THESIS

Mennatallah K. M. Nassar

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Hungarian University of Agriculture and Life Sciences
Gödöllő Campus
Department of Agricultural Business and Economics

Business Administration and Management
Bachelor's education

The Role of Information Technology in Increasing Business Competitiveness

Insider consultant: Noémi Fiser - Assistant professor
Insider consultant's Institute/department: Department of Agricultural
Business and Economics
Author: Mennatallah K. M. Nassar

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1. Introduction and Work Objective

1.1 Introduction

In today's globalized and digitalized economy, firms are not only expected to remain efficient but also to continuously adapt and innovate if they want to stay competitive. Within this environment, Information Technology (IT) has evolved from being a supporting tool into a strategic enabler of competitiveness. Companies are increasingly exposed to international competition, rapid technological change and shifting consumer expectations. The ability to leverage IT for operational efficiency, value creation, and innovation determines whether a firm can sustain its competitive edge.

The COVID-19 pandemic further accelerated digital transformation, demonstrating that IT-driven agility, resilience, and innovation are no longer optional but essential for business survival. This makes the link between IT and competitiveness both highly relevant and timely.

Competitiveness itself has been defined in multiple ways. Classical perspectives emphasize measurable outcomes such as market share, relative costs, and export performance (Hatzichronoglou, 1996). Later research expanded this view by linking competitiveness to strategic processes and innovation capacity (OECD, 2019). Porter (1980, 1985) focuses on positioning through cost leadership, differentiation, or focus, while the Resource-Based View (Barney, 1991) points to the role of unique and inimitable internal resources. The Dynamic Capabilities framework (Teece, Pisano, & Shuen, 1997) redirects attention toward how firms adapt to volatile conditions, and the Strategic Alignment Model (Henderson & Venkatraman, 1993) underscores the coherence between IT and business strategies. Taken together, these theories establish IT not merely as a technological asset, but as a core strategic capability.

Yet, IT's role in driving competitiveness remains complex. On the one hand, IT enables cost reductions, personalized customer experiences, and data-driven innovation, as shown by Walmart's RFID-based supply chain, Apple's ecosystem integration, and Netflix's recommendation systems. On the other hand, IT investments face significant challenges, including high implementation costs, weak alignment with business strategy, talent shortages, data governance concerns, and the constant risk of technological obsolescence. Therefore, IT may act as both an enabler and a barrier to competitiveness, depending on how it is deployed, aligned, and embedded within organisational processes. This tension forms the central problem addressed in this thesis: How can firms transform IT investments into a sustained competitive advantage rather than short-term operational improvements?

1.2 Objectives of the Study

The objective of this research is to examine the role of information technology in enhancing firm-level competitiveness, with a particular focus on how IT contributes to operational efficiency, value creation, and innovation. To achieve this, the thesis links theoretical frameworks (Porter's strategies, the Resource-Based View, Dynamic Capabilities, and the Strategic Alignment Model) with practical evidence on IT tools such as Enterprise Resource Planning (ERP), Customer Relationship Management (CRM), and Business Intelligence systems.

The study further evaluates how IT capability, when integrated with strategic alignment and governance, fosters Business Intelligence, which in turn enhances dynamic capabilities and, in turn, firm competitiveness. It also investigates whether cybersecurity, privacy, and trust strengthen the translation of Business Intelligence into Dynamic Capabilities (i.e., CPT moderates the BI → DC link).

1.3 Research Questions

Building upon the theoretical background and conceptual model developed in Chapter 2, this study is guided by the following research questions:

1. **RQ1:** Does IT capability positively influence strategic alignment between business and technology domains?
2. **RQ2:** Does strategic alignment enhance Business Intelligence capability?
3. **RQ3:** Does Business Intelligence capability strengthen dynamic capabilities such as sensing, seizing, and reconfiguring?
4. **RQ4:** Do dynamic capabilities improve firm-level competitiveness?
5. **RQ5:** Does strategic alignment mediate the relationship between IT capability and Business Intelligence capability?
6. **RQ6:** Do cybersecurity, privacy, and trust moderate the relationship between Business Intelligence capability and dynamic capabilities?

1.4 Structure of the Thesis

The thesis is organized into five chapters. **Chapter 1** introduces the topic, outlining the research background, research objectives and questions. **Chapter 2** provides a review of the relevant literature, discussing key theories on competitiveness, IT capabilities, strategic alignment, and Business Intelligence (BI), and ends with the proposed conceptual model and hypotheses. **Chapter 3** explains the research methodology, describing the research approach, data collection methods, and analysis techniques. **Chapter 4** presents and evaluates the research results, while **Chapter 5** summarizes the findings, concludes the study, and proposes recommendations for practice and future research.

2. Literature Review

2.1 Competitiveness

Competitiveness represents a foundational concept within management and strategy studies, as it determines a firm's ability to secure its market position, ensuring long-term viability. This section defines the concept of firm-level competitiveness and then synthesizes key theoretical perspectives that explain how companies achieve and sustain advantage.

2.1.1 Firm-Level Definitions and Scope

Defining competitiveness at the firm level refers to a company's capacity to achieve sustained success by consistently outperforming rivals. The OECD defines this as:

"The ability of companies, industries, regions, nations or supranational regions to generate, while being and remaining exposed to international competition, relatively high factor income and factor employment levels on a sustainable basis" (Hatzichronoglou, 1996).

This definition emphasizes sustainable income and employment in internationally competitive markets, assessed by:

- ♦ Relative prices and unit labour costs
- ♦ Domestic/export market shares
- ♦ Import penetration rates
- ♦ Trade balance (Hatzichronoglou, 1996)

More recent analyses extend this view by linking competitiveness to innovation capacity, digitalization, and sustainable productivity growth (OECD, 2019). Porter (1980) adds to this by highlighting strategic processes that deliver superior value or efficiency through defensible positioning (cost leadership, differentiation, or focus). Thus, competitiveness stems from capabilities in operational efficiency, innovation, and value creation.

In sum, firm-level competitiveness combines measurable economic outcomes (e.g., factor income, market position) with strategic processes that sustain long-term advantage (Porter, 1985; Teece, 2007; Hatzichronoglou, 1996). While conceptual definitions provide the necessary foundation, understanding the mechanisms through which firms achieve and sustain competitiveness requires a theoretical explanation. The following section introduces the main strategic frameworks that have shaped this debate. These frameworks also provide the basis for analyzing how information technology interacts with organisational resources and strategies, enabling firms not merely to compete but to continuously adapt and thrive in increasingly dynamic markets.

2.1.2 Operationalizing Firm-Level Competitiveness

While conceptual definitions clarify the essence of competitiveness, empirical research needs measurable indicators to assess it at the firm level. Competitiveness is not a single construct but a multidimensional outcome that can be evaluated through financial, productivity, market, and innovation indicators (Siggel, 2006; OECD, 2019).

Financial Performance Metrics

Profitability and valuation indicators, such as Return on Assets (ROA), Return on Sales (ROS), and Tobin's Q, are often applied to approximate competitiveness (Barney, 1991; Bharadwaj, 2000). These indicators capture a firm's ability to generate sustained income against its assets or market expectations, aligning with the OECD's (1996) emphasis on factor income and long-term viability.

Productivity-Based Measures

At the operational level, competitiveness is often measured through productivity indicators such as labour productivity, total factor productivity (TFP), and cycle-time reductions (Porter, 1985; Hatzichronoglou, 1996). These measures are closely linked to cost leadership strategies, with IT solutions like ERP and automation driving processes, enhancing efficiency, and reducing unit costs (McAfee & Brynjolfsson, 2012).

Market Outcomes

Market-based indicators such as market share, export intensity, and customer retention provide another way to assess competitiveness. For instance, the OECD (2019) notes that digital adoption in SMEs supports export growth and integration into global value chains through e-commerce platforms. Similarly, CRM-enabled personalization strengthens customer loyalty and sustains differentiation by leveraging rare and socially complex capabilities (Wade & Hulland, 2004).

Innovation Outputs

Competitiveness can also be assessed through innovation indicators, including R&D intensity, patents, patent citations, and the share of revenue from new products (Teece, 2007; Pavlou & El Sawy, 2011). IT-enabled analytics and digital platforms enhance these outcomes by reducing time-to-market and enabling data-driven product development (Gomez-Uribe & Hunt, 2015).

2.1.3 Synthesis

In practice, a balanced portfolio of indicators provides the most accurate picture of firm-level competitiveness, rather than a single metric. Financial and productivity outcomes reflect efficiency, market share captures positioning, and innovation outputs capture adaptive capacity. Taken together, this multidimensional view ensures that competitiveness is not reduced to profitability alone but is understood as a dynamic construct shaped by IT-enabled efficiency, value creation, and innovation.

While section 2.1 established how competitiveness can be defined and measured, the following section explores the strategic theories that explain how firms achieve and sustain it.

2.2 Strategic Foundation of Competitiveness

Three major theoretical perspectives provide more detailed explanations of how firms achieve and maintain competitive advantage:

1. **Porter's Competitive Strategies**, which emphasize external positioning via cost leadership, differentiation, or focus (Porter, 1980).
2. **The Resource-Based View (RBV)**, which centers on internal resources that meet the VRIN criteria (Barney, 1991).
3. **The Dynamic Capabilities Framework**, which prioritizes adaptive renewal in volatile markets (Teece et al., 1997).

