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FROM KNOWLEDGE TO INNOVATION: A REVIEW OF THE FACTORS, COMPONENTS, AND IMPACT OF ABSORPTIVE CAPACITY

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Abstract: This paper aims to build on existing research on absorptive capacity by exploring its key factors, components, outcomes, advantages, and constraints. Absorptive capacity, defined as an organization's ability to acquire, assimilate, transform, and utilize external knowledge, plays a crucial role in fostering innovation and sustaining competitive advantage. As a dynamic capability, absorptive capacity enables organizations to continuously adapt to changing environments by integrating and leveraging new knowledge. The paper examines the factors that shape absorptive capacity, including managerial influences, intra-organizational factors, inter-organizational networks, and prior knowledge. It also distinguishes between potential and realized absorptive capacity, highlighting their complementary roles in leveraging external knowledge for business success. Furthermore, the study discusses the outcomes of absorptive capacity, such as innovation, improved organizational performance, and competitive advantage. While absorptive capacity offers significant benefits, its implementation demands substantial resources, and organizations must strike a balance between acquiring knowledge and effectively applying it to avoid information overload. Building on previous academic contributions, this paper offers a comprehensive understanding of absorptive capacity and its managerial implications. Future research should further investigate the interplay between absorptive capacity components and their sector-specific implications.

Keywords: *absorptive capacity, innovation, knowledge, dynamical capability, competitive advantage.*
Field: Social Sciences

1. INTRODUCTION

Knowledge is a critical resource for organizations seeking to gain a competitive advantage. In today's era of rapid technological change and a highly dynamic environment, adapting to market demands is essential. To stay ahead, organizations must look beyond internal resources and actively acquire external knowledge, which is key to driving innovation and improving business performance. Cohen and Levinthal (1990) introduced the concept of absorptive capacity, defining it as "a firm's ability to recognize the value of new external information, assimilate it, and apply it for business purposes." This theory highlights a company's ability to leverage external knowledge, positioning absorptive capacity as a key determinant of innovation by shaping how firms acquire and utilize knowledge from their environment. The extent to which external knowledge adds value depends on an organization's internal resources and capabilities. To maximize this potential, firms must cultivate a learning culture and establish a robust infrastructure that facilitates knowledge integration. Additionally, managerial skills and leadership styles play an important role in fostering an environment that prioritizes knowledge sharing and continuous learning.

Zahra and George (2002) later reconceptualized absorptive capacity as "a set of organizational routines and processes through which firms acquire, assimilate, transform, and exploit knowledge to develop a dynamic organizational capability." Their framework has been widely accepted and serves as a fundamental reference for researchers. The dynamic nature of absorptive capacity is well-documented in the literature (Zou et al., 2016). Absorptive capacity is considered a dynamic capability because it enables organizations to continuously sense, absorb, and transform knowledge in response to external changes. In other words, absorptive capacity allows firms to continuously learn, innovate, and enhance their competitive position over time. As absorptive capacity evolves, firms gain experience and refine their knowledge absorption practices. Consequently, organizations must continuously adapt their strategies to effectively leverage external knowledge and sustain a competitive advantage. Further theoretical and empirical studies have explored absorptive capacity as a process model, analyzing its key mechanisms, influencing factors, and outcomes to deepen understanding of the concept.

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2. FACTORS OF ABSORPTIVE CAPACITY

Absorptive capacity is shaped by various internal and external factors that determine how effectively an organization acquires, assimilates, transforms, and utilizes knowledge. These factors influence the organization's ability to recognize valuable external knowledge and integrate it into its innovation processes. While some factors stem from internal structures and management practices, others arise from external relationships and prior knowledge accumulated over time. In general, the factors affecting absorptive capacity can be categorized into four groups (Volberda et al., 2010): managerial factors, intra-organizational factors, inter-organizational factors, and prior related knowledge.

Managerial factors that influence absorptive capacity include managerial skills, incentives, and leadership style. Managerial skills can synthesize and apply knowledge and can be influenced and limited by the manager's cognition and dominant logic. The education and motivation of individuals play a critical role in acquiring external knowledge. Managers must improve learning by encouraging employee skill development and foster the motivation of employees to enhance their capacity for knowledge absorption (Rezaei-Zadeh & Darwish, 2016). Aligning incentives with knowledge processes ensures that employees are motivated to engage in knowledge-sharing activities and contribute to the organization's learning culture. Leadership style also plays a pivotal role, as leaders who emphasize collaboration and openness to new ideas create an environment conducive to knowledge acquisition. A leadership approach that integrates both individual and organizational knowledge goals fosters a more effective and dynamic absorptive capacity.

