

**CHALLENGES OF DIGITAL TRANSFORMATION IN MEDIUM
SIZED ENTERPRISES IN INDIA: SELECT STUDIES**

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SIZED ENTERPRISES IN INDIA: SELECT STUDIES**

by

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Certificate

This is to certify that the thesis titled **“Challenges of Digital Transformation in Medium sized Enterprises in India: Select studies”** submitted by Mr. Raman Kumar Singh to the Indian Institute of Technology Delhi, for the award of the degree of **“Doctor of Philosophy”** in the Department of Management Studies, is a record of bonafide research work carried out by him. He has worked under my guidance and supervision, and has fulfilled the requirements for the submission of the thesis, which to my knowledge has reached the requisite standard. The models and research findings in this thesis have not been submitted elsewhere for the award of any degree.

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ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) form the bedrock of any economy. Like other sectors, this sector too has its own set of opportunities and challenges. The research began by investigating the challenges within the MSME sector. Upon exploration, it became clear that the sector comprised three distinct segments: micro, small, and medium enterprises. Among these, the medium segment occupied a particularly unique and vulnerable position - caught in what is known as the “*missing middle*” phenomenon.

To overcome this, transformation was imperative. Given the contemporary context of a digital era, digital transformation emerged as the essential need of the hour. However, such transformation is inherently complex and laden with risk. Navigating this uncertain landscape required *resilience* - a theme that prominently emerged during the initial challenge analysis.

This led to a focused study on the resilience of the medium segment. It was discovered that resilience had a strong linkage with the *organizational maturity* of the enterprises. Existing maturity assessment models, though insightful, were found to be somewhat exhaustive and in need of refinement. An improved version of the model was proposed and adopted for the measurement of organizational resilience. Based on this maturity measurement, medium enterprises were assessed to fall within the *evolving* maturity zone.

Having determined the resilience status of the sector, the next step was identifying ways to strengthen it further to ensure successful transformation. It was recognized that resilience could not be built through internal efforts alone – environmental (external) support was equally crucial.

To address this, a dual approach was adopted:

- For internal resilience, a comprehensive framework was developed.
- For external resilience, an analysis of contemporary policies was undertaken, leading to recommendations for policy improvements to better support the sector.

This integrated strategy aimed to empower the medium segment of MSMEs to break free from structural limitations and to embrace digital transformation with greater confidence and capability.

सारांश

सूक्ष्म, लघु और मध्यम उद्यम (MSMEs) किसी भी अर्थव्यवस्था की रीढ़ की हड्डी होते हैं। अन्य क्षेत्रों की तरह, इस क्षेत्र के भी अपने अवसर और चुनौतियाँ हैं। इस शोध की शुरुआत MSME क्षेत्र के भीतर मौजूद चुनौतियों की पहचान से हुई। जब इस क्षेत्र का विस्तार से अध्ययन किया गया, तो यह स्पष्ट हुआ कि यह क्षेत्र तीन भिन्न उप-खंडों में विभाजित है: सूक्ष्म, लघु और मध्यम उद्यम। इनमें से मध्यम उद्यम एक विशेष और संवेदनशील स्थिति में पाए गए - जिसे "मिसिंग मिडल" की स्थिति कहा जाता है।

इस स्थिति से उबरने के लिए परिवर्तन आवश्यक था। आज के डिजिटल युग के परिप्रेक्ष्य में, डिजिटल परिवर्तन समय की अनिवार्य आवश्यकता के रूप में उभरा। हालांकि, यह परिवर्तन स्वभावतः जटिल होता है और जोखिमों से भरा होता है। इस अनिश्चित परिदृश्य में दिशा खोजने के लिए जिस विशेष गुण की आवश्यकता थी, वह थी - 'लचीलापन' (resilience), जो प्रारंभिक चुनौती विश्लेषण के दौरान एक प्रमुख विषय के रूप में सामने आया।

इसके परिणामस्वरूप मध्यम उद्यमों के लचीलापन पर केंद्रित एक विशेष अध्ययन किया गया। यह पाया गया कि लचीलापन का गहरा संबंध संगठनों की परिपक्वता (organizational maturity) से है। यद्यपि मौजूदा परिपक्वता मूल्यांकन मॉडल उपयोगी थे, परन्तु वे अत्यधिक व्यापक और संशोधन योग्य पाए गए। इसलिए एक परिष्कृत मॉडल प्रस्तावित किया गया और संगठनात्मक लचीलापन के मापन के लिए अपनाया गया। इस परिपक्वता मापन के आधार पर, यह निष्कर्ष निकाला गया कि मध्यम उद्यम 'विकसित हो रही परिपक्वता' (evolving maturity) क्षेत्र में आते हैं।

जब क्षेत्र की लचीलापन स्थिति निर्धारित हो गई, तो अगला चरण यह था कि इसे और अधिक कैसे सशक्त बनाया जाए ताकि डिजिटल परिवर्तन सफलतापूर्वक संभव हो सके। यह समझा गया कि केवल आंतरिक प्रयासों से लचीलापन नहीं बढ़ाया जा सकता - इसके लिए बाह्य (पर्यावरणीय) समर्थन भी उतना ही आवश्यक है।