Critically, Information Technology (IT) plays a central role across these perspectives: it supports strategic execution (e.g., cost leadership through ERP) (Bharadwaj, 2000), transforms into VRIN-aligned assets (e.g., CRM-based ecosystems) (Wade & Hulland, 2004), and enhances a firm's capacity to adapt through data-driven responsiveness (e.g., AI-enabled market sensing) (Teece, 2007). In this way, IT directly activates the strategic capabilities outlined in Section 2.1.1: operational efficiency, innovation, and value creation.

2.2.1 Porter's Competitive Strategies and IT as an Enabler

Porter's (1980) foundational work introduced three generic strategies for achieving competitive advantage:

1. **Cost Leadership**

   Achieving the lowest cost of production through scale efficiencies, proprietary technologies, and process optimization.

Example: Walmart's adoption of RFID technology reduced out-of-stock incidents by 16% (Hardgrave et al., 2005) and cut labour costs by 65% (SAP, 2003), reinforcing operational efficiency (Lee & Özer, 2007).

2. **Differentiation**

   Offering products or services perceived as unique in the industry through brand image, technological innovation, or superior customer service (Porter, 1980).

   Example: Apple's integration of R&D and CRM creates a unique value by combining complementary resources (Wade & Hulland, 2004).

3. **Focus**

   Targeting a specific group of customers or narrow market segment, either through cost efficiency or customized differentiation (Porter, 1980).

   Example: Tesla's AI-powered Autopilot system enables highway driving automation under driver supervision, allowing the company to dominate the market for Level 2 autonomous driving (Garikapati & Shetiya, 2024).

Sustaining Competitive Advantage

Sustaining competitiveness requires not only choosing a single generic strategy but also maintaining strategic commitment to it over time (Porter, 1980). This persistence is achieved through the development of cohesive activity systems — interconnected processes that reinforce market positioning (Porter, 1996). Walmart demonstrates this principle by leveraging IT-enabled procurement and distribution synergies, which create a unique activity system that is difficult for rivals to replicate (McAfee & Brynjolfsson, 2012).

IT as an Enabler of Strategic Execution

Information Technology translates Porter's principles into practice by embedding strategy into organisational processes, preventing strategic drift, and strengthening barriers to imitation:

1. **Strategic Embedding**
   - *Cost Leadership:* Enterprise Resource Planning (ERP) systems automate processes and reduce waste (e.g., Walmart's supply chain) (McAfee & Brynjolfsson, 2012).
   - *Differentiation:* Omnichannel Customer Relationship Management (CRM) platforms personalize customer experiences, boosting spending and retention (e.g., Disney's MagicBand ecosystem) (Lemon & Verhoef, 2016).
2. **Drift Prevention**
   - Process-embedded decision rules ensure consistency in execution (Davenport, 1998).

- Real-time Key Performance Indicator (KPI) monitoring reinforces strategic discipline (Chen et al., 2012).

3. **Imitation Barriers**
   - Integrated IT platforms (e.g., cloud ERP/SCM/CRM suites) create causally ambiguous activity systems that are difficult to replicate. Their sustainability is reinforced through path dependency, historical evolution, and social complexity (Barney, 1991; Bharadwaj, 2000; Wade & Hulland, 2004).

Competitiveness Linkage

The relationship between Porter's generic strategies, the capability they require, and the outcome they generate can be summarized as follows:

Table 2.1. Porter's generic strategies, required capability, and expected outcome

Strategy	**Capability**	**Outcome**	**Source**
Cost Leadership	Operational efficiency	Long-term profitability	Porter (1980, 1996)
Differentiation	Innovation & value creation	Market share growth	Porter (1980)
Focus	Resource alignment	Niche dominance	Porter (1980)

Source: own editing based on Porter (1980, 1996).

2.2.2 Resource-Based View and IT as a VRIN Capability

Theoretical Foundation

The Resource-Based View (RBV) posits that competitive advantage arises from internal resources that meet the four VRIN criteria:

- **V**aluable - (efficiency enhancement)
- **R**are - (not widely available)
- **I**nimitable - (resists replication)
- **N**on-substitutable - (no functional equivalents)

In contrast to Porter's external positioning focus, the RBV emphasizes resource heterogeneity, arguing that firms possess unique bundles of assets that can form the basis of sustained competitive advantage

(Barney, 1991). Information Technology (IT) capability, including infrastructure, human expertise, and IT-enabled intangibles, can meet VRIN conditions when it is firm-specific, deeply integrated, and socially embedded (Bharadwaj, 2000).

VRIN - IT Alignment

Several widely used IT resources align with VRIN attributes and illustrate how information systems can generate sustained competitive advantage when embedded within organisational contexts.

Table 2.2. VRIN attributes mapped to representative IT resources and sources

Criterion	**IT Manifestation**	**Source**
Valuable	ERP automation (e.g., 96% faster payroll)	Shang & Seddon (2002)
Rare	Amazon’s behavioral data ecosystems	OECD (2020)
Inimitable	Salesforce’s 3,500+ AppExchange integration	Staub et al. (2021)
Non-substitutable	Apple’s proprietary iOS APIs	Kapoor & Agarwal (2017)

Source: own editing based on Barney (1991); Bharadwaj (2000); Shang & Seddon (2002); OECD (2020); Staub et al. (2021); Kapoor & Agarwal (2017).

Expanded analysis

Enterprise systems (ERP) illustrate the valuable dimension by automating core processes. For example, reducing payroll processing time from four days to four hours demonstrates how ERP systems deliver value by creating significant operational efficiencies through process automation (Shang & Seddon, 2000).

Amazon’s behavioral data ecosystem exemplify rarity, the firm’s extensive longitudinal datasets, built from millions of daily transactions, are not easily replicated by competitors, due to scope, privileged access, and accumulation advantages (OECD, 2020).

Salesforce’s AppExchange illustrates inimitability, which lies in its complex co-evolutionary development, where a vast network of interdependent complementors and customers creates significant architectural and relational barriers for competitors (Staub et al., 2021).

Apple’s iOS APIs demonstrate non-substitutability. These proprietary interfaces create tight coupling between developers and the iOS platform, positioning Apple at the core of an ecosystem that is very difficult to bypass. Complementors build products specifically for these APIs, making them an irreplaceable resource that sustains Apple's premium market position (Kapoor & Agarwal, 2017).

Critically, the Resource-Based View emphasizes that sustained competitive advantage does not arise from isolated resources but emerges when IT resources are integrated into firm-specific routines and socially complex practices. In other words, the competitive impact of IT lies not only in the technology itself but also in the way it is embedded, coordinated, and leveraged across the organisation (Barney, 1991; Bharadwaj, 2000).

IT Systems as Strategic Resources

Deeply embedded IT resources become causally ambiguous and path-dependent through firm-specific configurations, which make them sources of sustainable competitive advantage (Wade & Hulland, 2004). Examples include:

1. **ERP Systems**
   - *VRIN Attributes:* Valuable through process automation; Inimitable when customized into firm-specific workflows (Shang & Seddon, 2002).
   - *Competitive Impact:* Enable sustained cost leadership and productivity gains (OECD, 2020).
2. **API Ecosystems (Salesforce)**
   - *VRIN Attributes:* Inimitability through ecosystem complexity and network effects (Staub et al., 2021).
   - *Competitive Impact:* Create partner lock-in and niche dominance by embedding customers and developers within its ecosystem.
3. **Platform Architecture (Apple)**
   - *VRIN Attributes:* Non-substitutability through proprietary API control and developer ecosystem mastery (Kapoor & Agarwal, 2017).
   - *Competitive Impact:* Sustains higher developer revenues, estimated at 4.2% above Android's, driving value creation through premium monetization.

Synthesis: IT as a Source of Sustained Competitiveness

These VRIN-compliant IT resources directly enable the strategic capabilities defined in Section 2.1.1:

- **Operational efficiency:** ERP systems automate processes, sustaining cost leadership and profitability (Shang & Seddon, 2002).
- **Value creation:** CRM and API ecosystems drive customer engagement and monetization, reinforcing differentiation and market share growth.

- **Innovation:** Proprietary platform architectures foster niche dominance and continuous innovation (Kapoor & Agarwal, 2017).

By creating isolating mechanisms such as path dependency, social complexity, and causal ambiguity (Rumelt, 1984; Barney, 1991), IT evolves into strategic infrastructure that anchors long-term market positioning (Porter, 1985; Bharadwaj, 2000). In this sense, IT goes beyond being a commodity and becomes a deeply embedded capability that aligns with VRIN conditions and enables sustained competitive advantage.

2.2.3 Dynamic Capabilities and IT-Enabled Adaptation

In hypercompetitive digital markets, traditional sources of competitive advantage (Porter, 1980; Barney, 1991) tend to be short-lived. The Dynamic Capabilities framework (Teece, Pisano, & Shuen, 1997) addresses this challenge by focusing on the firm's capacity to sense, seize, and reconfigure resources to maintain competitiveness. Information Technology (IT) functions as a key enabler of this adaptive cycle, turning static resources into dynamic instruments that sustain efficiency, innovation, and value creation.