Intra-organizational factors play a significant role in shaping an organization's absorptive capacity. The organizational structure impacts knowledge assimilation, as different structural designs can either facilitate or hinder the flow of external knowledge. For example, matrix structures, which emphasize cross-functional collaboration, tend to enhance knowledge exchange compared to more traditional divisional or functional structures. Effective communication systems help improve the sharing of knowledge across different units and promote the assimilation of new information. The size of the firm and its informal networks further influence absorptive capacity, as larger firms with flexible communication channels are better equipped to absorb external knowledge. Finally, a receptive, learning-oriented organizational culture is strongly associated with absorptive capacity (Akkartal et al., 2023), fostering an environment where knowledge sharing is a priority and employees are constantly adapting new ideas to improve organizational performance.

Inter-organizational factors, including business collaboration, networks, informal ties, and localized spillovers, significantly influence absorptive capacity. Acquiring knowledge through interactions and collaborations with suppliers, customers, universities, research institutes, intermediaries, and other entities is essential for enhancing an organization's ability to innovate and improve performance. Collaboration with diverse partners, such as strategic alliances and joint ventures, further enriches a company's knowledge base and strengthens its absorptive capacity. Informal social ties, including communities of practice, facilitate the exchange of valuable insights and experiences, fostering knowledge sharing. Both formal and informal external relationships create networks that enable organizations to access, assimilate, and exploit external knowledge more effectively. Additionally, geographic proximity to key sources of knowledge can foster localized knowledge spillovers, allowing companies operating in knowledge-rich environments to innovate more rapidly than competitors in less dynamic regions (Breschi & Lissoni, 2001).

Prior related knowledge encompasses knowledge stocks, breadth, and depth. When an organization's existing knowledge is sufficiently similar to external knowledge, it enhances the firm's ability to recognize, assimilate, and apply new information effectively. The breadth of knowledge, which represents diversity across multiple domains (e.g., customers, market segments, and technology), enriches the organization's learning potential by facilitating connections between different knowledge areas. Depth of knowledge, reflecting expertise in key areas (Yang et al., 2017), strengthens absorptive capacity by enabling a deeper understanding and integration of complex information. Knowledge embedded in organizational routines, technologies, and employees becomes part of the firm's knowledge base, reinforcing its ability to absorb and utilize external insights. However, absorptive capacity decreases when external knowledge is highly complex, novel, or misaligned with the organization's existing knowledge base, making assimilation and application more challenging.

3. COMPONENTS AND DIMENSIONS OF ABSORPTIVE CAPACITY

Absorptive capacity is composed of potential absorptive capacity and realized absorptive capacity, each serving a distinct but complementary role. Potential absorptive capacity refers to an organization's ability to acquire and assimilate external knowledge, laying the groundwork for future learning and innovation. In contrast, realized absorptive capacity involves the transformation and exploitation of acquired knowledge, enabling firms to apply it for commercial or strategic benefits. The key difference between them lies in the transition from merely acquiring knowledge to effectively utilizing it in business processes and decision-making. While potential absorptive capacity determines a firm's readiness to absorb new information, realized absorptive capacity reflects the organization's ability to convert that knowledge into tangible outcomes. A strong absorptive capacity requires both elements to work together, ensuring that knowledge is not only gathered but also successfully leveraged for competitive advantage.

The construct of potential absorptive capacity encompasses two dimensions: knowledge acquisition and knowledge assimilation. Together, these processes ensure that newly acquired information is recognized and transformed into meaningful insights that can be leveraged for strategic decision-making and competitive advantage.

Knowledge acquisition enables organizations to identify, access, and gather valuable external information that enhances their innovation capabilities and competitive advantage. Organizations engage in external networks, leveraging both formal channels (such as partnerships and research collaborations) and informal interactions to acquire relevant knowledge. The recognition of external knowledge depends on a firm's prior knowledge base, as well as its ability to scan and interpret industry trends and technological advancements. A proactive technological orientation, including the establishment of environmental scanning mechanisms to identify external technology sources, along with a strong market orientation focused on new customers and emerging markets, are among the key prerequisites for recognizing valuable external knowledge (Lichtenthaler, 2016). Once external knowledge is identified, it must be effectively transferred to the appropriate units or teams within the organization to maximize its value.

