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DOCTORAL THESIS SUMMARY

Presented and publicly defended by:
CIPRIAN-SORIN M. CHIRVASE

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**THE IMPACT OF DIGITAL TRANSFORMATION ON
MANAGEMENT IN THE SERVICES SECTOR: A
STRUCTURAL MODEL OF DIGITAL ADOPTION AND
SUPPLY CHAIN PERFORMANCE**

Doctoral Supervisor: Prof.Dr. Andreea-Ileana ZAMFIR

Doctoral thesis defense committee:

(Academic rank).Dr. (First name and Last name) (Committee Chair) — (University name)

(Academic rank).Dr. (First name and Last name) (Reviewer) — (University name)

(Academic rank).Dr. (First name and Last name) (Reviewer) — (University name)

Prof.Dr. Andreea-Ileana Zamfir (Doctoral Supervisor) – Bucharest University of Economic Studies

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1. Research Context and Motivation

Digital transformation has fundamentally redefined the way organizations create and distribute value. Digital technologies — integrated ERP systems, Business Intelligence platforms, IoT solutions, robotic process automation, artificial intelligence and cloud computing — no longer represent isolated competitive advantages, but necessary conditions for competitiveness in high-dynamics sectors. The Supply Chain is one of the domains with the greatest potential for transformation through digitalization, with empirically documented benefits including end-to-end visibility, resilience in the face of disruptions, and operational cost optimization.

Romania represents a particularly relevant research context. As an emerging economy within the European Union, Romania occupies an intermediate stage of organizational digital maturity, with a significant gap compared to Western European economies. The Romanian services sector, which has recorded sustained growth and has become the main driver of national GDP, encompasses heterogeneous organizations — from multinational companies with fully implemented ERP systems to entrepreneurial firms with partially manual processes. This heterogeneity makes Romania fertile ground for studying the factors that differentiate organizations that adopt digitalization effectively from those that remain at incipient stages.

The central paradox of organizational digitalization is that access to technology does not guarantee its effective adoption and, even less so, the production of performance benefits. Organizations with similar digitalization budgets produce significantly different performance outcomes. The difference is not technological but organizational: the culture that facilitates or inhibits adoption, the leadership that directs or blocks change, the training that builds or neglects digital competencies, and the organizational resistance that manifests or dissipates.

The academic motivation of the research lies in identifying three major gaps in the literature: classical adoption models are centered on the individual, not on organizational adoption as a collective phenomenon; Supply Chain performance models rarely include organizational

capabilities as explicit predictors of performance; and the Romanian literature on Supply Chain digitalization lacks a validated empirical model that simultaneously integrates resistance to change, leadership, culture and training as predictors of adoption and performance.

2. The MADT-SC Model and Research Hypotheses

The present doctoral research proposes, operationalizes and empirically validates the MADT-SC model (Adaptive Management of Digitalization and Transformation in Supply Chain) — an original theoretical framework explaining the mechanisms through which organizational capabilities influence the effective adoption of digital technologies and, thereby, Supply Chain performance in the Romanian services sector.

The MADT-SC model is structured on five interdependent layers and tests six latent constructs. The four organizational capabilities — B_Resistance to Change, C_Leadership and Communication, D_Organisational Culture and E_Digital Training — act as predictors of the mediating construct F_Digital Technologies (the degree of effective adoption of a portfolio of digital technologies: ERP, IoT, AI, blockchain, RPA, cloud, BI), which in turn produces G_Supply Chain Performance — multidimensional performance including operational efficiency, resilience, service quality and supply chain transparency. The mechanistic core of the model is mediation: organizational capabilities influence SC performance not directly, but through the effective adoption of digital technologies.

The theoretical foundations of the model integrate several consolidated theories: Resource-Based View — which postulates that competitive advantage derives from rare and inimitable organizational capabilities; Technology Acceptance Model extended to the organizational level; the theory of organizational culture and psychological safety; transformational leadership; human capital theory; and Supply Chain management theories. The research tests 18 hypotheses organized into three groups: main structural relationships (H1–H5), direct effects and type of mediation (H6–H12), and demographic and professional moderation (H13–H18).

3. Research Methodology

The research adopts an explanatory sequential mixed design, structured in two successive phases. The quantitative phase involved the collection and analysis of 316 valid questionnaires from employees in organizations belonging to the Romanian services sector. The qualitative phase comprised 22 semi-structured interviews with managers and specialists, analyzed through reflexive thematic analysis.

The principal statistical method is PLS-SEM (Partial Least Squares — Structural Equation Modelling), implemented in SmartPLS 4, complemented by SPSS analyses (Cronbach Alpha, one-way ANOVA, OLS regression). The choice of PLS-SEM is justified by the formally confirmed non-normality of the data, the predictive nature of the model and the perceptual character of the latent constructs measured through Likert scales. Statistical inferences are performed through non-parametric BCa bootstrapping with 5,000 sub-samples.