Sensing: IT as Market Radar

Definition and Theoretical Foundation

Sensing involves identifying and interpreting market shifts (Teece, 2007). Information Technology (IT) has transformed this capability from an intuition-based into a data-driven one by enabling the generation, dissemination, and analysis of market intelligence. This is operationalized through advanced analytics, IoT sensors, and artificial intelligence (Pavlou & El Sawy, 2011).

- **Empirical Evidence**: Netflix's AI-driven recommendation system personalizes content discovery based on viewing patterns, influencing 80% of all streamed content hours and increases the effective catalog size by 4x. (Gomez-Uribe & Hunt, 2015).
- **Link to Competitiveness**: IT-enabled sensing drives innovation by guiding data-driven R&D and improving firms' responsiveness to market dynamics, giving firms a sustained first-mover advantage in adapting to shifts.

Seizing: IT as an Execution Platform

Definition and Theoretical Foundation

Seizing is defined as the "mobilization of resources to capture value from opportunities" (Teece, 2007). Information Technology (IT) enables rapid execution by leveraging cloud infrastructure (e.g., AWS, Azure) for scalability, supported by API orchestration and DevOps pipelines, which provide the coordination and integration needed to reconfigure resources (Pavlou & El Sawy, 2011).

- **Empirical Evidence:** Adobe's transition to a SaaS model through microservices and APIs has become a benchmark case for successful subscription-based transformation in the IT sector, ensuring recurring revenue streams and long-term value creation (Riesener et al., 2020).
- **Link to Competitiveness:** IT-enabled seizing accelerates value creation through agile business model transformation, positioning firms to rapidly capitalize on emerging opportunities while reducing their exposure to market volatility.

Reconfiguring: IT as a Transformation Engine

Reconfiguring refers to the transformation of resources to maintain strategic fit in changing environments (Teece, 2007). Information Technology (IT) enables this process through reconfigurable architectures, enhancing sensing and learning for data-driven adaptation, and facilitating integration across organisational boundaries (Pavlou & El Sawy, 2011).

- **Empirical Evidence:** Microsoft's strategic shift from licensed software to the modular Azure cloud platform exemplifies IT-enabled reconfiguration, which secured 29% year-over-year revenue growth for Azure, anchoring scalable and sustainable income streams while ensuring long-term adaptability (Microsoft, 2023).
- **Link to Competitiveness:** By supporting the swift adaptation of processes, structures, and business models, IT-enabled reconfiguring maintains operational efficiency and value creation under volatility by aligning resources with evolving market demands.

Synthesis: The IT-Powered Adaptation Cycle

IT powers a reinforcing cycle of three capabilities that directly activate the pillars of competitiveness:

1. **Sensing** (e.g., Netflix's AI) → **Innovation**
2. **Seizing** (e.g., Adobe's APIs) → **Value Creation**
3. **Reconfiguring** (e.g., Microsoft's cloud) → **Operational Efficiency & Value Creation**

This cycle positions IT not as a support function but as strategic infrastructure that turns market turbulence into sustained competitive advantage (Teece, 2007; Pavlou & El Sawy, 2011). More recent research highlights that dynamic capabilities in the digital era increasingly rely on data-driven sensing and agile IT architectures (Troisi et al., 2020). The effective alignment of this IT infrastructure with business objectives is essential, as explored in the next section on strategic alignment.

2.2.4 The IT Productivity Paradox and its Resolution via Complementarities

Although the Resource-Based View argues that firm-specific resources such as IT can generate sustained competitive advantage, research in the late 1980s and early 1990s questioned this claim. Despite the rise in IT investment, productivity statistics showed little improvement, a phenomenon known as the "IT Productivity Paradox" (Brynjolfsson, 1993; Roach, 1987). Robert Solow's (1987) quip, "You can see the computer age everywhere but in the productivity statistics," captured this apparent disconnect.

Early Evidence of the Paradox

In the late 1980s and early 1990s, analyses consistently revealed a gap between rising IT spending and stagnant productivity growth. Macroeconomic studies showed that national productivity statistics failed to reflect the scale of computerization occurring within firms, leading to the impression that IT offered little measurable return (Solow, 1987; Brynjolfsson, 1993). This mismatch between investment and outcome gave rise to the IT Productivity Paradox and cast doubt IT's contribution to competitiveness.

Resolution: Complementarities and Time Lags

Later research showed that the paradox did not prove that IT was ineffective but rather reflected the way its benefits were measured and realized. Brynjolfsson and Hitt (1998) found that IT payoffs are delayed, becoming visible only after firms have redesigned processes, trained employees, and embedded new routines. While Dedrick, Gurbaxani, and Kraemer (2003) confirmed that IT productivity gains are maximized when combined with complementary organisational assets, including managerial capability and process innovation. Similarly, Powell and Dent-Micallef (1997) argued that IT generates competitive advantage only when it is integrated with human and business resources, and Bharadwaj (2000) highlighted that IT capability represents a complex bundle of processes, whose value emerges through firm-specific integration. Aral, Brynjolfsson, and Wu (2012) further demonstrated that firms that combine IT with HR analytics and performance-based pay achieve higher productivity, emphasizing the importance of integrated incentive systems.

Implications for Competitiveness

The paradox highlights an important insight: IT alone cannot secure competitiveness. Its benefits arise only when IT is accompanied by complementary resources and embedded within firm-specific capabilities. This finding links the Resource-Based View (RBV), which stresses resource possession, with Dynamic Capabilities framework, which explains how firms convert those resources into adaptive advantage by sensing, seizing, and reconfiguring in response to environmental change (Teece, 2007).

Having outlined the principal theoretical foundations of competitiveness, the next section examines how firms operationalize these principles through IT-business alignment and governance.

2.3 Strategic Alignment and IT Governance

Strategy is a firm's long-term plan to achieve its objectives and secure its market position. Chandler (1962) defined strategy as the planning and execution of a firm's growth, involving the setting of long-term goals and the creation of organisational structures to manage expanded activities and resources. Strategic decisions are the high-stakes commitments characterized by long-term consequences, significant resource investment, and the ability to shape the firm's trajectory (Harrison, 1996). Decisions on technology investments, such as Enterprise Resources Planning (ERP) systems or cloud adoption, are inherently strategic, as they redefine a firm's capacity for value creation, efficiency, and innovation.

2.3.1 The Strategic Alignment Model (SAM)

According to the Strategic Alignment Model (SAM), achieving high performance requires consistency across four domains: business strategy, IT strategy, organisational infrastructure, and IT infrastructure (Henderson & Venkatraman, 1993). This is accomplished through two critical alignments:

- **Strategic Fit:** Reflects the coherence between business and IT strategies. For instance, Zara achieves agility and cost leadership through real-time POS data feeding into just-in-time manufacturing and a centralized, highly automated logistics system (Aftab et al., 2018).
- **Functional Integration:** Refers to the internal consistency between organisational and IT infrastructures. For example, centralized procurement relies on an integrated ERP system. In contrast, misalignment can create a 'strategy-IT gap,' as when a retailer's e-commerce ambitions are undermined by legacy inventory systems, leading to wasted resources and diminished competitiveness.

Synthesis: The Bridge to Competitiveness

Through strategic alignment, IT shifts from a support function to a core element of strategic infrastructure that enables the competitiveness pillars outlined in Section 2.1.1:

- **Operational efficiency** is achieved through cost-focused systems such as ERP, supporting long-term profitability (Porter, 1980; Shang & Seddon, 2002).
- **Value creation** is enhanced through customer-centric platforms like CRM ecosystems, enabling sustained growth.

- **Innovation** is fostered through agile IT architectures that allow firms to conduct rapid experimentation and adaptation (Teece, 2007).

In this way, alignment links strategic theories (Porter's positioning, the Resource-Based View (RBV), and Dynamic Capabilities) to execution, closing the gap between strategic intent and realized outcomes. The following section examines Business Intelligence (BI) as the data-driven foundation for aligned decision-making.

2.3.2 IT Governance Archetypes and Alignment Maturity

While alignment models such as SAM explain the need for coherence between business strategies and IT, governance mechanisms address how this alignment is achieved. IT governance is the set of structures, processes, and relational mechanisms that guide decisions on IT resources, ensuring accountability and align technology with business goals (Weill & Ross, 2004). It clarifies who has decision rights over IT budgets, architecture, and applications, and how these decisions are coordinated across organisational levels.

Governance Archetypes

Weill and Ross (2004) outline several governance archetypes, ranging from centralized (decisions made by a corporate IT function) to decentralized (models granting autonomy to business units), and federal models that combine both. Each type shapes competitiveness differently: centralization promotes efficiency and cost management, while decentralization fosters adaptability and innovation.

Alignment Maturity

Beyond governance structure, alignment maturity models assess how consistently business and IT strategies are integrated over time. Luftman (2000) introduced a maturity framework in which firms evolve from initial or ad hoc alignment toward optimized, metrics-driven integration. At higher levels of maturity, stages are characterized by shared domain knowledge, cross-functional collabouration, and established measures of IT value. Empirical evidence supports this view: Luftman, Ben-Zvi, et al. (2010) show that firms with higher IT governance maturity scores generally achieve better business performance, indicating that maturity is not only theoretical but also materially connected to firm outcomes.