Knowledge assimilation involves the interpretation, analysis, and integration of newly acquired external knowledge into the organization's existing knowledge base. This process ensures that external knowledge is not only recognized but also understood and effectively aligned with internal operations and strategic objectives. However, knowledge assimilation often lags due to contextual differences, complexity, or misalignment between the external knowledge and the organization's current capabilities. Knowledge assimilation depends on individuals' ability to understand new external information and connect it with the organization's existing knowledge (Chauvet, 2014). Since external knowledge is frequently context-specific, employees may face challenges in fully comprehending or applying it without additional adaptation, training, or knowledge-sharing efforts. Successful assimilation requires internal learning initiatives, collaboration among employees, and mechanisms to refine and contextualize new information for practical use.

The construct of realized absorptive capacity consists of two dimensions: knowledge transformation and knowledge exploitation. Together, these dimensions enable organizations to refine, integrate, and apply newly acquired knowledge, ensuring its effective utilization for innovation, problem-solving, and competitive advantage.

Knowledge transformation refers to the process by which organizations refine, adapt, and integrate newly acquired knowledge with existing knowledge to create a more coherent and applicable knowledge base. Knowledge transformation involves adjusting existing knowledge schemas to incorporate new information that may conflict with current understanding (Graham & Moore, 2021). This process requires organizations to have mechanisms for restructuring and reinterpreting knowledge to align it with internal operations, strategic goals, and industry demands. Through transformation, knowledge is modified to ensure it is relevant and useful, bridging gaps between external insights and internal capabilities. Organizations recognize new opportunities and potential innovations by effectively synthesizing external and internal knowledge. Indicators of success in knowledge transformation include improved decision-making, enhanced adaptability, and the seamless integration of new knowledge into business processes.

Knowledge exploitation refers to the process by which organizations apply transformed knowledge to improve their products, services, and overall performance. This process enables organizations to leverage knowledge for competitive advantage by driving innovation and enhancing operational efficiencies. Knowledge exploitation is crucial for fostering productivity, efficiency, and value creation, ensuring that knowledge is consistently applied across various organizational functions. As organizations continue to apply and optimize their knowledge assets, the systematic use of routines and best practices becomes increasingly refined. Organizations that excel in knowledge exploitation typically feature strong

learning cultures, effective leadership, and well-established processes for integrating new insights. Since knowledge exploitation is focused on achieving short-term effectiveness, companies must balance investments in knowledge exploitation and exploration capabilities (Agnihotri et al., 2024).

To remain competitive, companies must focus on both potential and realized absorptive capacity, ensuring they can effectively acquire, assimilate, and apply external knowledge. Companies that prioritize potential absorptive capacity excel at identifying and understanding technical challenges but may struggle to translate that knowledge into practical applications (Baker et al., 2003). In contrast, organizations that focus only on realized absorptive capacity can generate innovations based on existing knowledge but often fail to integrate new external insights that could enhance their long-term adaptability. Sustainable competitive advantage is achieved when firms develop both high potential absorptive capacity—enabling them to acquire and assimilate valuable external knowledge—and high actual absorptive capacity—allowing them to innovate and strategically implement that knowledge. This dual capability enables companies to remain agile in dynamic environments, continuously improving and adapting their strategies to market demands. By balancing these two dimensions, organizations can maximize their knowledge resources, foster continuous innovation, and maintain long-term success.

4. OUTCOMES OF THE ABSORPTIVE CAPACITY

Among the key outcomes of absorptive capacity are competitive advantage, innovation, and improved performance (Volberda et al., 2010, Zou et al., 2018). According to resource-based theory, the knowledge created by firms is a critical factor for survival and adaptation to market changes. As a dynamic capability, absorptive capacity enables firms to gain a competitive advantage by strategically acquiring, assimilating, transforming, and exploiting knowledge to better understand market trends. Furthermore, firms must effectively channel this acquired knowledge into products and processes. Innovation and strategic flexibility are essential components of competitive advantage. The transformation and exploitation capabilities that come with strong absorptive capacity directly impact organizational performance by stimulating product and process innovation.

Competitive Advantage - absorptive capacity allows companies to acquire and integrate external knowledge, enabling them to anticipate market trends and make informed strategic decisions. By continuously updating their knowledge base, organizations can develop unique capabilities that are difficult for competitors to replicate. This knowledge-driven agility enhances differentiation, cost efficiency, or both, strengthening the company's position in the market. Moreover, companies with strong absorptive capacity can better leverage partnerships, alliances, and industry networks to maintain their competitive edge.

