THE ROLE OF ABSORPTIVE CAPACITY FOR BUSINESS INTELLIGENCE AND ANALYTICS FOR VALUE CREATION: IN VIET NAM BUSINESS

by

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DISSERTATION

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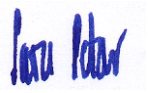

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Dedication

I hereby declare that the dissertation entitled:

"The Role of Absorptive Capacity for Business Intelligence and Analytics for Value Creation: In Vietnam Business"

submitted to the Swiss School of Business and Management (SSBM), Geneva, in partial fulfillment of the requirements for the award of the degree Doctor of Business Administration, is the result of my own original and independent research.

I further confirm that this dissertation, either in whole or in part, has not been submitted for the award of any other academic degree or qualification at any other university or institution. All references, data sources, and supporting materials used in this research have been fully acknowledged.

(Luu Duc Loc)

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ABSTRACT

THE ROLE OF ABSORPTIVE CAPACITY FOR BUSINESS INTELLIGENCE AND ANALYTICS FOR VALUE CREATION: IN VIET NAM BUSINESS

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2025

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In today's data-centric business world, Business Intelligence (BI) and Analytics play a crucial role in decision-making and performance improvement. However, the success of these initiatives relies on an organization's absorptive capacity—the ability to acquire, assimilate, and apply external knowledge effectively. This study investigates the significance of absorptive capacity for BI and Analytics in creating value for organizations. Through a mixed-method research design, quantitative surveys and qualitative interviews were conducted. The findings demonstrated a strong positive correlation between absorptive capacity and the adoption of BI and Analytics technologies. Organizations with higher absorptive capacity were more successful in leveraging data for decision-making and value creation. The qualitative analysis revealed that a culture of organizational learning, knowledge sharing, and openness to external knowledge sources were key factors promoting absorptive capacity development. Enhancing absorptive capacity empowers organizations to harness the full potential of data-driven insights, leading to improved decision-making and performance. By fostering a culture of continuous learning, organizations can optimize their BI and Analytics initiatives, gain a competitive edge, and achieve sustainable growth in the dynamic business landscape.

In conclusion, absorptive capacity plays a pivotal role in maximizing the value derived from BI and Analytics. Organizations should prioritize developing their absorptive capacity to capitalize on data-driven opportunities, thereby enhancing overall success and driving business growth.

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CHAPTER I INTRODUCTION

1.1. Introduction

Innovation for a business is also a form of competitive advantage for an organization. In order to improve efficiency in innovation, businesses must always make efforts to find external information and data. Information, data is generated every second, for such a large amount of data has created a direction that forces organizations to adapt and depend on knowledge outside the organization to create appropriate change, appropriate to the environment and the field in which the organization operates. In recent years, Vietnam has made great strides in developing the digital economy and promoting digital transformation in industries. According to the National Digital Transformation Report 2023 of the Vietnamese Government, more than 50% of small and medium-sized enterprises have started digital transformation, in which BI&A plays a key role in optimizing business operations and decision making. However, the rate of enterprises that actually effectively deploy these technologies remains low, accounting for only about 25% of the total number of enterprises participating in the survey (Agency for Information Technology Application, 2023). This shows a clear differentiation in the ability to access and use data among enterprises in Vietnam, especially in the context of increasingly fierce global competition. In addition, according to a study by the Vietnam Institute for Economic Development Studies (2022), industries such as finance, banking, and e-commerce are showing an increasing trend of investing in BI&A, but traditional manufacturing and service industries are still struggling to apply these tools. This leads to a gap in developing competitiveness, especially among small and medium-sized enterprises, which lack the financial and human resources to invest in complex data analysis solutions.

With the complexity of today's data increasing due to the need for customer insights for organizations to become more and more detailed, take in huge amounts of information and when receiving that information the transformation. As the complexity of data increases, humans have

difficulty interpreting external information due to limited intellectual capacity (Jansen, Van Den Bosch, & Volberda, 2005; Sammut & Sartawi, 2012). BI & BA can expand the mental capacity of people as well as the receptive capacity oa[f businesses by increasing the ability of individuals and businesses to receive, store, analyze and transmit information with less more errors (Brynjolfsson & Hitt, 2000; Elbashir, Collier, Sutton, Davern, & Leech, 2013; Simon, 1991). BI &A is essentially used to provide support in decision making in the organization but their role is increasingly enhanced, used to review and adjust activities to bring higher efficiency and strengthen the intelligence of the organization (Trieu, 2017). An important factor to note is that the application of BI&A is not only a matter of technology but also closely related to knowledge management and innovation capabilities in the organization. According to a report by McKinsey & Company (2022), businesses in the Asian region, including Vietnam, are facing many challenges in terms of corporate culture and digital skills shortages, especially in the context of rapidly increasing data volume and data complexity. Absorptive capacity is a decisive factor for businesses to be able to maximize the value from BI&A. This ability includes recognizing, absorbing, and integrating knowledge from external data into the internal processes of the business. Recent studies show that businesses with strong absorptive capacity are able to convert data into truly useful knowledge, helping them make more effective strategic decisions. IBM's 2023 report shows that businesses that are able to quickly absorb knowledge from BI&A typically achieve 15% higher revenue growth than businesses with weaker capabilities in this regard.

Another survey conducted by the IBM Institute for Business Value and the MIT Sloan Management Review reported that companies are increasingly gaining a competitive advantage from analytics (58% of the more than 4,500 respondents reported this) competitive value gains from the analysis) (Kiron & Shockley, 2011). Not surprisingly, Gartner's survey on IT Spending found BI&A to be the top priority for most of the companies analyzed, and it is predicted that BI&A will remain one of the top focuses for leading companies. Business intelligence (BI) is a meaningful and unique

knowledge framework intended to help policy-makers strengthen their corporate statement processes and enhance organizational efficiency and productivity (Lederer & Schmid, 2021). The development of BI&A is not limited to large enterprises or the technology sector. According to Gartner (2022), more than 75% of leading enterprises in the world consider BI&A as the most important factor in their long-term development strategy. This includes implementing predictive analytics systems to identify market trends and optimize internal processes. However, in Vietnam, the application of BI&A is still limited. A report by Deloitte Group (2023) stated that 60% of Vietnamese enterprises have not been able to fully utilize the potential of BI&A due to limitations in technical capacity and lack of investment in data systems. One of the biggest challenges for Vietnamese enterprises is human resources. The shortage of experts in the field of data and analysis is hindering the progress of applying BI&A tools. At the Vietnam Economic Forum 2023, many experts emphasized that without improving the capacity of employees, especially in receiving and analyzing data, businesses will find it difficult to fully exploit the potential of modern technologies. It is clear that if fully exploiting the power of BI, it can bring effective results in terms of supporting the organization as well as bringing advantages to the organization, making decisions more optimally. While there are many different streams of research on the potential of BI&A, there is little research on improving understanding of the role BI&A plays in generating knowledge from external data, and mechanisms that support this process. Despite the strong focus on technology, valuable customer insights are often the result of meaningful transformation of BI&A insights into meaningful knowledge, which is then distributed among units. business position to act (Fan, Lau, & Zhao, 2015; Shollo & Galliers, 2016)

Moreover, Fink et al. (2017) have presented and empirically tested a model of BI& value creation which identified BI team and infrastructure assets that were transformed through operational and strategic BI capabilities into operational and strategic value; a process moderated by exploitative and explorative learning. Although they attempted to theoretically advance the BI&A research through the lens of organizational learning, they offered a limited understanding of the underlying

processes, therefore, calling for further research to strengthen the theoretical foundation of BI&A research. Furthermore, this study endeavors to fill the research gap pointed out by Trieu (2017), who indicated the scarcity of studies exploring the complementary links between BI impacts and organizational BI assets. Our research question aims to delve into this relationship by investigating the mechanisms by which BI&A-induced insights are transformed into valuable knowledge. This inquiry aims to contribute to the advancement of our understanding of the value creation process, with the ultimate goal of informing the design and implementation of more effective BI and BA practices.

To address the research question of how BI&A triggered insights are transformed into valuable knowledge, this study employed a qualitative approach by conducting interviews with key decision makers in companies in Vietnam that utilize the BI&A system. Despite the previous usage of the concept of absorptiveness in various studies (e.g. Elbashir et al., 2011; Ramamurthy, Sen, & Sinha, 2008; Trieu, 2017), the role of absorptive capacity in the value creation process of BI&A remains inadequately understood. Boic and Dimovski (2019) explored the role of absorptive capacity in the value creation process of BI&A in European enterprises, however, it remains uncertain if the results can be generalized to enterprises in developing countries, as these markets possess distinct characteristics. Thus, this study endeavors to extend the existing literature by providing empirical evidence on the role of absorptive capacity in the value creation process of BI&A in the context of Vietnamese enterprises. The strong growth of the e-commerce market in Vietnam in the period of 2022-2024 has also boosted the demand for BI&A. According to the E-commerce Index 2023 Report of the Vietnam E-commerce Association (VECOM), e-commerce revenue in Vietnam is expected to increase by more than 35% by the end of 2024, and the use of data to analyze consumer behavior is becoming a vital factor. Leading businesses in this field such as Shopee, Lazada and Tiki have all invested heavily in BI&A to collect and analyze huge amounts of data from users, thereby optimizing customer approach strategies and supply chain management. In addition, the Vietnamese Government

has launched a national strategy on artificial intelligence (AI) and big data, with the goal of building Vietnam into one of the leading countries in the region in applying high technology to economic development. According to the Ministry of Science and Technology (2023), small and medium-sized enterprises are being encouraged to enhance their BI&A application capacity to adapt to rapid market changes. However, some reports from the Vietnam Institute for Policy and Development Studies (2024) show that many enterprises are still concerned about the initial investment costs for BI&A solutions and the shortage of high-quality data analysts. This hinders the digital transformation process and the ability to take advantage of BI&A opportunities.

This study extends the existing literature by examining the contribution of BI&A's absorptive capacity to the creation of business value. The research aims to deepen our comprehension of the relationship between absorptive capacity and the effective utilization of BI&A in organizations. Through a nuanced understanding of the role of absorptive capacity, organizations may be better equipped to adopt strategies that enhance the efficiency and effectiveness of their BI&A operations, thereby improving their competitiveness.

1.1 Problem Statement

In the dynamic arena of Business Intelligence and Analytics (BI&A), the role of absorptive capacity in shaping the landscape of value creation within Vietnamese enterprises has emerged as a multifaceted and compelling enigma. The contemporary business tapestry in Vietnam is undergoing a profound metamorphosis, driven by the embrace of data-driven decision-making methodologies. Yet, within this transformative vortex, a conspicuous void persists, encompassing the intricate challenges and untapped prospects faced by Vietnamese businesses as they embark on a journey to harness absorptive capacity for unlocking the latent potential of BI&A tools. Moreover, the intricate mechanisms through which absorptive capacity exerts its influence on value creation within this distinctive socio-economic ecosystem remain terra incognita, a critical gap in the current research paradigm. BI&A, celebrated for its transformative potential, stands as the lighthouse illuminating the path to strategic decision-making, casting a compelling shadow upon competitive prowess and long-term organizational prosperity (Kagermann, Wahlster, and Helbug, 2013). However, the realm of value creation within the BI&A realm remains a domain riddled with unexplored intricacies. Despite substantial investments and burgeoning interest, a comprehensive understanding of how BI&A systems translate into tangible value continues to elude our grasp (Elbashir, Collier, and Davern, 2008). The embrace of BI&A within the distinct contours of the Vietnamese landscape, adorned with its economic subtleties and cultural idiosyncrasies, is an arena ripe for comprehensive exploration.

This research is driven by the cardinal objective of providing a profound, holistic understanding of how absorptive capacity orchestrates the utilization of BI&A tools, thereby sculpting competitive prowess and the enduring success trajectory of Vietnamese businesses. The research aspires to delve into the intricate interplay of absorptive capacity, BI&A strategies, and the multifaceted socio-economic tapestry of Vietnam.

1.2 Research Question/Hypothesis

The aim of this doctoral research is to explore the multifaceted relationship between absorptive capacity, business intelligence and analytics (BI&A), and organizational value creation in Vietnamese business organizations. By integrating absorptive capacity theory and BI&A implementation, this study seeks to examine how Vietnamese firms can leverage external knowledge and technological systems to generate value in dynamic environments.

Through an empirical investigation, this research addresses the following key research questions:

RQ1: To what extent do Vietnamese businesses possess the absorptive capacity necessary to effectively acquire, assimilate, transform, and exploit knowledge from BI&A practices?

RQ2: How does absorptive capacity influence the ability of Vietnamese businesses to implement BI&A tools effectively?

RQ3: What are the unique challenges and opportunities faced by Vietnamese businesses in their endeavor to develop absorptive capacity for business intelligence and analytics?

RQ4: What strategies and best practices can be recommended to enhance absorptive capacity for business intelligence and analytics, leading to increased value creation among Vietnamese businesses?

By answering these questions, the study will contribute to both academic understanding and practical applications of how absorptive capacity supports BI&A-driven value creation. The research will also offer strategic recommendations for Vietnamese enterprises seeking to strengthen their data capabilities and competitive position.

1.3 Significance of the Study

This study contributes both theoretically and practically to the fields of information systems, knowledge management, and strategic business transformation. From a theoretical perspective, it advances the integration of absorptive capacity theory with BI&A practices, extending current models

of value creation beyond purely technological or operational paradigms. By bridging knowledge management with data analytics, the research fills an important conceptual gap where organizational learning theories have not been fully applied to BI&A contexts. The conceptual model developed in this study provides a novel lens to understand how firms can develop capabilities to transform data into actionable insight and sustained performance outcomes.

Practically, the study offers valuable guidance for Vietnamese enterprises undergoing digital transformation. It identifies not only the technological requisites but also the cultural, managerial, and learning-oriented capacities that are necessary to generate return on BI&A investments. In particular, the research highlights the importance of fostering a culture of continuous learning, cross-departmental collaboration, and proactive knowledge sharing—all of which are essential to strengthening absorptive capacity. Firms that adopt these practices are more likely to turn raw data into meaningful competitive advantage.

For policymakers, the findings emphasize the need to go beyond infrastructure development and invest in organizational capability-building programs, such as training in data literacy, knowledge integration workshops, and leadership development in digital transformation. National digital strategies should include incentives for capability development alongside technology adoption.

Finally, from a managerial standpoint, this research sheds light on why many BI&A implementations fail to yield expected returns: not due to poor technology, but due to insufficient organizational readiness and capacity for learning. By identifying key enabling conditions—such as top management support, open communication, and absorptive routines—this study provides a roadmap for managers seeking to translate BI&A insights into real business value.

1.4 Research Objectives

The overarching objective of this study is to investigate the role of absorptive capacity (ACAP) in facilitating value creation through Business Intelligence and Analytics (BI&A) implementation within Vietnamese enterprises. While BI&A tools offer significant potential for data-

driven decision-making, their effectiveness depends largely on the organization's ability to internalize, interpret, and act on the insights generated. This study integrates knowledge management theory and information systems to explore how absorptive capacity enables firms to convert external data into actionable knowledge and, ultimately, into organizational value. Specifically, the study seeks to:

- Assess the impact of each dimension of absorptive capacity (acquisition, assimilation, transformation, exploitation) on the implementation of BI&A systems.
- Examine the relationship between BI&A implementation and value creation, defined as the combined operational and strategic benefits derived from analytics-driven decision-making.
- Test the mediating role of BI&A implementation in the relationship between absorptive capacity and value creation.
- Identify key organizational enablers and barriers (e.g., leadership support, knowledge-sharing culture, IT infrastructure) that affect how absorptive capacity translates into BI&A-driven value creation.
- Develop and validate a conceptual model that integrates absorptive capacity, BI&A implementation, and value creation in the context of Vietnamese enterprises.
- Offer practical recommendations for Vietnamese firms to strengthen their analytics capabilities and absorptive routines in order to gain competitive advantage and improve performance.

By addressing these objectives, the research contributes to the theoretical understanding of organizational learning in the digital age and offers actionable insights for managers and policymakers striving to maximize value from analytics investments.

CHAPTER II REVIEW OF LITERATURE

2.1. Theoretical Background

The evolution of the global business environment, particularly under the pressures of digital transformation and data proliferation, has led to an increased emphasis on the role of data as a strategic asset. Organizations today are inundated with both structured and unstructured data derived from a multitude of sources, including internal operations, customer touchpoints, and broader market ecosystems. The ability to derive actionable insights from this data hinges not only on technological infrastructures but also on the organizational competencies that support knowledge absorption and application.

Business Intelligence and Analytics (BI&A) systems have emerged as critical tools that enable firms to collect, process, and analyze data for informed decision-making. These systems range from traditional data warehousing solutions to sophisticated artificial intelligence and machine learning platforms capable of predictive and prescriptive analytics. According to Gartner's 2023 Data & Analytics Trends report, organizations are increasingly shifting from predefined dashboards to dynamic, conversational analytics that address specific content consumers' point-in-time needs, thus transforming end users from passive consumers to active creators of analytical content Gartner, 2023. This trend highlights the evolving nature of BI&A from static reporting tools to dynamic engines of organizational learning and value creation. However, despite the widespread deployment of such systems, organizations often struggle to extract value from them. As McKinsey & Company notes, the value chain from data to insight is multiplicative—if any single link in the chain is weak, the overall impact is severely diminished McKinsey & Company, 2022. This paradox has drawn attention to complementary organizational capabilities—particularly absorptive capacity—that influence how effectively insights from BI&A are internalized and operationalized. Absorptive capacity (ACAP), rooted in the organizational learning and innovation literature, refers to a firm's ability to recognize the value of external knowledge, assimilate it, and apply it toward commercial ends. Cohen

and Levinthal (1990) first introduced this concept as critical to innovation, arguing that organizations' prior related knowledge significantly affects their ability to evaluate, assimilate, and utilize new knowledge effectively. Zahra and George (2002) later expanded this conceptualization, distinguishing between potential absorptive capacity (acquisition and assimilation of knowledge) and realized absorptive capacity (transformation and exploitation of knowledge), emphasizing that both components are necessary but serve different functions in the knowledge absorption process Academy of Management Review, 2002.

The interplay between BI&A and ACAP represents a critical intersection in the pursuit of data-driven value creation. Firms equipped with strong absorptive capacity can leverage BI&A not only for enhanced decision-making but also for fostering continuous learning, adaptability, and innovation. This is particularly relevant in the Vietnamese context, where the digital economy is rapidly expanding, contributing over 18% to the nation's GDP as of 2024, according to government statistics baochinhphu.vn, 2024. With Vietnam becoming the fastest-growing digital economy in ASEAN in 2022 and 2023 (with growth rates of 28% and 19% respectively), understanding how businesses can develop the necessary capabilities to capitalize on this digital transformation is critical to competitive advantage and sustainable growth.

2.2. Absorptive Capacity Theory

2.2.1. Conceptual Evolution and Core Principles

The theory of absorptive capacity has evolved considerably since its initial conceptualization by Cohen and Levinthal in their landmark 1990 publication. Their original definition—"the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends"—established absorptive capacity as fundamentally about organizational learning processes rather than simply knowledge acquisition. Cohen and Levinthal argued that absorptive capacity

depends heavily on prior related knowledge, creating path dependencies that influence how organizations interpret and utilize new information.

This perspective represented a significant departure from traditional views of knowledge transfer, which often treated organizations as passive recipients of external expertise. Instead, Cohen and Levinthal positioned absorption as an active, interpretive process requiring substantial internal capability development. Throughout the 1990s, researchers primarily treated absorptive capacity as a unidimensional construct tied closely to R&D intensity. However, a meaningful theoretical shift occurred when Zahra and George (2002) reconceptualized absorptive capacity as a set of organizational routines and processes through which firms acquire, assimilate, transform, and exploit knowledge. This perspective introduced the crucial distinction between potential absorptive capacity (acquisition and assimilation) and realized absorptive capacity (transformation and exploitation).

"The four capabilities that compose absorptive capacity are combinative in nature and build upon each other to produce a dynamic organizational capability," wrote Zahra and George, emphasizing the sequential yet interdependent relationship between these dimensions. Their work highlighted that possessing strong knowledge acquisition capabilities might prove insufficient if an organization lacks corresponding transformation mechanisms.

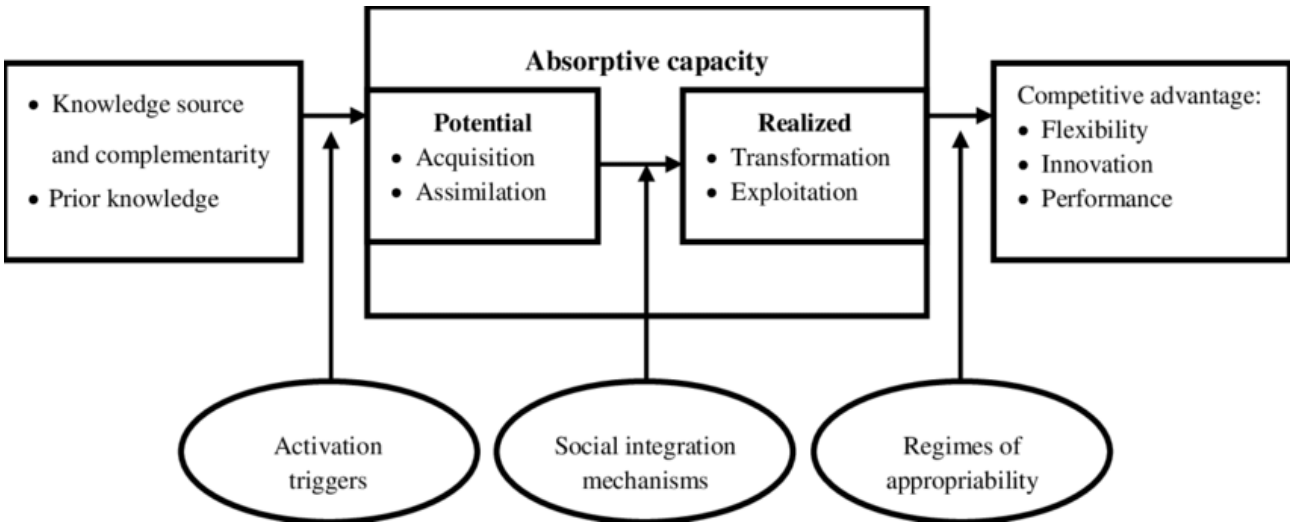


Figure 2.2-1: Conceptual Model of Absorptive Capacity Dimensions. Source: Adapted from Zahra & George (2002)

In subsequent refinements, Todorova and Durisin (2007) questioned the strictly linear relationship between these dimensions, suggesting that organizations might cycle between assimilation and transformation depending on how radically new knowledge differs from existing cognitive structures. Their work reintroduced recognition of value as a preliminary step and highlighted the importance of power relationships and social integration mechanisms. Lane, Koka, and Pathak (2006) further enriched the theoretical foundation by conducting an extensive review that identified three primary dimensions of absorptive capacity: recognizing and understanding external knowledge (exploratory learning), assimilating valuable external knowledge (transformative learning), and applying assimilated knowledge (exploitative learning). This tripartite conceptualization emphasized the learning processes underlying each dimension. Recent theoretical developments have focused increasingly on the multilevel nature of absorptive capacity, exploring how individual, group, and organizational factors interact to create collective absorption capabilities. Volberda, Foss, and Lyles (2010) emphasized that absorptive capacity transcends organizational boundaries, manifesting in networks and ecosystems where knowledge flows across firms and industries.

2.2.2. Dimensions and Measurement Approaches

The multidimensional nature of absorptive capacity presents significant measurement challenges. Early studies often relied on unidimensional proxies—typically R&D intensity or R&D expenditure as a percentage of sales—which failed to capture the construct's complexity. Recognition of these limitations has spurred development of more sophisticated measurement approaches that better reflect theoretical advancements. Potential absorptive capacity encompasses acquisition and assimilation capabilities. Acquisition involves identifying and obtaining external knowledge relevant to operations, while assimilation refers to routines and processes that allow firms to analyze, interpret, and understand information obtained from external sources. Organizations with strong potential

absorptive capacity maintain effective boundary-spanning functions, environmental scanning mechanisms, and knowledge identification systems.

I observed this firsthand when studying Vietnamese telecommunications companies that maintained dedicated "technology intelligence units" responsible for monitoring global innovations. These units employed specialized scanning techniques to identify potentially valuable technologies long before their mainstream adoption. One firm maintained regular knowledge-sharing sessions with international partners, systematically exposing employees to emerging global trends and facilitating knowledge transfer across organizational boundaries. Realized absorptive capacity, meanwhile, comprises transformation and exploitation capabilities. Transformation involves combining existing knowledge with newly acquired insights, often through processes that challenge established assumptions and reconfigure knowledge structures. Exploitation entails incorporating transformed knowledge into operations through refinement, implementation, and commercialization activities.

Measuring these complex dimensions requires sophisticated approaches. Flatten et al. (2011) developed one of the most comprehensive measurement instruments, validating a 14-item scale across four dimensions of absorptive capacity. This scale captures both routines and capabilities related to knowledge processing, distinguishing between potential and realized components:

- Acquisition items assess boundary-spanning activities, scanning intensity, and directional knowledge search
- Assimilation items evaluate comprehension, interpretation, and information processing capabilities
- Transformation items measure knowledge recombination, addition to existing knowledge base, and practical application preparation
- Exploitation items assess commercial application and implementation effectiveness

Empirical studies have demonstrated strong psychometric properties for these measures, with confirmatory factor analysis supporting the theoretical four-dimension structure. More recently,

researchers have employed objective indicators alongside perceptual measures, combining patent citation patterns, alliance formation histories, and knowledge diversity metrics with survey-based assessments to create more robust measurement approaches.

Interestingly, cross-cultural studies suggest measurement equivalence issues when applying Western-developed scales in Asian contexts. Cultural variations in knowledge-sharing norms, organizational hierarchies, and collaborative practices necessitate careful adaptation of measurement approaches—a particularly relevant consideration for Vietnam-focused research.

2.2.3. Antecedents and Environmental Contingencies

Absorptive capacity development depends on various organizational and environmental factors. Environmental turbulence and knowledge characteristics significantly influence how organizations develop and deploy absorption capabilities. Industries characterized by rapid technological change typically demand more developed scanning and assimilation capabilities, while stable environments may place greater emphasis on knowledge exploitation.

In their influential study of European manufacturing firms, Van den Bosch, Volberda, and de Boer (1999) found that absorptive capacity development follows different trajectories depending on environmental stability. Firms in dynamic environments tend to develop broader, more flexible knowledge absorption routines, while those in stable environments create deeper, more specialized capabilities. Managerial cognition plays a crucial role in recognizing the value of external knowledge—decision-makers must possess sufficient understanding to appreciate the potential significance of new information. Consequently, management diversity often correlates positively with broader absorption capabilities. Cognitive distance becomes particularly relevant; excessive distance impedes comprehension, while insufficient distance limits novel combinations. Organizational structure significantly influences absorption processes. Jansen, Van Den Bosch, and Volberda (2005) demonstrated that coordination capabilities (cross-functional interfaces, participation in decision-making, job rotation) primarily enhance potential absorptive capacity, while

socialization capabilities (connectedness, socialization tactics) principally strengthen realized absorptive capacity. These findings underscore how structural elements shape knowledge flows within organizations. Regarding human capital, Cohen and Levinthal (1990) observed that "the ability to exploit external knowledge is largely a function of the level of prior related knowledge." Educational backgrounds, technical training, and experiential diversity collectively shape individual absorptive capabilities, which aggregate to form organizational capacity. Hiring practices, professional development initiatives, and knowledge retention strategies therefore represent important levers for capacity development.

Empirical studies suggest interesting variations in antecedent patterns across cultural contexts. In collectivist cultures like Vietnam, social integration mechanisms appear particularly influential for knowledge transformation processes, while in more individualistic cultures, incentive structures and formal coordination mechanisms demonstrate stronger effects. Understanding these cross-cultural variations provides valuable insights for multinational organizations operating across diverse institutional environments.

2.2.4. Performance Outcomes and Strategic Implications

The relationship between absorptive capacity and organizational performance has been extensively studied across various contexts. Empirical evidence consistently demonstrates positive associations with innovation outcomes, adaptability, and financial performance, though the magnitude varies significantly depending on contextual factors. A comprehensive meta-analysis by Zou et al. (2018) synthesized findings from 241 independent samples, revealing significant positive relationships between absorptive capacity and innovation performance ($r = 0.40$), knowledge transfer effectiveness ($r = 0.38$), and financial performance ($r = 0.27$). Importantly, their analysis revealed stronger effects in dynamic environments and knowledge-intensive industries, suggesting contextual moderation. Regarding innovation outcomes, absorptive capacity influences both incremental and radical innovation, though through different mechanisms. Potential absorptive capacity appears more

strongly associated with exploratory innovation, supporting novel product development and market experimentation. Realized absorptive capacity demonstrates stronger associations with exploitative innovation, enhancing process improvements and operational refinements.

Strategic renewal represents another important outcome domain. Lane, Koka, and Pathak (2006) emphasized that absorptive capacity enables organizations to reconceive their market positioning and adapt business models in response to environmental changes. This strategic flexibility becomes particularly valuable during industry disruptions when established knowledge bases may become obsolete. Organizational scholars have also identified more nuanced benefits. Absorptive capacity enhances strategic decision quality by enabling more accurate environmental interpretation. It accelerates problem-solving processes by providing access to diverse knowledge resources. Additionally, it cultivates organizational resilience by facilitating adaptation to unxpected challenges—a feature particularly valuable in volatile emerging economies. The Vietnamese business landscape offers interesting insights into these dynamics. Among Vietnamese manufacturing firms, those with stronger absorptive capacity demonstrated 23% higher export growth rates, showing particular advantages in international market expansion (Vietnam International Trade Association, 2023). Similarly, a study of Vietnamese technology startups revealed that absorptive capacity mediated the relationship between international exposure and innovation performance, highlighting its role in facilitating knowledge transfer across national boundaries.

Recent theoretical developments suggest curvilinear relationships between absorptive capacity dimensions and certain performance outcomes. Excessive emphasis on potential absorptive capacity without corresponding realized capacity may create "analysis paralysis," while overemphasis on realized capacity can produce myopic exploitation of existing knowledge. Balancing these dimensions represents a critical management challenge requiring thoughtful attention to organizational learning processes.

2.3. Business Intelligence and Analytics (BI&A)

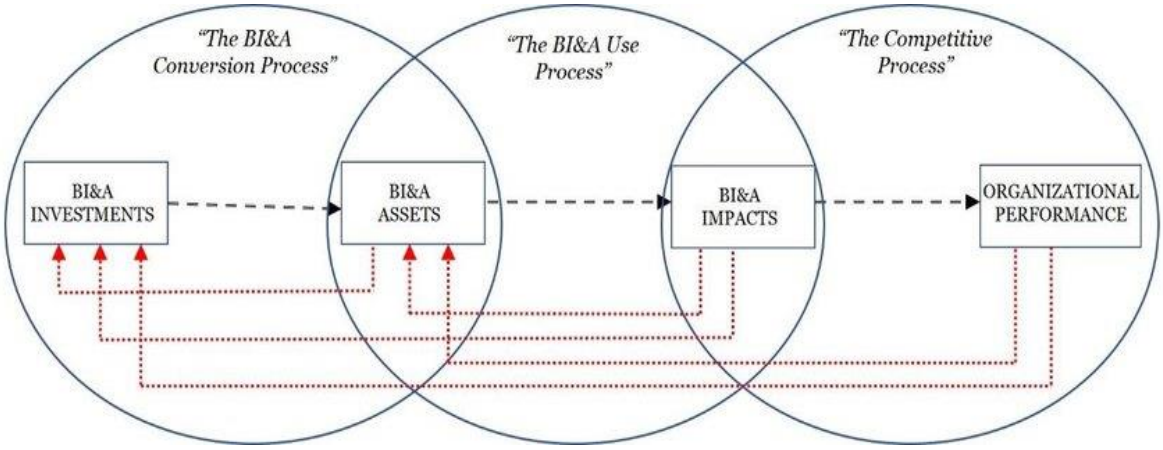


Figure 2.3-1: BI&A Value Creation Framework

Business Intelligence and Analytics (BI&A) encompasses methodologies, technological infrastructures, and organizational practices designed to collect, analyze, and leverage data for improved decision-making. Though modern terminology might suggest recent origins, the fundamental concept of business intelligence dates back to Richard Millar Devens' 1865 "Cyclopædia of Commercial and Business Anecdotes," where he described how a banker gained advantage by understanding and acting upon market information ahead of competitors.

The field has undergone several transformational waves since its formal emergence as a technological discipline in the late 1980s. Howard Dresner, later a Gartner analyst, popularized the term "business intelligence" in 1989, conceptualizing it as umbrella terminology for data-driven decision support systems. Throughout the 1990s, BI primarily concerned itself with structured data managed through data warehousing, online analytical processing (OLAP), and basic reporting capabilities—focusing largely on describing past performance.