The quantitative sample (N=316, no missing data) presents a balanced hierarchical distribution: Execution level 32.6%, Middle Management 38.6%, Top Management 28.8%. The gender distribution is 59.5% male and 40.2% female. The qualitative sample comprises 22 participants with diverse profiles across hierarchical level, functional domain and organizational tenure.

The psychometric quality of the MADT-SC instrument is confirmed through rigorous indicators: Cronbach Alpha between 0.859 and 0.950 for all constructs; Composite Reliability minimum 0.881; AVE above 0.50 for all constructs (maximum 0.833 for G_Supply Chain); 89.1% of the 55 final indicators with outer loadings above 0.70; discriminant validity confirmed through HTMT and Fornell-Larcker criteria; absence of severe multicollinearity (VIF below 5.0 for all indicators).

4. Main Quantitative Results

The structural model results confirm three out of five primary relationships at the significance level $p < 0.001$. Organisational culture ($\beta = 0.354$) and digital training ($\beta = 0.388$) are significant predictors of digital adoption, while digital adoption produces Supply Chain performance with high magnitude ($\beta = 0.651$, very large effect). The model explains 33.5% of the variance in adoption and 42.4% of Supply Chain performance.

Two main hypotheses produce counterintuitive results, transformed into paradoxes with distinct theoretical value. First: resistance to change does not significantly influence organizational adoption ($\beta = 0.004$, $p = 0.931$), contradicting the classical change management literature. Second: leadership produces a non-significant effect on adoption ($\beta = -0.141$), but a direct, positive and significant effect on SC performance ($\beta = +0.149$), generating competitive mediation — one of the rare types of mediation in the specialized literature.

The mediation analysis produces the most original empirical contribution of the research: the documentation of four distinct mediation patterns through the same central mediator. Mediation is complete for D_Culture (74.4% of the culture's effect on SC performance is transmitted through digital adoption); partial for E_Training (60.2% through adoption, 39.8% direct effect);

competitive for C_Leadership; and absent for B_Resistance. Documenting a single mediator with four distinct mediation patterns for four different predictors represents a methodological and substantive contribution rarely reported in the literature.

The multi-group analysis across six demographic and professional criteria reveals 15 significant differences configuring fundamentally different adoption profiles. The most contrasting result concerns the hierarchical level: in Top Management, training is the dominant driver of adoption ($\beta=0.594$) while culture is negligible ($\beta=0.014$); in Middle Management, the relationship is reversed — culture is dominant ($\beta=0.500$) and training is minor ($\beta=0.104$). The adoption-to-performance conversion differs dramatically: $\beta=0.817$ in Top Management versus $\beta=0.486$ in Middle Management, and the model explains 2.83 times more variance in performance at Top Management than at Middle Management.

A distinct finding regarding age: adoption mechanisms are practically identical between respondents over 40 years of age and those under 40, but the adoption-to-performance conversion differs significantly ($\beta=0.735$ versus $\beta=0.546$). Age does not influence adoption mechanisms but rather the capacity to leverage adoption into performance — accumulated organizational experience amplifies the efficiency of integrating digital tools with the implicit knowledge of processes, clients and partners.

5. Qualitative Results and Triangulation

The thematic analysis of the 22 semi-structured interviews generated five main themes, convergent with the MADT-SC model. Theme T1 — Resistance to Change as a Temporary Phase, not a Structural Barrier — explains the counterintuitive quantitative result of H1: participants describe a four-phase dynamic (initial reluctance, forced or stimulated use, discovery of practical benefits, acceptance or even enthusiasm), confirming that individual resistance dissipates in the presence of concrete benefits and organizational support, without blocking institutionally directed adoption.

Theme T2 — Applied Training as the Main Driver of Digital Adoption — quantitatively confirms H4 and deepens the mechanism: participants explicitly distinguish between theoretical training (ineffective) and applied training, with exercises on real systems (effective). Theme T3 — Leadership Through Personal Example — explains the H2 paradox: leadership produces effects on adoption not through formal directives, but through the visibility of leaders' own behaviour towards digital tools. Theme T4 — Organisational Culture as an Interpretive Filter of Digital Change — confirms H3, with culture determining whether digital tools are perceived as

opportunity or threat. Theme T5 — Digital Adoption as a Cascade Value Generator for Supply Chain — confirms H5, with detailed descriptions of the mechanisms through which adoption produces operational efficiency, visibility and resilience.

Triangulation between quantitative and qualitative data confirms convergence across all main relationships, with the exception of H1 (resistance), where the triangulation is explanatory: the quantitative study shows that resistance does not obstruct institutionally directed adoption, while the qualitative study explains why — individual resistance dissipates through the visibility of benefits and cannot block strategic decisions. This complementarity enriches understanding of the phenomenon beyond what either method could offer independently.