Implications: Why Similar IT Investments Produce Different Outcomes

The maturity of governance and alignment mechanisms help explain why firms with similar IT investments produce different outcomes. A firm that adopts an ERP system without clear governance or integration practices may fail to achieve the expected efficiencies, while another with mature governance processes may leverage the same system for strategic advantage. Thus, IT governance and alignment maturity act as moderating factors that shape whether IT resources translate into operational efficiency, value creation, and sustained competitiveness (Weill & Ross, 2004; Luftman, 2000).

Once alignment and governance are achieved, Business Intelligence (BI) becomes the analytical infrastructure that translates IT capability into informed, competitive decision-making.

2.4 Business Intelligence as a Strategic Capability

Business Intelligence (BI) refers to the techniques, technologies, and practices used to gather, integrate, and analyze key business data to support evidence-based decision-making. Core components include data extraction and integration (ETL), data warehousing, reporting and dashboards, and advanced analytics (e.g., data mining, predictive modeling, and visualization). BI systems integrate both internal and external data sources—including web, mobile, and sensor data-to provide a comprehensive business perspective (Chen et al., 2012).

In the era of Big Data-defined by high volume, velocity, and variety, BI helps organisations adapt to market changes and predict disruptions, shifting decision-making from intuition-based to evidence-driven and thereby enhancing competitiveness. For instance, e-commerce platforms use recommender systems to increase consumer engagement, while healthcare providers apply BI-driven analytics to improve patient outcomes (Chen et al., 2012; Foley & Guillemette, 2010).

Moreover, BI addresses the shortage of analytical talent by offering scalable and accessible platforms that enable non-specialists to perform complex analyses. In turn, BI has evolved from an IT support tool into a strategic capability that is essential for sustaining competitiveness in data-intensive markets (Chen et al., 2012).

2.4.1 BI through the Three Lenses (Porter/RBV/DC)

Based on its established architecture (Chen et al., 2012), Business Intelligence (BI) serves as a strategic enabler, linking information technology with competitiveness. Within Porter's framework, BI supports cost leadership by enhancing efficiency and drives differentiation through data-driven personalization and innovation (Porter, 1980).

From a Resource-Based View (RBV) perspective, BI meets the VRIN criteria when embedded in proprietary data, firm-specific routines, and managerial know-how that are difficult to imitate (Barney, 1991). As Bharadwaj (2000) demonstrates, IT capability—including infrastructure, human expertise, and IT-enabled intangibles-becomes a strategic asset when these resources are integrated and socially embedded.

From a Dynamic Capabilities perspective, BI enables firms to sense, seize, and reconfigure in response to environmental change (Teece et al., 2007). Empirically, Pavlou and El Sawy (2011) argue that these capabilities are information-intensive, with IT strengthening sensing, learning, integration, and coordination routines. More recent evidence confirms that big data analytics capabilities significantly enhance firm performance, mediated through dynamic capabilities (Wamba et al., 2017).

2.4.2 Evidence and Impact across Industries

The strategic role of Business Intelligence (BI) is supported by substantial empirical and case-based evidence across industries.

Empirical studies show broad adoption and measurable business value. According to a *Bloomberg Businessweek* survey, 97% of companies with revenues over $100 million use business analytics, highlighting BI's pervasive role in large firms. Similarly, the McKinsey Global Institute forecasted a U.S. shortage of up to 190,000 advanced analytics experts and 1.5 million data-oriented managers, underscoring BI's necessity for large-scale decision-making (Chen et al., 2012). Furthermore, the literature identifies five key benefit dimensions—operational, managerial, strategic, IT infrastructure, and organisational—demonstrating how BI contributes to efficiency, resource management, and long-term competitiveness.

Industry applications provide concrete evidence of BI's impact on performance. In e-commerce, Amazon and eBay have leveraged BI-enabled platforms and recommender systems to drive major market transformations (Chen et al., 2012). While Netflix's recommender system alone drives 80% of viewing hours, saving over $1 billion annually by reducing churn and expanding effective catalog diversity (Gomez-Uribe & Hunt, 2015). In healthcare, analytics based on electronic health records enable large-scale studies of disease progression, while BI tools such as COPLINK systems are deployed by over 4,500 police agencies in the U.S. and 25 NATO countries to improve intelligence sharing (Chen et al., 2012).

Corporate transformations further illustrate BI's strategic role. Adobe's transition to a SaaS model driven by APIs and analytics has shifted the firm from product sales to subscription services, fostering recurring revenue, customer loyalty, and continuous improvement (Riesener et al., 2020). Similarly Microsoft's Intelligent Cloud segment, anchored by Azure, achieved 29% year-over-year revenue growth, reflecting the rising demand for analytics and BI-enabled infrastructure (Microsoft, 2023)

Taken together, These findings demonstrate BI's capacity to deliver operational efficiency, personalized differentiation, and adaptive innovation, turning theoretical competitiveness frameworks into observable business outcomes.

2.4.3 Challenges and Limits

Implementation Costs and Legacy Systems

The adoption of Business Intelligence (BI) systems is often constrained by substantial financial investment, as implementation expenses can exceed software licensing fees by a factor of five to ten. The financial burden is further intensified by legacy systems, where either replacing or integrating outdated platforms entails significant costs, as shown by UtilityCoA's replacement of 17 systems (Shang & Seddon, 2002). Furthermore, organisations must recognize that BI adoption demands ongoing financial commitment, to continuously fund vendor-supported upgrades and system modifications.

Talent Shortages

The effective use of BI requires both advanced analytical talent and data-savvy managers to act on insights. The McKinsey Global Institute projected a U.S. shortfall of 140,000-190,000 analytical professionals and 1.5 million capable managers by 2018 (Chen et al., 2012; Manyika et al., 2011). This gap reduces the capacity of organisations to fully leverage BI for decision-making.

Data Integration and Reliability

BI's effectiveness is predicated on the availability of reliable and unified data. Practically, organisations often face fragmented sources, stovepipes, and heterogeneous formats, especially in security and e-government domains (Chen et al., 2012). When systems operate on inaccurate or unreliable data, their strategic value is sharply constrained (Chen et al., 2012; Park et al., cited therein). The challenge of integrating semi-structured data further compounds these issues, which may require advanced platforms such as Hadoop or semantic ontologies.

Governance, Privacy, and Ethical Concerns

In sensitive domains such as healthcare, knowledge extraction is governed by stringent regulations, including HIPAA and IRB protocols, which drive the demand for privacy-preserving data mining techniques. Similarly, security informatics often relies on large-scale surveillance data—including criminal records, multilingual sources, and the Dark Web, raising broader concerns about civil liberties and responsible use. Even celebrated projects such as Netflix's Prize, highlight how analytics initiatives can inadvertently create privacy risks (Chen et al., 2012). More recent studies also underscore risks in today's AI-driven analytics, such as the opacity of algorithmic decision-making, unjust classifications, and the need for stronger governance mechanisms (Günther et al., 2017).

Limits to Sustained Advantage

As noted in the RBV framework (Barney, 1991), standardised BI systems alone fail to meet VRIN criteria, limiting their potential to deliver a lasting advantage. Sustained competitiveness arises when BI is embedded in firm-specific infrastructures, tacit IT skills, and socially complex intangibles that resist imitation or substitution (Bharadwaj, 2000).

Therefore, BI's promise of measurable value is paradoxical, hinging on the mitigation of structural, organisational, and ethical limitations that prevent it from being a simple or guaranteed source of competitive advantage.

2.4.4 Cybersecurity, Privacy, and Trust as Competitive Constraints

With growing digitalization and data dependence, cybersecurity and privacy have become central to competitive sustainability. Even a single security breach can trigger operational losses, legal penalties, and reputational damage that weaken customer confidence and reduce market value (Cavusoglu, Mishra, & Raghunathan, 2004). Therefore, security and data governance are no longer merely support functions but strategic capabilities, serving to both protect and drive business performance.

Cybersecurity as a Strategic Capability

Cybersecurity protects digital assets while enhancing stakeholder confidence. From a resource-based perspective, security capabilities that combine technical systems with organisational routines and employee awareness can achieve VRIN characteristics (valuable, rare, inimitable, and non-substitutable) and serve as a foundation for long-term advantage (Werlinger, Hawkey, & Beznosov, 2009). Empirical studies further show that firms integrating security governance and employee-focused compliance programs achieve greater resilience and sustained performance outcomes (Bulgurcu, Cavusoglu & Benbasat, 2010).

Privacy and Trust as Market Differentiators

Data privacy and ethical data practices also serve as strategic differentiators in data-intensive industries. Compliance with frameworks such as the EU General Data Protection Regulation (European Commission, 2018) reinforces institutional legitimacy and stakeholder trust. Meanwhile, adopting privacy-by-design principles improves customer loyalty and strengthens brand equity (Martin, Borah, & Palmatier, 2017).

Synthesis

In the digital era, competitiveness depends not only on innovation and efficiency but also on trust. Firms that balance security, agility, and responsible data management are better positioned to secure and sustain IT-enabled advantages over time.

The preceding sections have defined the mechanisms through which IT improves competitiveness. The following synthesis presents a conceptual framework that serves as the foundation for the empirical analysis.

2.5 Synthesis: Conceptual Framework and Research Hypotheses

The discussion so far has established that firm competitiveness is not determined by technology adoption alone, but by how Information Technology (IT) capabilities are aligned, governed, and transformed into Business Intelligence (BI) capabilities that strengthen dynamic capabilities and overall performance.