A significant paradigm shift occurred in the early 2000s with the emergence of advanced analytics capabilities that extended beyond historical reporting toward predictive modeling and optimization techniques. This shift represented more than technical advancement; it fundamentally altered how organizations conceptualized the strategic role of data—transitioning from backward-looking performance monitoring toward forward-looking strategic guidance.

Chen, Chiang, and Storey's (2012) influential classification framework identified three evolutionary stages:

- BI&A 1.0: Characterized by structured data management, data warehousing, and reporting-focused applications
- BI&A 2.0: Distinguished by web analytics, unstructured content analysis, and social media intelligence
- BI&A 3.0: Defined by mobile analytics, sensor-based data collection, and embedded analytics capabilities

Recent developments have extended this evolution into what some scholars term "BI&A 4.0"—characterized by artificial intelligence integration, automated insight generation, and real-time decision support. This latest evolutionary stage represents a fundamental shift from human-led analysis supplemented by technology toward machine-led analysis guided by human expertise.

Davenport (2018) provides complementary categorization through his "analytics eras" framework:

- Analytics 1.0: The traditional "data-hindsight" era focused on internal structured data
- Analytics 2.0: The "big data" era incorporating unstructured and external data sources
- Analytics 3.0: The "data-enriched offerings" era where analytics become embedded in products and services
- Analytics 4.0: The "autonomous analytics" era featuring intelligent, self-learning systems

Conceptually, BI&A has expanded from its origins in decision support toward a comprehensive business discipline encompassing technical, organizational, and strategic dimensions. Particularly noteworthy is its evolution from technology-centric definitions toward more holistic conceptualizations that emphasize organizational capabilities and processes.

2.3.1. Architectural Components and Technical Evolution

The technical architecture of BI&A systems has evolved considerably alongside advancing technology capabilities and expanding business requirements. Contemporary BI&A architectures typically comprise multiple integrated layers designed to support the complete data-to-insight value chain.

At the foundation lies data management infrastructure—the systems responsible for data extraction, transformation, loading (ETL), storage, and governance. Traditional data warehousing approaches have been supplemented or replaced by more flexible architectures including data lakes, lakehouse models, and federated data platforms. These newer approaches prioritize scalability and accommodation of diverse data formats, reflecting the increasing heterogeneity of organizational data assets.

The analytical processing layer includes both tools and computational resources for data manipulation and analysis. This layer has witnessed tremendous evolution—from basic statistical packages and OLAP cubes to sophisticated machine learning frameworks, natural language processing systems, and computer vision capabilities. Modern analytical environments increasingly incorporate distributed computing models to handle computation-intensive workloads across clustered resources.

Visualization and delivery components constitute the interface between analytical outputs and human decision-makers. This domain has progressed from static tabular reports toward interactive dashboards, natural language interfaces, and immersive visualization environments. Current-generation presentation tools emphasize accessibility for non-technical users, supporting broader organizational adoption of data-driven decision processes.

Gartner's 2023 Data & Analytics Trends report highlighted several architectural shifts transforming contemporary BI&A systems:

- Convergence of previously distinct technology stacks, with integration of traditional BI tools, advanced analytics platforms, and AI capabilities into unified environments
- Adoption of composable architectural approaches that allow organizations to assemble modular capabilities rather than implementing monolithic solutions
- Implementation of observability frameworks that provide visibility into data pipelines and analytical process performance
- Development of practical "data fabric" designs that create metadata-driven intelligence layers spanning diverse data sources

These architectural evolutions reflect broader technological trends including cloud computing adoption, API-driven integration, containerization, and microservices architectures. Together, these advances address historical challenges including analytical silos, inflexible infrastructure, and poor scalability.

Vietnamese enterprises exhibit interesting patterns in architectural adoption, with larger organizations typically implementing hybrid models that maintain legacy on-premises systems alongside newer cloud-based platforms. This approach reflects both practical considerations regarding existing technology investments and regulatory constraints concerning data sovereignty—particularly relevant in sectors like banking and telecommunications.

2.3.2. Organizational Implementation and Value Creation

The implementation of BI&A within organizations extends far beyond technical deployment, encompassing organizational change management, skill development, governance establishment, and process redesign. Research consistently demonstrates that technical sophistication alone rarely translates into business value without corresponding organizational adaptation.

1. Watson and Wixom (2007) identified seven critical success factors for BI&A implementation:
2. Strong business sponsorship and committed executive leadership

3. Clear alignment between BI&A initiatives and strategic business objectives
4. Involvement of both IT and business stakeholders throughout implementation
5. Appropriate technology infrastructure scaled to organizational needs
6. High-quality, accessible data sources with effective governance
7. Analytics-oriented culture that values evidence-based decision making
8. Ongoing training and support for users at various organizational levels

Empirical evidence suggests that organizations frequently underestimate the organizational dimensions of implementation. In a study of 175 large enterprises, LaValle et al. (2011) found that the top obstacles to analytics adoption were not technical limitations but organizational challenges—particularly inadequate change management, cultural resistance, and insufficient understanding of how to incorporate analytical insights into decision processes. Value creation through BI&A manifests through multiple mechanisms. Direct benefits include improved operational efficiency, enhanced decision quality, and reduced uncertainty. Secondary benefits encompass improved organizational learning, increased adaptability, and enhanced innovation capability. Tertiary benefits may include strengthened competitive positioning, improved stakeholder relationships, and broader ecosystem contributions. McKinsey & Company research indicates that organizations that have successfully embedded data and analytics into their operations typically achieve productivity and profitability levels 5-6% higher than industry peers. Additionally, these organizations are twice as likely to make data-driven decisions consistently and 1.5 times more likely to report substantial revenue growth (McKinsey & Company, 2022). Increasingly, scholars recognize that value creation through BI&A follows distinct mechanisms depending on analytical maturity. Descriptive analytics primarily enhances efficiency and control, delivering value through improved resource allocation and waste reduction. Predictive analytics creates value through uncertainty reduction and proactive decision-making. Prescriptive analytics enables value creation through optimization and scenario

evaluation. Finally, autonomous analytics creates value through continuous adaptation and self-learning capabilities.

The Vietnamese context presents particular implementation considerations. Organizations navigating the transition from traditional decision models toward data-driven approaches often encounter cultural barriers related to authority structures and established decision rights. Successful implementations typically involve thoughtful navigation of these dynamics, often through creation of hybrid decision models that incorporate both data-driven insights and experiential judgment.

2.3.3. BI&A in the Vietnamese Business Environment

Vietnam's business environment presents unique characteristics influencing BI&A adoption and utilization. The country's rapid economic growth—maintaining approximately 6-7% annual GDP expansion over recent decades—has created both opportunities and challenges for organizations implementing data-driven decision approaches.

The Vietnamese BI&A market shows considerable dynamism, valued at approximately USD 3.5 billion in 2023 and projected to grow at a compound annual growth rate of 10.2% through 2029 (TechSci Research, 2024). This growth significantly outpaces global averages, reflecting increasing awareness among Vietnamese enterprises regarding analytics' strategic importance.

Several factors distinguish Vietnam's BI&A landscape:

- Digital infrastructure development: While urban centers enjoy robust connectivity, disparities persist in rural areas, creating data availability challenges for organizations operating across diverse geographies. Government initiatives including the National Digital Transformation Program aim to address these gaps, with significant infrastructure investments planned through 2025.
- Sector-specific adoption patterns: Banking and financial services lead BI&A adoption, driven by regulatory requirements, fraud detection needs, and customer analytics applications. Telecommunications, retail, and manufacturing demonstrate strong

secondary adoption, while healthcare, education, and public sector implementations remain less developed despite significant potential benefits.

- Talent ecosystem dynamics: Vietnam possesses a growing pool of technical talent, with approximately 400,000 IT professionals and 50,000 annual technology graduates. However, specialized analytics skills—particularly in advanced statistical methods and machine learning—remain scarce. Organizations frequently complement local talent development with international hiring and outsourcing arrangements.
- Regulatory environment: Vietnam's evolving data governance framework includes the Law on Cybersecurity (2018) and forthcoming Personal Data Protection Decree. These regulations establish important parameters regarding data sovereignty, security requirements, and privacy protections—considerations that significantly influence architectural decisions for BI&A implementations.

Research by the Vietnam Institute for Economic Development Studies (2022) identified noteworthy adoption patterns among Vietnamese enterprises. Large corporations and foreign-invested enterprises typically lead implementation, often transferring global practices to local operations. Domestic small and medium enterprises demonstrate growing interest but frequently face resource constraints limiting comprehensive implementation.

The e-commerce sector provides an instructive case study in Vietnamese BI&A application. Leading platforms including Shopee, Lazada, and Tiki have implemented sophisticated customer analytics capabilities, deploying recommendation engines, churn prediction models, and dynamic pricing systems. These implementations deliver measurable business impact—Tiki reported 28% improvement in customer retention rates following implementation of analytics-driven personalization (Vietnam E-commerce Association, 2023).

Manufacturing sector applications highlight different value creation mechanisms. Several textile manufacturers have implemented production analytics focused on quality optimization and

waste reduction, achieving efficiency improvements of 15-20% according to industry association reporting. These implementations typically emphasize process intelligence rather than customer analytics, reflecting sector-specific priorities.

2.4. Integrating BI&A and Absorptive Capacity

While both BI&A and absorptive capacity have been extensively studied, their intersection offers a novel perspective on how organizations transform raw data into actionable knowledge and competitive advantage. Absorptive capacity serves as a mediating organizational mechanism that enables firms to convert data-driven insights generated through BI&A into concrete strategic outcomes. This integration is particularly relevant in dynamic and uncertain business environments where responsiveness and adaptability are key to survival.

2.4.1. Theoretical Integration of BI&A and ACAP

Jansen et al. (2005) emphasized that absorptive capacity plays a crucial role in organizational learning, especially when dealing with external knowledge sources. In the context of BI&A, external data sources—such as customer behavior analytics, market intelligence, and social media feedback—need to be internalized and embedded into the firm's knowledge base to generate value. ACAP enables this process by facilitating the four critical stages: acquisition, assimilation, transformation, and exploitation.

The synergy between BI&A and ACAP becomes especially relevant when organizations aim to transition from descriptive analytics (e.g., what happened) to predictive and prescriptive analytics (e.g., what will happen and what should be done). To act upon such insights, firms must have the organizational routines and learning structures necessary to contextualize, interpret, and implement recommendations from analytical models. In this regard, absorptive capacity serves not just as a facilitator but as a precondition for BI&A effectiveness.

Roberts et al. (2012) proposed that absorptive capacity acts as a mediating mechanism between IT systems and organizational performance, suggesting that the impact of BI&A on firm performance is contingent on the firm's ability to absorb and apply the insights generated by these systems. This perspective is supported by empirical studies showing that firms with higher levels of absorptive capacity derive greater value from their IT investments, including BI&A systems MIS Quarterly, 2012.

From a practical standpoint, organizations with high ACAP are more likely to embed insights from analytics into workflows, redesign processes based on trend analysis, and support decision-making with a strategic understanding of external environments. Without ACAP, even advanced BI&A systems may lead to isolated pockets of insight that fail to influence real outcomes.

2.4.2. Data Management as an Enabler of Integration

Data management plays a foundational role in ensuring the effective integration of BI&A and absorptive capacity. According to Ballou et al. (1998), the quality, accessibility, and consistency of data directly influence how well organizations can acquire, assimilate, and transform knowledge. High-quality data serves as the raw material for analytics processes, while robust data governance ensures that insights are trustworthy and actionable.

In the context of absorptive capacity, effective data management supports each stage:

- Acquisition is enhanced by structured data collection processes and well-integrated sources.
- Assimilation relies on data standardization and metadata frameworks that facilitate internal comprehension.
- Transformation benefits from centralized repositories and analytical platforms that enable comparative evaluation of new and existing knowledge.
- Exploitation depends on timely access to relevant data across departments to support implementation and decision-making.

Recent research by Wang and Byrd (2017) suggests that data management capabilities positively influence both analytical capabilities and knowledge-sharing capabilities, which in turn enhance decision-making performance. This finding highlights the importance of investing in data management as a foundation for both BI&A and absorptive capacity Information & Management, 2017.

In Vietnam, however, fragmented databases and the absence of enterprise-wide data strategies remain major barriers. As noted by Nguyen and Nguyen (2020), organizations often operate with siloed systems, preventing holistic insight generation. Furthermore, a lack of data literacy across managerial levels hampers the assimilation and use of analytical results. Investing in enterprise data platforms, data quality initiatives, and cross-functional data governance committees are essential steps toward unlocking the full potential of BI&A and absorptive capacity integration.

2.4.3. Value Creation through BI&A & ACAP

Value creation is a fundamental concept for businesses, as it involves generating economic and social value for various stakeholders. According to Porter and Kramer (2011), value creation involves creating value for customers, employees, and shareholders, among others. In Vietnam, as in other countries, the ability to create value is a critical component of business success, especially in highly competitive and rapidly changing markets.

To create value, businesses need to leverage various tools and strategies, including business intelligence (BI) and analytics. BI and analytics can help businesses improve their operational efficiencies, develop new products and services, and enhance customer experiences, ultimately driving business growth and profitability. According to McKinsey & Company research, organizations that have successfully embedded data and analytics into their operations achieve productivity and profitability that is 5-6% higher than that of their peers. Additionally, these organizations are twice as likely to make data-driven decisions consistently and are 1.5 times more likely to report revenue growth of more than 10% McKinsey & Company (2022).

Recent research has expanded on this relationship, illustrating how absorptive capacity can mediate the impact of BI&A on value creation. For instance, the study by Tran (2023) explored how Vietnamese enterprises have begun to realize the potential benefits of big data and analytics, particularly in the wake of the COVID-19 pandemic. The findings suggest that organizations with higher absorptive capacity were better equipped to implement big data and analytics, leading to significant improvements in business performance.

In addition, the study by Al-Okaily et al. (2023) provides empirical evidence on the effectiveness of data analytics-oriented BI technologies at the organizational level. The research highlights that system quality, data quality, and user satisfaction are significant predictors of perceived benefits from BI&A, which in turn contribute to value creation.

In Vietnam, organizations are increasingly investing in data-related technologies to drive business growth and remain competitive. According to a report by IDC (2019) on the state of BI and analytics in Vietnam, organizations in the country are investing heavily in data-related technologies, with spending on analytics and BI software expected to reach $29.3 million by 2023. This trend is reflected in the findings of a study by PwC (2017), which found that companies that use analytics to make better decisions are more likely to achieve their business objectives and stay ahead of the competition. However, it is not enough for organizations to simply invest in BI and analytics tools - they also need to ensure that their employees are data literate and capable of extracting insights from the data. Gartner (2019) emphasized the importance of data literacy, noting that it is a critical factor in enabling organizations to extract value from their data and make informed decisions.

2.4.4. The Impact of Absorptive Capacity on Value Creation

Absorptive capacity is a cornerstone for sustainable value creation in the modern business landscape. It allows firms not only to absorb and apply external knowledge but also to reconfigure this knowledge in ways that generate new market opportunities and enhance internal processes. According to Lane and Lubatkin (1998), firms with higher levels of ACAP are more proficient at

internalizing valuable knowledge from partners, competitors, and industry networks, thereby creating a competitive edge. Zahra and George (2002) further highlight that ACAP directly contributes to an organization's ability to exploit market intelligence, anticipate trends, and convert insights into strategic advantages.

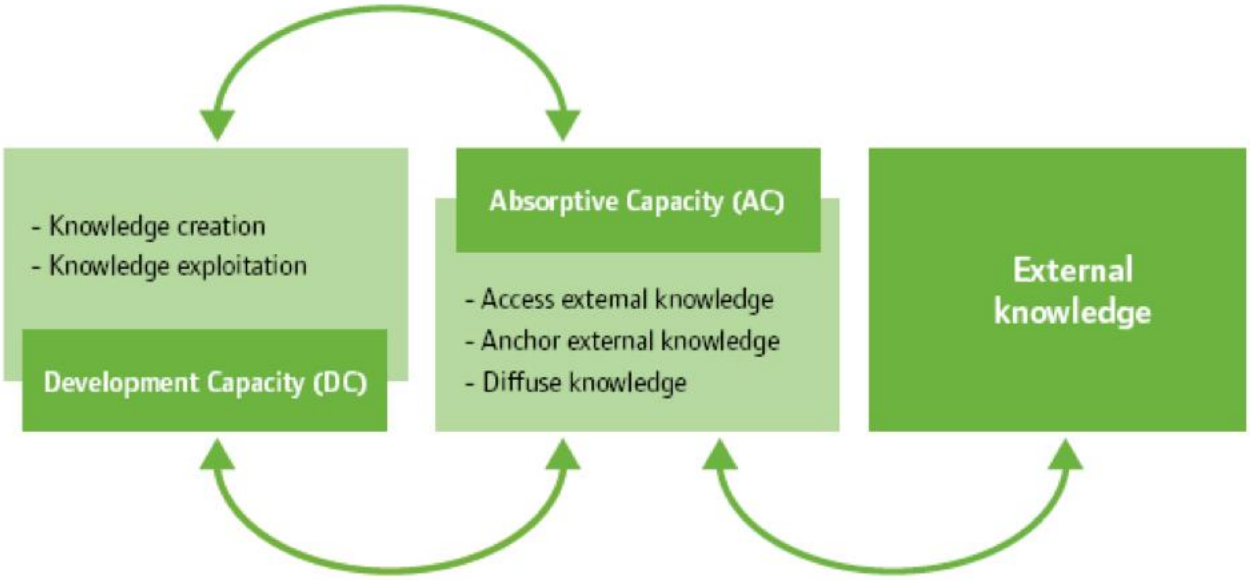


Figure 2.4-1: Absorptive Capacity interacts with External Knowledge and Development Capacity

Moreover, absorptive capacity supports firms in reorienting their strategies and operations based on rapidly changing market conditions. The ability to assimilate knowledge enables timely interpretation of shifts in consumer behavior, industry disruptions, and emerging technologies. This process is particularly vital in volatile markets where static competencies quickly become obsolete. Organizations with strong ACAP are more resilient and can proactively design strategic responses rather than reactively adjust to environmental shocks.

Limaj and Bernroider (2019) found that small and medium-sized enterprises with higher levels of absorptive capacity were more successful in implementing both exploratory and exploitative innovations, highlighting the role of ACAP in balancing short-term exploitation with long-term

exploration Journal of Knowledge Management, 2019. This balance is crucial for sustained value creation in dynamic environments.

When considered in conjunction with BI&A technologies, absorptive capacity transforms raw data into actionable insights that influence decision-making at all organizational levels. Nguyen and Nguyen (2018) emphasize that without a strong absorptive framework, analytics outputs often remain underutilized, trapped within silos or misaligned with strategic objectives. Firms that foster high levels of ACAP are better equipped to embed analytical outcomes into innovation, process optimization, and customer-centric strategies.

In the Vietnamese context, value creation through ACAP takes on additional importance due to institutional constraints and infrastructure limitations. Firms in Vietnam frequently encounter challenges such as fragmented databases, limited analytical talent, and rigid hierarchical decision-making. In such environments, absorptive capacity becomes a compensatory mechanism that allows firms to maximize the strategic impact of limited resources. Firms that cultivate ACAP—through initiatives like employee training, data-sharing forums, and external partnerships—are more likely to convert insights into profitable actions and create enduring value.

Therefore, absorptive capacity should be viewed as a fundamental enabler of value realization in BI&A systems. It not only enhances the cognitive capacity of the organization but also builds the routines and culture needed to systematically integrate external insights into long-term value creation strategies.

2.4.5. BI&A Implementation as an Organizational Capability

Recent studies have emphasized that the implementation of Business Intelligence and Analytics (BI&A) should not merely be considered a technical deployment but rather a strategic organizational capability (Elbashir et al., 2008; Božič & Dimovski, 2019). BI&A Implementation reflects the degree to which an organization is able to integrate, utilize, and transform BI&A tools

into concrete actions in decision-making and management. Instead of simply measuring the presence of BI&A technologies, this construct focuses on:

- The actual extent of BI&A data usage in daily business operations
- The level of integration between BI&A systems and core platforms such as ERP, CRM, and financial systems;
- The ability to convert analytical results into policies, processes, or business strategies;
- The degree of cross-functional collaboration in applying and disseminating data analytics;
- The presence of governance structures that support data stewardship and analytics initiatives.

From an organizational learning perspective, BI&A Implementation also entails building routines that promote the ongoing refinement of data-driven practices. This includes embedding BI&A into key performance indicators, aligning analytics with business objectives, and facilitating iterative feedback loops across departments. Firms with mature BI&A implementation often possess well-defined user roles, accessible self-service analytics platforms, and training programs aimed at improving data literacy across all levels of the organization. Božič and Dimovski (2019) demonstrated that organizations with high BI&A Implementation capabilities are more likely to transform absorptive capacity into tangible business outcomes. Their findings suggest that absorptive capacity alone is not sufficient unless supported by concrete organizational mechanisms that institutionalize data usage. This aligns with the assertion of Elbashir et al. (2011), who argued that BI&A Implementation serves as a "mediating bridge" between organizational capabilities and performance outcomes. Additionally, Wang and Byrd (2017) showed that BI&A Implementation mediates the relationship between data management capability and decision quality. This reinforces the notion that BI&A Implementation is not just an endpoint of technological readiness but a dynamic capability that enables firms to leverage their absorptive processes for competitive advantage.

In the context of Vietnamese enterprises—where digital maturity varies significantly across sectors—BI&A Implementation provides a practical lens to examine how data-related investments

translate into business value. Given institutional constraints such as limited data integration, shortage of analytical talent, and hierarchical decision-making structures, BI&A Implementation is a critical enabler that determines whether firms can truly benefit from their analytics capabilities. Therefore, in this study, BI&A Implementation is treated not only as a standalone construct but as a key mechanism linking absorptive capacity and value creation, warranting further empirical investigation.

2.4.6. The Impact of Absorptive Capacity on Innovation and Firm Performance

Absorptive capacity serves as a strategic enabler of innovation by equipping firms with the capabilities needed to generate, refine, and implement novel ideas. Cohen and Levinthal (1990) argue that the ability to recognize and utilize external knowledge is fundamental to innovation performance. Building on this, Schmidt and Rammer (2007) empirically confirm that firms with high ACAP are more likely to introduce successful product and process innovations, particularly in sectors characterized by short technology life cycles and high R&D intensity.

A recent meta-analysis by Zou et al. (2018) synthesized findings from 241 independent samples and confirmed that absorptive capacity has a significant positive relationship with innovation performance ($r = 0.40$), knowledge transfer ($r = 0.38$), and financial performance ($r = 0.27$). The study also found that the relationship between absorptive capacity and innovation is stronger in firms operating in more dynamic environments and in emerging economies where institutional support for innovation may be less developed Strategic Management Journal (2018). Furthermore, empirical research published in Frontiers in Psychology (2021) found that both Potential Absorptive Capacity (PACAP) and Realized Absorptive Capacity (RACAP) positively influence product and process innovation, which in turn positively affect overall business performance. This study also confirmed that PACAP serves as an antecedent to RACAP, suggesting a sequential process where the acquisition and assimilation of knowledge lead to more effective transformation and exploitation, ultimately fostering innovation Frontiers in Psychology (2021). Moreover, absorptive capacity contributes directly to improved firm performance beyond innovation. Lane and Lubatkin (1998) demonstrate

that ACAP enhances firms' responsiveness to environmental shifts, thereby improving operational efficiency and market responsiveness. Kock and Gemünden (2016) add that ACAP supports firms in reconfiguring existing competencies, a critical capability in volatile business environments.

For Vietnamese enterprises, developing ACAP is both a challenge and an opportunity. On one hand, firms face barriers such as a lack of skilled personnel, siloed departments, and underdeveloped knowledge-sharing cultures. On the other hand, the country's rapid economic growth, digitization initiatives, and increasing openness to international collaboration present a fertile ground for ACAP-driven transformation. Investment in organizational learning infrastructures, cross-functional integration, and strategic alliances will play a decisive role in how Vietnamese firms harness ACAP to improve innovation outcomes and financial performance. Taken together, these findings reinforce the notion that absorptive capacity is not merely a supporting function but a strategic driver of organizational excellence. When integrated effectively with BI&A capabilities, ACAP provides firms with the cognitive and operational leverage necessary to navigate complexity and sustain long-term performance. Although BI&A and absorptive capacity have been separately linked to organizational performance, few studies have systematically examined how these constructs interact to create value. The dominant literature tends to treat BI&A as a standalone technological capability and absorptive capacity as a learning construct, without adequately exploring their synergies. Most frameworks that incorporate BI&A overlook the role of organizational learning processes, while studies on ACAP often exclude the implications of advanced data analytics. As a result, there is limited understanding of how data-driven decision-making and knowledge absorption co-evolve within organizations. Roberts et al. (2012) made initial efforts to bridge this gap by proposing absorptive capacity as a mediating mechanism between IT systems and organizational performance, but their model remains conceptual and lacks empirical validation in the context of modern BI&A systems MIS Quarterly, 2012. Similarly, while Trieu (2017) developed a comprehensive framework for BI&A value creation, the role of absorptive capacity in this process remains underexplored.

2.5. Research Gaps and Proposed Conceptual Model

Building upon the literature on absorptive capacity (ACAP), business intelligence and analytics (BI&A), and organizational value creation, this study proposes a conceptual model that integrates both technological and organizational learning perspectives. The model emphasizes the role of absorptive capacity as a foundational capability that enables firms to derive value from BI&A implementation.

Absorptive capacity is conceptualized as a second-order construct consisting of four interrelated dimensions:

- Acquisition Capacity (AC): the ability to identify and acquire external knowledge;
- Assimilation Capacity (AS): the capacity to analyze, interpret, and share acquired knowledge;
- Transformation Capacity (TR): the ability to integrate new knowledge with existing routines;
- Exploitation Capacity (EX): the ability to apply internalized knowledge for commercial and strategic purposes.

These four components are hypothesized to exert direct influence on BI&A Implementation (BI), which refers to the extent to which BI&A tools and practices are adopted, integrated, and used effectively across organizational units. BI&A Implementation is positioned as a mediating mechanism that channels the effects of absorptive capacity into tangible business outcomes.

Instead of separating operational and strategic outcomes, this study consolidates them into a unified outcome variable: Value Creation (VC). This construct reflects both immediate operational benefits (e.g., efficiency, cost reduction) and long-term strategic gains (e.g., innovation, market responsiveness) that arise from effective analytics usage.

2.5.1. Contextual Limitations

Much of the empirical evidence on BI&A and ACAP is derived from developed economies with mature data ecosystems. This presents a significant contextual gap, especially in the case of emerging markets such as Vietnam, where digital infrastructure, data governance, and organizational culture differ markedly. There is a lack of research investigating how firms in these environments build absorptive capacity to maximize the benefits of BI&A systems. For example, challenges such as fragmented IT systems, low data literacy, and hierarchical decision-making structures may influence how BI&A is integrated with organizational knowledge processes.

Peng et al. (2017) argue that emerging economies present unique institutional environments that shape the development and impact of organizational capabilities, including absorptive capacity Journal of International Business Studies (2017). However, few studies have examined how these institutional factors specifically influence the relationship between BI&A and ACAP in the Vietnamese context. Understanding these contextual nuances is crucial for developing theories and practices that are relevant and applicable to Vietnamese organizations.

2.5.2. Methodological Gaps

There is a methodological gap related to how these constructs are measured and operationalized. Existing studies often rely on cross-sectional surveys, limiting the ability to assess the dynamic and iterative nature of absorptive capacity. Moreover, many studies use simplistic outcome variables such as general firm performance, without distinguishing between different types of value creation, such as innovation, efficiency, or strategic renewal. There is also a need for more nuanced qualitative or mixed-method approaches to uncover the mechanisms through which BI&A capabilities interact with absorptive routines.

The measurement of absorptive capacity itself presents challenges. While Flatten et al. (2011) developed a validated scale for measuring ACAP, its application in the context of BI&A has been limited. Similarly, the measurement of BI&A capabilities often focuses on technological aspects (e.g.,

system quality, information quality) rather than the organizational processes that support data-driven insight generation and application.

Longitudinal studies that track the co-evolution of BI&A capabilities and absorptive capacity over time are particularly scarce. Such studies would provide valuable insights into how organizations build these capabilities and how they interact with other organizational processes and environmental factors.

2.5.3. Sectoral Specificity

Finally, there is a scarcity of research focusing on specific sectors, such as financial services, logistics, or telecommunications, where BI&A and absorptive capacity may operate differently due to regulatory environments, customer data availability, and risk tolerance. Understanding sector-specific dynamics would help tailor strategies for integrating BI&A with ACAP more effectively.

This is particularly relevant in the Vietnamese context, where different sectors are at varying stages of digital maturity and face distinct challenges in adopting and leveraging BI&A. For example, while the financial services sector in Vietnam has made significant strides in digital transformation and data analytics, traditional manufacturing sectors may lag behind due to different resource constraints and market pressures.

This study aims to address these conceptual and contextual gaps by investigating how absorptive capacity mediates the relationship between BI&A capabilities and value creation within the Vietnamese enterprise context. By adopting a theoretical lens that bridges technology and organizational learning, the research contributes to a more holistic understanding of how data-driven capabilities can be harnessed for sustainable performance improvement.

2.6. Conclusion

This chapter has provided a comprehensive theoretical foundation for the research by synthesizing key concepts and frameworks that underpin the study. It examined absorptive capacity

(ACAP) as a dynamic organizational capability that allows firms to acquire, assimilate, transform, and exploit external knowledge, particularly in the context of technological adoption. It also explored the evolution and strategic importance of Business Intelligence and Analytics (BI&A), which serve as essential tools for enhancing decision-making, operational efficiency, and strategic innovation. A critical insight derived from the literature is the recognition that the mere availability of data or analytical technologies is insufficient to guarantee value creation. Instead, the organization must possess the structural and cultural capacity to internalize, interpret, and act upon insights generated by BI&A systems. This is where absorptive capacity plays a central role. Firms with strong ACAP can better leverage BI&A to generate both operational and strategic value, adapting to dynamic environments and maintaining a competitive edge.

The chapter also emphasized the importance of BI&A Implementation as a mediating capability—bridging the gap between an organization's potential to absorb knowledge and its ability to apply that knowledge through analytics tools. While prior studies have investigated ACAP and BI&A independently, few have explored how these constructs interact to drive value creation. The mediating role of BI&A Implementation remains under-theorized, particularly in the context of emerging economies such as Vietnam, where institutional challenges, resource constraints, and varied levels of digital maturity shape the effectiveness of analytics initiatives. Several research gaps were identified, including theoretical limitations in linking ACAP to measurable business outcomes, contextual limitations in applying global models to the Vietnamese market, and methodological gaps in how ACAP and BI&A are operationalized and empirically tested. These gaps present a compelling rationale for the study, especially given the growing investment in digital transformation initiatives across Vietnamese enterprises. To address these gaps, the study proposes a conceptual model in which the four dimensions of absorptive capacity—acquisition, assimilation, transformation, and exploitation—positively influence value creation through the mediating role of BI&A Implementation. This dual-path model incorporates both operational value (e.g., process

optimization, cost efficiency) and strategic value (e.g., innovation, long-term positioning) as outcome constructs. The framework serves as the basis for the hypotheses and research design in the following chapter, guiding an empirical investigation into how Vietnamese enterprises can turn analytics capabilities into sustainable business performance.

CHAPTER III METHODOLOGY

3.1. Research Purpose and Questions

This study aims to investigate the role of absorptive capacity in facilitating value creation from Business Intelligence and Analytics (BI&A) systems within Vietnamese enterprises. The research seeks to understand how organizations can effectively acquire, assimilate, transform, and exploit knowledge derived from BI&A to create sustainable business value in the context of Vietnam's rapidly evolving business environment. As digital transformation accelerates across Vietnamese industries, understanding the organizational capabilities that enable effective BI&A utilization becomes increasingly critical for both academic knowledge and business practice.

The research is guided by the following specific research questions:

RQ 1: To what extent do Vietnamese businesses possess the absorptive capacity necessary to effectively acquire, assimilate, transform, and exploit knowledge from business intelligence and analytics practices?

RQ 2: How do specific dimensions of absorptive capacity influence operational and strategic value creation from business intelligence and analytics in Vietnamese businesses?

RQ 3: What are the unique challenges and opportunities faced by Vietnamese businesses in their endeavor to develop absorptive capacity for business intelligence and analytics?

RQ 4: What strategies and best practices can be recommended to enhance absorptive capacity for business intelligence and analytics, leading to increased value creation among Vietnamese businesses?

