RELATIONSHIP OF SUPPLY CHAIN CAPABILITIES AND SUPPLY CHAIN TECHNOLOGY ADOPTION TOWARDS SUPPLY CHAIN OPERATIONAL PERFORMANCE IN TEXTILE AND APPAREL INDUSTRY

LEE KHAI LOON

DOCTOR OF PHILOSOPHY
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By

LEE KHAI LOON

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ABSTRACT

In today’s dynamic business environment, competition is no longer between firms, but between supply chains. The supply chain dependency leads the business focused on supply chain performance. Considering the importance given to the third industrial master plan by the Malaysia government, current supply chain environment accentuated the need of supply chain technology adoption to facilitate supply chain management. To explain the concerns, this study examined the impact of supply chain capabilities namely, relational capability, information technology capability, and organizational culture capability on supply chain operational performance and supply chain technology adoption. This study also examines the successive impact of supply chain technology adoption on supply chain operational performance and investigates whether supply chain technology adoption mediates supply chain capabilities and performance relationship under study. In order to achieve the research objectives, a two-step approach namely quantitative research method and a triangulation research approach are necessitated. 201 survey questionnaires were distributed to respondents in Malaysian textile and apparel organizations. 121 usable responses representing 60% response rate were empirically tested through structural equation modeling by using SPSS and SmartPLS. Research findings revealed that relational capability, organizational culture capability, and supply chain technology adoption contributed to firm’s supply chain operational performance, whereas, information technology capability was insignificant. The findings further revealed that supply chain capabilities have a positive influence to supply chain technology adoption. The findings also revealed a significant mediation effect of supply chain technology adoption in the model under study. A triangulation research approach was employed through face-to-face interviews with four industry practitioners to get their in-depth experiences and perceptions on the model under study. ATLAS.ti results showed that developed model had achieved agreement of industry experts with the suggestion of two emerging terms (human support and work experience) as moderators for future study on the model. Limitations and recommendations for future study are discussed.

**Keywords:** supply chain capabilities, supply chain technology adoption, supply chain operational performance, textile and apparel industry, Malaysia
ABSTRAK

Dalam persekitaran perniagaan yang dinamik pada hari ini, persaingan tidak lagi melibatkan antara sesebuah firma, tetapi turut melibatkan antara rantaian bekalan. Pergantungan kepada rantaian bekalan ini menyebabkan perniagaan memberikan tumpuan ke atas prestasi rantaian bekalan. Dengan mempertimbangkan kepentingan yang ditekankan dalam pelan induk perindustrian ketiga oleh kerajaan Malaysia, persekitaran semasa rantaian bekalan telah mendedahkan keperluan penggunaan teknologi rantaian bekalan untuk memudahkan pengurusan rantaian bekalan. Sehubungan dengan itu, kajian ini meneliti impak keupayaan rantaian bekalan yang meliputi keupayaan hubungan, keupayaan teknologi maklumat, dan keupayaan budaya organisasi terhadap prestasi operasi rantaian bekalan dan penggunaan teknologi rantaian bekalan. Kajian ini turut mengkaji impak penggunaan teknologi rantaian bekalan terhadap prestasi operasi rantaian bekalan serta menyelidik sama ada penggunaan teknologi rantaian bekalan merupakan pengantara kepada prestasi dan keupayaan rantaian bekalan yang dikaji. Untuk mencapai objektif kajian, dua pendekatan, iaitu kaedah penyelidikan kuantitatif dan pendekatan penyelidikan triangulasi diperlukan. Sebanyak 201 borang soal selidik telah diedarkan kepada responden di organisasi tekstil dan pakaian Malaysia. Sebanyak 121 jawapan soal selidik yang mewakili 60% kadar maklum balas telah diuji secara empirikal melalui pemodelan persamaan struktur dengan menggunakan SPSS dan SmartPLS. Hasil kajian menunjukkan bahawa keupayaan hubungan, keupayaan budaya organisasi, dan penggunaan teknologi rantaian bekalan menyumbang kepada prestasi operasi rantaian bekalan sesebuah firma, manakala, keupayaan teknologi maklumat adalah tidak penting. Hasil kajian juga mendedahkan bahawa keupayaan rantaian bekalan memberikan pengaruh positif terhadap penggunaan teknologi rantaian bekalan. Selain itu, hasil kajian turut menunjukkan kepentingan penggunaan teknologi rantaian bekalan sebagai pengantara bagi model yang dikaji. Pendekatan penyelidikan triangulasi telah diambil melalui temuduga bersemuka dengan empat orang pengamal industri untuk mendapatkan pengalaman yang mendalam dan persepsi mereka terhadap model yang dikaji. Keputusan ATLAS.ti menunjukkan bahawa model yang dibangunkan telah mencapai persetujuan pakar industri dengan cadangan dua terma yang baharu (sokongan manusia dan pengalaman kerja) sebagai moderator untuk kajian masa hadapan bagi model ini. Beberapa cadangan dan batasan untuk kajian masa hadapan turut dibincangkan.

