Facilitating Artificial Intelligence powered supply chain analytics through alliance management during pandemic crises in the B2B context

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Introduction

The impact of digital technologies on organizations, emphasizing the prevalence of data and the rapid development of analytics capabilities. It specifically mentions the use of artificial intelligence (AI), big data analytics, and blockchain in the industry. The focus then shifts to the significance of supply chain analytics (SCA) powered by cognitive technologies, especially AI, in enhancing complex supply chain decision-making processes. The context of the study is set within the challenges posed by the COVID-19 pandemic, where organizations have increasingly turned to AI-powered supply chain analytics (AI-SCA) to navigate disruptions.

Literature Overviews

1. **Digital Technologies and Data Explosion:**
   - The introduction acknowledges the widespread presence of data in organizations, fueled by the expansion of digital technologies like smartphones, social media, and e-commerce.

2. **AI and Cognitive Technologies in Supply Chain:**

   - Cognitive technologies, including artificial intelligence, are highlighted as tools that enhance decision-making in complex supply chain processes. The capability of machines to understand and process large amounts of data quickly is emphasized.

3. **AI-SCA During the COVID-19 Pandemic:**

   - The COVID-19 crisis has amplified the use of AI-SCA as organizations grapple with disruptions in supply chains, affecting customer payments, raw material supplies, and working capital management.

4. **Alliance Management Capability (AMC):**

   - The authors argue for the importance of alliance management capability in forming inter-organizational partnerships, especially during crises. The study aims to explore the influence of AMC on AI-SCA capability.

5. **Research Questions:**

   - Three research questions are posed:

     - What are the effects of AMC on AI-SCA capability (AI-SCAC)?

     - What are the effects of AI-SCAC on operational and financial performance?

     - What is the effect of environmental dynamism (ED) on the path joining alliance management capability and AI-SCAC?

6. **Data Analytics and Decision-Making Challenges:**

   - Despite the potential benefits of data analytics capability, there is a cautionary note about the challenges associated with ensuring data quality and addressing the complexities of utilizing big data in decision-making.

7. **Research Gap and Contribution:**

   - The paper addresses a research gap in the limited empirical study of AI-SCAC and the underdeveloped theoretical perspectives in this area. The authors contribute by examining direct effects and exploring the moderating effect of environmental dynamism.

8. **Organization of the Paper:**

- The paper is organized into six sections, including the presentation of theoretical frameworks, research design, data analysis using PLS-SEM, findings, conclusions, and areas for further study.

Methodologies and Approach

1. **Qualitative Interviews:**

   - Conducted 26 interviews with senior-level supply chain managers from the auto components manufacturing industry.

   - Used Zoom/Microsoft Teams for interviews.

   - Explored routine activities enabling organizations to adapt to rapid external changes, especially in response to the COVID-19 crisis.

   - Focused on the role of Alliance Management Capability (AMC) and AI-powered Supply Chain Analytics (AI-SCAC).

   - Confirmed research hypotheses through interviews.

   - Explored the criticality of activities for achieving operational and financial performance.

2. **Survey:**

   - Selected auto component manufacturing organizations registered on the database of the Auto Components Manufacturers Association of India (ACMA).

   - Justification for selecting this industry sector includes common alliances, the key role of supply chain analytics capability, and the significance of ACMA.

   - Employed a professional marketing firm for data collection services.

   - Pre-tested the questionnaire with 15 supply chain managers to ensure clarity and appropriateness of questions.

   - Conducted the main survey, initially emailed to 656 organizations, with 167 usable responses (25.46% response rate).

   - Utilized the key informant method to ensure diversity in responses.

3. **Nonresponse Bias Check:**

- Checked for non-response bias using Student's t-test, comparing early and late waves of data collection.

- Examined differences in organization size between respondents and non-respondents.

- Randomly selected non-respondents and collected partial responses to assess bias.

4. **Measures:**

- Adopted multi-item scales for constructs.

- Developed measures based on existing literature and refined through interviews with senior managers.

- Triangulated inputs obtained from managers with complementary data sources to ensure reliability.

- Included control variables like Organization Size (OS) and Alliance Portfolio Size (APS).

5. **Data Analysis:**

- Used Warp PLS 7.0 software for analysis based on Partial Least Squares (PLS) method.

- Evaluated the model in two stages: checking the validity and reliability of the measurement model, and analyzing the structural model.

6. **Results:**

- Tested four research hypotheses related to the effects of AMC on AI-SCAC and the effects of AI-SCAC on organizational performance.

- Provided β coefficients and corresponding p-values for hypothesis testing.

- Found support for the hypotheses and interaction effect of Environmental Dynamism (ED) on the path between AMC and AI-SCAC.

- Considered control variables (OS and APS) and interpreted observations during the pandemic crisis.

The passage outlines the comprehensive methodology, including interviews, surveys, non-response bias checks, measures, and data analysis, followed by the presentation

and interpretation of results.

Finding and Trends

1. **Dynamic Capabilities during Pandemic Crisis:**

   - The response to the COVID-19 pandemic crisis confirms that dynamic capabilities are simple, experiential, and unstable processes resulting from the learning process.

   - The study is framed within the Dynamic Capabilities View (DCV), emphasizing its importance during crises.

2. **Hierarchical Ordering of Dynamic Capabilities:**

   - The study addresses the hierarchical ordering of dynamic capabilities, with higher-order dynamic capabilities being significantly more linked to performance than lower-order dynamic capabilities.