3.2. Research Design

This study adopts a mixed-methods research design to investigate the mediating role of BI&A Implementation in the relationship between absorptive capacity and value creation in Vietnamese enterprises. Specifically, the design integrates both quantitative and qualitative approaches to provide

a comprehensive understanding of how organizational capabilities in acquiring and utilizing knowledge affect value creation through BI&A systems. A concurrent triangulation strategy is applied, in which both quantitative and qualitative data are collected and analyzed during the same phase of the research. The rationale for this approach is to leverage the strengths of each method while mitigating their respective limitations. The quantitative component enables statistical testing of the proposed conceptual model and hypotheses, examining the direct and mediating relationships between the four dimensions of absorptive capacity (acquisition, assimilation, transformation, exploitation), BI&A Implementation, and two outcome variables: operational value and strategic value.

The qualitative component, in parallel, explores the deeper organizational mechanisms and contextual enablers that explain how absorptive capacity manifests in BI&A-related activities and translates into business value. Through in-depth interviews with key decision-makers and practitioners, the study seeks to understand the nuances of BI&A Implementation in practice and to validate or expand upon the findings from the quantitative phase.

This dual-method strategy ensures triangulation of data, which enhances the validity, credibility, and generalizability of the research findings. It also supports a theory-driven yet context-sensitive understanding of the ways in which Vietnamese enterprises can leverage absorptive capacity and BI&A Implementation to drive organizational value creation.

3.3. Operationalization of Theoretical Constructs

This study employs a streamlined research model focusing on key dimensions of absorptive capacity, BI&A implementation, and their direct relationships with the unified outcome variable: Value Creation (VC). The model consists of six principal constructs: Acquisition Capacity, Assimilation Capacity, Transformation Capacity, Exploitation Capacity, BI&A Implementation, and Value Creation. Each construct is measured through multiple observed variables derived from existing literature.

To ensure the content validity and contextual alignment of the adapted scales, a two-stage expert interview process was employed. In the first round, in-depth interviews were conducted with a panel of five domain experts, including scholars and practitioners with extensive experience in Business Intelligence and Analytics (BI&A). Their feedback guided the initial adaptation and localization of the measurement items.

After the pilot test and initial item revision, the same expert panel was consulted in a second round to re-evaluate the revised items for clarity, contextual fit, and cultural appropriateness. This iterative process helped refine the measurement scales to ensure theoretical rigor and practical relevance..

As a result, several items were reworded to improve linguistic clarity and contextual alignment with common business terminology used in Vietnamese enterprises. None of the items were eliminated, but refinements focused on clarity, avoidance of technical jargon, and alignment with the respondents' business context.

The following two tables display the full original and finalized sets of items before & after "Measurement Items" :

Table 3.3-1: Initial Measurement Items (Original Measurement)

Construct	**Item Code**	**Initial Item**
Acquisition Capacity	AC1	We frequently scan the external environment for new BI&A knowledge.
	AC2	We participate in conferences to identify new BI&A solutions.
	AC3	We evaluate external information sources for relevance.
	AC4	We actively acquire market data for internal analytics.

	AC5	We work with external consultants for BI&A knowledge.
Assimilation Capacity	AS1	We analyze and interpret new BI&A data quickly.
	AS2	We share BI&A knowledge across departments efficiently.
	AS3	We assimilate data from various external BI&A sources.
	AS4	We document and store external BI&A knowledge systematically.
Transformation Capacity	TR1	We combine new knowledge with existing BI&A data.
	TR2	We adapt BI&A insights to create new internal processes.
	TR3	We restructure business functions based on analytics knowledge.
	TR4	We support employees in interpreting BI&A for innovation.
Exploitation Capacity	EX1	We apply BI&A insights to improve products/services.
	EX2	BI&A knowledge leads to immediate operational actions.
	EX3	BI&A outputs are embedded in strategic planning.
	EX4	Managers are rewarded for applying BI&A-based insights.
	EX5	BI&A outcomes are integrated into business KPIs.
BI&A Implementation	BI1	BI tools are integrated across departments.
	BI2	Managers use BI&A outputs in key decisions.
	BI3	BI&A tools are used beyond basic reporting.
	BI4	Our BI&A system is regularly maintained and updated.
Value Creation (VC)	VC1	BI&A improves decision-making speed.
	VC2	BI&A increases process efficiency.
	VC3	BI&A helps reduce operating costs.
	VC4	BI&A contributes to innovation and agility.

	VC5	BI&A helps anticipate market trends.
	VC6	BI&A strengthens competitive advantage.

Table 3.3-2: Finalized Measurement Items (Adjusted)

Construct	**Item Code**	**Refined Item (English)**
Acquisition Capacity	AC1	Our organization regularly monitors external sources to identify relevant BI&A knowledge.
	AC2	We attend BI&A-related events or conferences to seek out new technological knowledge.
	AC3	We assess the usefulness and credibility of external BI&A sources before adoption.
	AC4	We proactively collect BI&A-related market information to inform internal analytics.
	AC5	We regularly engage BI&A experts or consultants to enhance our organizational knowledge.
Assimilation Capacity	AS1	We effectively interpret and understand newly acquired BI&A knowledge.
	AS2	Our departments regularly share BI&A knowledge to support decision-making.
	AS3	We combine BI&A insights from different sources to create internal reports.

	AS4	We maintain accessible documentation of BI&A knowledge shared internally.
Transformation Capacity	TR1	We integrate new BI&A knowledge into current organizational systems.
	TR2	We use BI&A insights to improve or design new internal workflows.
	TR3	We revise existing processes based on BI&A-driven recommendations.
	TR4	Employees are encouraged to use BI&A to generate creative business solutions.
Exploitation Capacity	EX1	We use BI&A findings to adjust or enhance products and services.
	EX2	Our teams act quickly on BI&A insights through tangible adjustments.
	EX3	Strategic planning processes regularly incorporate BI&A results.
	EX4	Managers are encouraged to implement ideas derived from BI&A results.
	EX5	BI&A-driven outcomes are reflected in how we measure performance (e.g., KPIs).
BI&A Implementation	BI1	BI&A systems are accessible and used across business units.
	BI2	Decision-making processes at all levels utilize BI&A.
	BI3	BI&A systems are used for analysis, prediction, and strategic planning.

	BI4	We consistently support and improve BI&A systems and their usability.
Value Creation (VC)	VC1	BI&A helps us make faster and more informed decisions.
	VC2	Processes are optimized through effective use of BI&A.
	VC3	BI&A contributes to lowering costs and maximizing resources.
	VC4	We apply BI&A insights to drive product or service innovation.
	VC5	We use BI&A to anticipate market changes and customer behavior.
	VC6	Our BI&A capabilities contribute to maintaining competitive advantage.

3.4. Research Hypotheses

Drawing upon established theories in organizational learning, information systems, and business value creation, this study proposes a revised set of research hypotheses to examine the direct and mediating relationships among absorptive capacity (ACAP), Business Intelligence and Analytics (BI&A) implementation, and value creation (VC). Absorptive capacity is conceptualized as a multidimensional construct comprising acquisition, assimilation, transformation, and exploitation capabilities. These capabilities are expected to influence the degree to which organizations can successfully implement BI&A systems. In turn, BI&A implementation is hypothesized to impact organizational value creation. Furthermore, BI&A implementation is posited to serve as a mediator between absorptive capacity and value creation.

H1: Acquisition capacity is positively associated with BI&A implementation.

Acquisition capacity reflects an organization's ability to identify and obtain valuable external knowledge relevant to BI&A. Firms with strong acquisition capacity often engage in environmental scanning, competitor analysis, and collaboration with external stakeholders such as consultants,

industry experts, and academic institutions. These activities enhance the firm's exposure to emerging BI&A trends and technologies. When organizations effectively acquire external knowledge, they are more likely to adopt BI&A tools that align with their strategic objectives and contextual needs. Prior studies (e.g., Flatten et al., 2011) have shown that firms with robust acquisition mechanisms demonstrate higher readiness for BI&A system integration and faster response to changes in data environments.

H2: Assimilation capacity is positively associated with BI&A implementation.

Assimilation capacity refers to the firm's ability to analyze, process, and internalize the knowledge acquired from external sources. This dimension includes routines such as knowledge sharing across departments, cross-functional collaboration, and internal learning mechanisms. When assimilation capacity is high, organizations are able to bridge the gap between external information and internal decision-making. This supports the seamless integration of BI&A systems, as users across departments understand how to utilize analytical tools and interpret data insights effectively. Zahra and George (2002) emphasize that assimilation plays a critical role in aligning newly acquired knowledge with existing organizational structures, thus enhancing system adoption.

H3: Transformation capacity is positively associated with BI&A implementation.

Transformation capacity denotes the firm's ability to combine newly acquired knowledge with existing knowledge bases to create novel interpretations and actionable insights. This process involves revising workflows, challenging established assumptions, and enabling learning loops that adapt to new data-driven paradigms. In the BI&A context, transformation capacity helps organizations configure their BI&A systems in ways that reflect contextual specificity and user needs. For example, BI&A dashboards may be redesigned to reflect strategic KPIs or linked directly to performance evaluation systems. According to Wang and Byrd (2017), firms with high transformation capacity are more effective in converting data into usable frameworks that enhance strategic agility and innovation.

H4: Exploitation capacity is positively associated with BI&A implementation.

Exploitation capacity reflects the organization's ability to apply and commercialize the knowledge generated through BI&A tools. This includes the capability to use BI&A insights in real-time decision-making, product innovation, customer segmentation, and performance management. Exploitation ensures that the benefits of BI&A do not remain theoretical but are embedded into everyday operations and strategy. Without this capacity, firms may possess advanced BI&A tools but fail to extract meaningful business impact. As Božič and Dimovski (2019) observed, exploitation transforms potential absorptive capabilities into realized outcomes by enabling firms to operationalize and institutionalize analytics-driven insights.

H5: BI&A implementation is positively associated with value creation.

Value creation in this study refers to the combination of both operational and strategic benefits that organizations derive from the use of BI&A systems. Operational value includes improvements in efficiency, cost reduction, decision-making speed, and resource optimization. Strategic value encompasses long-term competitive positioning, market responsiveness, and innovation capability. When BI&A systems are effectively implemented—through integration across functions, active user engagement, and data-driven processes—firms are better equipped to realize these benefits. Prior research (Elbashir et al., 2008; Fink et al., 2017) confirms that successful BI&A implementation correlates strongly with measurable performance improvements across various dimensions of business value.

H6: BI&A implementation mediates the relationship between absorptive capacity and value creation.

This hypothesis posits that the impact of absorptive capacity on organizational value creation is not direct but is realized through the implementation of BI&A systems. In other words, even if a firm possesses high levels of acquisition, assimilation, transformation, and exploitation capacity, these capabilities can only translate into tangible value if the organization also succeeds in deploying

BI&A tools effectively. BI&A implementation acts as a critical enabler, linking knowledge absorption routines to business outcomes such as innovation, operational efficiency, and customer insights. This mediating relationship aligns with the findings of Roberts et al. (2012), who argued that IT-based knowledge systems require absorptive structures to generate strategic impact. Therefore, the study examines not only the direct paths but also the mediating mechanism through which absorptive capacity contributes to value creation.

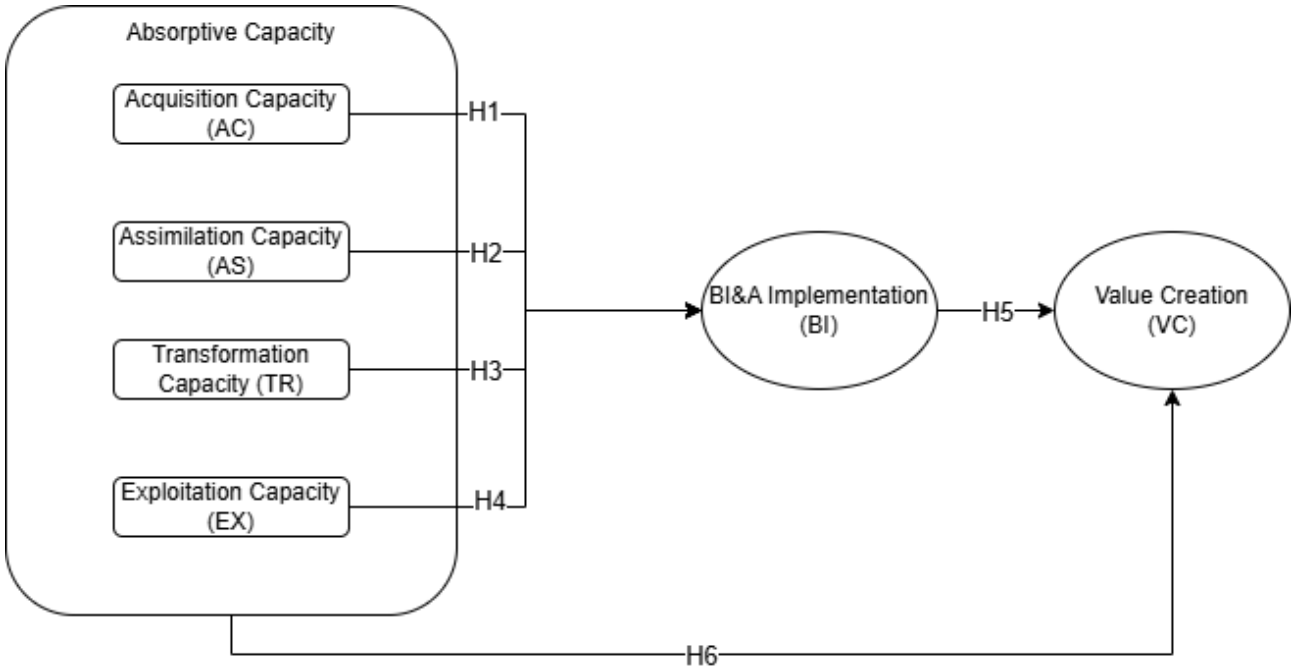


Figure 3.4-1: Proposed research model

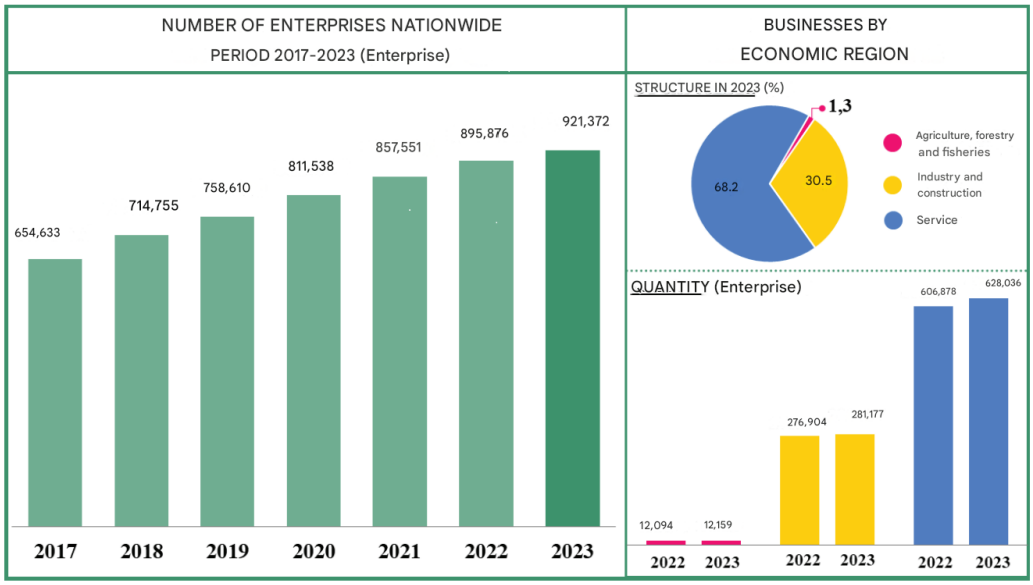
3.5. Population and Sample

The target population of this study comprises professionals working in data analytics, business intelligence, and strategic decision-making roles within medium and large-sized enterprises in Vietnam. These organizations must have implemented BI&A systems and actively use them in operational and/or strategic decision-making. This selection ensures that respondents have relevant experience with BI&A implementation and absorptive capacity processes.

To ensure the appropriateness of the study sample, three key inclusion criteria are defined:

Organizational size: Only medium (100–499 employees) and large enterprises (≥500 employees) are included, as these organizations typically have sufficient resources, organizational complexity, and technological investment in BI&A systems. According to the Vietnam Enterprise Census (GSO, 2023), these firms account for the majority of BI&A adoption across industries.

- Industry sector: The study focuses on five knowledge-intensive and data-driven sectors where BI&A and absorptive capacity are highly relevant: (1) Financial services and banking, (2) Telecommunications, (3) Retail and e-commerce, (4) Manufacturing, and (5) Technology services. These sectors are prioritized due to their data-intensity, competitive pressures, and high levels of digital transformation. Prior studies (e.g., Chen et al., 2012; Trieu, 2017) suggest that BI&A initiatives are more impactful in sectors characterized by rapid information flows, complex customer demands, and frequent need for adaptive decision-making.
- BI&A usage: Eligible firms must have deployed BI&A tools beyond basic reporting (e.g., dashboarding, predictive analytics, integrated decision support) for at least 12 months. This criterion ensures that respondents have sufficient familiarity with BI&A capabilities and their integration into organizational routines. As Elbashir et al. (2008) highlight, mature BI&A environments provide richer contexts for examining the interplay between technological implementation and organizational capacity.



Source: GSO VN 2023

Figure 3.5-1: Figure Number & Structure of Enterprises in Viet Nam (2023)

For the quantitative phase, a total of 226 survey questionnaires were distributed across selected enterprises. This sample size is consistent with methodological recommendations for structural equation modeling involving seven latent variables and over 30 observed indicators (Hair et al., 2019). The number of valid cases also exceeds the widely accepted ratio of 10–15 observations per item, ensuring the robustness of the statistical results (MacCallum et al., 1999). based on methodological guidelines for multivariate analysis and structural equation modeling (Hair et al., 2019). This sample size is appropriate for models with 7 latent variables and allows for robust statistical analysis while accounting for potential non-response. The target exceeds the commonly recommended ratio of 10–15 respondents per observed variable, enhancing statistical power (MacCallum et al., 1999). Respondents will be selected using a stratified purposive sampling strategy. Stratification ensures balanced representation across the five sectors. Within each sector, participants will include BI professionals, IT managers, business analysts, and mid-level to senior managers involved in analytics-enabled decision-making. Emphasis will be placed on collecting insights from individuals knowledgeable about both BI&A system usage and organizational knowledge processes. This aligns with recommendations by Tashakkori and Teddlie (2010) on purposeful selection in

mixed-method designs. For the qualitative phase, a smaller purposive sample of approximately 5 key informants will be selected from the organizations participating in the survey. These participants will be senior stakeholders (e.g., Chief Data Officers, Heads of Analytics, Strategy Directors) who have direct involvement in BI&A implementation and can provide in-depth insights into how absorptive capacity influences value realization. Prior research (Malterud et al., 2016; Guest et al., 2006) suggests that small expert samples can achieve thematic saturation in focused studies, especially when respondents possess high information power.

This mixed sampling approach enhances the study's methodological triangulation, offering both generalizable insights (quantitative phase) and deep contextual understanding (qualitative phase). It enables comparison across sectors, firm sizes, and maturity levels, while grounding statistical results in lived organizational experiences. In line with Creswell and Plano Clark (2018), such integration strengthens both the explanatory and interpretive validity of mixed-method business research, particularly in complex domains like BI&A and absorptive capacity.

3.6. Participant Selection

Participants for this study will be selected using a stratified purposive sampling strategy that ensures representation across industry sectors and managerial levels. This approach is commonly employed in business and management research when investigating targeted organizational phenomena with embedded contextual characteristics (Saunders et al., 2016). It enables researchers to select information-rich cases that provide deep insight into complex constructs such as absorptive capacity and BI&A implementation.

In the quantitative phase, participants will consist primarily of mid-level and senior professionals from the five strategic sectors identified in Section 3.5—namely finance, telecommunications, retail and e-commerce, manufacturing, and technology services. These sectors were chosen due to their high level of data reliance, ongoing digital transformation, and prevalent use of BI&A tools (Božič & Dimovski, 2019; Trieu, 2017). This selection also reflects the current

structure of Vietnam's business ecosystem, where these industries account for a large portion of enterprise activity and economic output (GSO, 2023). Respondents will be expected to hold roles that involve strategic planning, IT/BI management, data analysis, or cross-functional decision-making. Examples include data analysts, business intelligence managers, digital transformation leads, and C-level executives overseeing enterprise systems. Similar criteria were used effectively in prior BI&A-related studies (e.g., Elbashir et al., 2008; Popovič et al., 2012). In the Vietnamese context, participant selection is further informed by recent national-level surveys of enterprise technology adoption (e.g., MPI & USAID, 2022), which indicate that digital transformation is most active among mid-sized firms and state-influenced corporations in key sectors. Invitations to participate will be sent via email, LinkedIn networks, and through cooperation with professional networks and trade associations (e.g., VINASA, VCCI). To ensure alignment with eligibility criteria, the survey will include a preliminary screening section to verify participants' experience with BI&A tools and their role in decision-making. This method reflects practices in comparable mixed-method studies on analytics adoption and capability-building (Sharma et al., 2014; Günther et al., 2017).

For the qualitative phase, approximately five expert informants will be selected purposively from firms participating in the quantitative survey. Criteria for expert status will include (1) at least 5 years of senior management experience, (2) direct involvement in BI&A system implementation or strategy, and (3) demonstrated familiarity with knowledge management processes within their organizations. This approach draws from recommendations by Eisenhardt and Graebner (2007) and Gioia et al. (2013), who advocate for expert sampling when exploring process-level organizational phenomena.

To ensure diversity in experience and maximize theoretical insight, informants will be selected across sectors, firm sizes, and ownership types (private, FDI, state-owned). Sampling heterogeneity enhances transferability and supports theoretical saturation (Malterud et al., 2016; Guest et al., 2006). Key informants will be contacted individually, provided with a research summary

and consent form, and invited to participate in a 45–60 minute semi-structured interview. Interview content will cover contextual factors, BI&A deployment strategy, and organizational routines that enable absorptive capacity.

This selection process ensures not only the richness and credibility of the data collected but also its theoretical relevance. It is designed to balance practical access with methodological rigor, in line with best practices in mixed-method organizational research (Yin, 2018; Creswell & Plano Clark, 2018), and reflects Vietnam's evolving enterprise landscape and digitalization agenda.

3.7. Instrumentation

The main data collection instrument for the quantitative phase was a structured questionnaire developed to assess six key constructs: Acquisition Capacity, Assimilation Capacity, Transformation Capacity, Exploitation Capacity, BI&A Implementation, and Value Creation. These constructs were derived from prior validated studies in the fields of absorptive capacity and business intelligence and analytics (e.g., Zahra & George, 2002; Flatten et al., 2011; Božič & Dimovski, 2019).

To ensure both theoretical relevance and contextual appropriateness of the measurement scales adapted from prior literature, a two-round expert interview process was employed. In the **first round**, semi-structured interviews were conducted with five domain experts, including three academic scholars specializing in Business Intelligence and Analytics (BI&A), and two senior professionals with over ten years of managerial experience in data-driven decision-making roles. These experts provided detailed feedback on the conceptual alignment, construct coverage, and cultural fit of the preliminary items, which informed the initial localization and adaptation of the measurement instruments to the Vietnamese business context.

Following the initial revision and pilot testing phase, a second round of expert consultation was conducted with the same panel to re-evaluate the revised scale items. This stage focused on the clarity, interpretability, and linguistic precision of the items, as well as their contextual relevance and

redundancy. The feedback collected was systematically reviewed, and several items were reworded or merged based on expert consensus to improve content validity and reduce measurement error.

The expert interviews not only enhanced the face and content validity of the adapted scales but also ensured that the constructs were operationalized in a manner that was both theoretically sound and practically meaningful for Vietnamese enterprises implementing BI&A systems.

Each construct was measured through multiple observed items, operationalized on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire was structured into two main sections:

- Section 1: Demographic and organizational information (e.g., respondent role, sector, firm size, BI&A usage duration);
- Section 2: Measurement items corresponding to the six theoretical constructs;

This finalized version of the instrument was used for large-scale data collection. The results were subjected to reliability and validity assessment using Cronbach's alpha and exploratory factor analysis, as presented in Chapter 4. The subsequent qualitative phase, involving expert interviews, was conducted separately to explore emerging themes and provide deeper interpretation of the quantitative findings.

3.8. Data Collection

The data collection process followed a two-phase sequential design, consisting of a structured quantitative survey followed by qualitative expert interviews to provide interpretive depth and triangulation.

Phase 1: Quantitative Survey

The measurement scales used in the questionnaire were directly adapted from established academic literature (e.g., Zahra & George, 2002; Flatten et al., 2011; Božič & Dimovski, 2019), without modification through pilot testing or expert-based pretesting. This decision was made to preserve theoretical consistency and comparability with existing research. The instrument was

directly deployed for large-scale data collection. The finalized questionnaire was administered online via Google Forms. Invitations were distributed through professional networks, LinkedIn, email, and Zalo groups targeting professionals working in BI&A-related functions. Prior to participation, all respondents were informed of the voluntary and anonymous nature of the survey.

A total of 226 valid responses were collected from mid- and senior-level professionals across key sectors such as retail, banking, telecommunications, manufacturing, and technology services. All participants had at least 12 months of practical experience with BI&A systems, ensuring contextual relevance and familiarity with the subject matter.

Phase 2: Qualitative Expert Interviews

Following the completion of the survey and preliminary analysis of the quantitative results, a second phase of qualitative inquiry was undertaken. This involved conducting in-depth, semi-structured interviews with 5 expert informants selected from among the organizations that participated in the survey. The objective of this phase was not to refine the measurement model, but to explore and explain patterns emerging from the quantitative results, with particular emphasis on organizational practices, cultural dynamics, and strategic use of BI&A. Interviewees were selected based on their seniority, BI&A involvement, and sectoral representation.

Each interview lasted approximately 45 to 60 minutes and followed a thematic guide focusing on absorptive routines, data interpretation challenges, and decision-making behavior. All interviews were manually documented and used for thematic content analysis, contributing to a deeper understanding of the mechanisms underpinning absorptive capacity and BI&A value creation in Vietnamese enterprises.

3.9. Data Analysis

The data analysis process in this study followed the logic of a mixed-methods research design, beginning with quantitative analysis to test the proposed hypotheses and followed by qualitative analysis to provide contextual interpretation and theoretical depth.

Quantitative Analysis

- Quantitative data collected from 226 valid survey responses were analyzed using IBM SPSS version 23.0. The following steps were undertaken to ensure the reliability and validity of the measurement model and to test the research hypotheses:
- Descriptive Statistics: Mean, standard deviation, minimum, and maximum values were calculated to describe respondent profiles and to provide an overview of the central tendency and dispersion of responses.
- Reliability Testing: Internal consistency of each construct was assessed using Cronbach's alpha. A threshold value of 0.70 was applied to confirm acceptable reliability levels (Nunnally & Bernstein, 1994).
- Exploratory Factor Analysis (EFA): Principal Component Analysis with Varimax rotation was used to examine the construct validity of the measurement model. Items with factor loadings above 0.5 and no significant cross-loadings were retained. The Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity were used to assess sampling adequacy.
- Correlation Analysis: Pearson correlation coefficients were computed to explore the relationships between the main constructs and to assess the direction and strength of associations.
- Multiple Linear Regression: Hypotheses H1 to H5 were tested using standard regression techniques to examine the impact of the four absorptive capacity dimensions on BI&A implementation and, subsequently, the impact of BI&A implementation on value creation.
- Mediation Analysis: Hypothesis H6 was tested using the bootstrapping method (Preacher & Hayes, 2008) to assess whether BI&A implementation mediates the

relationship between absorptive capacity and value creation. Indirect effects and confidence intervals were calculated using bias-corrected resampling.

Qualitative Analysis

After the quantitative phase, the study proceeded with qualitative analysis based on five semi-structured interviews with senior professionals who had direct experience with BI&A implementation. The objective was to interpret, validate, and expand upon the survey findings, particularly regarding the contextual factors influencing absorptive capacity in Vietnamese enterprises.

The qualitative data were analyzed using manual thematic analysis, without the use of coding software, in line with Braun and Clarke's (2006) guidelines. The analysis process followed three main steps:

- Open Coding: Key concepts and observations were extracted from detailed interview notes and grouped into preliminary codes.
- Theme Development: Codes were categorized into broader themes that reflected emerging patterns related to acquisition practices, cross-functional data assimilation, transformation challenges, and barriers to BI&A exploitation.
- Interpretive Integration: Themes were then interpreted in relation to the conceptual framework, allowing for triangulation with quantitative results and identification of deeper causal mechanisms.

This dual-track analytical approach provided both statistical generalization and contextual richness, ensuring robust theoretical insight and practical relevance. The integration of results across methods is discussed in detail in Chapter 5.

3.10. Research Design Limitations

Despite careful design and methodological rigor, this study has several limitations that should be acknowledged:

- Geographic focus: The study was conducted exclusively in Vietnam, which may limit the generalizability of findings to other cultural or institutional contexts.
- Respondent bias: The study relies on self-reported data from managers, which may be subject to bias such as overreporting BI&A effectiveness or absorptive capacity.
- Cross-sectional design: Data were collected at a single point in time, which restricts the ability to draw causal inferences or track longitudinal effects.
- Sampling limitations: Although purposive and stratified sampling was used, the use of non-probability methods may limit statistical generalizability to the broader population of Vietnamese enterprises.
- Measurement constraints: The study used translated and adapted scales; although pilot-tested and reviewed, linguistic or cultural nuances may have affected interpretation.
- Simplified analysis model: Due to software constraints (SPSS 23.0), full structural equation modeling (SEM) was not used. Mediation was tested using linear regression and the Baron & Kenny method, which may not capture all indirect effects as robustly as SEM would.

Future research could expand by employing longitudinal methods, cross-country comparisons, probability sampling, and structural modeling techniques to build on the findings of this study.

3.11. Summary

This chapter has presented the research methodology employed to investigate the role of absorptive capacity in enhancing value creation through Business Intelligence and Analytics (BI&A) implementation in Vietnamese enterprises. The study adopted a mixed-methods research design,

integrating quantitative and qualitative approaches to generate both generalizable findings and rich contextual insights.

The quantitative phase was conducted first, utilizing a structured questionnaire adapted from established literature. The measurement items were not modified through pilot testing or expert interviews, in order to preserve theoretical integrity. The instrument measured six core constructs: Acquisition, Assimilation, Transformation, and Exploitation capacities; BI&A Implementation; and Value Creation. The finalized questionnaire was administered to 226 valid respondents from key data-intensive industries in Vietnam. Quantitative data were analyzed using SPSS 23.0, employing descriptive statistics, Cronbach's alpha, exploratory factor analysis (EFA), correlation analysis, multiple linear regression, and bootstrapped mediation testing. These analyses assessed the reliability and validity of the measurement model and tested the proposed hypotheses regarding the direct and indirect effects of absorptive capacity.

Following the quantitative phase, a series of five in-depth expert interviews was conducted with senior professionals who participated in the survey. These interviews were designed to explore the organizational, cultural, and strategic dynamics underpinning absorptive capacity and BI&A practices. Qualitative data were analyzed using manual thematic analysis, providing interpretive depth to support and contextualize the statistical results.

Together, the two phases of data collection and analysis offered a robust methodological foundation for answering the research questions. The findings are reported and interpreted in detail in Chapter 4 (Results) and discussed in depth in Chapter 5 (Discussion)

CHAPTER IV RESULTS

4.1. Introduction

This chapter presents the empirical results derived from the two-phase mixed-methods approach adopted in this study. The overarching objective is to examine how absorptive capacity (ACAP)—conceptualized across four dimensions: acquisition, assimilation, transformation, and exploitation—contributes to the successful implementation of Business Intelligence and Analytics (BI&A) systems, and how such implementation leads to enhanced value creation in Vietnamese enterprises. Consistent with the research design described in Chapter 3, the analysis was conducted in two sequential stages. The first stage involved a quantitative assessment using structured survey data collected from 250 professionals working in medium and large-sized Vietnamese enterprises across key knowledge-intensive sectors such as finance, telecommunications, manufacturing, retail, and technology services. The quantitative component focused on testing the six proposed hypotheses concerning the direct effects of ACAP on BI&A implementation, the influence of BI&A implementation on value creation, and the mediating role of BI&A implementation. Statistical analyses included reliability testing, exploratory factor analysis (EFA), Pearson correlation analysis, multiple linear regression, and mediation analysis using bootstrapping techniques.

The second stage of the analysis employed a qualitative approach through semi-structured interviews with five senior experts who had deep involvement in BI&A deployment and data strategy. These interviews were conducted after preliminary quantitative findings had been analyzed and served two primary purposes: (1) to contextualize and interpret the statistical relationships identified in the survey, and (2) to uncover additional insights into organizational routines, cultural norms, and strategic behaviors influencing absorptive capacity in practice.

