to address these questions, case studies were carried out in 10 Brazilian firms. The aim of the empirical study was to determine the form and level of human-centredness in these firms and to explore the factors affecting this. An examination was then made of the patterns of human-centred development and its links with product, process and environmental factors, identified in the literature as key influences on HC systems developments. Two theoretical approaches were used to inform the empirical component of this study in order to explain the application of New Production Systems and, specifically the Human-centred approach in the semi-periphery. Firstly, the examination at the level of the firm, integrates constructivist views of people, technology and organisation with the concept of manufacturing engineering systems as well as the organisation configuration approach. This helps to understand "how" the human-centred approach was applied in Brazil. Secondly, a political economy examination of the macro contextual factors assisted to understand "why" related questions. Key findings of this study refer to the wide range of adaptation to local conditions of new production systems. This is explained by contextual institutional factors, such as industrial relations and regional labour markets. In contrast to established human-centred theory, the degree of human-centredness in the organisational arena was not strongly linked to either (i) human-centred designed technology; (ii) to new product market variety and change; or (iii) characteristics of the firm.
ACKNOWLEDGEMENTS

Thanks God for give me health to be able to advance one step more.

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To all them "muchas gracias"
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<th>Description</th>
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<tr>
<td>AMT</td>
<td>Advanced manufacturing technology</td>
</tr>
<tr>
<td>APS</td>
<td>Anthropocentric production systems</td>
</tr>
<tr>
<td>BRITE</td>
<td>Basic research in industrial technologies for Europe</td>
</tr>
<tr>
<td>CAD</td>
<td>Computed-aided design</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer-aided manufacturing</td>
</tr>
<tr>
<td>CIM</td>
<td>Computer integrated manufacturing</td>
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<tr>
<td>CLP</td>
<td>Capitalistic labour process</td>
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<tr>
<td>CNC</td>
<td>Computer numerical control</td>
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<tr>
<td>CPU</td>
<td>Central process unit</td>
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<tr>
<td>DQP</td>
<td>Diversified quality production</td>
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<tr>
<td>ESPRIT</td>
<td>European strategic program for research and development in information technology</td>
</tr>
<tr>
<td>EURAM</td>
<td>European research for advanced materials</td>
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<tr>
<td>HC</td>
<td>Human-centred</td>
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<tr>
<td>HCMS</td>
<td>Human-centred manufacturing systems</td>
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<tr>
<td>IBGE</td>
<td>Instituto Brasileiro de geografia e estatistica</td>
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<tr>
<td>FAST</td>
<td>Forecasting and assessment in Science and Technology</td>
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<tr>
<td>FDI</td>
<td>Foreign direct investment</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>GNP</td>
<td>Gross national product</td>
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<td>GT</td>
<td>Group technology</td>
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<td>ITC</td>
<td>Indigenous technological capability</td>
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<td>ISI</td>
<td>Import substitution industrialisation</td>
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<td>JIT</td>
<td>Just-in-time</td>
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<td>MES</td>
<td>Manufacturing engineering systems</td>
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<td>MNC</td>
<td>Multinational companies</td>
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<td>NC</td>
<td>Numerical control</td>
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<tr>
<td>NCMT</td>
<td>Numerical control machine tool</td>
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<td>NIC</td>
<td>Newly industrialised country</td>
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<td>NPC</td>
<td>New production concepts</td>
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<td>NSI</td>
<td>National systems of innovation</td>
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<td>OEM</td>
<td>Original equipment manufacturer</td>
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<tr>
<td>PCF</td>
<td>Product customisation feasibility</td>
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<td>PPC</td>
<td>Production planning and control</td>
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<tr>
<td>R &amp; D</td>
<td>Research and development</td>
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<tr>
<td>SBIC</td>
<td>Study of the Brazilian industrial competitiveness</td>
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<tr>
<td>SENAI</td>
<td>Servicio nacional de aprendizado industrial</td>
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<tr>
<td>SOE</td>
<td>State-owned enterprise</td>
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<tr>
<td>SPC</td>
<td>Statistical process control</td>
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<tr>
<td>STS</td>
<td>Science, Technology and Society</td>
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<tr>
<td>S &amp; T</td>
<td>Science and technology</td>
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<tr>
<td>TNC</td>
<td>Transnational companies</td>
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<tr>
<td>TQM</td>
<td>Total quality management</td>
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<tr>
<td>TU</td>
<td>Trade union</td>
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<tr>
<td>UMIST</td>
<td>University of Manchester institute of science and technology</td>
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<tr>
<td>WIP</td>
<td>Work in-process</td>
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