3. **Effect of Environmental Dynamism (ED):**

   - The research finds that the effect of higher-order dynamic capabilities on lower-order dynamic capabilities is more pronounced in the presence of high environmental dynamism (ED).

   - The relationship is noted to be nonlinear, with performance outcomes higher in the case of medium ED.

4. **Antecedent of AI-Powered Supply Chain Analytics (AI-SCAC):**

   - The study extends the theoretical contribution to understanding how Alliance Management Capability (AMC), as a higher-order dynamic capability, influences AI-SCAC, a lower-order dynamic capability, especially in the context of the COVID-19 pandemic.

5. **Empirical Evidence for AMC as an Antecedent:**

   - The research provides empirical evidence that AMC acts as an antecedent to AI-SCAC, contributing to a nuanced understanding of DCV boundaries.

6. **Managerial Implications:**

- Senior managers are advised to understand the details of investing in higher-order and lower-order capabilities, particularly considering the what, how, and when aspects.

- The study suggests that in the absence of AMC, organizations may face challenges in translating AI-SCAC into successful outcomes, especially during a crisis.

- The importance of swift trust is identified as a critical driver of AMC, particularly during sudden crises like the pandemic.

7. **Guidance for Policymakers:**

- Policymakers are informed about how dynamic capabilities can be exploited to gain superior outcomes during a pandemic crisis.

8. **Contingent Role of External Conditions:**

- The results emphasize the contingent role external conditions play in the relationship between dynamic capabilities and organizational performance.

9. **Alliance Management Capability (AMC):**

- The study emphasizes the significance of alliance management capability, listing components such as inter-organizational coordination, alliance portfolio coordination, inter-organizational learning, alliance pro-activeness, and alliance transformation.

10. **Recommendations for Future Research:**

- The study suggests the need for longitudinal studies to assess causality and variable effects.

- There is a recommendation for multi-informant instruments to minimize common method bias.

- Future research could explore the role of other capabilities such as strategic alliances and new product development capabilities in explaining variations in organizational performance.

- Generalization of results is cautioned, and the study encourages replication studies in different settings and industries.

Future Research Direction

1. **Longitudinal Studies:**

   - The study recommends conducting longitudinal studies to assess causality and variable effects more comprehensively. This could involve collecting data over an extended period to capture changes and developments in dynamic capabilities.

2. **Multi-Informant Instruments:**

   - To minimize common method bias, the text suggests the use of multi-informant instruments. Future research could explore this approach to enhance the robustness of the data collected and improve the validity of the findings.

3. **Exploration of Other Capabilities:**

   - While the study focuses on the relationship between Alliance Management Capability (AMC), AI-SCAC, and organizational performance, there is a suggestion to explore the role of other capabilities. For example, future research could investigate the impact of strategic alliances and new product development capabilities on organizational performance during crises.

4. **Cross-Industry Replication Studies:**

   - Generalization of results is cautioned in the context of the Indian auto components manufacturing industry. Future research could involve replication studies in different settings, industries, countries, and time periods to ensure a higher level of variance in AMC and analytics capability.

5. **Qualitative Approaches:**

   - The study suggests using a qualitative approach to understand the interplay of alliance management, analytics capability, and environmental changes. This qualitative exploration could provide deeper insights into the dynamics and outcomes during a crisis.

6. **Flexible Forms of Organizational Change:**

   - The study acknowledges a narrow definition of contingent Dynamic Capabilities View (DCV) and recommends exploring more flexible forms of organizational change. Future research could delve into understanding the differential

outcomes of dynamic capabilities during crises by considering a broader range of organizational change approaches.

7. **Global Context Studies:**

   - The text emphasizes the importance of understanding how dynamic capabilities function in a global crisis. Future research could focus on cross-cultural studies to explore variations in the application and effectiveness of dynamic capabilities in different regions and industries during crises.

8. **Exploration of Other External Factors:**

   - While the study highlights the role of environmental dynamism (ED), future research could expand on this by exploring the influence of other external factors such as regulatory changes, geopolitical events, or economic shifts on the relationship between dynamic capabilities and performance.

9. **Enhanced Conceptualization of AMC:**

   - The study acknowledges that the conceptualization of Alliance Management Capability (AMC) is in its early stage. Future research could involve refining and enhancing the conceptualization of AMC, possibly exploring additional dimensions or components that contribute to its effectiveness.

10. **Comparative Studies:**

    - Future research could conduct comparative studies between industries or companies that invested in dynamic capabilities and those that did not during a crisis. This could provide valuable insights into the impact of strategic decision-making on organizational outcomes.

These future research directions aim to build upon the existing study, address its limitations, and contribute to the evolving understanding of dynamic capabilities in the context of organizational responses to crises.

Conclusion

In conclusion, we suggest that DCV, which is one of the most popular theories among management scholars, requires further development in some areas, which is the rationale for our study. Specifically, the behavior of dynamic capabilities and the effect of ED on their performance outcomes are yet to be fully understood. We believe that

emerging technologies as dynamic capabilities, such as AI, are far more complex in terms of their management, than capabilities based on traditional and well-established technologies. Hence, our findings suggest that future organizational scholars seeking to expand the boundaries of DCV theory ought to focus on explaining how some dynamic capabilities yield superior results beyond expectations, whilst other such capabilities produce poor outcomes. To do this we believe a more integrated approach, supported by other organizational theories, may be a fruitful avenue for further research.

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