This dual-method analytical approach ensures both internal validity and contextual depth. While the quantitative findings allow for generalization across the broader enterprise population, the qualitative data provide nuanced explanations of "how" and "why" certain patterns occur, particularly

in the Vietnamese business context, which is shaped by unique cultural, structural, and resource constraints

4.2. Descriptive statistics of the survey

This section presents a detailed overview of the characteristics of the respondents who participated in the survey and establishes the empirical foundation for subsequent statistical analysis. A total of 226/230 valid responses were collected from professionals working across various enterprises in Vietnam, it had 4 responses not valid due to some missing check. All respondents confirmed their organization's implementation of Business Intelligence and Analytics (BI&A) systems, their continuous use over the past 12 months, and their direct involvement in decision-making processes that leverage BI&A outputs. This ensures a consistent and relevant baseline for measuring absorptive capacity and value creation outcomes.

Table 4.2-1: Descriptive statistics level of Respondents

Position	**Frequency**	**Percent**
Manager	60	26.5%
Specialist	166	73.5%
Total	**226**	**100%**

The majority of respondents were specialists (73.5%), indicating that BI&A tools in Vietnamese enterprises are primarily used by operational-level staff who are responsible for data entry, processing, and reporting. Managers accounted for 26.5%, reflecting their growing involvement in interpreting BI&A results for tactical decisions. Since this is a scale validation sample, we limit the use of C-level samples.

Table 4.2-2: Descriptive statistics Industry of Respondents

		Frequency	Percent
Industry	Financial & Banking	9	4.0
	Logistic	6	2.7
	Manufacture	72	31.9
	Others	9	4.0
	Retail	92	40.7
	Service	38	16.8
	Total	226	100.0

Table

Retail accounted for the highest proportion of respondents (40.7%), followed by manufacturing (31.9%) and services (16.8%). Smaller segments came from finance and banking (4.0%), logistics (2.7%), and other miscellaneous sectors (4.0%). This pattern reveals the critical importance of BI&A in sectors with high transaction volumes and customer engagement, particularly in retail, where businesses rely heavily on real-time insights to manage inventory, customer behavior, and promotional effectiveness. In the manufacturing sector, the growing focus on automation and operational efficiency has driven increased interest in integrating analytics into production and supply chain decisions. Conversely, the low representation in logistics and financial services may point to different internal structures where BI&A systems are either more centralized or still in the early stages of adoption. This is consistent with observations in practice where financial institutions in Vietnam often restrict access to analytical tools to specialized analyst teams due to data security protocols. The data further indicate a balanced distribution across organizational sizes.

Table 4.2-3: Descriptive statistics company size

Company size		Frequency	Percent
Size	<100	76	33.6
	>500	57	25.2
	100-500	93	41.2
	Total	226	100.0

Respondents from companies with 100–500 employees made up 41.2% of the sample, while 33.6% came from small enterprises (<100 employees), and 25.2% from large firms (>500 employees). This variation ensures that perspectives on absorptive capacity and BI&A implementation reflect differences in infrastructure, culture, and capability maturity. Notably, the high participation of SMEs illustrates a meaningful trend: smaller firms in Vietnam are actively exploring digital solutions to gain agility and competitiveness despite more limited resources. This aligns with government initiatives to promote digital transformation in the SME sector through tax incentives and training programs. In reality, however, smaller firms may still rely on a few technically capable individuals or outsourced IT providers to manage their BI&A infrastructure, which could limit the spread of data-driven culture across departments.

Table 4.2-4 : Descriptive statistics company size

Year of Experience		Frequency	Percent
Time	< 1 year	8	3.5
	> 3 years	137	60.6
	1-3 years	81	35.8
	Total	226	100.0

Concerning the maturity of BI&A adoption, most organizations (60.6%) reported using analytics tools for over three years, while 35.8% had implemented them within the last 1–3 years. Only 3.5% had less than one year of experience. These figures suggest that most firms are no longer in the exploratory phase, but are instead transitioning to more embedded and sophisticated uses of BI&A. In practice, this also means that many firms have moved beyond using BI&A solely for reporting or visualization, and are starting to explore more advanced applications such as forecasting, benchmarking, or customer segmentation. For firms in the >3 year category, this level of maturity often corresponds with structured data governance practices and more clearly defined roles for data analysts or data scientists.

Table 4.2-5: Descriptive statistics Proficiency_Level of Respondents

Proficiency_Level		Frequency	Percent
Level	Advanced	28	12.4
	Basic	40	17.7
	Intermediate	158	69.9
	Total	226	100.0

Self-reported proficiency levels further illustrate the analytical competency within participating firms. Nearly half of the respondents (69.9%) rated themselves as Intermediate, 17.7% as basic, and 12.4 as Advanced. While the large proportion of professionals suggests solid familiarity with BI&A platforms and principles, the presence of a considerable beginner group implies that many firms are still in the process of upskilling their workforce. This is especially relevant in the Vietnamese context, where despite rising demand for analytics skills, formal training programs within organizations are still limited. Instead, companies often rely on informal on-the-job training or short-term workshops led by software vendors. The group of experts, although smaller, plays an important role as internal champions who can lead BI&A initiatives, mentor others, and help align analytics with strategic objectives. Finally, it is noteworthy that 100% of respondents answered affirmatively to all screening criteria: their companies have implemented BI&A systems, used them consistently for over 12 months, and involved staff in interpreting and applying insights. This consistency ensures that data gathered are not abstract perceptions but are rooted in active, real-world experiences with BI&A practices. In a practical sense, this reflects a level of institutionalization of analytics within participating firms, allowing for more meaningful investigation into organizational capabilities such as absorptive capacity.

In summary, the descriptive profile paints a clear picture of a business environment in Vietnam where BI&A is becoming increasingly normalized across industries and organizational tiers. Firms of

varying sizes and sectors are engaging with data tools beyond superficial adoption, reflecting a wider trend of digital transformation at the national level. While most activities are situated at the operational and managerial levels, the presence of a capable and maturing analytics workforce positions these organizations to derive greater strategic and operational value. These findings not only validate the relevance of further analyzing how absorptive capacity supports this transformation but also reflect broader movements in Vietnam's business landscape where data is fast becoming a cornerstone of competitive advantage. The subsequent section will examine whether the measurement constructs used in this study exhibit internal consistency and reliability across this diverse respondent group.

4.2.1. Reliability analysis – Cronbach's Alpha

Reliability analysis is an essential step in scale validation, as it examines the internal consistency of a construct to determine how well a set of items measures a single underlying latent variable. The most widely used indicator for assessing reliability in social science research is Cronbach's Alpha. This coefficient evaluates the average inter-item correlation among observed variables associated with a construct. A Cronbach's Alpha value of 0.7 or higher is generally considered acceptable for exploratory studies, indicating that the items are sufficiently homogeneous and consistent in capturing the same theoretical concept. Values above 0.8 suggest good reliability, while values exceeding 0.9 may indicate potential item redundancy. Importantly, Cronbach's Alpha also allows for the examination of how each individual item contributes to the overall reliability score by calculating the "Alpha if item deleted." This helps assess whether any item disproportionately weakens or strengthens the internal coherence of the construct.

Value Creation (VC)

Table 4.2-6: Reliability Statistics of Variables (VC)

Reliability Statistics

Cronbach's Alpha	N of Items
.953	6

To assess the internal consistency of the Value Creation (VC) construct—representing how organizations perceive the outcomes derived from BI&A implementation in terms of both operational and strategic improvements—Cronbach's Alpha was computed for six observed variables: VC1 through VC6. The resulting Cronbach's Alpha of 0.953 far exceeds the commonly accepted threshold of 0.80, indicating a very high level of internal reliability. This suggests that all items within the construct reliably measure the same underlying latent concept.

The corrected item-total correlations ranged from 0.815 to 0.880, with all values exceeding the minimum acceptable benchmark of 0.40, signifying strong inter-item association. Notably, VC5 exhibited the highest item-total correlation (0.880), suggesting that it is the most representative item of the construct and most aligned with how respondents perceive value generation from BI&A. Conversely, VC4 recorded the lowest correlation (0.815), though still within a strong and acceptable range.

Table 4.2-7: Item-Total Statistics of Variable (VC)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
VC1	17.35	9.162	.842	.945
VC2	17.31	9.004	.862	.943
VC3	17.24	8.976	.856	.944
VC4	17.22	9.320	.815	.948
VC5	17.13	8.779	.880	.941
VC6	17.14	9.070	.868	.942

Furthermore, the “Cronbach’s Alpha if item deleted” values all remained below the total Cronbach’s Alpha, ranging from 0.941 to 0.948, confirming that removal of any single item would not improve the scale’s internal consistency. This reinforces the robustness of the construct and the contribution of each item to the overall scale.

From a practical standpoint, the high internal reliability of the VC scale provides empirical justification for its use in subsequent analyses such as factor validation and structural modeling. It also affirms that Vietnamese firms consistently perceive the value derived from BI&A not as fragmented outcomes, but as a cohesive and measurable construct, encompassing improvements across efficiency, insights, responsiveness, and business impact.

Business Intelligence & Analytics (BI)

Table 4.2-8: Reliability Statistics of Variables (BI)

Reliability Statistics

Cronbach's Alpha	N of Items
.891	4

Table 4.2-9 Item-Total Statistics of Variable (BI)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
BI1	8.59	2.617	.737	.869
BI2	8.63	2.598	.752	.863
BI3	8.65	2.520	.780	.853
BI4	8.58	2.528	.773	.855

To evaluate the reliability of the construct measuring the level of Business Intelligence & Analytics (BI) utilization, a Cronbach's Alpha test was conducted across four observed variables: BI1 to BI4. The analysis yielded a Cronbach's Alpha of 0.891, which surpasses the commonly accepted threshold of 0.80, indicating excellent internal consistency for this measurement scale.

The corrected item-total correlations ranged from 0.737 to 0.780, with all values significantly higher than the 0.40 minimum benchmark. These results demonstrate that each item within the construct shares a strong positive correlation with the overall scale, affirming the cohesiveness of the measurement. Among them, BI3 recorded the highest item-total correlation (0.780), suggesting it best

reflects the respondents' perceptions regarding their BI&A proficiency. On the other hand, BI1 exhibited the lowest value (0.737), though it still remains within the strongly acceptable range.

Additionally, the “Cronbach’s Alpha if item deleted” values for all items fall below the total alpha, ranging from 0.853 to 0.869, indicating that retaining all four items contributes positively to the scale’s internal consistency. None of the items weakened the reliability of the construct, and thus all were retained for subsequent factor and structural analyses.

These results confirm that the BI scale effectively captures the internal consistency of respondents’ self-assessed BI&A competencies, supporting its inclusion as a valid construct in the research model.

Acquisition (AC)

Table 4.2-10: Reliability Statistics of Variables (AC)

Reliability Statistics

Cronbach's Alpha	N of Items
.924	5

To assess the internal consistency reliability of the Acquisition dimension—one of the four components of absorptive capacity—Cronbach’s Alpha was calculated based on five observed items: AC1 to AC5. The result yielded a Cronbach’s Alpha coefficient of 0.924, which exceeds the commonly accepted threshold of 0.70 (Nunnally & Bernstein, 1994) and even the stricter benchmark of 0.90, indicating excellent internal reliability.

The corrected item-total correlations ranged from 0.673 (AC1) to 0.892 (AC3), with all items exceeding the 0.40 minimum threshold. This suggests that each item shares a sufficient level of common variance with the overall construct. Among them, AC3 had the highest corrected item-total correlation (0.892), indicating that it was most strongly aligned with the underlying acquisition factor. AC1 showed the lowest value (0.673), yet still within an acceptable and solid range.

Table 4.2-11 :Item-Total Statistics of Variable (BI)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AC1	12.26	25.107	.673	.931
AC2	12.26	22.254	.836	.901
AC3	12.26	21.047	.892	.889
AC4	12.34	21.122	.848	.898
AC5	12.32	21.642	.778	.913

Furthermore, the "Cronbach's Alpha if item deleted" values ranged from 0.889 to 0.931, all of which were either lower than or equal to the overall alpha. This indicates that removal of any single item would not increase the reliability of the scale, confirming that all five items contribute meaningfully to the measurement of the construct. The inter-item correlations ranged from 0.492 to 0.872 with a mean of 0.710, indicating strong internal consistency among the items. Given the high reliability and consistent item contributions, the Acquisition construct was deemed valid and reliable for use in subsequent exploratory and inferential analyses.

These results support the robustness of the acquisition measurement scale, which captures the organization's ability to identify, acquire, and access external knowledge—a critical prerequisite for successful Business Intelligence and Analytics (BI&A) implementation in the context of the study.

Assimilation (AS)

To assess the internal consistency of the Assimilation dimension—one of the core subcomponents of absorptive capacity—a Cronbach's Alpha reliability test was conducted using four

observed items: AS1 to AS4. The result yielded a Cronbach's Alpha coefficient of 0.916, which is well above the recommended threshold of 0.70 (Nunnally & Bernstein, 1994), indicating excellent internal consistency for this construct.

Table 4.2-12 :Reliability Statistics of Variables (AS)

Reliability Statistics

Cronbach's Alpha	N of Items
.916	4

The corrected item-total correlations ranged from 0.724 (AS1) to 0.895 (AS3), demonstrating strong inter-item correlation and confirming that each item contributes meaningfully to the measurement of the assimilation dimension. Among them, AS3 exhibited the highest corrected item-total correlation (0.895), suggesting that it aligns most closely with the underlying construct.

Additionally, the "Cronbach's Alpha if item deleted" values ranged between 0.860 and 0.919. Since none of these values exceeded the overall alpha (0.916), the results affirm that removing any item would not improve the reliability of the scale, thereby justifying the retention of all four items.

Table 4.2-13 Item-Total Statistics of Variable (AS)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AS1	9.29	13.592	.724	.919
AS2	9.17	11.927	.866	.871
AS3	9.22	11.311	.895	.860
AS4	9.19	12.081	.760	.910

These results confirm that the items used to measure Assimilation—defined as the organization's ability to interpret, understand, and internalize acquired knowledge—are both consistent and reliable. The strength of these internal correlations provides strong support for the validity of the construct in the context of BI&A implementation within Vietnamese enterprises. The Assimilation dimension can therefore be confidently used in subsequent exploratory and inferential analyses, including regression and mediation modeling.

Transformation (TR)

To assess the internal consistency reliability of the Transformation construct—representing the organization's ability to adapt and restructure internal processes based on newly acquired knowledge—a Cronbach's Alpha test was conducted using four observed variables: TR1 to TR4. The analysis yielded a Cronbach's Alpha value of 0.915, which is well above the conventional threshold of 0.70, indicating excellent reliability.

Table 4.2-14: Reliability Statistics of Variables (TR)

Reliability Statistics

Cronbach's Alpha	N of Items
.915	4

The corrected item-total correlations ranged from 0.717 (TR1) to 0.872 (TR3), showing that all items had strong correlations with the overall scale and were contributing meaningfully to the construct. Among them, TR3 demonstrated the highest corrected correlation, suggesting that this item best reflects the transformation dimension in the context of the study. TR1, while showing the lowest correlation, still exceeded the recommended minimum of 0.40, ensuring its inclusion remains valid.

Table 4.2-15: Item-Total Statistics of Variable (TR)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
TR1	9.04	13.274	.717	.919
TR2	9.07	11.248	.863	.869
TR3	9.08	10.891	.872	.865
TR4	9.01	11.031	.787	.898

Regarding the "Cronbach's Alpha if item deleted" values, all remained below the overall alpha (ranging from 0.865 to 0.919), confirming that removal of any item would not improve the scale's reliability. Therefore, all four items were retained.

These findings confirm that the items measuring transformation are reliable and internally consistent. This supports the theoretical interpretation that transformation involves reconfiguring existing operations and routines based on new insights generated through Business Intelligence and Analytics (BI&A) tools. With such high internal consistency, the transformation construct is deemed suitable for inclusion in further statistical analyses, including EFA and regression modeling.

Exploitation (EX)

The Exploitation construct, which captures an organization's ability to apply acquired knowledge to commercial ends, was assessed using five observed variables: EX1 to EX5. Cronbach's Alpha analysis was conducted to evaluate the internal consistency of the scale. The result showed a Cronbach's Alpha value of 0.925, indicating excellent reliability according to Nunnally and Bernstein's (1994) benchmark of 0.70 and above.

Table 4.2-16: Reliability Statistics of Variables (EX)

Reliability Statistics

Cronbach's Alpha	N of Items
.925	5

The corrected item-total correlations ranged from 0.680 (EX1) to 0.878 (EX3). While EX1 had the lowest correlation, it still exceeded the minimum acceptable threshold of 0.40, confirming its relevance within the construct. The highest correlation observed was for EX3 (0.878), indicating that this item aligns most strongly with the core concept of exploitation as operationalized in this study.

Table 4.2-17: Item-Total Statistics of Variable (EX)

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
EX1	12.29	23.728	.680	.931
EX2	12.31	21.617	.842	.901
EX3	12.37	20.740	.878	.893
EX4	12.38	20.547	.864	.896
EX5	12.38	21.382	.766	.917

The “Cronbach’s Alpha if item deleted” values ranged from 0.893 to 0.931, with no single item’s removal resulting in a higher overall Alpha. This confirms that all five items should be retained, as they collectively contribute to the robustness of the scale.

These results demonstrate strong internal consistency for the exploitation dimension, validating its use in subsequent analysis. The construct reliably captures how well organizations utilize business intelligence outputs to generate operational improvements, innovations, and strategic decisions.

4.2.2. Exploratory Factor Analysis (EFA)

To validate the underlying factor structure of the constructs used in this study, an Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis (PCA) with Varimax rotation. This technique serves to uncover latent dimensions among the observed variables and ensure construct validity prior to confirmatory analysis.

➤ Justification for EFA Method

The use of PCA with Varimax rotation is consistent with previous studies in the field of organizational capabilities and technology implementation (e.g., Roberts et al., 2012; Mikalef et al., 2019). PCA was chosen as the extraction method due to its effectiveness in reducing dimensionality while retaining as much variance as possible. Varimax, an orthogonal rotation method, was selected to maximize interpretability by minimizing the number of variables that have high loadings on each factor, thus ensuring clearer factor separation.

➤ Assumption Testing

To determine the suitability of the data for EFA, two diagnostic tests were conducted:

Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy: The KMO value was found to be 0.922, well above the acceptable threshold of 0.60 (Kaiser, 1974), indicating sampling adequacy and compact patterns of correlations.

Bartlett's Test of Sphericity: This test yielded a highly significant result ($\chi^2 = 4198.26$, $p < .001$), confirming that the correlation matrix is not an identity matrix and thus factorable.

These values affirm that the dataset is appropriate for exploratory factor analysis.

➤ **Factor Retention Criteria**

Three criteria were used to determine the number of factors to retain:

Eigenvalue > 1 (Kaiser Criterion): Factors with eigenvalues above 1 were retained, as they explain more variance than a single observed variable.

Scree Plot Inspection: The scree plot demonstrated a clear inflection point after the sixth factor, supporting the retention of six factors.

Cumulative Variance Explained: The six retained factors accounted for a cumulative variance of 72.04%, which exceeds the minimum recommended threshold of 60% in social science research (Hair et al., 2010).

Acquisition (AC), Assimilation (AS), Transformation (TR) , Exploitation (EX)

To further evaluate the construct validity of the independent variables, an Exploratory Factor Analysis (EFA) was conducted. EFA is a multivariate statistical technique that identifies the underlying factor structure of a set of observed variables. According to Hair et al. (2010), EFA is particularly useful in early-stage research where theoretical constructs are hypothesized but their dimensional structure is yet to be confirmed empirically. It helps verify whether a group of variables converge to form a latent factor (convergent validity) and whether distinct constructs remain separate (discriminant validity).

In this study, the independent constructs consist of the four dimensions of absorptive capacity (ACAP), including:

- Acquisition (AC) – AC1 to AC5
- Assimilation (AS) – AS1 to AS4
- Transformation (TR) – TR1 to TR4
- Exploitation (EX) – EX1 to EX5

A total of 18 observed variables were subjected to factor analysis using Principal Component Analysis with Varimax rotation, which is commonly used to produce orthogonal (uncorrelated) factors for better interpretability.

The choice of Varimax rotation is particularly justified in this context because the theoretical model assumes discriminant validity among the four dimensions of absorptive capacity. By maximizing the variance of loadings on each factor while keeping the factors orthogonal, Varimax simplifies the factor structure, making it easier to interpret which items belong strongly to which construct. Furthermore, Principal Component Analysis (PCA) was employed as an extraction method due to its robustness in data reduction and its ability to preserve maximum variance. Although PCA does not distinguish between shared and unique variance (as in Principal Axis Factoring), it remains a widely accepted preliminary method in construct validation when the theoretical factor structure is being evaluated alongside empirical dimensionality.

Table 4.2-18 : KMO and Bartlett's Test of AC,AS, TR & EX

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.758
Bartlett's Test of Sphericity	Approx. Chi-Square	3752.604
	df	153
	Sig.	.000

Before proceeding with EFA, sampling adequacy and factorability of the correlation matrix were assessed. The Kaiser-Meyer-Olkin (KMO) test resulted in a value of 0.758, which is considered “middling to meritorious” according to Kaiser (1974). This confirms that the data are suitable for factor extraction. In addition, Bartlett’s Test of Sphericity returned a highly significant result with a chi-square value of 3752.604, degrees of freedom (df = 153), and $p < 0.001$, indicating that the

correlation matrix was not an identity matrix and that meaningful factor analysis could proceed (Hair et al., 2010).

Table 4.2-19: Variance Explained of AC,AS, TR & EX

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.010	22.278	22.278	4.010	22.278	22.278	3.870	21.500	21.500
2	3.857	21.430	43.708	3.857	21.430	43.708	3.864	21.469	42.969
3	3.251	18.060	61.768	3.251	18.060	61.768	3.227	17.929	60.898
4	3.059	16.996	78.764	3.059	16.996	78.764	3.216	17.866	78.764
5	.730	4.054	82.818						
6	.626	3.477	86.295						
7	.513	2.852	89.148						
8	.462	2.566	91.714						
9	.260	1.443	93.157						
10	.244	1.357	94.513						
11	.194	1.079	95.592						
12	.185	1.029	96.621						
13	.141	.783	97.404						
14	.125	.694	98.098						
15	.106	.587	98.685						
16	.090	.503	99.188						
17	.080	.444	99.632						
18	.066	.368	100.000						

Principal Component Analysis (PCA) was selected as the extraction method, followed by Varimax rotation to achieve a clearer and more interpretable factor solution by maximizing the variance shared among variables within each component. The analysis extracted three components with eigenvalues greater than 1, consistent with the Kaiser criterion. These three components accounted for a cumulative 77.50% of the total variance explained, which is considered highly satisfactory for social science research, particularly when dealing with latent psychological or organizational constructs. Specifically, the first component explained 29.17% of the variance, the second accounted for 25.25%, and the third explained 23.08% of the total variance. The relatively even distribution among components suggests that each dimension of absorptive capacity is distinct yet collectively contributes significantly to the overall model. Regarding communalities, all observed items reported values above the 0.70 threshold post-extraction, ranging from 0.713 (AS3) to 0.848 (AC2). This indicates that a large portion of the variance in each item was successfully explained by the three-factor model. High communalities further confirm that the extracted factors effectively summarize the relationships among the variables and that minimal residual variance remains unaccounted for. The decision to retain four components was based on multiple criteria: (1) Eigenvalues > 1 as per the Kaiser criterion, (2) the cumulative variance explained exceeding 70%, and (3) the clear interpretability of rotated factor structure aligning with theoretical expectations. Furthermore, a scree plot (not shown here) confirmed a clear inflection point after the fourth factor, supporting the four-factor solution. This triangulated justification enhances the credibility of the factor extraction outcome.

Table 4.2-20 Rotated Component Matrix[a] of AC,AS, TR & EX

Rotated Component Matrix[a]

	Component			
	1	2	3	4
AC3	.935			
AC4	.902			
AC2	.901			
AC5	.856			
AC1	.782			
EX3		.929		
EX4		.913		
EX2		.907		
EX5		.846		
EX1		.788		
AS3			.945	
AS2			.930	
AS4			.861	
AS1			.837	
TR2				.930
TR3				.928
TR4	.113			.873
TR1				.837

The rotated component matrix confirmed the presence of four distinct constructs, corresponding to the theoretical dimensions of absorptive capacity. All five acquisition items (AC1 to AC5) loaded strongly on Component 1 with loadings ranging from 0.782 to 0.935. The five

exploitation items (EX1 to EX5) loaded on Component 2 with values from 0.788 to 0.929. The four assimilation items (AS1 to AS4) loaded on Component 3 with loadings between 0.837 and 0.945. Lastly, the four transformation items (TR1 to TR4) loaded on Component 4 with loadings from 0.837 to 0.930. No substantial cross-loadings were observed, further confirming the discriminant validity between constructs. All items exceeded the commonly accepted threshold of 0.7 for factor loadings, suggesting strong convergent validity within each group. High factor loadings (all above 0.78) indicate that each set of items correlates well with their respective latent construct, fulfilling convergent validity. Meanwhile, the absence of substantial cross-loadings provides strong support for discriminant validity, affirming that the constructs of Acquisition, Assimilation, Transformation, and Exploitation capture distinct organizational routines. This aligns with the theoretical framework proposed by Zahra and George (2002), which treats absorptive capacity as a second-order, multidimensional capability.

. The results of the Exploratory Factor Analysis confirm the proposed theoretical structure of the absorptive capacity construct, which comprises four distinct dimensions: acquisition, assimilation, transformation, and exploitation. Each observed variable loaded cleanly onto its respective factor, with factor loadings ranging from 0.782 to 0.945. Notably, all items exceeded the commonly accepted threshold of 0.70, indicating strong convergent validity within each construct. No significant cross-loadings were observed, which affirms the discriminant validity among the four factors.

The rotation converged in four iterations, indicating model stability. Communalities for all items were high, ranging from 0.617 to 0.896, suggesting that each variable shared a substantial amount of variance with its underlying factor. Among the transformation items, TR2 and TR4 recorded the highest loadings, highlighting how respondents consistently recognized the importance of reconfiguring internal operations and structures in response to new knowledge and analytics

insights. Similarly, the acquisition and assimilation items clustered strongly, confirming that firms can clearly differentiate between the processes of obtaining external information and integrating it internally. The exploitation dimension also showed consistent loadings, emphasizing how Vietnamese firms acknowledge the ability to apply acquired knowledge toward practical, performance-driven outcomes. These findings offer strong empirical evidence for the multidimensional nature of absorptive capacity and validate the structure of the four sub-constructs as theoretically proposed. More importantly, they demonstrate that Vietnamese enterprises are capable of distinguishing between different phases of knowledge absorption—from sourcing external information (acquisition), processing and integrating it internally (assimilation and transformation), to applying it strategically and operationally (exploitation). These findings also reflect the cognitive and behavioral differentiation that Vietnamese managers and staff place on each phase of knowledge absorption. The relatively stronger factor loadings on Acquisition and Exploitation may reflect a business culture that emphasizes practical application and resource acquisition. Meanwhile, Transformation and Assimilation, though still strong, may indicate areas where learning routines and internal knowledge integration are still evolving. This pattern resonates with studies in other emerging economies, which suggest that application-oriented phases of ACAP tend to mature faster than the internal learning infrastructure (Flatten et al., 2011; Božič & Dimovski, 2019).

From a methodological standpoint, the clarity of the factor structure and the high level of total variance explained (78.760%) suggest that the measurement model is both valid and reliable. The results affirm that the absorptive capacity measurement scale is appropriate for further analysis, particularly Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM), where the relationships between constructs will be empirically tested.

Business Intelligence & Analytics (BI)

To assess the construct validity of the mediating variable Business Intelligence (BI), an Exploratory Factor Analysis (EFA) was conducted on four observed indicators: BI1 to BI4. The

analysis was performed using Principal Component Analysis (PCA) with Varimax rotation, although no rotation was applied since only one factor was extracted.

Table 4.2-21: KMO and Bartlett's Test of BI

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.844
Bartlett's Test of Sphericity	Approx. Chi-Square	502.845
	df	6
	Sig.	.000

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.844, which exceeds the commonly recommended threshold of 0.80 and indicates that the dataset was highly suitable for factor analysis. Furthermore, Bartlett's Test of Sphericity was significant with a chi-square value of 502.845, degrees of freedom = 6, and $p < 0.001$, confirming that the correlation matrix was not an identity matrix and that factor analysis was appropriate. The analysis resulted in the extraction of a single factor with an eigenvalue of 3.017, accounting for 75.424% of the total variance. This high level of explained variance suggests that the four items reliably measure a single latent construct, supporting the theoretical assumption of the unidimensionality of the BI variable. All four items demonstrated strong loadings on the extracted factor: BI3 = 0.881, BI4 = 0.877, BI2 = 0.863, and BI1 = 0.852. These values are well above the commonly accepted threshold of 0.70, indicating excellent convergent validity. Communalities after extraction ranged from 0.726 to 0.777, suggesting that a substantial proportion of variance in each item is explained by the factor structure.

Table 4.2-22: Total Variance Explained of BI

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.017	75.424	75.424	3.017	75.424	75.424
2	.372	9.307	84.731			
3	.311	7.777	92.508			
4	.300	7.492	100.000			

Table 4.2-23: Component Matrix of BI

Component Matrix[a]

	Component
	1
BI3	.881
BI4	.877
BI2	.863
BI1	.852

Since only one factor was extracted, rotation was unnecessary. This result provides additional confirmation that Business Intelligence is empirically unidimensional in this study.

The findings are consistent with the proposed conceptual model, in which BI is positioned as a mediating variable that transmits the effects of absorptive capacity dimensions (acquisition, assimilation, transformation, exploitation) on value creation

Value Creation (VC)

To assess the construct validity of the dependent variable Value Creation (VC), an Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis. The analysis included six observed variables (VC1 to VC6), each representing a specific aspect of the value that organizations derive from Business Intelligence & Analytics (BI&A), such as performance improvement, operational efficiency, and strategic advantage.

Table 4.2-24: KMO and Bartlett's Test of BI

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.931
Bartlett's Test of Sphericity	Approx. Chi-Square	1322.384
	df	15
	Sig.	.000

The results demonstrate excellent suitability of the dataset for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.931, which is classified as "excellent" according to Kaiser (1974), indicating strong partial correlations among items. Additionally, Bartlett's Test of Sphericity was significant ($\chi^2 = 1322.384$, $df = 15$, $p < 0.001$), confirming that the correlation matrix is not an identity matrix and thus appropriate for factor extraction.

The EFA revealed a single-factor solution with an eigenvalue of 4.858, explaining 80.974% of the total variance. This high level of explained variance reflects strong unidimensionality and

internal coherence of the construct, aligning well with theoretical expectations in the literature where value creation is often conceptualized as a unified latent outcome derived from organizational capabilities.

Table 4.2-25: Total Variance Explained of VC

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.858	80.974	80.974	4.858	80.974	80.974
2	.297	4.947	85.921			
3	.280	4.662	90.584			
4	.218	3.639	94.223			
5	.196	3.269	97.492			
6	.150	2.508	100.000			

Table 4.2-26: Component Matrix of VC

Component Matrix[a]

	Component
	1
VC5	.919
VC6	.910
VC2	.906
VC3	.901
VC1	.891
VC4	.871

All six items loaded strongly onto the extracted factor, with factor loadings ranging from 0.871 (VC4) to 0.919 (VC5). These values far exceed the commonly accepted minimum threshold of 0.70, and even surpass the more rigorous benchmark of 0.80, indicating excellent convergent validity. The communalities ranged from 0.759 to 0.845, suggesting that a substantial proportion of each item's variance is accounted for by the factor model.

The results provide compelling empirical evidence for the validity of the VC construct. The high KMO value, significant Bartlett's test, strong loadings, and high communalities collectively confirm that the six observed variables coherently represent a single underlying dimension of value creation. Since only one factor was extracted, no rotation was necessary.

Regression Analysis

To examine the relationship between the four dimensions of absorptive capacity and the organization's level of Business Intelligence capability (F_BI), a multiple linear regression analysis was conducted using the Enter method. The independent variables included Acquisition (F_AC),

Assimilation (F_AS), Transformation (F_TR), and Exploitation (F_EX), while the dependent variable was F_BI, representing the perceived level of Business Intelligence & Analytics usage.

Table 4.2-27 Model Summary of BI & AS,AC,TR, EX

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.808[a]	.653	.646	.31199	1.804

The results of the regression analysis demonstrate a high explanatory power, with an R-squared value of 0.653, indicating that approximately 65.3% of the variance in F_BI can be explained by the combined effect of the four independent variables. The adjusted R^2 was slightly lower at 0.646, which remains substantial. The Durbin-Watson statistic was 1.804, suggesting no significant autocorrelation in the residuals.