This section synthesizes these relationships into a single conceptual framework and presents the hypotheses to be tested empirically in the following chapter

2.5.1 Conceptual Integration

The literature indicates a sequential relationship among the constructs discussed:

1. **IT Capability** underpins the technological foundation that enables effective operational and strategic processes (Bharadwaj, 2000).
2. **Strategic Alignment and IT Governance** play a central role in ensuring how effectively IT resources are integrated with business objectives (Henderson & Venkatraman, 1993; Weill & Ross, 2004).
3. Effective alignment promotes **Business Intelligence Capability**, enabling firms to transform data into actionable insights for decision-making (Chen et al., 2012).
4. **Dynamic Capabilities:** sensing, seizing, and reconfiguring, transform these insights into adaptability and innovation (Teece, 2007; Pavlou & El Sawy, 2011).
5. The result is **firm Competitiveness**, reflected in efficiency, innovation, and sustained performance (Porter, 1980; OECD, 2019).
6. Finally, **Cybersecurity, privacy, and trust** moderate the BI → Dynamic Capabilities relationship by strengthening or weakening how analytics insights are converted into sensing, seizing, and reconfiguring (Werlinger et al., 2009; Martin et al., 2017).

In sum, competitiveness results from an integrated IT-business ecosystem linking capabilities → alignment → intelligence → adaptability → competitiveness, with digital trust mechanisms moderating these relationships.

2.5.2 Research Hypotheses

Based on the conceptual framework, the following hypotheses are proposed:

H1: IT capability positively influences strategic alignment.
Firms with well-developed IT infrastructure, human skills, and effective integration practices tend to achieve higher strategic alignment between business and IT domains (Bharadwaj, 2000; Henderson & Venkatraman, 1993).

H2: Strategic alignment positively influences Business Intelligence capability.
When IT and business objectives are aligned, organisations are better positioned to develop data-driven decision systems and analytics functions (Luftman, 2000; Chen et al., 2012).

H3: Business Intelligence capability positively influences Dynamic Capabilities.
BI systems strengthen firms' sensing, seizing, and reconfiguring processes by transforming information into real-time learning and adaptive action (Pavlou & El Sawy, 2011; Wamba et al., 2017).

H4: Dynamic Capabilities positively influence firm competitiveness.
A firm's capacity to sense opportunities, seize them effectively, and reconfigure resources drives sustained innovation, operational efficiency, and long-term market advantage (Teece, 2007).

H5: Strategic alignment mediates the relationship between IT capability and Business Intelligence capability.
IT investments contribute to BI development primarily when alignment ensures that technology supports strategic goals (Weill & Ross, 2004; Luftman, 2000).

H6: Cybersecurity, privacy, and trust positively moderate the relationship between Business Intelligence capability and Dynamic Capabilities. The impact of Business Intelligence on Dynamic Capabilities is stronger when levels of cybersecurity, privacy, and trust are high.

Firms that maintain strong data governance and privacy frameworks are better positioned to convert analytics into sustainable competitive advantage (Martin et al., 2017).

2.5.3 Conceptual Model

The conceptual model illustrates the relationships among the core constructs: IT Capability influences Strategic Alignment, which enhances Business Intelligence Capability and subsequently strengthens Dynamic Capabilities, leading to firm Competitiveness, with Cybersecurity, Privacy, and Trust moderating the link from Business Intelligence Capability to Dynamic Capabilities.

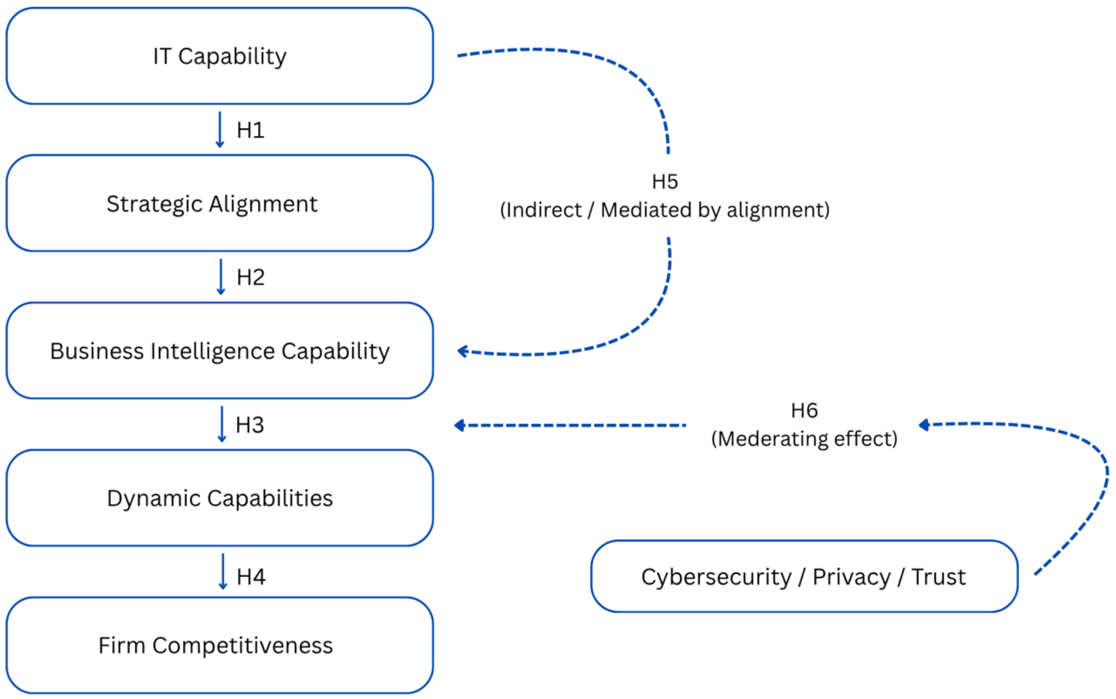

Figure 2.1. Conceptual Model of IT-Enabled Competitiveness (CPT moderates the BI → DC path). Source: own editing.

In summary, this framework provides the theoretical foundation for the empirical stage of the research. The next chapter presents the research design, survey instrument, and data analysis methods used to test these hypotheses.

3. Methodology

3.1 Research Design

The study uses a quantitative, cross-sectional survey to examine the role of information technology in increasing business competitiveness. The research follows an explanatory approach, estimating directional relationships between the main constructs (IT capability → strategic alignment → Business Intelligence (BI) capability → dynamic capabilities → firm competitiveness), with (cybersecurity, privacy, and trust moderating the Business Intelligence capability → dynamic capabilities).

This design was selected because it enables standardised measurement across diverse organisations and provides practical way to test the theory within a limited timeframe. All data were collected at a single point in time by using Google Forms.

3.2 **Population, Sampling, and Sample Size**

The target population is individuals with organisational work experience across various functions (e.g., IT, Finance, Operations), where IT plays a strategic or operational role. A non-probability approach was applied, combining purposive and snowball sampling. The survey was distributed anonymously through professional networks (LinkedIn, colleagues from the researcher's current company, and a network of corporate friends who further shared the survey within their own professional circles). This approach helped reach a relevant and diverse set of respondents with direct organisational experience.

Inclusion criteria:

1. Respondents with organisational work experience (answered "Yes" to the work-experience screening question).
2. Passed the attention check ("select 4").
3. Completed all construct items used in the model.

Exclusion criteria:

1. failed the attention check.
2. responses with no variation (e.g., identical ratings for nearly all questions).
3. Duplicate entries identified by identical timestamps or responses).
4. Responses with unusually short completion times.

In total, 102 responses were collected through the online questionnaire, after data cleaning, 90 valid responses passed for analysis. The sample size is appropriate for quantitative analysis and for testing the relationships proposed in the research model.

3.3 **Measures of Variables**

All variables were measured through statements rated on a 5-point Likert scale (1 = Strongly disagree, 5 = Strongly agree).

- **IT Capability (ITC):** system reliability and scalability, regular IT investment, employee IT skills, data and process integration.
- **Strategic Alignment (ALIGN):** IT supports business priorities, shared strategy between management and IT, regular joint planning, strategy-based project selection.
- **Business Intelligence Capability (BI):** Timely and accurate data, use of dashboards, trend identification, combining data sources for insights.
- **Dynamic Capabilities (DC):** sensing market changes, acting quickly, reconfiguring resources, and learning from past projects experiences.
- **Firm Competitiveness (COMP):** performance versus competitors, customer value, and speed of innovation.
- **Cybersecurity-Privacy-Trust (CPT, moderator):** strength of cybersecurity practices, employee training and awareness, stakeholder trust in data handling.

Control variables included Organisation size, industry, region of operation, role seniority, function, and tenure, which support the findings.

The Google Form Survey contained duplicate statements in several blocks, which were assigned to the correct construct before analysis.

3.4 Data Collection Procedure

The questionnaire was administered online via Google Forms. Participation was entirely voluntary and anonymous, and respondents were informed that their answers would be used only for academic research. An attention check (‘Select 4’) was included to ensure response quality. No personal or identifying data was collected.

3.5 Data Preparation and Quality Screening

After data collection, the dataset was exported to Microsoft Excel for cleaning and analysis. Each entry was assigned a unique identification. The Inclusion and exclusion criteria were applied to ensure data quality. Duplicate or incomplete records were removed, and Likert-scale responses were ensured to fall within the 1-5 range. All questions were mandatory, missing data were not expected, and the dataset was checked to confirm full completion. Responses were screened for straight-lining and unrealistically short completion items, which were removed. The final step involves creating an analysis-ready dataset and codebook for reference.