इस समस्या के समाधान के लिए एक दोहरा दृष्टिकोण अपनाया गया:

आंतरिक लचीलापन के लिए एक समग्र रूपरेखा (framework) तैयार की गई।

बाह्य लचीलापन के लिए समकालीन नीतियों का विश्लेषण किया गया और इस क्षेत्र को बेहतर समर्थन देने के लिए नीति सुधारों की सिफारिशें दी गईं।

इस एकीकृत रणनीति का उद्देश्य मध्यम वर्ग के MSMEs को संरचनात्मक बाधाओं से मुक्त कर, उन्हें डिजिटल परिवर्तन को अधिक आत्मविश्वास और सामर्थ्य के साथ अपनाने हेतु सशक्त बनाना था।

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List of Symbols

₹	Indian Rupee
\$	United States Dollar
%	Percent
&	Ampersand meaning ‘and’
et	And
al.	Others
~	Tilde meaning ‘approximately’
€	Euro

List of Abbreviations

ABDC	Australian Business Deans Council
AI	Artificial Intelligence
API	Application Programming Interfaces
ASAP	Automated Statistical and Analytical Purchasing
AVE	Average Variance Extracted
AWGBC	Architecture Work Governance Business-model Culture
B2B	Business to Business
BEEP	Blockchain-Enabled E-commerce Platforms
BG	Business Groups
BMI	Business Model Innovation
CAGR	Compound Annual Growth Rate
CBDC	Central Bank Digital Currency
CGS	Credit Guarantee Scheme
CIDB	Cottage Industries Development Board
CITS	Craft Instructor Training Scheme
CLCS	Credit Linked Capital Subsidy
CMIE	Centre for Monitoring Indian Economy
COND	Co-Occurrence Network Diagram
COSO	Committee of Sponsoring Organizations
CR	Composite Reliability
CRM	Customer Relationship Management
DFM	Document Feature Matrix
DGT	Directorate General of Training
DPI	Digital Public Infrastructures
DST	Dual System of Training
DT	Digital Transformation
DTM	Document Term Matrix
DVD	Digital Video Disc
e-NAM	Electronic National Agricultural Market
ECLGS	Emergency Credit Line Guarantee Scheme
EOC	Evolving Organizational Culture
ERM	Enterprise Risk Management
ERP	Enterprise Resource Planning
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
FISME	Federation of Indian Micro, Small and Medium Enterprises
FP	Financial Performance
FY	Fiscal Year
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GFC	Global Financial Crisis
GP	Global Performance
GST	Goods and Services Tax
GSTN	Goods and Services Tax Network
GVA	Gross Value Added
HR	Human Resource
HTMT	Heterotrait-Monotrait
ICICI	Industrial Credit and Investment Corporation of India
IDT	Implementation of Digital Transformation
IIT	Indian Institute of Technology

INDEST	Indian National Digital Library in Engineering Science and Technology
INR	Indian National Rupee
IoT	Internet of Things
IPMA	Importance-Performance Matrix Analysis
IPR	Industrial Policy Resolution
IPRs	Intellectual Property Rights
IRDPA	Integrated Rural Development Program
IS	Information Systems
IT	Information Technology
ITI	Industrial Training Institutes
JSS	Jan Shikshan Sansthan
KA	KWIC Analysis
KLEMS	Kapital (Capital) Labour Energy Materials and Services
KNN	Knowledge and News Network
KWIC	KeyWord-In-Context
LDA	Latent Dirichlet Allocation
LPG	Liberalization, Privatization, and Globalization
MCA	Manual Content Analysis
MIT	Massachusetts Institute of Technology
MoSSIARI	Ministry of Small-Scale Industries and Agro and Rural Industries (MoSSIARI)
MSME	Micro Small and Medium Enterprises
MSMED	Micro, Small, and Medium Enterprises Development
NBFC	Non-Banking Financial Corporations
NCVET	National Council for Vocational Education and Training
NIMZ	National Investment and Manufacturing Zones
NLP	Natural Language Processing
NMP	National Manufacturing Policy
NSIC	National Small Industries Corporation
NTC	New To Credit
ONDC	Open Network for Digital Commerce
PLS-SEM	Partial Least Square Structure Equation Modelling
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-analysis
PRQ	Primary Research Questions
PRS	Passenger Reservation System
QUANTEDA	QUantitative ANalysis of TEXTual DATA
R&D	Research and Development
RBI	Reserve Bank of India
ROI	Return on Investment
RPYS	Reference Publication Year Spectroscopy
SaaS	Software as a Service
SABRE	Semi-Automated Business Research Environment.
SAP	Systems, Applications and Products
SIDO	Small Industries Development Organization
SLR	Systematic Literature Review
SLA	Service Level Agreements
SMEs	Small and Medium Enterprises
SMM	Social Media Marketing
SSI	Small-Scale Industries
SVM	Support Vector Machine
TF	Term Frequency
TF-IDF	Term Frequency Inverse Document Frequency
TFP	Total Factor Productivity
TISM	Total Interpretive Structural Modelling

ToT	Training of Trainers
UAM	Udyog Aadhar Memorandum
UPI	Unified Payment Interface
USD	United States Dollar
VIF	Variance Inflation Factor
WFH	Work From Home