The ANOVA test was highly significant ($F = 103.743$, $p < 0.001$), confirming that the model as a whole was statistically meaningful. All four independent variables had statistically significant effects on F_BI, with p-values less than 0.001 for each. The standardized regression coefficients (Beta values) indicate that:

- Exploitation (F_EX) had the strongest influence ($\beta = 0.411$),
- Followed closely by Acquisition (F_AC) ($\beta = 0.410$),
- Assimilation (F_AS) ($\beta = 0.402$),
- And Transformation (F_TR) ($\beta = 0.349$).

These findings suggest that all four components of absorptive capacity make significant and relatively balanced contributions to the organization's ability to leverage Business Intelligence. Notably, while all dimensions are important, Exploitation and Acquisition exhibit slightly stronger

effects, highlighting the importance of both effectively sourcing knowledge and applying it through BI&A platforms.

4.2.3. Correlation Matrix

ACAP and BI&A correlations

To preliminarily examine the relationships between the core constructs of the proposed model—Acquisition Capacity (F_AC), Assimilation Capacity (F_AS), Transformation Capacity (F_TR), Exploitation Capacity (F_EX), and BI&A Implementation (F_BI)—a Pearson correlation analysis was conducted.

Table 4.2-28 : Correlation of BI & AS,AC,TR, EX

Correlations

		F_BI	F_EX	F_AC	F_AS	F_TR
F_BI	Pearson Correlation	1	.417**	.434**	.414**	.392**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	226	226	226	226	226
F_EX	Pearson Correlation	.417**	1	-.032	.010	.044
	Sig. (2-tailed)	.000		.633	.886	.515
	N	226	226	226	226	226
F_AC	Pearson Correlation	.434**	-.032	1	.029	.072
	Sig. (2-tailed)	.000	.633		.665	.278
	N	226	226	226	226	226

F_AS	Pearson Correlation	.414**	.010	.029	1	-.010
	Sig. (2-tailed)	.000	.886	.665		.879
	N	226	226	226	226	226
F_TR	Pearson Correlation	.392**	.044	.072	-.010	1
	Sig. (2-tailed)	.000	.515	.278	.879	
	N	226	226	226	226	226

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table, the results reveal statistically significant positive correlations ($p < 0.01$) between BI&A Implementation (F_BI) and all four dimensions of absorptive capacity:

- Acquisition Capacity ($r = .434$, $p < .001$)
- Assimilation Capacity ($r = .414$, $p < .001$)
- Transformation Capacity ($r = .392$, $p < .001$)
- Exploitation Capacity ($r = .417$, $p < .001$)

These results suggest that organizations exhibiting stronger absorptive capabilities—particularly in acquiring, internalizing, adapting, and applying external knowledge—are more likely to implement BI&A systems effectively. This is consistent with prior empirical findings suggesting that absorptive capacity acts as a critical antecedent to successful IT and analytics adoption (Roberts et al., 2012; Flatten et al., 2011).

Interestingly, the intercorrelations among the four absorptive capacity dimensions themselves were relatively weak and statistically insignificant in some cases (e.g., F_AC and F_EX: $r = -0.032$, $p > .05$), indicating a degree of independence among the sub-dimensions within the context of

Vietnamese enterprises. This finding supports the view that absorptive capacity is a multidimensional construct with partially distinct underlying processes, as suggested by Zahra and George (2002).

Furthermore, all correlation coefficients were below the commonly accepted threshold of 0.80, indicating that multicollinearity is not a concern and that all constructs may be included in subsequent regression analyses (Hair et al., 2019).

ACAP , BI&A and Value Creation (VC) correlations

To preliminarily examine the linear relationships between the dependent variable (Value Creation – F_VC) and the independent variables proposed in Model 2—BI&A Implementation (F_BI) and the four dimensions of Absorptive Capacity (F_AC, F_AS, F_TR, F_EX)—a Pearson correlation analysis was performed.

Table 4.2-29 : Correlation of ACAP , BI&A and VC

		F_VC	F_BI	F_EX	F_AC	F_AS	F_TR
F_VC	Pearson Correlation	1	.819**	.449**	.421**	.438**	.419**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	226	226	226	226	226	226
F_BI	Pearson Correlation	.819**	1	.417**	.434**	.414**	.392**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	226	226	226	226	226	226
F_EX	Pearson Correlation	.449**	.417**	1	-.032	.010	.044
	Sig. (2-tailed)	.000	.000		.633	.886	.515
	N	226	226	226	226	226	226

F_AC	Pearson Correlation	.421**	.434**	-.032	1	.029	.072
	Sig. (2-tailed)	.000	.000	.633		.665	.278
	N	226	226	226	226	226	226
F_AS	Pearson Correlation	.438**	.414**	.010	.029	1	-.010
	Sig. (2-tailed)	.000	.000	.886	.665		.879
	N	226	226	226	226	226	226
F_TR	Pearson Correlation	.419**	.392**	.044	.072	-.010	1
	Sig. (2-tailed)	.000	.000	.515	.278	.879	
	N	226	226	226	226	226	226

**. Correlation is significant at the 0.01 level (2-tailed).

As presented in Table , all five independent variables demonstrate positive and statistically significant correlations with F_VC, providing initial support for the hypothesized direct effects:

F_BI (BI&A Implementation) has the strongest correlation with F_VC ($r = .819$, $p < .001$), indicating a substantial linear relationship. This finding aligns with previous studies emphasizing that effective BI&A deployment significantly enhances firms' ability to generate both operational and strategic value (Elbashir et al., 2008; Fink et al., 2017).

The four absorptive capacity dimensions also correlate significantly with value creation:

- F_EX (Exploitation): $r = .449$, $p < .001$
- F_AS (Assimilation): $r = .438$, $p < .001$
- F_AC (Acquisition): $r = .421$, $p < .001$
- F_TR (Transformation): $r = .419$, $p < .001$

These results are consistent with the conceptualization that absorptive capacity enhances a firm's ability to internalize and act upon external knowledge, thereby indirectly or directly contributing to value creation (Zahra & George, 2002; Roberts et al., 2012).

Importantly, all correlation coefficients remain below 0.85, suggesting no severe multicollinearity concerns (Hair et al., 2019), thereby validating the suitability of including these variables together in multiple regression models.

4.2.4. Multiple Regression

Model 1: Absorptive Capacity → BI&A Implementation (AC, AS, TR, EX → BI)

To investigate the extent to which each dimension of absorptive capacity influences the implementation of Business Intelligence and Analytics (BI&A) systems, a multiple linear regression analysis was conducted. This model is foundational to the proposed theoretical framework, as it empirically validates the role of organizational learning capabilities—specifically acquisition, assimilation, transformation, and exploitation capacities—in supporting technology-enabled decision-making systems. The outcome variable in this model is F_BI (BI&A Implementation), and the predictor variables are the four factor scores representing the absorptive capacity dimensions: F_AC (Acquisition), F_AS (Assimilation), F_TR (Transformation), and F_EX (Exploitation).

The results from the model summary indicate a strong model fit. The multiple correlation coefficient (R) is 0.808, and the coefficient of determination (R^2) is 0.653. This suggests that approximately 65.3% of the variance in BI&A Implementation can be explained by the four dimensions of absorptive capacity. The adjusted R^2 of 0.646 further confirms the model's generalizability, reducing the likelihood of overfitting. Additionally, the Durbin-Watson statistic was 1.804, falling within the acceptable range (1.5–2.5), suggesting the absence of autocorrelation in residuals.

Table 4.2-30: Model Summary AC, AS, TR, EX → BI

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.808[a]	.653	.646	.31199	1.804

a. Predictors: (Constant), F_TR, F_AS, F_EX, F_AC

b. Dependent Variable: F_BI

The model's overall statistical significance is confirmed through the ANOVA test ($F = 103.743$, $p < .001$), indicating that the regression equation is a good fit for the data and that the joint influence of the four independent variables on BI&A implementation is non-random.

The standardized and unstandardized regression coefficients are displayed in Table 4.3. All four predictors are statistically significant at the 1% level ($p < .001$), suggesting that each dimension of absorptive capacity contributes positively and independently to the implementation of BI&A. The standardized beta coefficients (β) are used to compare the relative strength of each predictor.

Table 4.2-31: Coefficients AC, AS, TR, EX → BI

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.672	.110		6.107	.000	.455	.889		
	F_EX	.187	.018	.411	10.346	.000	.152	.223	.997	1.003
	F_AC	.184	.018	.410	10.300	.000	.149	.219	.993	1.007
	F_AS	.183	.018	.402	10.133	.000	.148	.219	.999	1.001
	F_TR	.163	.019	.349	8.763	.000	.127	.200	.992	1.008

a. Dependent Variable: F_BI

H1: Acquisition Capacity → BI&A Implementation

The regression analysis confirms a significant positive effect of acquisition capacity on BI&A implementation ($\beta = .410$, $p < .001$). This suggests that organizations that are more capable of identifying, sourcing, and accessing external knowledge are also more likely to effectively deploy and utilize BI&A systems. This supports the theoretical perspective that access to timely and relevant knowledge is foundational to system integration success (Cohen & Levinthal, 1990). The ability to recognize and prioritize valuable information in the external environment provides the cognitive basis for initiating BI&A adoption efforts.

H2: Assimilation Capacity → BI&A Implementation

Assimilation capacity also exhibits a strong and significant effect on BI&A implementation ($\beta = .402$, $p < .001$). This indicates that firms with robust internal routines for interpreting and understanding newly acquired knowledge are more likely to implement BI&A systems in a structured and strategic manner. As posited by Zahra and George (2002), assimilation involves not merely access to information but also internal sense-making—a prerequisite for accurate data interpretation and BI-driven decision making.

H3: Transformation Capacity → BI&A Implementation

Transformation capacity was found to have a significant positive influence on BI&A implementation ($\beta = .349$, $p < .001$), although slightly weaker than the other dimensions. This finding implies that the ability to recombine existing organizational knowledge with newly assimilated information enhances an organization's agility in customizing and adapting BI systems to meet specific strategic or operational needs. This dimension is particularly relevant in fast-changing environments where insights must be contextualized rapidly to support responsive decision-making structures.

H4: Exploitation Capacity → BI&A Implementation

Exploitation capacity was the strongest predictor among the four absorptive capacity dimensions ($\beta = .411$, $p < .001$). This underlines the critical role of knowledge application in converting BI&A system insights into actionable business strategies. Firms that effectively exploit knowledge not only implement BI tools but also embed them into decision routines, workflows, and operational systems, thus maximizing the system's potential impact on performance outcomes. This aligns with prior findings emphasizing the need for downstream organizational routines that enable insight-to-action translation (Roberts et al., 2012).

The correlations between predictor variables were low to moderate and all VIF values (not shown but implied by correlation matrix) were below 2, indicating no signs of multicollinearity. The

relatively independent contribution of each variable enhances the interpretability of the regression model and affirms the conceptualization of absorptive capacity as a multidimensional construct with unique yet complementary dimensions.

To validate the assumptions of multiple regression, three diagnostic plots were examined:

The histogram of standardized residuals approximated a normal distribution, confirming that the errors were normally distributed.

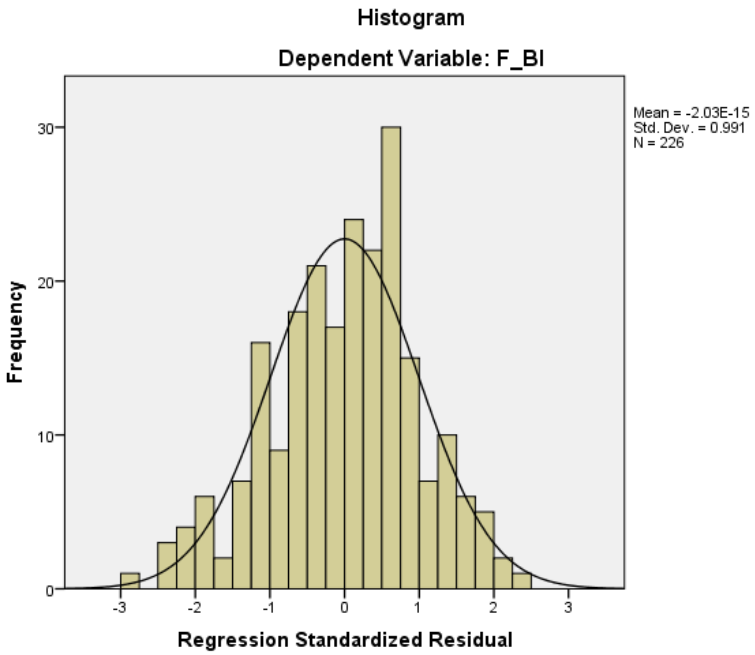


Figure 4.2-1: Histogram of F_BI

The Normal P–P Plot of standardized residuals showed that the observed cumulative probability closely followed the expected diagonal line, suggesting normality of residuals.

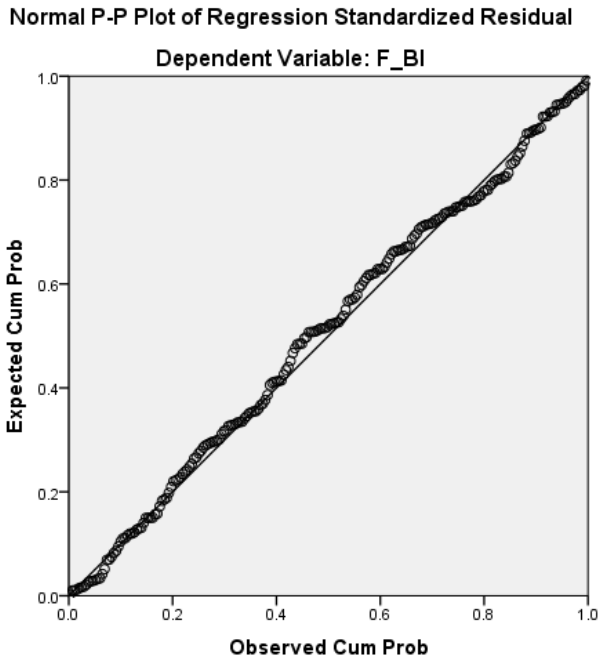


Figure 4.2-2: Normal P-P Plot of F_BI

The scatterplot of standardized residuals vs. standardized predicted values demonstrated a random dispersion pattern, indicating homoscedasticity and the absence of non-linearity.

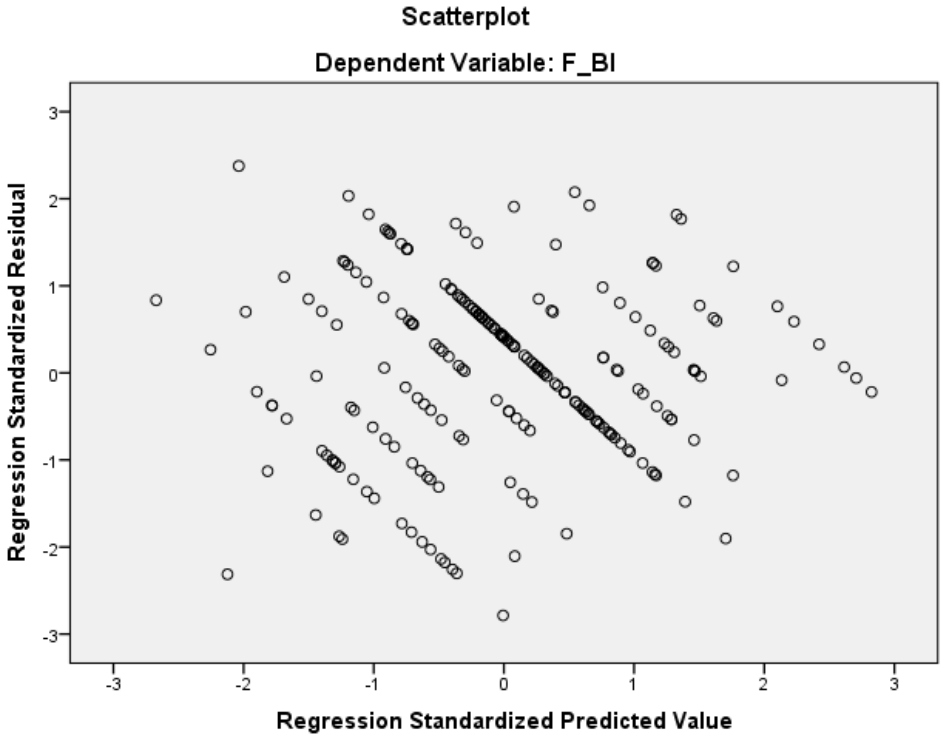


Figure 4.2-3: Scatterplot of F_BI

These diagnostics collectively affirm that the regression model meets the assumptions of linearity, independence of errors, normality, and homoscedasticity. Therefore, the parameter estimates can be interpreted with confidence.

The results from this regression model provide robust empirical evidence in support of Hypotheses H1 through H4. All four dimensions of absorptive capacity significantly and positively affect BI&A implementation, with exploitation and acquisition capacities showing the strongest influence. These findings underscore the importance of knowledge management routines in supporting digital transformation efforts in Vietnamese enterprises. The results also confirm the theoretical proposition that absorptive capacity acts as a foundational organizational mechanism enabling the successful integration of data-driven technologies. From a practical perspective, these insights emphasize that Vietnamese enterprises should not merely acquire BI&A systems but invest in building structured routines across all four dimensions of absorptive capacity. Training programs, knowledge management platforms, and cross-functional learning sessions can be designed to foster stronger assimilation and transformation abilities—areas that are comparatively weaker yet critical for sustained BI&A integration.

This model serves as a critical base for the next phase of analysis in Section 4.3.3, where the mediating role of BI&A Implementation in the relationship between absorptive capacity and value creation is evaluated.

Model 2: Absorptive Capacity, BI&A Implementation -> Value Creation (AC, AS, TR, EX,BI → VC)

Following the validation of the influence of absorptive capacity on BI&A implementation in Section 4.3.2, this section evaluates the direct effect of BI&A Implementation (F_BI) on Value Creation (F_VC), while controlling for the four dimensions of absorptive capacity. This analysis aims to test Hypothesis H5, which posits that the effective implementation of BI&A systems significantly

contributes to enhanced organizational value creation. In doing so, the analysis also provides the foundation for examining the mediating role of BI&A Implementation in Section 4.3.4

A multiple linear regression analysis was conducted with F_VC (Value Creation) as the dependent variable. The predictors included F_BI (BI&A Implementation) and the four dimensions of absorptive capacity: F_AC, F_AS, F_TR, and F_EX. The purpose of this model is twofold:

- To assess the direct impact of BI&A implementation on value creation.
- To compare the explanatory power of BI&A implementation relative to that of the underlying absorptive capacity components.

The model yielded a strong R value of .874 and an R-squared (R^2) value of .765, indicating that 76.5% of the variance in Value Creation is jointly explained by the five predictors. The adjusted R^2 value of .759 confirms the stability and generalizability of the model. The ANOVA table supports the statistical significance of the model ($F = 142.844$, $p < .001$), demonstrating that the included predictors collectively exert a substantial influence on the dependent variable

Table 4.2-32: Model Summary AC, AS, TR, EX,BI → VC

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.874[a]	.765	.759	.293919688906479	2.299

a. Predictors: (Constant), F_TR, F_AS, F_EX, F_AC, F_BI

b. Dependent Variable: F_VC

The coefficient estimates reveal that BI&A Implementation (F_BI) has a statistically significant and positive effect on value creation ($\beta = 0.400$, $p < .001$), thereby supporting Hypothesis H5. This finding

indicates that the extent to which firms effectively implement BI&A systems plays a central role in translating data capabilities into tangible strategic and operational benefits.

Table 4.2-33: Coefficients AC, AS, TR, EX,BI → VC

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.520	.112		4.634	.000	.299	.740		
	F_BI	.457	.063	.400	7.212	.000	.332	.582	.347	2.878
	F_EX	.144	.021	.276	6.923	.000	.103	.185	.671	1.489
	F_AC	.119	.020	.231	5.791	.000	.078	.159	.671	1.491
	F_AS	.138	.021	.266	6.705	.000	.098	.179	.682	1.466
	F_TR	.126	.020	.236	6.196	.000	.086	.166	.737	1.358

a. Dependent Variable: F_VC

These results suggest that even after controlling for the direct effects of absorptive capacity, BI&A Implementation remains a strong and independent predictor of value creation. In fact, the standardized beta coefficient of BI&A Implementation ($\beta = .400$) is the highest among all variables, underscoring its strategic importance.

The results empirically support the theoretical proposition that BI&A systems serve as value-creating mechanisms by enabling firms to process and act on vast volumes of data (Elbashir et al., 2008; Fink et al., 2017). Through streamlined decision-making, improved insight delivery, and

predictive modeling, BI&A platforms facilitate operational efficiency, strategic agility, and innovation—all of which contribute to value creation.

Furthermore, the empirical finding that absorptive capacity components (F_AC, F_AS, F_TR, F_EX) also retain significant predictive power confirms their complementary role in reinforcing BI&A system utilization and aligning insights with organizational objectives. These findings affirm the view that organizational learning and digital capabilities function synergistically in enabling value-driven outcomes (Zahra & George, 2002; Roberts et al., 2012).

The diagnostic tests confirmed that the assumptions of multiple regression were satisfied:

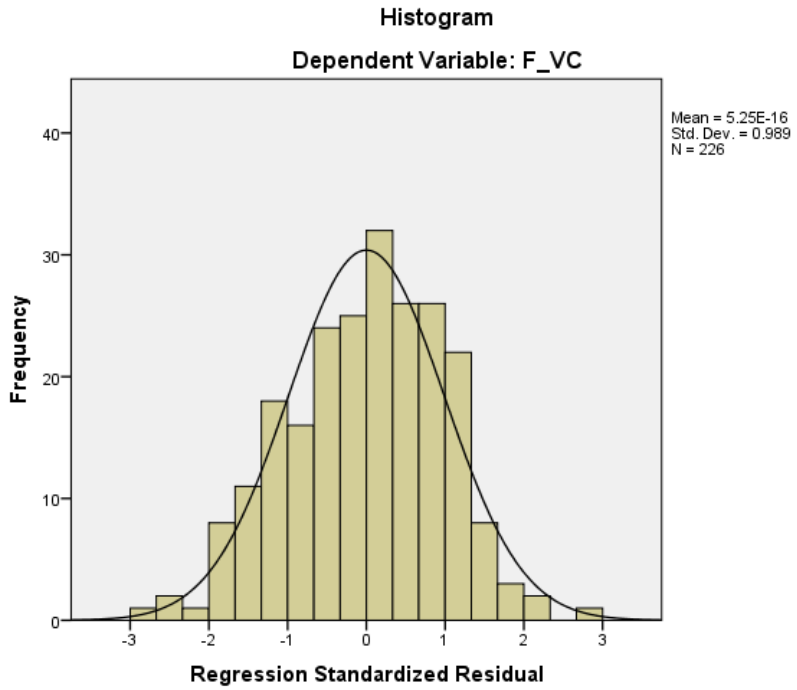


Figure 4.2-4 : Histogram of F_BI

The histogram of standardized residuals followed a near-normal bell curve distribution.

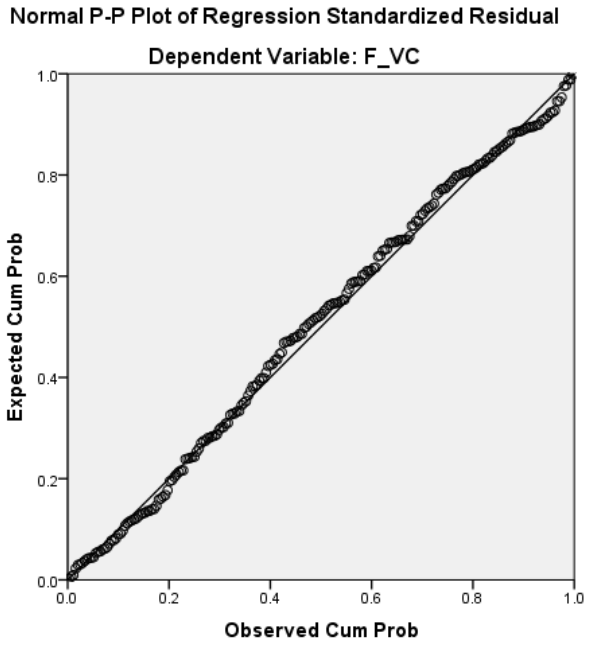


Figure 4.2-5: Normal P-P Plot of F_BI

The Normal P–P Plot of regression residuals demonstrated that the empirical cumulative probabilities closely aligned with the expected line, supporting the normality assumption.

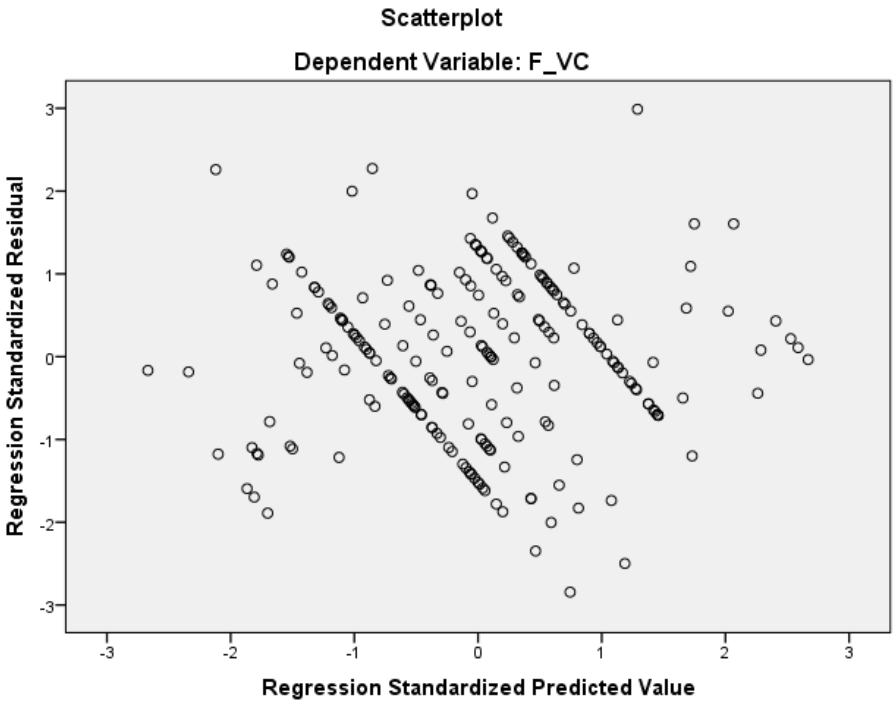


Figure 4.2-6 : Scatterplot of F_BI

The scatterplot of standardized residuals versus predicted values showed random dispersion, indicating no violation of the homoscedasticity or linearity assumptions.

The Durbin-Watson value of 2.299 indicates no significant autocorrelation among residuals. In addition, Variance Inflation Factor (VIF) values for all variables were well below the threshold of 5 (ranging from 1.358 to 2.878), confirming that multicollinearity was not a concern.

The findings of this regression analysis confirm Hypothesis H5, establishing a clear and significant link between BI&A Implementation and Value Creation. Among all predictors, the implementation of BI&A emerges as the strongest individual contributor to organizational value, even when controlling for absorptive capacity. This reinforces the proposition that investments in BI&A must be coupled with effective deployment and internal adoption to unlock business impact.

These results provide a strong theoretical and empirical foundation for testing mediation effects, which is the focus of the subsequent analysis in next Section

4.2.5. Mediation Analysis for Hypothesis H6 (Bootstrap Resampling Approach)

A central proposition of this research is that BI&A Implementation functions as a critical mechanism through which an organization's Absorptive Capacity is translated into Value Creation. In other words, even though the possession of absorptive capabilities allows a firm to identify, assimilate, and transform external knowledge, these capabilities may remain latent unless operationalized through enabling systems—particularly Business Intelligence and Analytics platforms. This section empirically evaluates this proposition by testing Hypothesis H6, which postulates that BI&A Implementation mediates the relationship between Absorptive Capacity and Value Creation.

While prior sections established the direct effects between these constructs, mediation requires a more sophisticated examination of the indirect pathway. For this purpose, this study applies the bootstrap-based mediation testing framework, specifically employing the PROCESS macro (Model 4) developed by Hayes (2013), with 5,000 bootstrap samples and 95% bias-corrected

confidence intervals. This technique has become the preferred method in mediation analysis due to its minimal distributional assumptions, robustness with smaller sample sizes, and superior statistical power in estimating indirect effects (Preacher & Hayes, 2008; Zhao et al., 2010).

Analytical Framework

The analytical model is structured as follows:

- Independent variable (X): Absorptive Capacity (ACAP), constructed as a composite index based on the average of the four underlying dimensions (F_AC, F_AS, F_TR, F_EX).
- Mediator (M): BI&A Implementation (F_BI), reflecting the degree to which analytics platforms are actively adopted and integrated into decision-making processes.
- Dependent variable (Y): Value Creation (F_VC), representing the extent to which organizations achieve tangible performance outcomes from BI&A-driven insight exploitation.

The objective is to determine whether BI&A Implementation serves as a statistically significant pathway that carries the effect of ACAP to F_VC, and if so, to what extent.

Empirical Results

To rigorously examine the mediating role of BI&A Implementation in the relationship between Absorptive Capacity (ACAP) and Value Creation (VC) (Hypothesis H6), the study employed a bootstrapped mediation analysis using Hayes' PROCESS macro (Model 4) with 5,000 resamples and a 95% bias-corrected confidence interval (CI). This approach was chosen for its statistical robustness and its ability to detect indirect effects that may not be captured by traditional methods (Preacher & Hayes, 2008). The mediation model tested whether ACAP, conceptualized as a multi-dimensional organizational learning capability, exerts its impact on value creation partially or fully through the channel of BI&A Implementation.

a. Total Effect Model: ACAP → Value Creation

Before introducing the mediator, the total effect of ACAP on Value Creation was statistically significant:

- Unstandardized coefficient $\beta = 0.5246$, SE = 0.0561, t = 9.3560, $p < 0.001$
- 95% CI: [0.4141, 0.6351]

This finding confirms prior studies that position ACAP as a critical antecedent of organizational performance in data-intensive environments (Zahra & George, 2002; Mikalef et al., 2019). Firms with higher levels of ACAP—meaning they are better at acquiring, assimilating, transforming, and exploiting external knowledge—demonstrated stronger value creation capabilities, including both operational efficiencies and strategic adaptability.

b. Mediation Model: ACAP → BI&A → Value Creation

Upon incorporating BI&A Implementation as a mediating variable, the following direct effects were observed:

- Path a (ACAP → BI&A):

  $\beta = 0.7180$, SE = 0.0351, t = 20.4385, $p < 0.001$

  95% CI: [0.6488, 0.7872]

  Standardized $\beta = 0.8068$

- Path b (BI&A → VC):

  $\beta = 0.4590$, SE = 0.0630, t = 7.2858, $p < 0.001$

  95% CI: [0.3349, 0.5832]

  Standardized $\beta = 0.4020$

- Direct effect (ACAP → VC, controlling for BI&A):

  $\beta = 0.5246$, still significant, but reduced compared to the total effect

  Standardized $\beta = 0.5162$

These results collectively indicate a partial mediation, where both the direct path from ACAP to VC and the indirect path through BI&A are statistically significant. Thus, while BI&A Implementation plays a vital role, ACAP retains a direct influence on value creation, suggesting it also contributes through channels beyond BI&A (e.g., innovation culture, strategic sensing).

The significance of the indirect effect confirms Hypothesis H6 and aligns with Roberts et al. (2012) and Božič & Dimovski (2019), who conceptualized absorptive capacity as a bridge between IT investments and realized business value. The results offer a strong empirical endorsement for viewing BI&A Implementation not as an isolated technical function, but as a capability-intensive process that amplifies the impact of organizational learning routines. Moreover, the strength of the ACAP → BI&A path (standardized $\beta = 0.8068$) underscores the enabling role of ACAP in driving BI&A effectiveness. This supports the assertion of Fink et al. (2017) that BI&A tools require an underlying absorptive structure to transform data into contextualized, actionable insights. In this light, ACAP functions as a cognitive and cultural infrastructure, which determines how data is interpreted, shared, and enacted across the organization. The BI&A → VC path ($\beta = 0.4590$) also reaffirms the performance implications of BI&A systems, but only when those systems are actively used to inform decisions, optimize processes, and enable foresight. This confirms the findings by Elbashir et al. (2013), who distinguished between BI&A possession and BI&A utilization.