Kata kunci: keupayaan rantaian bekalan, penggunaan teknologi rantaian bekalan, prestasi operasi rantaian bekalan, industri tekstil dan pakaian, Malaysia
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Based on the research presented in this thesis, the following papers have been published with supervisory panel. The remaining parts of the thesis have not yet been published.

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<td>ACLM</td>
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<tr>
<td>AMOS</td>
<td>Analysis of Moment Structure</td>
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<tr>
<td>AMOS-SEM</td>
<td>Analysis of Moment Structure Structural Equation Modeling</td>
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<tr>
<td>APICS</td>
<td>Association for Operations Management</td>
</tr>
<tr>
<td>APO</td>
<td>Advanced Planning and Optimization</td>
</tr>
<tr>
<td>APS</td>
<td>Advanced Planning and Scheduling Systems</td>
</tr>
<tr>
<td>AQC</td>
<td>Automated Quality Control System</td>
</tr>
<tr>
<td>ARS</td>
<td>Automate Replenishment Systems</td>
</tr>
<tr>
<td>ASN</td>
<td>Automatic Shipment Notices</td>
</tr>
<tr>
<td>ASRS</td>
<td>Automated Storage and Retrieval Systems</td>
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<tr>
<td>AVE</td>
<td>Average Variance Extracted</td>
</tr>
<tr>
<td>B2B</td>
<td>Business to Business</td>
</tr>
<tr>
<td>B2C</td>
<td>Business to Customer</td>
</tr>
<tr>
<td>C2B</td>
<td>Customer to Business</td>
</tr>
<tr>
<td>CA</td>
<td>Cronbach’s Alpha</td>
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<tr>
<td>CAD</td>
<td>Computer-Aided Design Systems</td>
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<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
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<tr>
<td>CAT</td>
<td>Computer Aided Testing</td>
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<td>CB-SEM</td>
<td>Covariance Based Structural Equation Modeling</td>
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<td>C-Commerce</td>
<td>Collaborative Commerce</td>
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<td>CEO</td>
<td>Chief Executive Officer</td>
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<tr>
<td>CFA</td>
<td>Confirmatory Factor Analysis</td>
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<td>CIM</td>
<td>Computer Integrated Manufacturing</td>
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<td>CLM</td>
<td>Council of Logistics Management</td>
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<tr>
<td>CMV</td>
<td>Common Method Variance</td>
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<td>CNC</td>
<td>Computer Numerical Control</td>
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<tr>
<td>CoT</td>
<td>Cloud of Things</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>CPFR</td>
<td>Collaborative Planning, Forecasting, and Replenishment</td>
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<tr>
<td>CR</td>
<td>Composite Reliability</td>
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<tr>
<td>CRM</td>
<td>Customer Relationship Management Systems</td>
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<td>CRP</td>
<td>Continuous Replenishment Programs</td>
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<td>CSCMP</td>
<td>Council of Supply Chain Management Professionals</td>
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<td>DFM</td>
<td>Demand Forecasting Management</td>
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<tr>
<td>DOI</td>
<td>Diffusion of Innovation Theory</td>
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<tr>
<td>DRP</td>
<td>Distribution Resource Planning</td>
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<tr>
<td>DSS</td>
<td>Decision Support System</td>
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<tr>
<td>DW</td>
<td>Data Warehouse Systems</td>
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<td>E&amp;E</td>
<td>Electrical and Electronic</td>
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<td>E-business</td>
<td>Electronic business</td>
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<td>E-commerce</td>
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<td>EDI</td>
<td>Electronic Data Interchange</td>
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<td>EFA</td>
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<td>Electronic Funds Transfer</td>
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<td>E-mail</td>
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<td>EOS</td>
<td>Electronic Ordering System</td>
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<td>E-procurement</td>
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<td>ERP</td>
<td>Enterprise Resource Planning Systems</td>
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<td>E-SCM</td>
<td>Electronic Supply Chain Management</td>
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<td>( F^2 )</td>
<td>Effect Sizes</td>
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<td>FMCG</td>
<td>Fast Moving Consumer Goods</td>
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<td>FMM</td>
<td>Federation of Malaysian Manufacturers</td>
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<td>FMS</td>
<td>Flexible Manufacturing Systems</td>
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<tr>
<td>GCTS</td>
<td>Geo-Coded Tracking Systems</td>
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<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GIS</td>
<td>Geographical Information Systems</td>
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<td>GoF</td>
<td>Goodness of Fit</td>