3.6 Analysis Strategy

Data analysis was performed using Microsoft Excel, following the approach:

1. Reliability Analysis: Cronbach's Alpha was calculated for each construct to test the internal consistency. All results were above 0.80 threshold, confirming acceptable reliability.
2. Descriptive Statistics: Mean, standard deviation, minimum, and maximum values were calculated to summarize the distribution of each construct.
3. Correlation Analysis: Pearson correlation coefficients were calculated to examine the strength and direction of relationship among the constructs, providing a testing for hypothesis evolution (H1-H6).

This approach provided a transparent and replicable survey-data analysis process, which aligned with the research's quantitative design.

3.7 Reliability and Validity

The reliability and validity of the survey were evaluated using Cronbach's Alpha, with all constructs scoring above 0.80 indicating a strong internal consistency (ITC = 0.81, ALIGN = 0.80, BI = 0.82, DC = 0.80, COMP = 0.81, CPT = 0.82).

Construct validity was supported by aligning the survey items with concepts discussed in the literature. Since the same validated item structure was adopted from previous studies on IT capability, alignment, BI, and competitiveness, the measures were viewed as conceptually valid for this research context.

3.8 Ethical Considerations

Participation was voluntary and anonymous. Respondents could stop at any point before submission. No personal identifiers or sensitive company information were collected. Results are presented only in aggregated form. The study follows the university's research ethics guidance and is for academic purposes only.

4. Results and Evaluation

This chapter represents the results of the study obtained from the survey, examining how information technology contributes to business competitiveness through strategic alignment, Business Intelligence capability (BI), and dynamic capabilities, with Cybersecurity-Privacy-Trust (CPT) included as a moderating factor. This section provides an overview of the reliability findings, descriptive statistics, inter-construct correlations, and the evaluation of hypotheses.

4.1 Reliability Analysis

Internal consistency was evaluated using Cronbach's alpha and the average inter-item correlation. As shown in the table 4.1, all constructs exceeded the recommended 0.70 threshold, confirming strong reliability across the six dimensions (n = 90).

Table 4.1. Reliability Analysis of Constructs

Construct	**Items**	**Average inter-item correlation** ($\bar{r}$)	**Cronbach's α**
IT Capability (ITC)	ITC1 – ITC4	0.529	0.818
Strategic Alignment (ALIGN)	ALIGN1 – ALIGN4	0.512	0.808
Business Intelligence (BI)	BI1 – BI4	0.534	0.821
Dynamic Capabilities (DC)	DC1 – DC4	0.514	0.809
Firm Competitiveness (COMP)	COMP1 – COMP3	0.592	0.813
Cybersecurity-Privacy-Trust (CPT)	CPT1 – CPT3	0.605	0.821

Source: own editing (based on survey data collected by the author)

All constructs' results achieved Cronbach's α between 0.808 and 0.821, which reflects high internal consistency and reliability of measurement. This means the items measured the intended constructs.

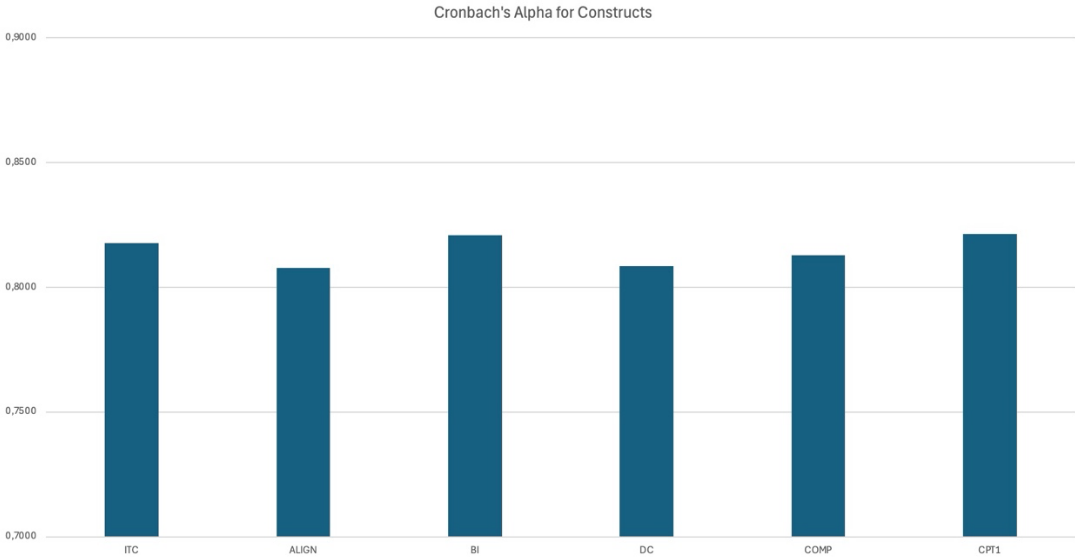

Figure 4.1. Cronbach's α by Construct, n = 90. Source: own editing.

4.2 Descriptive Statistics

Descriptive statistics were calculated to understand the central tendencies and how much responses varied across constructs. The next table 4.2 summarises the mean, standard deviation, and range (minimum-maximum) values across the dataset (n = 90).

Table 4.2. Descriptive Statistics of Constructs

Construct	Mean	Standard deviation	Minimum	Maximum
IT Capability (ITC)	3.55	0.85	1	5
Strategic Alignment (ALIGN)	3.52	0.76	1	5
Business Intelligence (BI)	3.60	0.85	1	5

Dynamic Capabilities (DC)	3.40	0.85	1	5
Firm Competitiveness	3.62	0.81	1	5
Cybersecurity-Privacy-Trust (CPT)	3.86	0.83	1	5

Source: own editing (based on survey data collected by the author)

Means range from 3.40 (DC) to 3.86 (CPT), showing that respondents viewed their organisations as performing moderately to strongly across all IT-related dimensions. The lower average for DC indicates that firms may still struggle with adaption and resource reconfiguration, even when IT systems are present. By contrast, the highest value for CPT (M = 3.86, SD = 0.83), suggesting that respondents view cybersecurity, privacy, and trust as well-developed areas in their organisations.

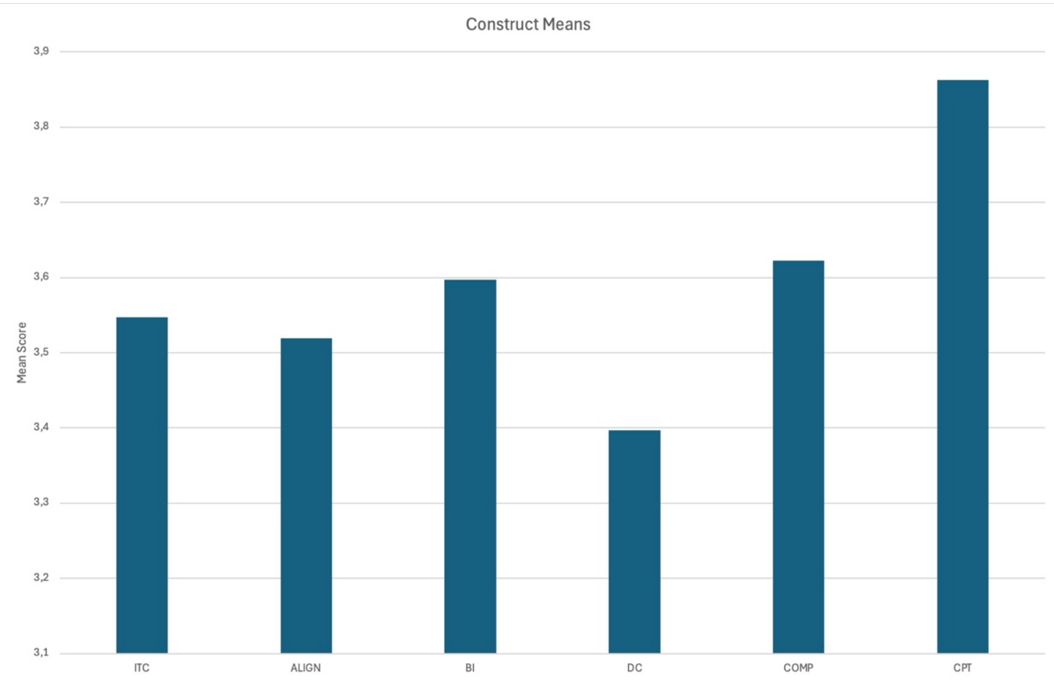

Figure 4.2. Construct means (ITC, ALIGN, BI, DC, COMP, CPT), n = 90. Source: own editing.

4.3 Correlation Analysis

Correlation analysis was performed to test the strength and direction of relationships between the six constructs. Pearson correlations were computed using all valid responses (n = 90). Table 4.3 reports Pearson correlation coefficients.