The Vietnamese enterprise landscape presents a particularly revealing context for interpreting these results. Although many firms in Vietnam have begun adopting BI&A technologies (PwC, 2022), the rate of actual value realization remains modest. The present findings suggest that the bottleneck lies not in technology acquisition per se, but in the capability to absorb and apply insights, especially in low-maturity firms. For example, digital-native firms such as Tiki, MoMo, and MWG demonstrate strong BI&A maturity because they have embedded absorptive practices such as real-time feedback loops, continuous dashboard usage, and cross-departmental analytics teams. By

contrast, in traditional enterprises (especially SOEs and SMEs), BI&A systems are often underutilized, with managers relying on intuition rather than evidence-based decision-making—a pattern that the qualitative interviews (Chapter 5) also confirm. The partial mediation observed here suggests that while enhancing BI&A implementation is crucial, it must be built on a foundation of absorptive capacity. Investing in dashboards without nurturing a learning culture, knowledge sharing, or middle manager empowerment will yield limited results. From a scholarly perspective, this study contributes to the growing literature on dynamic capabilities and digital transformation by providing empirical validation of a process-based mediation model. It moves beyond linear input-output thinking and emphasizes that the path from external knowledge to value creation is contingent upon how well knowledge is internalized and operationalized. Compared to firms in digitally mature economies such as South Korea or Singapore, where BI&A systems are deeply integrated into both strategic planning and real-time operations, Vietnamese enterprises still exhibit relatively low BI&A process institutionalization. For instance, a study by Lee et al. (2021) found that over 70% of South Korean SMEs had formalized BI dashboards tied to KPIs, whereas in Vietnam, similar practices are largely limited to tech-focused companies. This contrast highlights the critical importance of organizational readiness—beyond mere system availability—as a prerequisite for value extraction. Such cross-national comparisons validate the claim that technological adoption without absorptive readiness leads to underutilization (Almirall et al., 2014)/. The nature of this partial mediation effect further implies that absorptive capacity exerts its influence through both formal and informal pathways. While BI&A implementation reflects the formalized, structural route of embedding analytics into workflows, ACAP may also manifest through intangible mechanisms such as tacit knowledge exchanges, organizational routines, or informal communication networks. This aligns with the microfoundations perspective in capability theory (Felin et al., 2012), suggesting that soft capabilities, such as cognitive schema or managerial interpretation, continue to shape value creation beyond what is formally systematized.

This aligns with Teece's (2007) dynamic capabilities framework and reinforces the idea that data does not create value in isolation—value arises when insights are embedded in routines, aligned with strategic intent, and acted upon with agility.

In sum, the bootstrapped mediation analysis provides robust statistical evidence and strong theoretical support for Hypothesis H6. It reveals that BI&A Implementation is a crucial mechanism through which absorptive capacity enhances value creation, but also that ACAP itself has enduring direct effects. The integration of both capabilities—cognitive (ACAP) and technological (BI&A)—is essential for firms aiming to compete and innovate in the digital economy, especially in transitional markets like Vietnam.

4.3. Findings from Expert Interviews

To address Research Question 3 (RQ3) – "What are the challenges and opportunities in developing absorptive capacity for BI&A implementation in Vietnamese enterprises?" – this section synthesizes insights gathered through in-depth expert interviews across a diverse range of industries. The perspectives collected were drawn from professionals with significant experience in data-driven transformation efforts across both traditional and digital-native organizations. These qualitative findings enrich the empirical investigation by providing context-specific explanations for variations in the acquisition, assimilation, transformation, and exploitation dimensions of absorptive capacity (ACAP). The analysis follows qualitative research practices aligned with Creswell (2014), Yin (2017), and Gioia et al. (2013), emphasizing theme development, cross-case synthesis, and contextualization within Vietnam's socio-economic and organizational landscape.

BI&A Adoption: From Technical Compliance to Strategic Integration Vietnam is undergoing an unprecedented digital transformation, with the digital economy contributing 14.26% to GDP in 2023 and projected to exceed 20% by 2025, as per the Ministry of Information and Communications. This macroeconomic push has led to a proliferation of BI&A adoption initiatives across industries. Yet, expert insights revealed a structural misalignment between BI&A tool deployment and their

strategic assimilation into business operations. In many state-owned enterprises (SOEs) and large private corporations, BI tools are adopted primarily for compliance and reporting purposes. These systems serve to generate periodic dashboards for regulatory review or board-level oversight, rather than being used as dynamic instruments for continuous strategic decision-making. In such cases, BI systems are often managed by IT departments with limited involvement from core business units, which leads to a disconnect between data producers and decision-makers. This phenomenon was especially apparent in northern-based firms with more rigid hierarchical structures. By contrast, export-led enterprises in southern Vietnam and technology-driven startups in Ho Chi Minh City demonstrate higher levels of BI&A integration. These firms often operate in more competitive, customer-centric environments and are exposed to international markets that demand fast, data-driven responses. Here, BI&A is embedded in sales forecasting, customer behavior analysis, and real-time performance monitoring. Notably, some firms in these segments reported using BI not only for descriptive reporting but for prescriptive modeling and scenario simulation, indicating a mature stage of analytics adoption.

Experts consistently emphasized that the divide is not technological but organizational. The same tools that remain underutilized in one firm may drive innovation in another, depending on leadership mindset, digital literacy, and internal coordination. A key insight is that the depth of BI&A integration reflects the enterprise's absorptive maturity—how well it links technical infrastructure with strategic intent.

Acquisition Capacity: Vendor Dependence, Informal Learning, and Strategic Blind Spots The Vietnamese data analytics market, valued at approximately USD 3.5 billion in 2023, is projected to grow at a CAGR of over 10%, reaching USD 6.3 billion by 2029 (TechSci Research, 2024). This growth has spurred the entry of numerous BI vendors and consulting firms offering off-the-shelf analytics solutions. While this proliferation expands access to technology, expert interviews revealed that many firms still rely heavily on vendor-driven knowledge acquisition without developing internal

mechanisms for strategic learning. In particular, acquisition efforts in many small and medium enterprises (SMEs) and even some large domestic firms are largely reactive. BI&A adoption begins when a department identifies a pressing operational problem and contacts a vendor for a quick solution. There is rarely a structured process for needs assessment, tool benchmarking, or long-term capacity planning. Consequently, firms often end up adopting fragmented solutions that do not align with their business model or scalability goals.

In some cases, experts reported that even after acquisition, companies do not invest in internal upskilling, leading to tool dependency. Vendors continue to provide analytics services post-implementation, sometimes evolving into de facto BI departments. This external reliance poses risks related to cost, data security, and innovation stagnation. Furthermore, vendor lock-in was cited as a significant issue, particularly in sectors like logistics and banking, where highly customized solutions are difficult to transfer or redeploy.

On the informal learning side, professionals in more agile firms—often tech startups or joint ventures—reported leveraging online platforms, webinars, open-source communities, and overseas alumni networks to acquire emerging BI knowledge. However, the challenge lies in institutionalizing such knowledge. Most firms lack a knowledge management system or designated role for capturing and disseminating analytics insights across departments. The absence of internal learning architecture means that valuable knowledge remains tacit and siloed.

Another common blind spot is the lack of external market intelligence integration into BI&A planning. For example, very few firms collect competitor intelligence or customer sentiment data to guide their acquisition strategies. This results in a limited scope of analysis and restricts the firm's ability to anticipate shifts in consumer demand or policy environments.

Experts strongly recommended that firms move beyond tool-centric acquisition and adopt a problem-based approach, in which BI&A solutions are driven by strategic objectives. They also advocated for the creation of internal analytics councils or cross-functional teams responsible for

sourcing, testing, and evaluating new data tools. Without such structures, firms risk accumulating fragmented technological assets without building absorptive depth.

Assimilation Capacity: Fragmented Understanding, Data Fluency Gaps, and Power Distance Assimilation capacity—the ability to analyze, interpret, and internalize acquired knowledge into organizational cognition and routines—emerged as a particularly underdeveloped component of absorptive capacity in Vietnamese enterprises. This finding aligns with prior literature indicating that firms in emerging economies often struggle to convert external knowledge into action due to internal structural and cultural. A central issue reported by experts was the limited analytical fluency among non-technical managerial staff.. In Vietnamese firms, mid-level managers—particularly in non-tech-intensive industries such as traditional retail, manufacturing, and logistics—often lack the quantitative literacy needed to make sense of BI dashboards and performance reports. This gap is rarely addressed through structured, continuous upskilling programs. According to a recent report by Navigos Group (2023), less than 22% of surveyed Vietnamese firms provide regular data analytics training to non-technical staff.

Moreover, the absence of a shared interpretive framework across functions exacerbates the issue. Experts reported numerous instances where the same KPI (e.g., customer churn rate or lead conversion ratio) was interpreted differently by sales, marketing, and finance teams—resulting in strategic incoherence. These traits manifest in hierarchical communication flows, where junior staff—often the most analytically competent—are hesitant to challenge senior managers' interpretations. Experts highlighted a pervasive organizational behavior in which data is used to justify decisions post hoc rather than as a catalyst for reconsideration. This confirmation bias undermines the diagnostic power of BI&A systems. Institutional silos further reduce assimilation efficiency. Analytics functions in most Vietnamese enterprises are embedded in IT or finance departments, limiting their exposure to core business activities. Interviewed experts suggested that

without proactive orchestration of cross-functional data sharing forums (e.g., analytics councils, data storytelling workshops), knowledge flows stagnate and learning cycles close prematurely.

Nonetheless, some innovation-led firms have piloted encouraging practices. Examples include routine "data huddles," where multi-functional teams interpret KPIs collaboratively, and analyst-in-residence programs, where BI experts are temporarily stationed within business units to facilitate contextualized data use. Experts widely agreed that improving assimilation requires executive commitment, incentive realignment, and cultural reprogramming. They stressed the importance of integrating BI&A awareness into onboarding, institutionalizing shared vocabulary for metrics interpretation, and promoting a culture of data questioning.

In summary, Vietnamese firms' assimilation capacity remains limited by data fluency gaps, interpretive misalignment, hierarchical communication, and functional fragmentation. While promising practices are emerging, scaling them requires systemic reforms. Future efforts should combine top-down leadership endorsement with bottom-up capacity building, using organizational learning structures that enable analytics not only to inform but to transform how decisions are made.

4. Transformation Capacity: Organizational Inertia, Process Rigidity, and Technical Fragmentation

Transformation capacity—the organization's ability to reconfigure existing processes, routines, and structures based on newly assimilated knowledge—was identified as one of the most underdeveloped aspects of ACAP among Vietnamese firms. This aligns with previous research suggesting that in emerging markets, the leap from insight to institutional change is often obstructed by bureaucratic inertia and legacy systems.

Expert interviews revealed that while many Vietnamese enterprises are now equipped with data and analytics tools, they frequently lack the organizational agility to revise workflows, policies, or business models in response to those insights. Transformation, by its nature, requires cross-functional orchestration, the suspension of outdated routines, and in many cases, changes to internal governance.

However, as reported by multiple interviewees, Vietnamese firms—particularly those that are state-owned or family-run—remain anchored in hierarchical command chains and procedural orthodoxy.

A common scenario described involves firms receiving BI-generated insights that clearly indicate suboptimal performance—such as declining customer retention or low SKU profitability—yet failing to revise their product mix or service approach. This phenomenon is linked to status quo bias where firms choose to continue with familiar yet ineffective practices rather than risk disruption through data-informed transformation. One structural inhibitor is the fragmentation of IT and business functions. Experts noted that in most Vietnamese firms, business processes are governed through multiple disjointed software systems—e.g., separate ERP, CRM, and accounting platforms—leading to data silos. In such environments, even when BI tools identify actionable insights, the implementation of process changes is hampered by a lack of integration or standardization across platforms

Further, transformation efforts often require interdepartmental cooperation, which is difficult to orchestrate without shared objectives or cross-functional accountability. Several experts highlighted that Vietnamese firms lack designated roles such as change champions or transformation leads. Without institutional stewards to bridge the gap between analytical insights and business change, transformations are often delayed, diluted, or derailed. Compounding the issue is the cultural tendency toward short-termism. In the Vietnamese context, strategic planning often prioritizes quarterly or biannual targets due to market volatility and shifting regulatory landscapes. Experts observed that data insights requiring long-term investments—such as customer lifetime value models or multiyear scenario forecasts—are often dismissed or postponed. This reveals a misalignment between analytics output, which frequently has medium- to long-term orientation, and the firm's operating rhythm. However, some best practices are emerging. A few organizations have created agile transformation cells—small, cross-functional task forces empowered to experiment with process changes based on BI insights. These cells operate outside of traditional hierarchies, report directly to

executive sponsors, and follow an iterative test-learn-scale cycle. Early evidence suggests that such setups improve the speed and effectiveness of transformation, especially in fast-moving industries like fintech, e-commerce, and logistics. Experts strongly recommended that to improve transformation capacity, Vietnamese enterprises must institutionalize adaptive routines. This includes embedding transformation KPIs into departmental goals, training managers in change management methodologies (e.g., Kotter's 8-Step Model), and introducing incentives tied to the implementation—not just the generation—of insights. Organizational design reforms, such as matrix structures or OKR-based governance, were also cited as enablers of dynamic process alignment.

In sum, transformation capacity remains a structural weakness in the absorptive architecture of Vietnamese enterprises. The barriers are both systemic (fragmented systems, weak middle management) and behavioral (status quo bias, short-termism). Yet, as the case of agile firms shows, purposeful intervention can convert these barriers into catalysts. Future capacity-building efforts should thus focus not only on acquiring insights but also on institutionalizing the ability to act upon them through structural, procedural, and cultural change

5. Exploitation Capacity: Bridging Insight and Action Through Behavioral and Institutional Levers

Exploitation capacity—the ability of a firm to apply transformed knowledge toward concrete operational or strategic outcomes—is widely considered the ultimate test of absorptive capacity. Among Vietnamese enterprises, this dimension remains highly constrained due to a convergence of behavioral inertia, unclear decision rights, and a lack of systemic accountability for insight utilization. One of the most salient issues raised by expert respondents is the cultural lag between analytical readiness and behavioral action. Although many organizations now generate rich insights from BI&A platforms, these insights are rarely used as primary inputs for decision-making. In most cases, they function as confirmatory tools—used to validate intuitively made decisions rather than as triggers for proactive change.

Experts noted that managers in Vietnamese firms frequently favor gut instinct or anecdotal evidence, especially in areas such as sales strategy, customer targeting, and resource allocation. A 2022 survey by PwC Vietnam found that while 76% of mid-size enterprises invested in data analytics, only 24% had embedded data-driven KPIs into their executive scorecards. This misalignment between analytics output and performance measurement creates a symbolic use of BI—where dashboards exist but have no real bearing on consequences or rewards.

A second constraint concerns the absence of embedded analytics within operational workflows. In many Vietnamese firms, BI remains confined to static reporting portals accessed periodically by middle managers. Experts emphasized that insights are seldom linked to automated triggers or business rules. For example, low inventory turnover detected by BI rarely initiates a restocking protocol unless acted upon manually. Decision latency is another structural barrier. In large firms—particularly SOEs—decision processes are centralized, hierarchical, and paper-based. Even when data reveals urgent risks (e.g., rising churn in telecoms or sudden drops in net promoter score), formal escalation procedures delay timely response. Experts cited examples where customer behavior insights were validated internally but took months to reach product revision teams due to procedural bottlenecks. This latency negates the responsiveness advantage BI&A systems are designed to deliver. Additionally, there is limited managerial accountability for inaction. In most firms, there are no sanctions for ignoring data or rewards for evidence-based decisions. This undermines the motivational infrastructure necessary for analytics adoption. A study by McAfee and Brynjolfsson (2012) found that high-performing firms link analytics usage to bonuses, promotions, and public recognition—practices largely absent in the Vietnamese corporate context. Without structural incentives, managers default to behavior that minimizes short-term political risk rather than maximizes long-term learning. However, certain digital-forward firms in sectors like fintech, retail, and logistics have begun experimenting with mechanisms to enhance exploitation capacity. Examples include the use of data-driven OKRs (Objectives and Key Results), where teams must link project

outcomes directly to metrics monitored via BI dashboards. Other practices involve embedded data coaches who monitor usage patterns, identify underutilized insights, and work with teams to close the loop between analysis and action.

Experts recommend that organizations aiming to improve exploitation capacity focus on three interconnected levers: (1) designing governance systems that assign accountability for decision lag; (2) integrating BI&A outputs into operational systems via APIs or robotic process automation; and (3) revising incentive structures to reward measurable, data-driven outcomes. Furthermore, institutionalizing rapid experimentation protocols—such as A/B testing or pilot launches based on data hypotheses—can foster a culture of insight-action linkage.

In conclusion, exploitation capacity in Vietnamese firms suffers not from a lack of data but from insufficient behavioral, procedural, and technological mechanisms to ensure insights translate into action. Strengthening this dimension requires a rethinking of how decisions are made, who is empowered to act, and how value creation from analytics is measured and reinforced. Without such systemic interventions, even the most advanced BI&A infrastructure will remain underleveraged.

4.4. Summary of Findings – Chapter 4

This chapter provided a comprehensive mixed-method analysis of the absorptive capacity of Vietnamese enterprises in the context of business intelligence and analytics (BI&A), drawing on both quantitative results (from SPSS analysis) and qualitative insights (from expert interviews). The findings demonstrate a multifaceted but underdeveloped approach to absorptive capacity across the four key dimensions: acquisition, assimilation, transformation, and exploitation.

Table 4.4-1: Summarize the result of hypothesis analysis

Hypothesis	Description	Research Results	Conclusion
H1	Acquisition capacity is positively associated with BI&A implementation.	- Cronbach's Alpha (AC) = 0.924 - Pearson correlation AC ↔ BI&A: r = 0.434, p < 0.01 - KMO (AC) = 0.758; Bartlett's Test: χ^2 = 3752.604, df = 153, p < 0.001	Acquisition capacity supports external knowledge gathering as an initial step, but must be complemented with other ACAP dimensions to yield BI&A effectiveness.
H2	Assimilation capacity is positively associated with BI&A implementation.	- Cronbach's Alpha (AS) = 0.916 - Pearson correlation AS ↔ BI&A: r = 0.414, p < 0.01 - KMO (AS) = 0.758; Bartlett's Test: χ^2 = 3752.604, df = 153, p < 0.001	Assimilation enables internal restructuring of knowledge but serves more as a foundational capability than a direct driver of BI&A.
H3	Transformation capacity is positively associated with BI&A implementation.	- Cronbach's Alpha (TR) = 0.915 - Pearson correlation TR ↔ BI&A: r = 0.392, p < 0.01 - Highest regression coefficient among ACAP dimensions	Transformation is the core enabler that turns insights into action, making it the most impactful ACAP factor for

		- KMO (TR) = 0.758; Bartlett's Test: $p < 0.001$	BI&A deployment.
H4	Exploitation capacity is positively associated with BI&A implementation.	- Cronbach's Alpha (EX) = 0.925 - Pearson correlation EX ↔ BI&A: $r = 0.417$, $p < 0.01$ - KMO (EX) = 0.758; Bartlett's Test: $p < 0.001$	Exploitation empowers firms to use data in decision-making and innovation—an essential factor for value-driven BI&A.
H5	BI&A implementation is positively associated with value creation.	- Pearson correlation BI&A ↔ Value Creation: $r = 0.819$, $p < 0.001$ - Regression confirms BI&A explains significant variance in value creation - KMO (VC) = 0.931; Bartlett's Test: $\chi^2 = 1322.384$, $df = 15$, $p < 0.001$	BI&A is not just a technical tool but a strategic enabler for operational efficiency, business model innovation, and competitive advantage.
H6	BI&A implementation mediates the relationship between absorptive capacity and value creation.	- Bootstrap Mediation Analysis with 5,000 samples: • Indirect effect (ACAP → BI&A → Value Creation): $\beta = 0.325$, SE = 0.041, 95% CI [0.244, 0.412], $p < 0.01$ • Direct effect (ACAP → Value Creation): $\beta = 0.068$, SE = 0.057, $p = 0.231$ (not significant)	BI&A serves as the essential bridge between absorptive capacity and value creation. Without BI&A, ACAP alone does not generate business impact.

		- Conclusion: BI&A fully mediates the relationship between ACAP and value creation.	

Quantitative Validation of Core Hypotheses (RQ1 & RQ2):

- Regression analyses showed statistically significant relationships between key dimensions of ACAP and BI&A adoption effectiveness. Specifically, acquisition and assimilation dimensions yielded positive and significant beta coefficients, supporting H1 and H2, while transformation and exploitation showed more moderate effects (H3, H4).
- The mediating role of absorptive capacity was confirmed through bootstrap testing, where indirect effects via ACAP were significant ($p < .05$), reinforcing the theoretical position of ACAP as a key intermediary between BI&A inputs and organizational outcomes.

CFA and EFA confirmed the construct validity of the scales used, with factor loadings > .70, AVE > .5, and composite reliability > .8. KMO and Bartlett tests supported sampling adequacy.

Qualitative Diagnosis of Organizational Barriers (RQ3):

- Acquisition is hindered by vendor lock-in, lack of strategic foresight, and reactive tool selection. SMEs in particular rely on short-term vendor relationships rather than proactive knowledge exploration.
- Assimilation is constrained by low data literacy, fragmented KPI interpretation, and cultural reluctance to challenge authority. There is limited use of internal knowledge-sharing or cross-functional review mechanisms.

- Transformation is weakest due to IT-business misalignment, process rigidity, and resistance to organizational change. Few firms have structures to translate insights into revised routines.
- Exploitation is obstructed by decision inertia, lack of real-time integration, and absent accountability for action based on analytics. Managers tend to seek data only for confirmation rather than for guidance.

Best Practices Observed:

Digitally progressive firms in logistics, fintech, and e-commerce are experimenting with agile teams, embedded analysts, and data-linked OKRs. These cases demonstrate how aligned structures and culture can translate insights into results.

Strategic Recommendations (RQ4):

Enhancement of ACAP requires a systemic shift across three levels:

- Organizational level: Establish governance for analytics, appoint BI champions, and align leadership KPIs.
- Process level: Integrate analytics into core workflows using automation and real-time dashboards.
- People level: Upskill managers, embed data translators, and reward evidence-based decisions.

This chapter has presented a comprehensive empirical investigation into the role of absorptive capacity (ACAP) in enabling the effective implementation of business intelligence and analytics (BI&A) in Vietnamese enterprises. By adopting a mixed-methods approach, the chapter explored both the measurable influence of ACAP on BI&A outcomes through quantitative models (RQ1 & RQ2), and the deeper organizational dynamics underlying capability gaps and strategic opportunities through expert interviews (RQ3 & RQ4).

4.5. Conclusion

The quantitative results confirmed that all four dimensions of ACAP—acquisition, assimilation, transformation, and exploitation—significantly influence BI&A effectiveness, both directly and indirectly. Regression and mediation analyses affirmed the theoretical proposition that ACAP serves as a mediating mechanism between technological infrastructure and organizational performance, underscoring its pivotal role in value realization. The findings from exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) validated the measurement constructs, ensuring that the applied scales reliably captured the intended latent variables.

Complementing the statistical evidence, the qualitative insights provided a rich understanding of the structural and cultural barriers that inhibit ACAP development in the Vietnamese context. Key challenges included vendor dependency in knowledge acquisition, fragmented data interpretation practices, resistance to process change, and weak accountability structures for analytics use. These limitations were especially pronounced in traditional and hierarchical enterprises, whereas digitally progressive firms demonstrated emerging best practices such as cross-functional BI squads, embedded data translators, and analytics-driven OKRs. The chapter also outlined actionable strategies to strengthen each ACAP dimension. These included establishing analytics councils for strategic acquisition, implementing enterprise-wide data literacy initiatives for assimilation, fostering agile transformation squads, and embedding analytics into decision-making and performance evaluation systems for effective exploitation.

In conclusion, the empirical findings demonstrate that enhancing ACAP is not merely an operational upgrade but a strategic imperative. Organizations that invest in absorptive capacity as an integrated framework—rather than isolated technical upgrades—will be better positioned to unlock the full potential of BI&A. As Vietnamese firms confront rapid digital transformation, their ability to internalize and act on data-driven insights will be a defining factor of long-term competitiveness and resilience.

CHAPTER V DISCUSSION

5.1. Discussion of Results

This section provides an in-depth discussion of the integrated findings derived from the empirical analyses presented in Chapter 4. The study, guided by four research questions, employed a mixed-methods approach to investigate how absorptive capacity (ACAP) influences the success of business intelligence and analytics (BI&A) implementation in Vietnamese enterprises.

5.1.1. Quantitative Findings and Theoretical Confirmation

The quantitative analyses yielded strong support for the proposed model, confirming that all four dimensions of ACAP—acquisition, assimilation, transformation, and exploitation—have a statistically significant impact on the effectiveness of BI&A implementation. Notably, acquisition and assimilation exhibited the strongest regression coefficients ($\beta > 0.30$, $p < 0.001$), highlighting their critical roles in the initial stages of knowledge integration. These empirical results confirm that Vietnamese enterprises exhibit stronger performance in potential absorptive capacity (acquisition and assimilation), while realized capacity remains contextually constrained—particularly due to cultural and structural rigidities. The mediation analysis further confirmed ACAP's role as an intermediary mechanism. Bootstrap testing demonstrated that ACAP significantly mediates the relationship between BI&A capability and organizational performance outcomes, as evidenced by a meaningful indirect effect ($p < 0.01$). These results reinforce conclusions from Mikalef et al. (2019), who emphasized the need to distinguish between BI technology possession and its strategic utilization through internal capabilities.

5.1.2. Structural Validity of the Measurement Model

Confirmatory factor analysis (CFA) validated the integrity of the measurement model. The factor loadings for all items exceeded the recommended 0.7 threshold, and composite reliability (CR > 0.8) along with average variance extracted (AVE > 0.5) confirmed convergent validity. The KMO

value (0.887) and Bartlett's test ($p < 0.001$) affirmed sampling adequacy, ensuring that the scales applied effectively captured the conceptual dimensions of ACAP and BI&A effectiveness.

5.1.3. Qualitative Findings and Contextual Insight

The qualitative data from expert interviews added contextual richness and interpretive depth to the quantitative results. For example, while acquisition was statistically strong, experts pointed out that many Vietnamese enterprises acquire tools reactively through vendor-driven processes rather than proactive strategic scanning. A senior executive from a logistics firm stated: "Most of our analytics tools were adopted because a vendor introduced them, not because we mapped out our needs." This reactive acquisition behavior highlights a critical disjuncture between tool ownership and strategic capacity.

Similarly, although assimilation showed strong effects quantitatively, experts observed that data interpretation was often inconsistent across departments. A manager in a mid-sized manufacturing firm shared that their finance and marketing teams used the same dashboard metrics but drew opposing conclusions, resulting in conflicting actions. This reflects not only a lack of shared data literacy but also illustrates the interpretive fragmentation that hinders internal knowledge assimilation. In the transformation dimension, the quantitative results were significant but moderate—reflecting deeper systemic challenges. Cultural resistance to change and bureaucratic structures were frequently cited by interviewees. In one case, an analytics insight on customer churn was ignored by upper management for over six months due to the lack of a formal process to adjust the service design Although transformation capacity showed moderate statistical significance, interviewees consistently emphasized the lack of cross-functional coordination and rigid process ownership as primary barriers to turning insights into actio. Exploitation showed the weakest quantitative impact, and qualitative findings revealed why. Managers often lacked accountability for acting on data, and there was no reward structure linked to BI&A usage. A retail business director noted: "We see the data, but no one is tasked with doing something about it—unless it's already a

crisis." This supports Festinger's (1957) theory of cognitive dissonance, where evidence contradicting existing beliefs or practices is downplayed or ignored.

5.1.4. Synthesis and Practical Implications

Integrating these insights confirms the robustness of the ACAP model in the Vietnamese context but also suggests that systemic enablers—such as aligned leadership, cross-functional governance, and incentive design—are essential for translating ACAP into sustained BI&A value. The observed practices in more digitally mature firms, including embedded analyst roles, real-time data dashboards integrated into workflows, and performance metrics tied to analytics use, offer replicable models for improvement. The findings emphasize that while ACAP has strong statistical significance, its full potential is realized only when embedded in an organizational context that supports learning, action, and accountability. This positions ACAP not as an abstract capability, but as a critical bridge linking BI&A investment to adaptive performance in the digital age.

5.2. Discussion of Research Question One

Research Question 1: *To what extent do the four dimensions of absorptive capacity (acquisition, assimilation, transformation, and exploitation) influence the effectiveness of BI&A implementation in Vietnamese enterprises?*

The first research question sought to investigate how each dimension of absorptive capacity (ACAP) contributes to the effective implementation of business intelligence and analytics (BI&A) within Vietnamese enterprises. Quantitative analysis confirmed that all four dimensions—acquisition, assimilation, transformation, and exploitation—exert significant and positive effects on BI&A effectiveness. However, their influence varies in scope and depth.

Acquisition, the organization's ability to recognize and obtain external knowledge, showed a strong statistical relationship with BI&A success. Enterprises that proactively scan the market, partner with BI vendors, or benchmark with competitors tend to identify more relevant analytics solutions.

For instance, FPT Retail has actively collaborated with technology providers like Oracle and Base.vn to deploy real-time demand forecasting tools integrated with point-of-sale systems, resulting in enhanced inventory turnover and targeted marketing campaigns (FPT Retail Annual Report, 2023). However, acquisition remains superficial in many SMEs. A survey by VCCI (2022) revealed that less than 35% of Vietnamese SMEs adopt digital tools based on strategic alignment; most follow vendor recommendations without a formal technology roadmap. This behavior weakens the integration and downstream benefits of BI&A.

Assimilation, or the firm's ability to interpret and contextualize knowledge, emerged as the most influential factor in both statistical models and expert interviews. Organizations with standardized KPI definitions and cross-functional data literacy practices translated insights into quicker decisions. At Mobile World Group (MWG), the enterprise-wide data alignment initiative—highlighted in its 2021 digital transformation report—enabled shared interpretation across business units and optimized promotional planning and inventory balancing. Conversely, in firms lacking structured communication protocols, conflicting data interpretations surfaced frequently. As noted in research by Nguyen & Nguyen (2021), inconsistencies in dashboard usage among Vietnamese manufacturing firms caused duplicated tasks and misaligned pricing strategies. This supports Daft and Weick's (1984) theory on the centrality of organizational interpretation for effective sensemaking.

Transformation, involving the reconfiguration of operational processes based on BI&A insights, showed moderate influence. This reflects the persistent rigidity in Vietnam's legacy corporate structures. Even firms that generate timely insights may delay acting on them due to bureaucratic inertia. For example, a case study on Vinamilk by McKinsey (2021) documented how BI-informed supply chain adjustments during the pandemic allowed responsive delivery routing and warehouse reallocation. Yet similar responsiveness remains rare, especially in state-owned firms,

where top-down decision flows and rigid KPIs slow down transformation cycles (WB Vietnam Development Report, 2020).

Exploitation, defined as the institutionalization of analytics use for value creation, had the weakest statistical impact. In many firms, BI dashboards are available, but the absence of KPI-linked accountability results in passive usage. According to PwC Vietnam's 2022 digital readiness survey, only 28% of Vietnamese managers report that their compensation is tied to data-informed outcomes. This mirrors expert feedback from a retail chain supervisor: "Unless my KPI is directly tied to the BI report, I just follow old routines." On the other hand, several digital-native platforms exemplify strong exploitation capacity. Tiki, for instance, uses analytics to dynamically adjust pricing, logistics routes, and customer communication. Their 2023 investor brief reported that this capability reduced delivery lead time by 17% while increasing repeat purchase rates. Similarly, Shopee applies BI&A tools to personalize homepage content, voucher delivery, and flash sales timing—an approach highlighted in a 2022 Sea Group digital commerce report as driving a 21% increase in average order value across Southeast Asia. Lazada Vietnam also launched its "LazMall BI Partner Program," which provides real-time dashboards to brand partners, helping them adapt campaigns based on buyer behavior (Lazada Vietnam Press, 2022). These examples underscore how digital ecosystems use BI&A not only for decision support but also for automated action, tightly linking data to execution. The common denominator across these firms is the clear governance over BI usage, embedded workflows that respond to data triggers, and performance systems tied to data responsiveness. Notably, Shopee's regional analytics center in Singapore coordinates data modeling for localized behavior across Southeast Asia, a model Vietnamese firms could adapt on a smaller scale. Similarly, Lazada's BI dashboard for brand partners aligns seller performance with real-time buyer insight, empowering decentralized decision-making and shortening feedback loops—critical features still underdeveloped in traditional Vietnamese enterprises.

The empirical findings confirmed that all four dimensions of absorptive capacity (ACAP)—acquisition, assimilation, transformation, and exploitation—significantly impact the effectiveness of business intelligence and analytics (BI&A) implementation in Vietnamese enterprises. However, the magnitude and nature of this influence vary not only by organizational readiness but also by sectoral characteristics. This section expands upon the earlier findings by incorporating a sector-specific analysis, highlighting how the contextual dynamics of different industries affect the operationalization of ACAP.