Innovation - companies that effectively absorb new knowledge can translate it into innovative products, services, and processes that differentiate them from competitors. The ability to assimilate and exploit knowledge fosters a culture of continuous improvement and experimentation, supporting both radical and incremental innovation. Furthermore, absorptive capacity increases strategic flexibility, enabling companies to pivot in response to technological advances and market disruptions. By channeling knowledge into research, development, and creative problem-solving, organizations can sustain long-term innovation cycles and maintain industry leadership.

Improved performance - companies with high absorptive capacity improve their operational efficiency and adaptability, resulting in better financial and market performance. The transformation and exploitation of knowledge lead to lower costs, improved quality, and faster time-to-market for new products and services. Additionally, companies that successfully innovate through absorptive capacity can capture new customer segments and generate sustainable revenue streams. Over time, these advantages contribute to increased profitability, resilience to competitive pressures, and long-term business sustainability.

5. ADVANTAGES AND LIMITATIONS OF ABSORPTIVE CAPACITY

Absorptive capacity plays a crucial role in helping organizations adapt to environmental changes and explore new opportunities, thereby enhancing their innovative potential. Companies that effectively adopt external knowledge are better positioned to anticipate technological trends and capitalize on market opportunities. By assimilating external insights, these organizations gain a deeper understanding of customer needs and the strengths and weaknesses of competitors. However, knowledge within an organization is often unevenly distributed, making it essential to facilitate the efficient exchange of information across individuals and units. Additionally, absorptive capacity serves as a key mechanism for knowledge transfer in inter-organizational innovation activities.

Absorptive capacity offers numerous advantages, including the ability to recognize valuable external knowledge and facilitate its efficient transfer and application (Flatten et al., 2011). By integrating external knowledge and improving internal knowledge exchange, organizations can strengthen their capacity for innovation and sustain a competitive edge. The theory of absorptive capacity also explains why some companies struggle with innovation—due to their inability to absorb and effectively exploit new knowledge (Smith, 2015). Moreover, absorptive capacity helps organizations expand their knowledge base, leading to enhanced technological development performance. It fosters a culture of continuous learning, flexibility, and adaptability, enabling companies to develop innovative strategies and implement new business models (Müller et al., 2021). In an era of globalization, absorptive capacity has become increasingly vital for organizations striving to remain competitive in dynamic, rapidly evolving markets.

Despite its advantages, absorptive capacity also presents challenges that can limit a company's ability to fully leverage it. Implementing absorptive capacity requires substantial resources and capabilities (Bedoya-Villa et al., 2023), including but not limited to skilled personnel, investments in knowledge management systems, technological infrastructure, a supportive organizational culture, collaboration with external networks, and sufficient time for individuals and teams to absorb, interpret, and apply external knowledge. Additionally, absorptive capacity relies heavily on an existing knowledge base, making it difficult for companies to pivot to new knowledge domains if they lack prior expertise in those areas. Overemphasizing absorptive capacity can also lead to information overload, diverting attention from core tasks. To maximize long-term adaptability and competitive advantage, organizations must strike a balance between acquiring knowledge and fostering innovation while mitigating these potential drawbacks.

6. CONCLUSIONS

For three and a half decades, absorptive capacity has been the bedrock of theories of innovation and is the key dynamic capability of an organization. According to the model provided by Zahra and George (2002), it consists of two distinct but interconnected components: potential and realized absorptive capacity. The former relates to how organizations acquire and assimilate knowledge, while the latter concerns how they transform and exploit it. Organizations must consider the key factors influencing absorptive capacity – managerial, intraorganizational, interorganizational, and prior related knowledge – as well as its outcomes, including competitive advantage, innovation, and improved performance. Additionally, they must understand both its advantages and limitations. By integrating valuable external insights with internal knowledge, companies enhance adaptability, improve performance, and sustain long-term growth. However, effective implementation requires significant resources, strong managerial support, and a learning-oriented culture, while challenges such as information overload, uneven knowledge distribution, and reliance on prior knowledge must be carefully managed. Ultimately, organizations that successfully develop absorptive capacity can drive innovation, maintain resilience, and secure a sustainable competitive advantage in an increasingly complex business environment.

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