Table 4.3. Correlations Between Constructs

Constructs	ITC	ALIGN	BI	DC	COMP	CPT
IT Capability (ITC)	1					
Strategic Alignment (ALIGN)	0.697	1				
Business Intelligence (BI)	0.646	0.618	1			
Dynamic Capabilities (DC)	0.526	0.571	0.675	1		
Firm Competitiveness (COMP)	0.509	0.585	0.607	0.676	1	
Cybersecurity-Privacy-Trust (CPT)	0.554	0.509	0.452	0.373	0.543	1

Source: own editing (based on survey data collected by the author)

The results show all correlations were positive and significant, suggesting that higher IT capability is linked with greater strategic alignment, Business Intelligence capability, dynamic capabilities, and competitiveness. The strongest correlations were found between ITC with ALIGN (r = 0.697), and Dynamic Capabilities and Firm Competitiveness (r = 0.676). Both results indicate strong linear relationships.

	ITC	ALIGN	BI	DC	COMP	CPT
ITC	1,000	0,697	0,646	0,526	0,509	0,554
ALIGN	0,697	1,000	0,618	0,571	0,585	0,509
BI	0,646	0,618	1,000	0,675	0,607	0,452
DC	0,526	0,571	0,675	1,000	0,676	0,373
COMP	0,509	0,585	0,607	0,676	1,000	0,543
CPT	0,554	0,509	0,452	0,373	0,543	1,000

Figure 4.3. Pearson correlations among constructs (darker shading = stronger |r|), n = 90. Source: own editing.

4.4 Hypothesis Testing Overview

While the study did not use modelling tools (e.g., SmartPLS), the relationships among the constructs were examined using Pearson correlations. this approach allows the study to examine the linear associations in (H1-H4) and treated (H5-H6) as theory-consistent but not directly tested.

Table 4.4. Summary of Hypothesis Evaluation

Hypothesis	Path	Relationship Observed	Supported
H1	ITC → ALIGN	Strong positive (r = 0.70)	Supported
H2	ALIGN → BI	Positive (r = 0.62)	Supported
H3	BI → DC	Strong positive (r = 0.68)	Supported
H4	DC → COMP	Strong positive (r = 0.68)	Supported
H5	ALIGN mediates ITC → BI	Mediation cannot be tested with bivariate correlations	Not directly testable, theory-consistent only
H6	CPT moderates BI → DC	Moderation cannot be tested with bivariate correlations; CPT shows r with BI = 0.452 and with DC = 0.373	Not directly testable, exploratory only

Source: own editing (based on survey data collected by the author)

These results confirm that stronger IT capability is linked with higher strategic alignment, which in turn relates positively to Business Intelligence capability and dynamic capabilities (H1-H4). These findings suggest that organisations with higher developed IT foundations and better alignment practices report stronger analytical and adaptive capabilities.

H5 and H6 involve mediation and moderation mechanisms, which cannot be empirically tested using correlations. The correlations with CPT provide only exploratory indications its contextual influence. While cybersecurity, privacy, and trust show positive associations with both BI and DC, these correlations alone are not enough to demonstrate statistical moderation. Overall, the findings support the main directions of the conceptual model, while the more complex causal paths remain theoretical within the scope of this analysis.

4.5 Discussion of Findings

The findings provide a solid empirical support for the central relationship proposed in the conceptual model. Organisations with higher IT capability are more likely to achieve strong strategic alignment, confirming that firms with well-developed IT resources help to create a tighter fit between business and technology priorities (supporting H1). In turn, stronger alignment is associated with higher levels of Business Intelligence (BI) (supporting H2), which says that BI is more effective in organisations that manage to coordinate their IT and business strategies.

The positive relationship between BI and dynamic capabilities (H3) suggests that firms with stronger analytical capability tend to sense and respond to market changes. Dynamic capabilities show also a strong relationship with competitiveness (H4), which support the idea that quick adaption and organisational learning play a key role in driving performance.

In this analysis, the mediating role of alignment (H5) and Cybersecurity-Privacy-Trust (CPT) remain theoretical in this study. These mechanisms cannot be tested with correlation analysis alone. The moderate correlations between CPT, BI, and DC suggest that cybersecurity and trust may help create a supportive organisational climate, but they are not sufficient to demonstrate moderation. Instead, the results suggest that CPT functions more as an enabling context than a direct driver of adaptation in this dataset.

Overall, the results are consistent with the existing theoretical frameworks discussed earlier, the Strategic Alignment Model (Henderson & Venkatraman, 1993), information intensive dynamic capabilities (Pavlou & El Sawy, 2011), and on IT-enabled competitiveness (Teece et al., 1997). The evidence indicates that IT capability affects competitiveness primarily through better alignment and stronger intelligence and adaptive capabilities.

5. Conclusions and Suggestions

5.1 Conclusions

The results of the study supported the main logic of the proposed model. Strong IT capability is associated with better strategic alignment, which in turn relates positively to Business Intelligence (BI). The results further show that Business Intelligence capability is linked to stronger dynamic capabilities, and dynamic capabilities are closely tied to competitiveness. These findings indicate that IT contributes to competitiveness indirectly, through alignment, analytical capability, and adaptive routines. Although the potential mediating and moderating effects (alignment and cybersecurity-privacy-trust) could not be tested with the chosen methods; however, the observed associations are consistent with the theoretical expectations.

5.2 Answers to Research Questions

RQ1: supported – IT capability relates positively to strategic alignment.

RQ2: supported – alignment relates positively to Business Intelligence capability.

RQ3: supported – Business Intelligence capability relates positively to dynamic capabilities.

RQ4: supported – dynamic capabilities relate positively to competitiveness.

RQ5: Not tested statistically – alignment likely plays a mediating role.

RQ6: Not tested statistically – cybersecurity-privacy-trust appears supportive but not confirmed as a moderator.

5.3 Managerial Suggestions

- Prioritise system reliability, integration, and regular IT upgrading to support alignment.
- Use joint business-IT planning and strategy-driven project selection to help strengthen Business Intelligence capability.
- Ensure Business Intelligence (BI) dashboards are standardised and embed their use into weekly decision routines.
- Establish sensing indicators and regular review practices to improve dynamic capabilities.
- Maintain strong cybersecurity, privacy, and trust processes to ensure data can be used safely and confidently.

5.4 Limitations

As the study is based on cross-sectional, self-reported data and convenience sampling limit, the results cannot be generalised broadly and do not support causal claims. The use of descriptive and correlation analysis does not allow testing of mediation or moderation, leaving H5 and H6 at a theoretical level.

5.5 Future Research

Future research should apply structural equation modelling (e.g., PLS-SEM) to test the full pathway, including mediation and moderation effects, and make use of larger more diverse samples, multi-sources data, and longitudinal approaches. Expanding the model to include AI and data-governance capabilities, which would better reflect today's technological environment.

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Annex1. Survey Questionnaire

Screening Question

1. Do you have organizational work experience you can refer to for this survey?
   Yes / NO

Selection A. Background Information

2. **Your main function:**
   IT / Information Systems
   Data / Analytics / Business Intelligence
   Operations / Supply Chain
   Finance / Controlling
   Marketing / Controlling
   Human Resources
   General Management
3. **Organization size:**
   1-49 employees
   50-249 employees
   250-999 employees
   1000-4999 employees
   5000+ employees
4. **Industry:**
   Manufacturing
   Services
   Healthcare
   Retail
   Public Sector
   Technology
5. **Role seniority:**
   Intern/Trainee
   Individual Contributor
   Team Lead/Manager
   Senior Leadership (Director/VP/C-level)
   External (self-employed/consultant/owner)
6. **Time spent with organization:**
   < 6 months
   6-12 months
   1-3 years
   3-5 years
   5-10 years
   10+ years
7. **Where does your organisation mainly operate**
   EU/EEA

United Kingdom
North America
Middle East
Africa
Asia-Pacific
Latin America
Multiple regions/Global

8. **Attention check (please select 4):**
1
2
3
4
5

Section B. Main Constructs (5-point Likert scale)

Scale used:

1 = Strongly disagree

2 = Disagree

3 = Neither agree nor disagree

4 = Agree

5 = Strongly agree

IT Capability (ITC)

B1. Our core IT systems are reliable and scalable.

B2. We invest regularly to improve key IT systems.

B3. People here have the IT skills to use systems well.

B4. Data and processes are integrated across departments.

Strategic Alignment (ALIGN)

B5. Our IT work supports business priorities.

B6. Senior management and IT share a common view of strategy.

B7. IT roadmaps are aligned with business plans on a regular cycle.

B8. Projects are selected for their strategic contribution.

Business Intelligence Capability (BI)

B9. We have timely, accurate data for decisions.

B10. Managers use dashboards or analytics in daily work.

B11. Our analytics help us spot trends and opportunities

B12. We can combine data from different sources to gain insights.

Dynamic Capabilities (DC)

B13. We detect customer or market changes quickly.

B14. We act fast to capture new opportunities.

B15. We can change processes or resources when needed.

B16. We use lessons from past projects to adapt.

Firm Competitveness (COMP)

B17. Our performance is strong compared to competitors.

B18. We deliver superior value to customers.

B19. We improve or innovate faster than peers.

Cybersecurity-Privacy-Trust (CPT)

B20. Our cybersecurity practices are strong.

B21. Employees are trained to protect data and privacy.

B22. Customers and partners trust us with their data.