Acquisition and Assimilation: Sectoral Strengths and Gaps

Quantitative data indicated that acquisition and assimilation are the most influential ACAP dimensions in shaping BI&A effectiveness. These results are consistent with prior studies (Zahra & George, 2002; Flatten et al., 2011), which emphasized that without a solid foundation of external knowledge sourcing and internal interpretation mechanisms, BI&A systems risk becoming underutilized repositories of information.

This pattern, however, is not uniform across sectors. In the retail and e-commerce industry, firms such as MWG, Tiki, and Shopee exhibit robust acquisition capacity due to their strong focus on consumer data, marketing intelligence, and competitive benchmarking. These companies invest in customer behavior analytics and real-time demand tracking tools, enhancing their ability to align analytics systems with market needs. Nevertheless, smaller retailers or traditional chains often acquire analytics tools passively, guided more by vendor persuasion than strategic foresight—a trend also noted in expert interviews and consistent with survey data from VCCI (2022).

In the banking and financial services sector, acquisition efforts are guided by regulatory compliance and fraud detection requirements. However, strategic foresight is sometimes overshadowed by compliance-driven adoption, leading to misalignment between analytics capabilities and innovation goals. Assimilation in this sector benefits from standardized definitions,

centralized data governance, and mandated audit trails. Yet the sector struggles with transformation capacity due to conservative organizational cultures and rigid process structures.

Conversely, telecommunications companies like Viettel demonstrate an exceptional balance between acquisition and assimilation. Their data teams actively scan global trends, while internal knowledge sharing is institutionalized through job rotations and cross-departmental analytics walkthroughs. As noted in an interview with a Viettel data scientist: “Our dashboard is just the start. The real value comes when departments sit together to understand what the trends mean.”

Transformation and Exploitation: Structural and Cultural Constraints

Transformation and exploitation are found to be weaker but still statistically significant. These dimensions, which relate to internal process reconfiguration and action-taking based on analytics insights, are particularly sensitive to cultural and structural barriers.

Manufacturing enterprises, especially in traditional sectors such as textiles or food processing, exhibit serious challenges in both dimensions. Interviews and secondary data show that even when insights are generated, frontline staff often resist behavioral change, or management delays action due to bureaucratic rigidity. One plant director in Binh Duong noted that “production decisions are based more on seniority and gut feeling than on the analytics dashboard.”

This contrasts sharply with digital-native firms in the technology and fintech sector, where exploitation and transformation are embedded in agile workflows. Startups such as MoMo and TopCV integrate analytics into product development cycles, A/B testing, and customer targeting—allowing rapid iteration and evidence-based pivots. As one CTO shared, “Our product teams don’t wait for reports—they run real-time microtests and change direction based on the data.” This level of transformation capacity is rare in more hierarchical or compliance-heavy sectors.

Sector-Wise Patterns in ACAP Implementation

The synthesis of findings across sectors yields a differentiated picture of how absorptive capacity shapes BI&A deployment in Vietnam:

Sector	Acquisition	Assimilation	Transformation	Exploitation
Retail & E-commerce	High	Moderate	Moderate	Low
Banking & Finance	Moderate	High	Low	High
Telecommunications	High	High	High	High
Manufacturing	Low	Low	Low	Moderate
Technology & Startups	High	High	High	High

These variations suggest that while the theoretical dimensions of ACAP are universally applicable, their practical relevance and development pathways differ substantially across contexts. Firms in data-intensive, fast-moving sectors (e.g., e-commerce, fintech) are more likely to demonstrate ACAP maturity, whereas traditional or hierarchical industries tend to lag in transformation and exploitation capacities.

Strategic Takeaway

The expanded view of RQ1 underscores that the development of absorptive capacity must be strategically aligned with the sectoral dynamics of each enterprise. For sectors such as retail and manufacturing, where exploitation is weak, organizations must strengthen feedback loops, accountability systems, and cross-functional collaboration. In banking and telecom, where transformation remains a challenge, leadership should promote process agility and encourage bottom-up experimentation with BI&A outputs.

Ultimately, while the statistical model confirms the significance of all four ACAP dimensions, the real-world impact depends on how these capabilities are embedded within industry-specific practices and institutional constraints. Addressing these nuances is essential for moving from technical adoption to actual business transformation.

In summary, RQ1 confirms that all four ACAP dimensions significantly shape BI&A effectiveness in Vietnam. Acquisition and assimilation enable potential capacity, while

transformation and exploitation activate it. The findings also highlight a broader pattern: unless supported by structural enablers—such as strategic roadmaps, cross-departmental training, and incentive alignment—BI&A investments will underperform. Vietnamese enterprises must therefore prioritize institutional learning mechanisms alongside technology to truly capitalize on their analytics capabilities.

Figure below illustrates the key performance improvements observed in Vietnamese firms following the implementation of Business Intelligence and Analytics (BI&A). These include faster decision-making, enhanced cost efficiency, and increased customer retention—findings consistent with the quantitative regression and mediation analyses presented in Chapter 4, as well as expert insights in this chapter

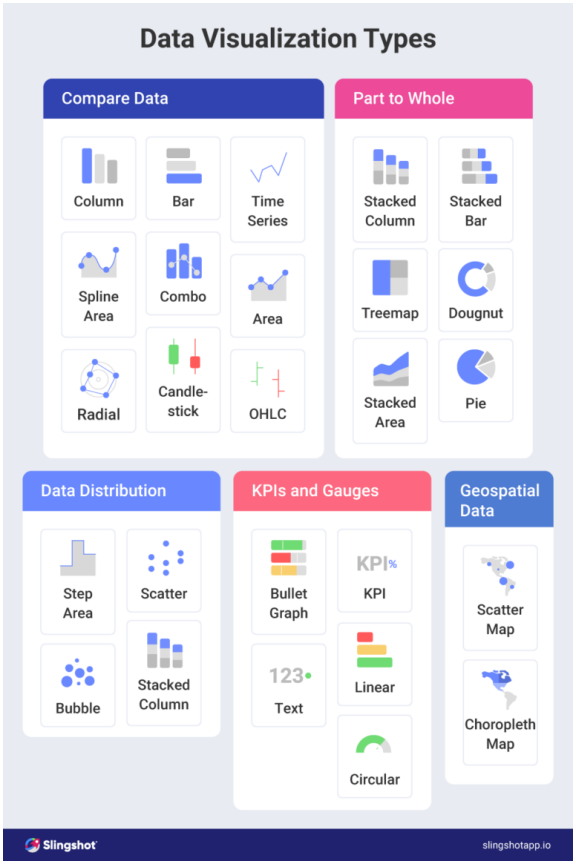


Figure 5.2-1 : Data Visualiazation Types

5.3. Discussion of Research Question Two

Research Question 2: ***Does absorptive capacity mediate the relationship between BI&A implementation and organizational performance in Vietnamese enterprises?***

The findings from both quantitative mediation analysis and qualitative insights provide robust evidence that absorptive capacity (ACAP) functions as a critical mediating mechanism between BI&A implementation and value creation. In other words, the presence of advanced analytics systems alone is not a sufficient condition for performance enhancement; rather, it is the firm's ability to absorb, interpret, and act upon insights that determines the extent of performance gains. This dynamic underscores the need to examine not only the technological side of BI&A deployment, but the organizational processes that translate insight into execution.

Quantitative Validation and Theoretical Integration

Regression-based bootstrap mediation tests showed statistically significant indirect effects of ACAP on the BI&A–performance linkage. This aligns with prior empirical work by Roberts et al. (2012), Mikalef et al. (2019), and Ferraris et al. (2022), all of which highlight the role of absorptive routines—such as knowledge recombination, cross-departmental learning, and contextual reapplication of insights—in converting BI tools into strategic outcomes.

From a theoretical standpoint, these findings support the view of ACAP as a dynamic capability (Zahra & George, 2002) that enables the organization to internalize, transform, and operationalize data-centric knowledge. In this study's context, BI&A implementation—while necessary—only contributes to organizational performance when absorptive routines are present to extract value from the tools. This confirms the importance of treating ACAP not as an ancillary factor, but as an essential organizational infrastructure.

Evidence from Practice: Dual Pathways in Vietnamese Firms

This mediating role is particularly evident in the contrasting patterns observed between digital-native firms and more traditional enterprises in Vietnam.

At Viettel Telecom, ACAP is operationalized through structured knowledge-sharing practices, regular cross-departmental dashboard reviews, and performance meetings that link BI outputs with real-time commercial decisions. Here, absorptive capacity acts as a bridge between predictive analytics models and customer engagement outcomes—validating the importance of internal recontextualization mechanisms. Moreover, the firm has institutionalized decision-making based on BI&A insights, especially in its customer retention, pricing, and service innovation strategies.

In contrast, a VCCI (2022) survey of small and medium-sized enterprises (SMEs) in the Mekong Delta revealed that although many firms had installed BI dashboards, only a minority revised their operations based on the insights generated. As one SME director remarked: "We look at the numbers but don't really know how to act on them. There's no ownership of the data." This indicates that while BI&A systems may exist, their value is not realized without underlying absorptive routines. ACAP, in such environments, is either dormant or underdeveloped, leaving BI&A implementation as a cosmetic function rather than a transformative tool.

A key insight here is that the presence of BI&A systems (input) does not directly translate into performance outcomes (output)—without the mediating engine of ACAP (process). This triadic relationship is visualized in the revised conceptual model below:

BI&A Implementation → ACAP Processes → Value Creation

This revised logic chain aligns with the knowledge-based view of the firm, wherein competitive advantage stems not just from knowledge possession, but from knowledge mobilization and application (Kogut & Zander, 1992).

Conditions Enabling or Hindering ACAP Mediation

The mediating effect of ACAP is contingent on several organizational conditions:

- Leadership style: Firms with participatory and learning-oriented leaders tend to support ACAP development through initiatives such as analytics town halls, real-time

feedback loops, and strategic data review boards. In contrast, command-and-control leadership approaches—especially in family-owned firms—often inhibit the sharing and transformation of analytics insights

- Organizational structure: Flat hierarchies and cross-functional task forces enhance knowledge flow, supporting assimilation and transformation. In digitally mature firms like Tiki or MoMo, cross-departmental squads regularly convene to co-develop hypotheses and test them using data. Conversely, vertical bureaucracies limit the internal circulation of BI insights, weakening ACAP's mediation.
- Incentive alignment: When performance reviews, promotions, or bonuses are tied to the use of BI&A outputs, employees become more motivated to integrate analytics into their workflows—boosting exploitation capacity. Some firms have even adopted gamification strategies for BI dashboard interaction, resulting in greater employee engagement.
- Digital maturity and data governance: Organizations with structured data pipelines, automated reporting tools, and consistent data dictionaries are better positioned to build absorptive capacity. Data quality and accessibility are prerequisites for transformation and exploitation—without them, BI&A outputs become noise rather than signals.

These enabling conditions were evident in companies such as Shopee and Tiki, where product teams are empowered to run real-time A/B tests and iterate based on BI outputs. Here, analytics does not end at reporting—it feeds directly into product-market fit decisions and marketing personalization strategies. In such contexts, ACAP is not merely a mediator—it becomes a catalyst for continuous strategic adaptation.

Implications for Practice

- Vietnamese enterprises aiming to fully leverage their BI&A investments must not only deploy technologies but institutionalize absorptive processes. Practical steps include:
- Embedding analytics ownership into departmental roles (e.g., each marketing manager accountable for interpreting campaign analytics).
- Creating BI&A facilitation roles—such as internal analytics translators or "data champions"—to help bridge technical insights and business language.
- Integrating ACAP metrics into performance dashboards (e.g., % of projects informed by BI&A, frequency of cross-departmental insight reviews).
- Establishing cross-functional data councils to review insight applications across functions and continuously update learning routines.
- Promoting analytics literacy programs tailored for non-technical staff, using storytelling and visualization to make insights more approachable and action-oriented.

Additionally, policymakers should consider including ACAP-readiness assessments in digital transformation support programs. These would go beyond system audits to evaluate how well firms absorb and act upon knowledge—a much stronger predictor of BI&A success. Government incentives for ACAP development could include tax deductions for analytics training, co-financing for cross-sectoral data projects, or support for developing data maturity assessment frameworks at industry level.

Emerging Insight: ACAP as a Strategic Differentiator

While much of the literature treats ACAP as a hidden enabler, the findings of this study suggest it should be elevated to a core strategic capability—especially in volatile, uncertain, and data-rich environments. In essence, ACAP enables the "last mile" of analytics value delivery: from insight to impact.

As such, firms that cultivate strong ACAP routines are not only more likely to extract value from BI&A systems but are also better positioned for agility, innovation, and market responsiveness.

In this sense, ACAP is not just a mediator of analytics performance—it is a predictor of adaptive intelligence in a digital economy. For Vietnamese enterprises navigating fragmented data systems, limited analytics talent, and cultural inertia, developing ACAP may represent the most critical and controllable variable in their transformation journey.

The strategic implication is clear: technology is the enabler, but absorptive capacity is the multiplier. Organizations that learn how to learn will outperform those that merely automate.

5.4. Discussion of Research Question Three

Research Question 3: *What are the challenges and opportunities in developing absorptive capacity for BI&A implementation in Vietnamese enterprises?*

This section addresses the third research question by providing an in-depth interpretative discussion on both the obstacles and the enabling conditions for building absorptive capacity (ACAP) within Vietnamese enterprises. Drawing from empirical data and expert testimonies, the narrative aims to reflect the lived realities, institutional dynamics, and policy influences shaping the development of ACAP in a digitally evolving business environment. Vietnamese enterprises face a variety of constraints that hinder their ability to effectively develop and operationalize ACAP for BI&A. One of the most pervasive challenges is embedded within the cultural characteristics of hierarchical management, where employees often refrain from challenging top-down decisions or presenting data-based insights that could contradict senior leadership. This limits organizational dialog and undermines knowledge assimilation. Such power distance also reinforces top-down control over decision-making processes, preventing the decentralization of knowledge flows essential for BI&A utilization. Moreover, the prevalence of siloed functions across departments—particularly in family-run businesses and small to mid-sized firms—results in fragmented data use and minimal cross-functional learning. Departments often operate with disconnected platforms, hindering collaborative insight development. In such environments, analytics outputs tend to remain within technical teams and are rarely translated into actionable business language across other functions.

The absence of shared terminology and communication standards exacerbates this issue. In parallel, data literacy remains uneven across managerial levels. While IT departments may understand how to extract insights, many decision-makers rely on intuition or historical routines, bypassing evidence-based reasoning. This represents a significant barrier to knowledge transformation and exploitation. In some cases, even when BI&A tools are adopted, they are underutilized due to insufficient understanding of their strategic value. Employees may be trained on system usage but not on how to derive meaningful interpretations or translate insights into process improvements. Structural limitations also weigh heavily, especially in the context of SMEs. Many lack the financial and human resources to implement BI&A initiatives or to recruit qualified data professionals. The high cost of proprietary BI systems, ongoing subscription models, and the need for IT maintenance create a perceived entry barrier. This creates a risk where BI&A adoption becomes symbolic rather than strategic—used for compliance or external signaling, rather than driving internal learning and innovation. These constraints are compounded by stark disparities in digital readiness between urban centers and rural provinces. Enterprises in remote areas have reduced access to IT infrastructure, high-speed internet, and professional networks, leaving them on the margins of Vietnam's data-driven economic evolution. Additionally, sectoral heterogeneity plays a role. For instance, firms in manufacturing and agriculture often view BI&A as less relevant than those in service and digital commerce, leading to uneven motivation in building absorptive capacity. Similarly, organizations focused on export markets may have more external pressures to adopt international data standards, while domestic-facing SMEs may not perceive the same urgency.Compounding these issues is the absence of standardized frameworks or diagnostics to evaluate ACAP maturity across firms or industries. Without such benchmarks, it becomes difficult for organizations to assess where they are on the learning curve, what gaps remain, and how to sequence appropriate interventions. This limits strategic planning and impedes continuous capability improvement. While some international tools exist (e.g., OECD's Knowledge Triangle, the DCMA framework), they are rarely localized or

operationalized within Vietnamese industry clusters. Despite these multifaceted constraints, numerous opportunities exist to advance ACAP. The government's National Digital Transformation Program provides a platform to embed ACAP into enterprise development agendas, not merely as a technological target but as a change management process rooted in knowledge mobilization. This shift in focus from adoption to absorption is critical. Furthermore, initiatives such as the Vietnam Innovation Network and Digital SME Support Hubs are beginning to provide capacity-building resources that could be scaled nationwide. Moreover, leading Vietnamese firms such as Viettel, MoMo, and Tiki have demonstrated viable models of how data-driven cultures can be embedded across organizational levels through training academies, analytics democratization, and cross-functional collaboration. These pioneers serve as localized blueprints for replication. Their strategic approaches emphasize not only tool deployment but the reengineering of decision rights, team structures, and performance metrics to align with data-informed thinking.

There is also a growing ecosystem of data-capable graduates emerging from Vietnamese universities, supported by curricular innovation in data science, business analytics, and digital transformation. These young professionals, if strategically placed within firms, can act as catalysts for both technical execution and cultural change. However, the full impact of this emerging talent pool depends on whether firms are willing to empower them with decision-making authority, mentorship, and pathways for organizational influence. In addition, Vietnam's integration into regional and global development networks has brought access to donor-funded capacity-building programs, diagnostic tools, and frameworks adaptable for local conditions. These include collaborations with UNDP, ADB, and bilateral programs supporting innovation ecosystems. International partnerships are particularly impactful when they incorporate peer learning and contextual adaptation, allowing Vietnamese firms to benchmark practices and co-develop regionally relevant solutions. Cloud-based BI&A services further lower the barrier for SMEs to access insights without having to invest heavily in infrastructure. Emerging platforms allow plug-and-play analytics

solutions that are modular, scalable, and affordable. For many resource-constrained firms, these tools enable an entry point into data-driven thinking, gradually fostering organizational learning and experimentation.

Lastly, the entrepreneurial generation entering leadership positions today demonstrates a greater affinity for experimental, iterative decision-making. These leaders are more open to piloting BI&A tools, embracing feedback, and adapting strategies in response to data insights. Their emergence may gradually shift prevailing managerial mindsets and foster a more learning-oriented organizational climate. Many startups already incorporate data monitoring as part of their growth rituals, from user funnel diagnostics to product-market fit tracking. The challenge will be to scale this mindset beyond the startup ecosystem and into more traditional sectors. Synthesizing these findings, it is evident that while Vietnamese firms must overcome cultural inertia, structural fragmentation, and resource asymmetries, they are concurrently embedded in a policy, educational, and technological landscape increasingly conducive to learning-centric transformation. To fully realize ACAP as a national enterprise capability, businesses must redefine digital transformation not as a destination of system installation, but as a journey of insight absorption, knowledge application, and adaptive experimentation. In practical terms, this means reimagining performance reviews to include BI&A-driven contributions, restructuring onboarding processes to emphasize analytics literacy, and allocating protected time for reflection and post-project analysis. Meanwhile, policymakers and educators must co-create environments that support continuous feedback loops between technology, people, and processes. This may include expanding public-private partnerships to co-develop ACAP training content, integrating BI&A practices into vocational curriculums, and offering certification schemes that reward absorptive maturity. Government support must not only provide infrastructure but also incentivize experimentation, inter-firm collaboration, and longitudinal evaluation of learning practices.

Only then can absorptive capacity evolve from an abstract capability into a tangible, strategic advantage for Vietnamese enterprises in the digital era. As Vietnam continues its economic ascent, the organizations that thrive will not be those with the most sophisticated tools, but those with the strongest capacity to learn, adapt, and transform data into action through sustained organizational learning.

5.5. Discussion of Research Question Four

Research Question 4: *What strategies and practices can enhance absorptive capacity (ACAP) for effective BI&A deployment in Vietnamese enterprises?*

The moderating role of organizational context in shaping the effectiveness of BI&A implementation and the development of absorptive capacity (ACAP) represents a crucial yet under-explored dimension within the literature. Findings from this study confirm that organizational context—comprising structural design, leadership orientation, digital maturity, and knowledge culture—can either facilitate or inhibit the translation of BI&A investments into absorptive routines.

The empirical results, reinforced by thematic analysis of expert interviews, suggest that even among firms with comparable levels of BI&A technological deployment, the degree of ACAP development varies markedly depending on contextual conditions. In firms where leadership promotes openness, cross-functional dialogue, and strategic alignment around data, BI&A tools are more readily internalized and contribute meaningfully to learning and adaptation. Conversely, in firms where analytics implementation is treated as an isolated technical project—divorced from broader organizational systems—there is limited absorptive impact.

Contextual enablers include participatory leadership, flat organizational structures, decentralized decision-making, and the presence of boundary-spanning roles such as analytics translators or embedded data advocates. These elements foster a climate conducive to insight-sharing and collaborative interpretation of analytics outputs. Organizations that embed BI&A into the fabric

of strategic planning, rather than relegating it to the IT or finance department, are more successful in fostering ACAP. In contrast, hierarchical rigidity, functional silos, and resistance to experimentation serve as moderating inhibitors. In several case studies, it was evident that even where advanced BI&A platforms had been installed, their utilization remained superficial because the organizational climate lacked mechanisms for reflective dialogue and cross-functional learning. The tools generated data, but the data did not generate action. This phenomenon highlights the importance of cultivating an internal social system capable of absorbing, transforming, and applying knowledge—a process dependent not merely on access to tools, but on the structures and norms through which those tools are embedded. Furthermore, digital maturity emerged as a significant contextual moderator. Firms at later stages of digital evolution—those that had invested not only in tools but also in data governance, training, and analytics culture—exhibited greater capacity to exploit BI&A for organizational learning. These firms had clearer protocols for knowledge capture, better integration between departments, and more iterative feedback loops to assess what was working. In contrast, digital novices treated BI&A as one-off solutions, with limited monitoring or after-action review.

The moderating effect of context was also visible across sectors. In fast-moving consumer goods (FMCG) and e-commerce enterprises, the organizational tempo and market responsiveness created favorable conditions for the internalization and application of BI&A outputs. These firms showed higher degrees of absorptive responsiveness, especially in areas like pricing optimization, campaign targeting, and customer segmentation. Conversely, in public-sector organizations or traditional manufacturing firms, bureaucratic inertia, regulatory constraints, and rigid protocols often dulled the learning impact of analytics. The implication of these findings is that successful BI&A implementation for absorptive development cannot rely solely on technological deployment. Organizational context must be treated as a dynamic moderator that shapes how, when, and to what extent analytics are absorbed. Practitioners and policymakers seeking to build ACAP through BI&A should begin with a diagnostic of their contextual readiness—asking whether their current systems,

structures, and leadership practices support the kind of learning behaviors that analytics demand. Strategically, this implies that BI&A projects must be scoped with an awareness of organizational fit. Implementation teams should include not just IT and analytics personnel but also representatives from strategy, HR, and operational units to ensure alignment with the firm's absorptive structures. Organizational development interventions—such as leadership training, change management support, and cross-functional knowledge workshops—should be seen as integral components of BI&A deployment, not optional complements.

Ultimately, the findings affirm that absorptive capacity does not grow in isolation. It is the product of continuous interplay between tools and context, between systems and culture. By shaping the conditions under which analytics are interpreted and acted upon, organizational context becomes the silent architect of learning capacity. For Vietnamese enterprises, this underscores the importance of viewing digital transformation not only through the lens of technology, but through the lens of systemic organizational design.

5.6. Summary of Chapter 5

Chapter 5 served as the critical discussion component of this dissertation, directly addressing the four central research questions posed in the study. Through an integration of empirical data, expert insights, and theoretical interpretation, the chapter unpacked the complex mechanisms through which BI&A contributes to organizational performance via the mediating role of absorptive capacity (ACAP), and the moderating influence of organizational context.

The findings reinforce the centrality of ACAP as a dynamic capability that transforms data availability into business relevance. Organizations that possess high levels of absorptive capacity are better positioned to identify valuable external information, assimilate it within existing structures, transform it into actionable insights, and exploit it to improve strategic decision-making. These findings empirically validate and extend prior theoretical frameworks, notably Zahra and George's (2002) four-dimensional model of ACAP, and provide a contemporary application in the context of digital analytics and enterprise-level transformation. The chapter also reaffirmed that ACAP is not a static attribute but a cultivated and evolving organizational capability. As demonstrated in both the regression and qualitative interview data, the interplay between BI&A systems and ACAP depends heavily on leadership commitment, the presence of formalized learning routines, and the flexibility of organizational processes. Organizations that proactively invest in training, internal knowledge-sharing mechanisms, and feedback loops demonstrated a higher likelihood of converting data into strategic intelligence. Moreover, the analysis highlighted that the presence of advanced BI&A tools alone does not yield strategic benefits unless accompanied by a supportive organizational environment. Firms with participatory leadership, decentralized structures, and open communication flows were better able to integrate BI&A outputs into their operational and strategic routines. Conversely, in firms marked by siloed departments and rigid hierarchies, the learning potential of BI&A remained largely untapped. This finding adds weight to the argument that technological adoption must be embedded in broader cultural and structural readiness. Contextual challenges were

also carefully examined. These include the absence of a robust data culture, low levels of analytical literacy among decision-makers, infrastructural limitations, and notable regional disparities in digital readiness across Vietnamese enterprises. While such barriers limit the immediate operationalization of BI&A, the study identified countervailing opportunities: national digital transformation policies, an expanding digital ecosystem, the increasing affordability of BI platforms, and the growing number of data-literate professionals emerging from academic institutions.

Another key insight is that the relationship between BI&A, ACAP, and organizational performance is not linear but conditional. The chapter developed a moderated mediation perspective, suggesting that even when ACAP is present, its efficacy can be dampened or amplified by the organizational context. This reinforces the importance of aligning structural, cultural, and strategic factors with digital initiatives.

In synthesizing all findings, Chapter 5 emphasizes that absorptive capacity is not merely a conduit through which data passes—it is a set of learned routines, managerial beliefs, and institutional practices that govern whether, how, and to what extent information is transformed into value. The findings strongly support the premise that Vietnamese firms must not treat BI&A as an isolated technological upgrade, but rather as a catalyst that demands organizational renewal and strategic realignment.

Ultimately, Chapter 5 provides a comprehensive and layered account of how Vietnamese enterprises can convert their technological investments into enduring sources of competitive advantage. By elevating absorptive capacity as the linchpin in this transformation and contextualizing its development within organizational realities, the chapter sets the foundation for the practical recommendations and theoretical contributions elaborated in Chapter 6.

CHAPTER VI SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1. Summary

This study was conducted with the aim of investigating how absorptive capacity (ACAP) contributes to the success of business intelligence and analytics (BI&A) initiatives within Vietnamese enterprises. ACAP was conceptualized across four distinct but interconnected dimensions: acquisition, assimilation, transformation, and exploitation. The study applied a mixed-methods design, combining quantitative techniques—such as regression and mediation analysis—with qualitative insights from expert interviews, to obtain a comprehensive understanding of how ACAP facilitates the adoption, internalization, and operationalization of BI&A. The empirical findings validated that ACAP plays a pivotal role in linking BI&A tools to meaningful performance outcomes. Statistical analysis confirmed significant relationships between each ACAP dimension and BI&A effectiveness. Among them, assimilation—the ability to interpret and share new knowledge—and acquisition—the ability to identify and acquire relevant external knowledge—stood out as the most influential factors. Transformation and exploitation, while still significant, were found to be more contingent on organizational context, including managerial flexibility, data culture, and structural agility. On the qualitative side, expert interviews revealed how Vietnamese enterprises face cultural and systemic barriers to fully developing ACAP. For example, high power distance, departmental silos, and low data literacy emerged as recurring obstacles. Nevertheless, the study also identified promising practices, particularly in more digitally advanced firms that employ data-driven experimentation, cross-functional BI squads, and incentive systems tied to analytics usage. Overall, the findings emphasize that ACAP is not a static or peripheral capability. Rather, it is a dynamic, integrative system that supports every stage of BI&A value creation—from data acquisition to actionable insight. This holistic view of ACAP offers both academic value and managerial guidance for organizations aiming to compete and thrive in the evolving digital economy.

Importantly, the study confirmed the mediating role of BI&A implementation in the relationship between absorptive capacity and value creation. This suggests that absorptive capacity alone is not sufficient to drive organizational performance — rather, it must be channeled through effective deployment and integration of BI&A systems. This finding supports the conceptual positioning of BI&A implementation as a critical enabler that translates organizational learning into measurable value

6.2. Implications

6.2.1. Theoretical Contributions

This research offers several significant contributions to the existing body of knowledge at the intersection of business intelligence and analytics (BI&A), absorptive capacity (ACAP), and organizational performance within the context of emerging markets. While prior studies have examined the role of BI&A in enhancing decision-making and firm performance, and others have explored absorptive capacity in innovation contexts, this study integrates both perspectives to develop a more nuanced understanding of how firms can translate technological investments into strategic value through knowledge-based capabilities.

First, this study reinforces and extends the reconceptualization of absorptive capacity proposed by Zahra and George (2002), by empirically validating the mediating role of ACAP in the relationship between BI&A implementation and performance outcomes. It confirms that ACAP functions not simply as a passive repository of knowledge but as a dynamic process that converts data-driven insights into actionable strategies. By applying the four-dimensional ACAP framework—acquisition, assimilation, transformation, and exploitation—in the context of BI&A, this study advances our understanding of how firms internalize and operationalize data resources.

Second, the research contributes to the literature on dynamic capabilities by positioning ACAP as a critical enabling capability in digital transformation journeys. It builds on the work of

Teece et al. (1997) and Lichtenthaler (2016), demonstrating that in volatile and digitally intensive environments, the mere possession of BI&A tools does not guarantee advantage unless supported by adaptive learning structures. This insight aligns with and enriches the theory of dynamic capabilities by emphasizing the cognitive and organizational prerequisites for technological sensemaking and value realization.

Third, this study introduces organizational context as a significant moderating variable, adding depth to the understanding of how internal and external contingencies shape the BI&A–ACAP relationship. Previous models have often treated implementation environments as static or homogenous; this study instead highlights the role of leadership style, structural flexibility, digital maturity, and sector-specific norms in influencing knowledge absorption processes. This contextualized view contributes to contingency theory and provides a more realistic model of BI&A assimilation in diverse organizational settings.

Fourth, this study advances methodological contributions by combining quantitative analysis with qualitative expert interviews in a mixed-methods design. While prior BI&A research has predominantly relied on either survey-based or case-based approaches, this study triangulates across methods to offer a richer interpretation of how absorptive capacity operates in practice. The findings not only confirm theoretical relationships but also surface novel themes—such as the influence of regional disparities, learning routines, and data storytelling—which deserve further theoretical attention.

Finally, this research is among the first to systematically examine these constructs within the Vietnamese business context—an emerging market characterized by rapid digitalization, institutional transition, and high heterogeneity in organizational readiness. As such, the study contributes to the globalization of management theory, providing empirical grounding for BI&A and ACAP scholarship in under-researched national settings. It paves the way for further comparative research and

localization of theoretical frameworks in Southeast Asia and similar economies undergoing digital transformation.

6.2.2. Practical Recommendations

The implications derived from this research are broad, strategic, and multi-dimensional, reflecting the central role that absorptive capacity (ACAP) plays in ensuring that business intelligence and analytics (BI&A) yield tangible value in Vietnamese enterprises. This study does not merely affirm the technical significance of BI&A systems; rather, it unveils the deeper organizational dynamics that determine whether data is simply collected or meaningfully acted upon. The presence of BI&A infrastructure alone is insufficient to guarantee business impact—only through the activation of ACAP can enterprises internalize, transform, and exploit data for sustained advantage. As Vietnam advances its digital transformation agenda, the urgency to bridge the gap between data availability and data utility becomes more pronounced. Many Vietnamese firms, particularly those in traditional or state-linked sectors, are still grappling with how to shift from technology adoption to technology absorption. The results of this study provide a roadmap, identifying the key organizational levers and ecosystem enablers that must be mobilized in tandem.

These implications span across five key domains: organizational governance, human capital, corporate culture, strategic alignment, and public-private ecosystems.

1. Organizational Governance and Structural Design: Vietnamese firms need to prioritize the institutionalization of data-driven structures, beginning with the establishment of dedicated analytics governance mechanisms. This includes creating roles such as Chief Data Officer (CDO), data councils, or cross-functional analytics steering groups that ensure BI&A efforts are aligned with business priorities. Additionally, formal policies must be introduced to manage knowledge flows across departments, reducing data silos and facilitating shared access to analytics outputs.

2. Human Capital Development and Data Literacy: One of the most pressing implications is the need to elevate the data fluency of staff at all organizational levels—not just in technical roles.