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<td>GPS</td>
<td>Global Positioning Systems</td>
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<tr>
<td>GT</td>
<td>Group Technology</td>
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<td>H</td>
<td>Hypothesis</td>
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<td>ICT</td>
<td>Information and Communication Technology</td>
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<td>Acronym</td>
<td>Description</td>
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<td>IMP3</td>
<td>Third Industrial Master Plan</td>
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<td>IOS</td>
<td>Inter-organizational System</td>
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<td>IoT</td>
<td>Internet of Things</td>
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<tr>
<td>IS</td>
<td>Information System</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>JIT</td>
<td>Just-In-Time</td>
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<td>LV</td>
<td>Latent Variable</td>
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<td>MATRADE</td>
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<td>MES</td>
<td>Manufacturing Execution Systems</td>
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<td>MGMA</td>
<td>Malaysian Garment Manufacturers Association</td>
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<tr>
<td>MIDA</td>
<td>Malaysian Investment Development Authority</td>
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<tr>
<td>MIDC</td>
<td>Maharashtra Industrial Development Corporation</td>
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<td>MKMA</td>
<td>Malaysian Knitting Manufacturers Association</td>
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<td>ML</td>
<td>Maximum Likelihood</td>
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<td>MRP</td>
<td>Material Requirements Planning Systems</td>
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<td>MTMA</td>
<td>Malaysia Textile Manufacturers Association</td>
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<td>MV</td>
<td>Manifest Variable</td>
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<tr>
<td>NCPDM</td>
<td>National Council of Physical Distribution Management</td>
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<td>OCC</td>
<td>Organizational Culture Capability</td>
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<td>P&amp;G</td>
<td>Procter and Gamble</td>
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<td>PCA</td>
<td>Principle Component Analysis</td>
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<td>PDM</td>
<td>Product Data Management Systems</td>
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<td>PLS</td>
<td>Partial Least Square</td>
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<td>Point of Sales Tracking Systems</td>
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<td>PricewaterhouseCoopers</td>
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<td>Q²</td>
<td>Predictive Relevance</td>
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<td>Coefficients of Determination</td>
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<td>Resource Based View Theory</td>
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<td>Relational Capability</td>
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RFID  Radio Frequency Identification Systems
SCE  Supply Chain Event Management Systems
SCM  Supply Chain Management
SCOP  Supply Chain Operational Performance
SCOR  Supply Chain Operation Reference
SCP  Supply Chain Performance
SCT  Supply Chain Technology
SCTA  Supply Chain Technology Adoption
SEM  Structural Equation Modeling
SmartPLS  Smart Partial Least Square
SME  Small and Medium Enterprise
SMED  Single Minute Exchange of Die
SPSS  Statistical Package for Social Science
SRM  Supplier Relationship Management Systems
TMS  Transportation Management Systems
TOE  Technology-Organization-Environment Theory
TQM  Total Quality Management
UK  United Kingdom
US  United States
VAF  Variance Accounted For
VAN  Value Added Network
VIF  Variance Inflation Factor
VMI  Vendor Managed Inventory
VMR  Vendor Managed Replenishment
VPN  Virtual Private Network
VRM  Vendor Relationship Management
WMS  Warehouse Management Systems
CHAPTER ONE
INTRODUCTION

1.1 Background of Study

The concept of supply chain management (SCM) starts to emerge in the mid of 1960s and first appeared in the literature in 1982, with a dramatic increased attraction to researchers since 1990s (Huan, Sheoran, & Wang, 2004; Cooper, 2006). It has gained an incredible attention since 2000s from both academics and practitioner’s community (Chan & Qi, 2003). Over the last 30 years, the significance of SCM on the organization’s performance has been indicated in literature (Houlihan, 1985). Nowadays, in a competitive business environment, firms need to emphasize on supply chain performance (SCP) instead of organizational performance (Leng & Zailani, 2012). Several studies supported that firm should focused on supply chain performance since it has a huge direct effect on organization performance (Green Jr, Mcaughey, & Casey, 2006; Green Jr, Whitten, & Inman, 2008; Constangoara, 2012; Deshpande, 2012).

Nowadays, the SCM studies are becoming a great deal of interest among the organizations. This is because the current business trends are shaping global business and providing the opportunities to firms to becoming multi-nationals (Thomas & Griffin, 1996) and thus, increase the complexity of the supply chain. SCM is based on the complete chain which is necessary to involve all partners in the chain to hold the
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