6. Theoretical and Practical Contributions

The main theoretical contributions of the research are organized into six directions. First (CT1): the construction and empirical validation of the MADT-SC model as an integrated model of organizational capabilities — digital adoption — Supply Chain performance, covering the gaps of classical individual-centered adoption models and supply chain management models without explicit organizational predictors. Second (CT2): documentation of the differentiated mediation taxonomy — a single mediator with four distinct patterns (complete, partial, competitive, absent) for four different predictors, demonstrating that not every organizational capability converts into Supply Chain performance through the same mechanism. Third (CT3): re-evaluation of the role of resistance to change — individual resistance does not obstruct institutionally directed organizational adoption, reformulating the classical literature that treats it as the main obstacle to digital transformation. Fourth (CT4): identification of the directive leadership paradox — leadership produces relative inhibition of autonomous adoption ($\beta=-0.141$), but a direct positive effect on SC performance ($\beta=+0.149$), a duality not previously identified in the organizational digital adoption literature. Fifth (CT5): demonstration of the superiority of applied over theoretical training as a digital development format — the most consistent qualitative pattern confirmed quantitatively through the strongest predictor of adoption ($\beta=0.388$). Sixth (CT6): conceptual separation between adoption mechanisms (invariant to age) and the capacity to leverage adoption into performance (amplified by accumulated organizational experience) — a distinction not previously explored in the digital adoption literature.

Practical contributions are organized by intervention level. For Top Management: prioritizing investments in pro-digitalisation organizational culture and applied digital training over resistance management programmes, which produce marginal structural returns; building culture before launching technological initiatives, as culture produces adoption and not the reverse; leveraging

senior employees as performance multipliers, not merely as training recipients. For Middle Management: reformatting digital training from theoretical sessions to practical demonstrations with immediately visible results, as applied intensive training is the main adoption driver at this level ($\beta=0.487$). For HR and L&D specialists: designing digital training as a dual-channel investment — instrument-specific formation and cultivation of critical digital thinking — to leverage both mechanisms through which training produces performance.

Romania-specific implications: the identified gap between e-learning infrastructure availability and the systematization of training programmes indicates an actionable organizational deficit — organizations have the platform, but not the process; the perceptual gap in leadership evaluation across hierarchical levels (Top Management evaluates leadership 0.66 Likert points more favorably than Execution) suggests a problem of translating strategic vision into practices perceived by employees; and the sectoral paradox — digital adoption produces greater SC performance benefits in sectors where Supply Chain is a secondary function ($\beta F \rightarrow G=0.745$) compared to SC/Logistics proper ($\beta=0.494$) — directs support policies and European funds towards sectors with greater gain potential.

7. Research Limitations and Future Directions

The main research limitations are of seven types: the cross-sectional nature of the quantitative data, which limits strict causal inference; non-probabilistic sampling, which limits generalization to the entire population of Romanian organizations; self-reported data, subject to social desirability and hierarchical perspective bias; partial measurement invariance for two pairs of multi-group comparisons; the conceptual overlap between leadership and organizational culture, which requires caution in interpreting their separate effects; the asynchronous written format of the qualitative interviews, which may produce more generic responses; and the specific national context, which limits direct generalization to other national contexts or time periods.

Future research directions derive directly from these limitations. The absolute priority is a longitudinal study across multiple temporal waves, the only method capable of demonstrating the temporal causality of the model. This is followed by replication in other national contexts to test the invariance of structural relationships, experimental investigation of the resistance dissipation mechanism, triangulation with objective operational performance data from organizational information systems, empirical operationalization of the value management dimension that remains conceptual in the current version, and extension of the model with organizational context variables through multi-level modelling.

8. General Conclusions

The present doctoral thesis responds to a fundamental question with academic and practical relevance: through what organizational mechanisms do the human, cultural and managerial capabilities of an organization convert into effective digital adoption and, thereby, into Supply Chain performance? The empirical answer — obtained from 316 questionnaires and 22 semi-structured interviews, tested through PLS-SEM, ANOVA and reflexive thematic analysis — configures a nuanced and actionable picture.

The validated MADT-SC model demonstrates that the success of Supply Chain digitalisation is not determined by technology itself, but by the organizational capabilities that produce its adoption — primarily pro-digitalisation culture and applied digital training. Digital adoption generates substantial SC performance benefits, significantly amplified by accumulated organizational experience. Resistance to change, contrary to the classical vision of change management literature, does not obstruct organizationally directed adoption — a counterintuitive result with direct implications for the allocation of organizational resources.

The central contribution of the research is the dual taxonomy: documentation of four distinct mediation patterns through the same central mediator, and the configuration of a typology of adoption mechanisms across hierarchical levels. Organizations do not adopt digitalisation through the same mechanism at all levels — culture dominates at Middle Management, training dominates at Execution and Top Management, and experience amplifies the conversion of adoption into performance.

The MADT-SC model ultimately delivers a clear message for practitioners involved in the digital transformation of Romanian organizations: the optimal investment is not in managing employee resistance, but in building an organizational culture favorable to innovation and in applied digital training programmes, supported by leadership that demonstrates adoption through its own visible behaviour. This is the structural recipe for efficient digital adoption — empirically documented, qualitatively explained and managerially actionable.