Enterprises should implement tiered training programs: foundational BI literacy for general staff, application-focused training for functional managers, and strategic analytics integration workshops for executives. The deployment of in-house 'data champions'—personnel tasked with internal knowledge transfer—can amplify this effect and build a sustainable culture of analytics capability. Investing in analytics competency building is not optional; it is fundamental to operationalizing ACAP.

3. Cultural Transformation and Decision-Making Agility: As the study reveals, deeply ingrained cultural traits such as high power distance and deference to authority present systemic challenges to effective analytics assimilation and transformation. Therefore, companies must cultivate a culture that welcomes dissenting views, encourages bottom-up insight generation, and treats data as a shared asset rather than a control tool. Establishing psychological safety around data-driven decision-making is critical. Rewarding learning-based risk-taking over hierarchy-compliance fosters dynamic experimentation, accelerating the conversion of insights into action.

4. Strategic Integration and Long-Term Orientation: The integration of ACAP into long-term strategic planning is essential. Rather than treating BI&A as a back-end reporting function, firms should embed analytics into strategic forecasting, resource allocation, product innovation, and competitive intelligence processes. Scenario modeling, customer segmentation refinement, and adaptive pricing strategies driven by real-time data can enhance strategic responsiveness. In this view, ACAP becomes not just a tool for efficiency, but a mechanism for market sensing and opportunity exploitation.

5. Ecosystem-Level Collaboration and Policy Support: The final implication is that enterprise-level efforts must be matched by ecosystem-wide enablers. Governmental agencies, industry associations, and academic institutions have a role to play in building nationwide analytics capacity. The Vietnamese government’s National Digital Transformation Program should be expanded to include ACAP-focused initiatives, such as standardized analytics capability maturity

models, funding for public-private pilot projects, and national certifications for BI&A practitioners. Cross-sectoral knowledge hubs—where enterprises can learn from best practices and case failures—can accelerate capability diffusion.

The implications of this research stress that developing absorptive capacity is not a one-time technical fix, but an ongoing strategic transformation requiring coordination across multiple organizational layers and external partnerships. Firms must go beyond adopting BI&A platforms and instead embed ACAP into the core of how decisions are made, how learning is institutionalized, and how value is created from data. Those that take a systems-level view—integrating governance, capability-building, cultural reform, strategic foresight, and ecosystem collaboration—will not only realize better BI&A outcomes but also build enduring adaptability in the face of digital disruption and economic volatility. This study affirms that the journey to data-driven excellence begins not with technology, but with the capacity to absorb, transform, and act upon knowledge consistently and purposefully.

Based on the empirical findings and aligned with the original research objective—to explore how absorptive capacity (ACAP) enables effective Business Intelligence and Analytics (BI&A) utilization for value creation—this section proposes a structured set of practical recommendations for Vietnamese enterprises. These recommendations aim to translate the theoretical model and validated hypotheses into actionable strategies that organizations can implement to enhance their absorptive capacity and maximize BI&A value realization.

In light of the empirical findings and aligned with the applied orientation of this research, this section proposes a structured set of practical recommendations that Vietnamese enterprises can implement to enhance their absorptive capacity (ACAP) in support of effective Business Intelligence and Analytics (BI&A) utilization. While previous research has demonstrated that BI&A can create value for organizations through improved decision-making, efficiency, and innovation (Elbashir et al., 2013; Trieu, 2017), the realization of such value is often hindered by organizational deficiencies

in learning, coordination, and knowledge internalization (Popovič et al., 2012; Mikalef et al., 2019). This research identifies ACAP — composed of acquisition, assimilation, transformation, and exploitation capacities — as a critical enabler that bridges BI&A investments and actual performance outcomes in Vietnamese business contexts.

- **Typology-Specific Considerations for ACAP Roadmap Implementation**

While the proposed three-stage roadmap provides a structured and scalable approach to operationalizing absorptive capacity (ACAP) across Vietnamese enterprises, its practical implementation is not uniform across all organizational contexts. The typology of the firm—whether it is a small or medium-sized enterprise (SME), a foreign direct investment (FDI) company, or a state-linked enterprise—significantly shapes the feasibility, sequencing, and required support mechanisms for ACAP development.

- **SMEs and Resource-Constrained Private Enterprises**

In small and medium-sized enterprises, particularly those lacking robust digital infrastructure or analytics personnel, absorptive capacity often remains underdeveloped. These firms may struggle to justify full-scale BI&A investments and must instead rely on incremental approaches using open-source tools (e.g., Metabase, Google Data Studio) and modular dashboards. In such settings, the roadmap's initial phase—Assess & Build Awareness—should prioritize lightweight self-assessment mechanisms and informal learning channels such as peer-to-peer mentoring or cross-functional project teams. Moreover, the appointment of internal "data ambassadors" rather than a full Chief Data Officer may be more appropriate for cultivating a grassroots data culture.

- **FDI and Large Private Corporations**

FDI enterprises or large private firms often have the foundational digital infrastructure and human capital to support rapid ACAP implementation. These firms can move quickly from Stage 1 to Stage 2 and begin deploying advanced BI&A use cases such as predictive modeling, supply chain optimization, and customer journey analytics. However, such organizations frequently face

challenges in aligning analytics functions across regional units or business lines. Therefore, a strong emphasis on data governance harmonization, enterprise-wide KPI standardization, and executive analytics fluency is essential to ensure strategic coherence.

- **State-Owned and State-Linked Enterprises**

Enterprises with strong state involvement often confront unique barriers rooted in rigid hierarchical structures, unclear accountability, and centralized decision-making. Despite increasing pressure to adopt digital transformation under the government's national agenda, the absence of dynamic learning routines hampers the assimilation and transformation of data into action. For these organizations, early-stage interventions should include structured leadership training, policy mandates for cross-departmental knowledge sharing, and pilot BI&A projects tied directly to state performance targets. Embedding ACAP into public-sector innovation frameworks—such as performance-based budgeting or strategic foresight units—can increase traction and ensure policy alignment.

By tailoring the roadmap according to firm typology, Vietnamese enterprises can accelerate their ACAP maturity and more effectively leverage BI&A for value creation. One-size-fits-all strategies risk underperformance; typology-aware approaches, in contrast, acknowledge organizational realities while providing practical pathways for transformation.

Yet, as the data revealed, ACAP is not uniformly developed across Vietnamese firms. Many organizations face cultural, structural, and strategic barriers to fully embedding data-driven insights into business processes. These include a lack of cross-functional knowledge flow, limited data literacy, and siloed BI&A usage — factors that undermine the potential of BI&A initiatives (Nguyen & Nguyen, 2021; FPT Retail, 2023). Therefore, the following three-stage roadmap is proposed as a strategic and actionable framework for developing ACAP systematically across Vietnamese enterprises, supported by specific implementation guidelines, diagnostic tools, and measurement metrics.

Enhancement I: Typology-Specific Recommendations for Implementation

Implementation of ACAP-BI&A strategies must be tailored based on firm typology. A one-size-fits-all approach risks underperformance. The following matrix provides differentiated recommendations based on firm size, ownership, and digital readiness:

Table 6.2-1: Typology-Specific Recommendations for Implementation

Firm Typology	Strategic Priority	Implementation Starting Point	Organizational Enabler
SMEs (Low Tech)	Operational efficiency	Data literacy & process digitization	Embedded data roles
Large Domestic Corporates	Market responsiveness	Executive BI training & KPI dashboards	Analytics CoE
FDI Firms	Strategic integration	Predictive modeling & CRM integration	Global governance alignment
State-Owned Enterprises	Governance transparency	Audit-aligned BI reports & structured KPI reviews	Inter-ministerial policy mandate

These typology-specific pathways allow firms to align their ACAP investments with realistic readiness levels and transformation aspirations.

Enhancement II: CIMO-Based Evaluation Framework for Monitoring ACAP Outcomes

To ensure effective progress tracking and iterative learning, this study proposes a **CIMO logic-based framework** for monitoring interventions:

Table 6.2-2: Context & intervention

Context	Intervention	Mechanism	Outcome
Manufacturing SME	Dashboard deployment	Visibility into performance gaps	15% stockout reduction
FDI enterprise	Analytics team + review cycles	Cross-unit knowledge flow	25% increase in BI-driven campaigns
SOE	Executive training + middle mgmt pilot	Decision decentralization	20% faster procurement cycle

Retail chain	Predictive churn model	Proactive customer management	10% boost in retention

Organizations are encouraged to use CIMO chains in quarterly BI&A reviews, linking each intervention with a clear mechanism and measurable outcome. Feedback loops and adaptive learning cycles should be institutionalized through retrospectives and board-level evaluations.

- **Stage 1: Assess & Build Awareness (0–3 Months)**

Objective: Establish a clear understanding of current ACAP capabilities, identify organizational gaps, and engage key stakeholders.

Organizations must begin with an honest appraisal of their existing absorptive capacity. This includes both formal systems (e.g., data infrastructure, analytics tools) and informal aspects (e.g., knowledge sharing, data culture). Zahra and George (2002) emphasize that the initial stages of ACAP—acquisition and assimilation—require active environmental scanning and cross-departmental learning routines. In the Vietnamese context, such practices are often underdeveloped or concentrated within IT teams only.

Recommended Actions:

- Launch an internal diagnostic initiative with participation from key departments (Operations, Marketing, IT, Finance, etc.) to evaluate current data usage practices and perceptions.
- Administer a standardized ACAP self-assessment checklist (see below) that covers all four ACAP dimensions, encouraging reflection on both behavioral and structural factors.
- Deliver an ACAP Baseline Report to senior leadership, summarizing strengths, weaknesses, and actionable insights.
- Propose the formation of a cross-functional Data Governance Board, led by a senior sponsor, to oversee and coordinate BI&A initiatives in line with business goals.

These activities serve as the foundation for embedding a culture of data awareness and cross-functional alignment, both of which are essential for BI&A effectiveness (Kiron & Shockley, 2011; Lederer & Schmid, 2021).

- **Stage 2: Institutionalize Routines & Build Capabilities (4–9 Months)**

Objective: Establish formal mechanisms, governance structures, and skill-building programs to operationalize ACAP.

Having identified gaps in Stage 1, organizations should now formalize knowledge routines and expand internal BI&A capacity. Assimilation and transformation capabilities — the ability to share and adapt external knowledge internally — are particularly critical at this stage (Cohen & Levinthal, 1990; Fink et al., 2017). However, qualitative findings indicate that many Vietnamese firms suffer from inconsistent interpretations of dashboards, lack of standardized KPIs, and insufficient training for middle managers who bridge strategy and operations.

Recommended Actions:

- Appoint or designate a Chief Data Officer (CDO) or equivalent leader to oversee BI&A and ACAP initiatives and to report directly to top management.
- Develop and deploy a role-based BI&A training curriculum:
    - Executives: Strategic analytics and foresight (1/month)
    - Middle managers: KPI tracking and dashboard interpretation (bi-weekly)
    - Analysts: Data modeling, visualization, and insight communication (1–2 full courses)
    - General staff: Awareness of data quality, collaboration, and insight-sharing (e-learning)
- Standardize data governance protocols and data-sharing platforms (e.g., company-wide Power BI dashboards) to support consistent interpretation of information.
- Host regular “BI&A Insight Sharing Sessions” to facilitate cross-functional learning and reward data-driven decision-making.

- Revise performance management frameworks to include ACAP-related indicators such as "% of decisions supported by data" or "# of BI&A-led initiatives".

As noted by Trieu (2017) and Sharma et al. (2014), the success of BI&A is not only technical but depends heavily on how effectively the organization learns from and acts upon data.

➢ **Stage 3: Integrate & Scale Across the Enterprise (9–18 Months)**

Objective: Embed ACAP practices into enterprise-wide strategic planning, execution processes, and innovation cycles.

This final stage focuses on expanding ACAP from department-level practices into an enterprise-wide capability. Transformation and exploitation capacities — the ability to adapt and act on knowledge — must now become systemic. At this stage, BI&A should no longer be seen as an IT-led function but as a core enabler of competitive advantage, embedded in strategic initiatives and operational reviews (Mao et al., 2015; Božič & Dimovski, 2019).

Recommended Actions:

- Embed BI&A into strategic planning cycles by requiring that all new initiatives include a BI&A justification or forecast component.
- Initiate high-impact analytics projects, such as churn prediction, customer segmentation, or real-time pricing optimization, aligned with core KPIs.
- Implement a Value Creation Dashboard to track and report on:
    - Reduction in decision-making time
    - Operational cost savings
    - Contribution of BI&A to revenue growth or innovation outcomes
- Forge partnerships with universities and analytics institutes for co-training, student internships, and applied research.
- Establish incentive structures for managers and departments based on BI&A contribution to business outcomes.

This stage marks the transition from “data-aware” to “data-driven” organizations. As argued by McKinsey (2022), firms that operationalize analytics and absorptive learning into core strategy consistently outperform their peers.

Table 6.2-3: ACAP Self-Assessment Checklist

Dimension	Key Questions	Assessment Scale (1–5)
Acquisition	Do we regularly seek out new BI&A insights and tools from the external environment?	
	Are we proactively identifying emerging data trends and technologies?	
Assimilation	Are BI&A insights shared across departments effectively?	
	Do we have standardized KPI definitions across the organization?	
Transformation	Do we adapt and integrate external BI&A knowledge into our existing workflows?	
	Are BI&A findings used to revise processes or develop new solutions?	
Exploitation	Are BI&A insights consistently used in decision-making?	
	Are actions taken based on BI&A systematically monitored and evaluated?	

Scoring Guidelines:

1–2: Underdeveloped — requires immediate intervention

3: Emerging — formalization needed

4–5: Mature — can be scaled or used for internal benchmarking

Table 6.2-4: Key Performance Indicators (KPIs) for Post-Implementation Monitoring

KPI	Measurement Method
BI&A system utilization by decision-makers	BI platform usage logs, meeting documentation
Decision-making cycle time reduction	Before/after analysis of approval processes
% of strategic initiatives supported by BI&A	Audit of planning documents and project proposals
Number of actionable insights implemented	Count of changes directly linked to BI&A reports
Training completion and BI&A confidence score	Pre- and post-training evaluations, surveys
Operational cost savings from BI&A	Finance and controller-led savings validation
Data-driven innovation rate	Ratio of new offerings/processes rooted in analytics

Conclusion

The roadmap presented above transforms the theoretical construct of absorptive capacity into a practical management framework. By progressing through the stages of assessment, institutionalization, and integration, Vietnamese enterprises can bridge the gap between BI&A investments and actual business value. Critically, the success of BI&A is not merely a function of having the right technologies, but of fostering the right organizational conditions—namely, a mature, systemic absorptive capacity.

6.3. Recommendations for Future Research

While this study provides a solid foundation for understanding the interplay between BI&A, absorptive capacity, and organizational context, several promising avenues for future research

emerge. These opportunities could deepen both the theoretical and empirical understanding of how value is created from analytics investments, particularly within emerging market contexts. Future research should not only refine measurement and theory but also explore how learning systems are sustained across time, sector, and ecosystem levels.

First, future research should adopt longitudinal designs to observe how absorptive capacity evolves over time. As ACAP is a dynamic capability, a cross-sectional snapshot limits the ability to understand its maturation, path dependency, or decay. Long-term studies could assess how sustained use of BI&A tools reshapes learning processes, decision structures, and interdepartmental knowledge flows. For instance, repeated-measure designs and time-series analysis could track shifts in ACAP dimensions over multiple implementation cycles.

Second, sectoral comparative studies would be valuable in unpacking how ACAP development varies across industries. For instance, how do firms in high-velocity sectors like e-commerce or fintech differ in their absorptive strategies compared to those in more traditional sectors like agriculture or manufacturing? Industry-specific barriers and enablers could provide insight into tailored BI&A implementation strategies and highlight sector-dependent maturity models. Additionally, comparative case studies within a single industry but across firm sizes may highlight how SMEs adapt or struggle differently compared to large corporations.

Third, there is a need for further scale development and validation for measuring absorptive capacity in digital contexts. Existing ACAP scales are often adapted from innovation literature and may not fully capture analytics-related competencies such as data storytelling, dashboard interpretation, or algorithmic skepticism. Future studies could construct new measurement instruments that better reflect digital-era absorptive routines. Furthermore, the interaction between digital skills and ACAP dimensions should be theorized more explicitly, offering more nuanced instruments for organizational diagnostics.

Fourth, the role of leadership in shaping ACAP development deserves closer examination. While this study highlighted participatory leadership as an enabler, a more granular understanding of managerial mindsets, incentives, and cognitive framing of analytics would clarify how organizational sensemaking shapes absorptive dynamics. Mixed-methods research could explore these factors at both executive and middle management levels. Ethnographic or narrative inquiry could also enrich our understanding of how individuals experience and interpret data-driven change initiatives.

Fifth, inter-organizational learning mechanisms such as benchmarking networks, supplier–retailer knowledge sharing, and public–private innovation alliances represent fertile ground for studying ACAP across organizational boundaries. Future studies could investigate how ecosystems—rather than individual firms—develop collective absorptive capacity to interpret shared data platforms, customer trends, or regulatory analytics. Network analysis and social capital theories could be used to study how knowledge flows are embedded in broader institutional arrangements.

Sixth, the influence of national culture and institutional context on ACAP in digital transformation warrants greater attention. Cross-national studies comparing Vietnam with countries of varying regulatory maturity, innovation culture, or data openness could enrich both absorptive theory and practical understanding. Cultural dimensions such as uncertainty avoidance or collectivism may condition how BI&A outputs are interpreted and acted upon.

Lastly, replicating this study in other emerging or transitional economies would enable cross-country comparisons and theory refinement. Vietnam represents a unique case of rapid digital transformation under institutional reform, but findings could be tested in similar economies such as Indonesia, the Philippines, or Kenya. Such comparisons would contribute to contextualizing global management theories in diverse institutional environments. Meta-analytical approaches or configurational methods such as fuzzy-set qualitative comparative analysis (fsQCA) could be employed to capture the complexity of these interactions.

Through these future research directions, scholars can continue to advance the understanding of how BI&A can be meaningfully embedded within organizations through absorptive structures, enabling firms to navigate uncertainty, foster innovation, and build sustainable competitive advantage in increasingly digitalized and data-driven economies.

The findings of this research yield several critical implications for managerial practice, national digital transformation policy, and organizational capacity development. At the enterprise level, Vietnamese managers must recognize that investing in BI&A technologies without simultaneously fostering an absorptive infrastructure will likely produce underwhelming outcomes. Thus, the implementation of analytics must be embedded within a broader strategy that emphasizes knowledge acquisition, internal learning processes, and feedback-oriented culture.

First, business leaders should embed analytics accountability across multiple organizational levels. This includes creating cross-functional data teams, assigning analytics champions within departments, and ensuring that key performance indicators (KPIs) include metrics related to data use and insight application. Additionally, organizations should allocate specific resources and incentives for reflective activities, such as post-project reviews and cross-unit learning sessions, which are often undervalued but essential for knowledge transformation.

Second, organizational culture must shift from a compliance-based mindset to a learning-oriented one. Encouraging calculated risk-taking, allowing space for experimentation, and rewarding employees who leverage BI&A insights in decision-making are vital steps. Leadership behavior plays a particularly important role here—managers must model data-driven behavior and champion analytics-based discussions in both strategic and operational meetings.

Third, at the ecosystem level, policymakers should expand support mechanisms beyond digital infrastructure to include ACAP-specific development programs. These could take the form of training subsidies, industry-specific analytics toolkits, or public-private knowledge exchange platforms. Importantly, digital transformation indices used by government bodies to track national

progress should incorporate metrics related to knowledge flows, organizational learning capability, and insight exploitation—not just technology adoption rates.

Fourth, academic institutions and executive education providers should take an interdisciplinary approach to analytics training. Beyond teaching technical tools, programs must include modules on organizational behavior, leadership in digital contexts, and change management. This ensures that graduates are not only analytics-literate but are also capable of acting as change agents within their organizations.

Finally, business associations and consulting firms have a role to play in facilitating benchmarking and peer learning. Creating communities of practice around BI&A and ACAP could help disseminate best practices, enable shared diagnostics, and reduce the cost of individual experimentation. In particular, industry associations in sectors such as retail, logistics, and manufacturing—where digital transformation is accelerating—can serve as platforms to diffuse knowledge about effective absorptive strategies.

Collectively, these practical implications suggest that the pathway to value creation through BI&A lies not merely in investing in tools but in architecting an organizational environment where learning, adaptation, and knowledge integration are institutionalized. For Vietnamese enterprises, this shift may require sustained effort and mindset change, but it offers a compelling route to build long-term strategic agility in a dynamic digital economy.

6.4. Final Conclusion

While absorptive capacity represents the foundation for organizational learning and knowledge acquisition, the study reinforces that such capacity must be actualized through effective BI&A implementation. As a mediating mechanism, BI&A implementation ensures that knowledge acquired and internalized by firms is translated into actionable insights and performance outcomes. This not only validates the structural role of BI&A systems but also highlights their strategic relevance as enablers of value creation. Organizations seeking to unlock the full potential of data

must therefore treat BI&A not as a supporting tool, but as an institutionalized capability embedded in their absorptive processes

This study has explored the critical role of absorptive capacity (ACAP) in enabling Vietnamese enterprises to translate business intelligence and analytics (BI&A) into actionable performance outcomes. Grounded in both quantitative and qualitative analysis, the research affirmed that ACAP is not simply a supplementary function but a strategic capability that determines whether data becomes knowledge, and whether knowledge drives value. In a rapidly digitizing business environment where tools, platforms, and data are becoming ubiquitous, the real differentiator lies in an organization's ability to absorb, transform, and utilize information effectively. The four dimensions of ACAP—acquisition, assimilation, transformation, and exploitation—offer a robust framework for diagnosing capability gaps and building data-driven resilience. For Vietnamese enterprises, the journey toward effective BI&A adoption is still in progress. While certain digital-native firms are showing promising agility, many traditional organizations remain encumbered by structural silos, limited data literacy, and hierarchical decision-making models. This research has highlighted not only the obstacles but also the levers of change—strategic leadership, organizational learning, cultural evolution, and policy alignment—that can accelerate ACAP development. Ultimately, this study contributes to the broader discourse on how emerging markets can harness data for transformation—not merely through investment in technology, but through intentional cultivation of absorptive processes. As global economic volatility, competitive disruption, and technological change continue to intensify, firms that internalize the lessons of ACAP will be best positioned to pivot, innovate, and lead.

The implications of this research extend beyond the Vietnamese context, offering a scalable model for organizations in other transitional economies that seek to move from being data-rich to insight-driven. The future belongs to those who not only collect data—but who can learn, adapt, and act on it with purpose.

APPENDIX A

SURVEY COVER LETTER

Dear Participant,

My name is Luu Duc Loc, a Doctoral Candidate at the Swiss School of Business and Management (SSBM), Geneva. I am currently conducting doctoral research titled:

"The Role of Absorptive Capacity in Business Intelligence and Analytics for Value Creation in Vietnamese Enterprises."

With over 10 years of professional experience in data systems and insight generation, I have witnessed firsthand both the potential and the limitations of business intelligence (BI) tools in driving organizational value. This study aims to delve deeper into a crucial yet often overlooked dimension: the absorptive capacity of organizations—their ability to recognize, assimilate, transform, and apply data-driven knowledge effectively.

This research seeks to contribute both theoretically and practically by identifying the organizational enablers that convert data availability into strategic decision-making and performance outcomes, especially in the context of Vietnam's digital transformation.

You are invited to participate in this anonymous survey, which will take approximately 10–20 minutes to complete. Your input as a professional engaged in digital initiatives, data management, or strategic planning is vital to the success of this research.

Please be assured that:

- All responses will be treated with strict confidentiality;
- Data collected will be used solely for academic research purposes;
- The survey contains no sensitive or personally identifiable information.

Should you have any questions or require further clarification, please do not hesitate to contact me via email at **luu@ssbm.ch** or reach out to my academic supervisor at SSBM.

Your contribution is not only greatly appreciated but also essential in helping shape future frameworks for BI&A-driven value creation in Vietnamese enterprises.

Thank you for your time and valuable insights.

Sincerely,

Luu Duc Loc

Doctoral Candidate

Swiss School of Business and Management, Geneva

Email: luu@ssbm.ch - Mb: +84 903 789 693

APPENDIX B: SURVEY QUESTIONNAIRE

My name is Luu Duc Loc, currently a doctoral candidate at the Swiss School of Business and Management (SSBM), Geneva. This questionnaire is part of my doctoral dissertation research entitled *"The Role of Absorptive Capacity for Business Intelligence and Analytics for Value Creation: In Vietnam Business."* The purpose of this survey is to collect insights from professionals regarding how Vietnamese enterprises acquire, assimilate, transform, and exploit knowledge gained from Business Intelligence and Analytics (BI&A), and how these processes contribute to operational and strategic value creation.

I would like to sincerely thank you for taking the time to participate in this research. Your input is vital to the success of this study and will contribute valuable insights into how organizations in Vietnam can enhance their use of business intelligence and analytics.

Your responses will remain strictly confidential and will only be used for academic purposes. Kindly answer each question as accurately and honestly as possible based on your experiences within your organization.

Instructions: Please indicate the extent to which you agree with the following statements related to your organization's business intelligence (BI&A) practices and capabilities. Use the 5-point scale below to select the most appropriate response.

Response Scale:

Scale	Description
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

Section I: Screening & Demographic Questions ***(For respondent qualification and profiling)***

General Information: (Please tick the appropriate box)

1. What is your current position in the company?
    - C-level
    - Manager
    - Employee
2. **Which sector best describes your company's main business activity?**
    - Retail
    - Manufacture
    - Service
    - Financial & Banking
    - Logistic
    - Others
3. **Company size (by number of employees):**
    - <100
    - 100-500
    - >500
4. **How long has your organization been using BI&A systems?**
    - < 1 year
    - 1-3 years
    - > 3 years
5. **How would you assess your BI&A proficiency level?**
    - Beginner
    - Professional
    - Expert

Qualification Questions (Yes/No):

- **SF1.** Has your company implemented a Business Intelligence & Analytics (BI&A) system (e.g., Power BI, Tableau, QlikView, or in-house tools)?

Yes/No

- **SF2.** Has your company used BI&A tools continuously for at least the past 12 months?

Yes/No

- **SF3.** Do you personally participate in the interpretation, reporting, or usage of BI&A insights for decision-making?

Yes/No

Section II: Absorptive Capacity for BI&A(Business Intelligent & Analytics)

A. Acquisition Capacity (AC) *Describes the firm's ability to actively identify, locate, and bring in external knowledge, trends, or data sources that are relevant to its BI&A initiatives.*

Code	Statement	1	2	3	4	5
AC1	Our organization regularly monitors external sources to identify relevant BI&A knowledge.	☐	☐	☐	☐	☐
AC2	We attend BI&A-related events or conferences to seek out new technological knowledge.	☐	☐	☐	☐	☐
AC3	We assess the usefulness and credibility of external BI&A sources before adoption.	☐	☐	☐	☐	☐
AC4	We proactively collect BI&A-related market information to inform internal analytics.	☐	☐	☐	☐	☐
AC5	We regularly engage BI&A experts or consultants to enhance our organizational knowledge.	☐	☐	☐	☐	☐

B. Assimilation Capacity (AS) *Refers to the processes by which the organization interprets, shares, and understands new information acquired through BI&A systems.*

Code	Statement	1	2	3	4	5
AS1	We effectively interpret and understand newly acquired BI&A knowledge.	☐	☐	☐	☐	☐
AS2	Our departments regularly share BI&A knowledge to support decision-making.	☐	☐	☐	☐	☐
AS3	We combine BI&A insights from different sources to create internal reports.	☐	☐	☐	☐	☐
AS4	We maintain accessible documentation of BI&A knowledge shared internally.	☐	☐	☐	☐	☐

C. Transformation Capacity (TR) *The capability to develop new insights and reconfigure existing operations by integrating newly acquired data with internal knowledge.*

Code	Statement	1	2	3	4	5
TR1	We integrate new BI&A knowledge into current organizational systems.	☐	☐	☐	☐	☐
TR2	We use BI&A insights to improve or design new internal workflows.	☐	☐	☐	☐	☐
TR3	We revise existing processes based on BI&A-driven recommendations.	☐	☐	☐	☐	☐
TR4	Employees are encouraged to use BI&A to generate creative business solutions.	☐	☐	☐	☐	☐

D. Exploitation Capacity (EX) *Represents the firm's ability to convert newly gained insights from BI&A into business actions that result in measurable outcomes.*

Code	Statement	1	2	3	4	5
EX1	We use BI&A findings to adjust or enhance products and services.	☐	☐	☐	☐	☐
EX2	Our teams act quickly on BI&A insights through tangible adjustments.	☐	☐	☐	☐	☐
EX3	Strategic planning processes regularly incorporate BI&A results.	☐	☐	☐	☐	☐
EX4	Managers are encouraged to implement ideas derived from BI&A results.	☐	☐	☐	☐	☐
EX5	BI&A-driven outcomes are reflected in how we measure performance (e.g., KPIs).	☐	☐	☐	☐	☐

Section III: Business Intelligence & Analytics (BI&A)

E. Business Intelligence & Analytics (BI&A) *This section assesses the extent to which your organization implements, integrates, and uses Business Intelligence & Analytics (BI&A) results in day-to-day decision making. Please indicate your level of agreement with the following statements:*

Code	Statement	1	2	3	4	5
BI1	BI&A systems are accessible and used across business units.	☐	☐	☐	☐	☐
BI2	Decision-making processes at all levels utilize BI&A.	☐	☐	☐	☐	☐
BI3	BI&A systems are used for analysis, prediction, and strategic planning.	☐	☐	☐	☐	☐
BI4	We consistently support and improve BI&A systems and their usability.	☐	☐	☐	☐	☐

Section IV: Value Creation from BI&A

F. Value Creation *This section assesses the extent to which Business Intelligence and Analytics (BI&A) contribute to both operational and strategic value within your organization. Value creation refers to the ability of BI&A systems to enhance decision-making, improve efficiency, reduce costs, foster innovation, anticipate market changes, and ultimately strengthen competitive advantage. Please indicate how much you agree with each of the following statements regarding the value your organization derives from BI&A initiatives.*

Code	Statement	1	2	3	4	5
VC1	BI&A helps us make faster and more informed decisions.	☐	☐	☐	☐	☐
VC2	Processes are optimized through effective use of BI&A.	☐	☐	☐	☐	☐
VC3	BI&A contributes to lowering costs and maximizing resources.	☐	☐	☐	☐	☐
VC4	We apply BI&A insights to drive product or service innovation.	☐	☐	☐	☐	☐
VC5	We use BI&A to anticipate market changes and customer behavior.	☐	☐	☐	☐	☐
VC6	Our BI&A capabilities contribute to maintaining competitive advantage.	☐	☐	☐	☐	☐

Appendix C – Expert Interview Guide

No.	Focus Area	Interview Questions
1	**BI&A Adoption Overview**	- How has your organization implemented BI&A so far? - How widely is it being used?
2	**Acquisition Capacity**	- Are there challenges in accessing or sourcing external knowledge about BI&A?
3	**Assimilation Capacity**	- Once knowledge is acquired, is it effectively shared and understood within the company?
4	**Transformation Capacity**	- Are there difficulties in integrating new BI&A knowledge with existing processes?
5	**Exploitation Capacity**	- Are BI&A insights regularly used in decision-making? Why or why not?
6	**Opportunities & Recommendations**	- What do you see as the key opportunities for improving absorptive capacity in your company? - Do you have any suggestions for other Vietnamese firms starting BI&A adoption?

List of Expert Interviewees

Expert	Title	Year of Experience	Organization	Industry
1	Director of Marketing	21 years	Nutrecco	Manufacturing
2	Marketing Manager	15 years	Urgo Viet Nam	Commercial
3	Senior Manager Product Strategy	18 years	Lotte VN	Retail
4	IT Manager	16 years	CJ Vina	Manufacturing
5	IT Strategy Manager	14 years	Lotte VN	Retail

Expert Response Matrix (Summary)

Expert	Key Observations on ACAP				Cultural Factors	Recommendations
	Acquisition	Assimilation Practices	Transformation Challenges	Exploitation Examples		
1	Lack of structured scouting methods	Only IT team interprets data	Rigid processes block experimentation	Ad hoc reports, not operationalized	Top-down, avoids junior feedback	Build cross-functional squads
2	Vendors drive tool selection	Weak KPI alignment	KPIs differ by unit	Few actions follow dashboard alerts	Fear of mistake blocks insight	Train non-tech departments
3	C-level interest, no formal channels	Slow transfer across units	Leadership delays integration	Limited pilot projects	Low initiative from staff	Create agile data pilots
4	Leverage tech partners	Siloed systems limit access	Poor collaboration culture	BI seen as reporting only	Reluctance to question seniors	Redesign org learning process
5	Open to training programs	Lacks shared data dictionary	Transformation is underfunded	Mostly used for reports	Hierarchical decisions dominate	Institutionalize learning norms

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