Annex 2. Codeboke (Item-Construct Mapping)

Item Code	Survey Question	Construct	Scale
ITC1	Our core IT systems are reliable and scalable	IT Capability	1-5 Likert
ITC2	We invest regularly to improve key IT systems	IT Capability	1-5 Likert
ITC3	People here have the IT skills to use systems well	IT Capability	1-5 Likert
ITC4	Data and processes are integrated across departments	IT Capability	1-5 Likert
ALIGN1	IT supports business priorities	Strategic Alignment	1-5 Likert
ALIGN2	Shared view of business and IT strategy	Strategic Alignment	1-5 Likert
ALIGN3	IT and business plans are aligned cyclically	Strategic Alignment	1-5 Likert
ALIGN4	Projects are selected based on strategy	Strategic Alignment	1-5 Likert
BI1	We have timely, accurate data for decisions	Business Intelligence Capability	1-5 Likert
BI2	Managers use dashboards or analytics daily	Business Intelligence Capability	1-5 Likert
BI3	Analytics help detect trends and opportunities	Business Intelligence Capability	1-5 Likert
BI4	We combine data from multiple sources for insights	Business Intelligence Capability	1-5 Likert
DC1	We sense market or customer changes quickly	Dynamic Capabilities	1-5 Likert
DC2	We act fast to seize new opportunities	Dynamic Capabilities	1-5 Likert
DC3	We can reconfigure resources when needed	Dynamic Capabilities	1-5 Likert
DC4	We learn from past projects to adapt	Dynamic Capabilities	1-5 Likert
COMP1	Our performance is strong versus competitors	Firm Competitiveness	1-5 Likert
COMP2	We deliver superior value to customers	Firm Competitiveness	1-5 Likert
COMP3	We innovate faster than peers	Firm Competitiveness	1-5 Likert
CPT1	Our cybersecurity practices are strong	Cybersecurity-Privacy-Trust	1-5 Likert
CPT2	Employees are trained on data privacy and security	Cybersecurity-Privacy-Trust	1-5 Likert
CPT3	Stakeholders trust us with data	Cybersecurity-Privacy-Trust	1-5 Likert
function	Respondent's main work function	Demographic	Categorical
org_size	Organization size category	Demographic	Categorical
industry	Industry category	Demographic	Categorical
seniority	Role seniority	Demographic	Categorical
tenure	Work tenure	Demographic	Categorical
region	Region of operation	Demographic	Categorical
work_experience	Indicates if respondent has organizational work experience	Screening	Yes/No
attention_check	Response to the attention check ("select 4")	Screening	05.Jan

Annex 3. Statistical Outputs

Table A3.1 Reliability Analysis of Constructs (Cronbach's Alpha)
Source: Own editing based on survey data (n=90).

Construct	Item	Avg inter-item corr (r̄)	Cronbach's α
IT Capability (ITC)	ITC1-ITC4	0,528759886	0,817792282
Strategic Alignement (ALIGN)	ALN1-ALN4	0,512479555	0,807869072
Business Intelligence (BI)	BI1-BI4	0,534035843	0,82092817
Dynamic Capabilities (DC)	DC1-DC4	0,513649433	0,808594859
Firm Competitiveness (COMP)	COMP1-COMP3	0,591616887	0,81294577
Cybersecurity-Privacy-Trust (CPT)	CPT1-CPT3	0,605332604	0,821471205

Table A3.2. Descriptive Statistics of Constructs
Soruce: Own editing based on survey data.

Construct	Mean	Standard Deviation	Minimum	Maximum
IT Capability (ITC)	3,547222222	0,853688662	1	5
Strategic Alignment (ALIGN)	3,519444444	0,761824187	1	5
Business Intelligence (BI)	3,597222222	0,851877013	1	5
Dynamic Capabilities (DC)	3,397222222	0,845422609	1	5
Firm Competitivemess (COMP)	3,622222222	0,809124	1	5
Cybersecurity-Privacy-Trust (CPT)	3,862962963	0,82998495	1	5

Table A3.3 Pearson Correlation Matrix
Source: Own editing based on survey data (n=90).

Column1	ITC	ALIGN	BI	DC	COMP	CPT
ITC	1,000	0,697	0,646	0,526	0,509	0,554
ALIGN	0,697	1,000	0,618	0,571	0,585	0,509
BI	0,646	0,618	1,000	0,675	0,607	0,452
DC	0,526	0,571	0,675	1,000	0,676	0,373
COMP	0,509	0,585	0,607	0,676	1,000	0,543
CPT	0,554	0,509	0,452	0,373	0,543	1,000

Declaration of Students and Doctoral Candidates on the Use of Artificial Intelligence (AI)"

1. general information:

Name of the student:	Mennatallah K. M. Nassar
Neptun ID:	O7ZH9V
Level of program (mark with X):	☑ BSc/BA ☐ MSc/MA ☐ Doctoral School (PhD) ☐ Other: ....
Name and code of the subject*:	B-GOD-N-EN-GAZME
Title of the work:	The Role of Information technology in increasing Business competitiveness

* Not required to be completed in the case of a doctoral dissertation.

2. Declaration on the Use of AI

I, the undersigned, fully aware of my ethical responsibility, make the following declaration:

(Please choose one of the options below!)

☑ A) I have not used any artificial intelligence system or service.

(If you selected this option, completing the subsequent tables is not required.)

☐ B) I have used an artificial intelligence system or service.

(Please fill in the relevant tables!)

3. Details of Artificial Intelligence Usage

TABLE I: Assistant or Minor Usage (e.g., translation, language proofreading, brainstorming, etc.)

(For these uses, attaching the specific prompts and responses is not required.)

Purpose of Use	Name and Version of the AI Tool Used	Affected Section (if not applicable to the entire text)

TABLE II: Significant Content Contribution (e.g., generating an entire figure or a longer text section)

(In these cases, documenting the key prompts used and the raw responses provided by the AI, and attaching them as an appendix to the work, is required.)

Purpose of Use	Name, Version, and Access Information	Exact Number of the Affected Chapter /	Entry Number of the Appendix

	of the AI Tool Used	Figure / Table	Containing the Prompt Log

3/A. Additional Rules Prescribed by the Lecturer (if any)

If the instructor or supervisor of the course has established specific rules or expectations regarding the use of AI tools, please summarize them in the field below:

For example: prohibition of AI use for certain types of tasks; only specific tools are permitted; different citation requirements; documentation format, etc.

Rules Prescribed by the Lecturer or Supervisor

....

....

....

....

4. Declaration Applicable to All Students:

I declare that I have critically reviewed, edited, and incorporated any content potentially generated by AI in all cases. I take full responsibility for every element of the submitted work, including its originality and scientific validity. I acknowledge that the Hungarian University of Agriculture and Life Sciences may check the submitted work with an artificial intelligence detector and may initiate proceedings if my declaration is found to be false or incomplete.

Place and Date: ....Gödöllő.........., 2025. .....11..... month ..10.. day

....

Signature of the Student **Signature of the Advisor/Supervisor**

MATE Organizational and Operational Regulations
III. Requirements for Students
III.1. Study and Examination Regulations
Appendix 6.13: The MATE Uniform Thesis /thesis / final thesis / portfolio guidelines
Annex 4.2: Declaration of public access and authenticity of the thesis/thesis/dissertation/portfolio

DECLARATION

the public access and authenticity of the thesis/dissertation/portfolio[1]

Student's name: Mennatallah K. M. Nassar
Student's Neptun code: O7ZH9V
Title of thesis: The Role of Information Technology in Increasing Business competitiveness
Year of publication: 2025
Name of the consultant's institute: Institute of Agricultural and Food Economic
Name of consultant's deparment: Department of Agricultural Business and Economic

I declare that the final thesis/thesis/dissertation/portfolio[2] submitted by me is an individual, original work of my own intellectual creation. I have clearly indicated the parts of my thesis or dissertation which I have taken from other authors' work and have included them in the bibliography. Furthermore, I declare that the artificial intelligence tools (e.g. text generation, linguistic correction, translation, data analysis) used during the preparation of the thesis did not substitute my own research and creative work; their use was indicated either in the list of sources or in the methodology section, and I acted in accordance with professional and ethical expectations.

If the above statement is untrue, I understand that I will be disqualified from the final examination by the final examination board and that I will have to take the final examination after writing a new thesis.

I do not allow editing of the submitted thesis, but I allow the viewing and printing, which is a PDF document.

I acknowledge that the use and exploitation of my thesis as an intellectual work is governed by the intellectual property management regulations of the Hungarian University of Agricultural and Life Sciences.

I acknowledge that the electronic version of my thesis will be uploaded to the library repository of the Hungarian University of Agricultural and Life Sciences. I acknowledge that the defended and

- not confidential thesis after the defence
- confidential thesis 5 years after the submission

will be available publicly and can be searched in the repository system of the University.

Date: 2025 year 11 month 10 day

Student's signature

[1] While keeping the appropriate thesis type, all other types are to be removed.
[2] While keeping the appropriate thesis type, all other types are to be removed.0

DECLARATION

Mennatallah K. M. Nassar (name) (student Neptun code: O7ZH9V) as a consultant, I declare that I have reviewed the thesis and that I have informed the student of the requirements, legal and ethical rules for the correct handling of literary sources.

I recommend / do not recommend[1] the thesis to be defended in the final examination.

The thesis contains a state or official secret: yes no*[2]

Date: 2025. November 07.

insider consultant

[1] The appropriate one should be underlined.
[2] The appropriate one should be underlined.