

Secondary Publication



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Date of secondary publication: 05.10.2026

Version of Record (Published Version), Article

Persistent identifier: urn:nbn:de:bvb:473-irb-117514x

Primary publication

Reitz, Andreas; Beimborn, Daniel (2026): Facilitating Business Process Outsourcing by Modularizing IT and Business Processes, in: Information systems management, London [u.a.]: Taylor & Francis, Vol. 43, No. 4, pp. 231–249, doi: 10.1080/10580530.2026.2693800.

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Facilitating Business Process Outsourcing by Modularizing IT and Business Processes

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ABSTRACT

Modern businesses are undergoing transformative processes, positioning themselves to leverage specialized skills and capabilities from external markets. To harness the full potential of this transformation, they are increasingly breaking down and dispersing their value chains. Business process outsourcing (BPO) allows organizations to restructure their operational processes and selectively source specific parts of those. This study attempts to determine whether and how the modularity of the process organization (i.e., the business processes and IT parts of the enterprise architecture) influences the intention to outsource (parts of) business processes. Using data from the financial services sector and PLSc-SEM, we show that modularity influences the perception of benefits, risks, and the business process outsourcing intention.

KEYWORDS

BPO; outsourcing; modularity; PLSc-SEM; business process

Introduction

Modern organizations, by leveraging digitalization, aim to globally access specialized skills and capabilities. However, to do so, they must (partially) split and distribute their value chain to gain these benefits (Ge et al., 2021; Tanriverdi et al., 2007). As IT functionality expands, firms increasingly recombine resources and shift from functional or matrix structures (Tafti et al., 2013) to flexible network organizations (Eloranta et al., 2021). Recent disruptions such as COVID-19 and geopolitical conflicts underscore the need for flexibility and diversified sourcing.

Business process outsourcing (BPO) enables firms to externalize processes, focus on core competencies, and redefine their organizational boundaries (Lacity et al., 2016). It can also include the outsourcing of supporting IT infrastructures and personnel, further facilitating the firm's focus on its core competencies (Gewald et al., 2006; Lacity et al., 2011). BPO is a lucrative option for clients and vendors (Deloitte, 2023), but many companies struggle to realize the expected potential (Handley & Benton, 2009, 2013; Suresh & Ravichandran, 2022). Research on determinants of BPO decisions remains fragmented (Hanafizadeh & Zareravasan, 2020; Lacity et al., 2016). Scholars have long examined the motivations and multifaceted risks of such decisions (Gonzalez et al., 2010; Herath & Kishore, 2009). While these

studies provide a foundation for understanding “why” firms outsource, there is a need to better understand “how” the underlying structure of processes affects these perceptions. Our study extends this line of research by showing how modularity acts as an architectural lever to mitigate the operational and strategic risks previously identified (Herath & Kishore, 2009).

Outsourcing specific tasks or processes separates them from other tasks and business processes. This interweaving of the processes with the firm's organizational structure poses a prominent challenge for both parties and requires constant coordination and adaptation (Gopal & Koka, 2010). Modularity offers a way to manage this complexity (Schilling, 2000), and a few works have examined it as a potential positive antecedent of outsourcing (Campagnolo & Camuffo, 2010; Tanriverdi et al., 2007).

Previous research has tended to focus on either IT modularity (e.g., Tanriverdi et al., 2007; Tiwana & Konsynski, 2010) or business process modularity (e.g., Eloranta et al., 2021) when analyzing outsourcing decisions. We argue that different forms of modularity are not isolated antecedents but interrelated architectural dimensions.

This integrated perspective addresses prior inconsistent findings (Benazeer et al., 2025; Cabigiosu et al., 2013) and reflects the evolution from early service models. To the best

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/10580530.2026.2693800>

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of our knowledge, the impact of modularity across multiple layers of the enterprise architecture on the decision to outsource a business process has yet to be empirically examined. Existing outsourcing research has primarily explained BPO decisions through perceived benefits, perceived risks, transaction costs, and vendor-related considerations. Prior studies have also examined the role of modularity in outsourcing settings, particularly with respect to IT modularity, process modularity, and interfirm coordination (e.g., Tanriverdi et al., 2007; Tiwana & Konsynski, 2010). However, these perspectives have largely been examined in isolation and less attention has been paid to how different architectural layers jointly shape the organizational feasibility of outsourcing in BPO contexts. We argue that outsourcing is not merely a governance or transaction-cost decision, but also an architectural one. Specifically, the modularity of business processes and IT systems shapes whether organizational capabilities can be separated, governed, and transferred across firm boundaries. By introducing a separability perspective into outsourcing theory, we shift attention from why firms outsource to how enterprise architectures make outsourcing organizationally feasible and governable. By integrating business process modularity, IT modularity, and IT detachability into an enterprise architecture perspective on BPO, we also contribute to current Information Systems discussions on digital modularity and organizational boundary design (Coskun-Setirek et al., 2024). The aim of this study is to close this gap by utilizing The Open Group Architecture Framework (TOGAF) (Haren, 2011) to structure an enterprise and empirically investigate the following research question:

RQ: *Whether and how is modularity, in the form of modular processes and IT modularity, related to decision-makers' intention to engage in BPO?*

This remainder is structured as follows: First, we give a brief overview of the key concepts, namely business process modularity, IT detachability, and IT modularity, to analyze how modularity can be applied to the process organization of an enterprise architecture. To analyze the influence of modularity on BPO, we derive a theoretical model and evaluate our hypotheses using PLSc-SEM and data collected in the financial services sector.

Theoretical foundations

Business process outsourcing

Business process outsourcing (BPO) involves the delegation of the execution of one or more IT-intensive business processes (e.g., payroll, accounting, HR administration, or mortgage application handling) to a third-party service

provider (Lacity et al., 2011, 2016). This often also includes the transfer of supporting IT systems, human workforce, ownership, administration, and management (Gewald & Dibbern, 2009; Munjal et al., 2019).

As the business processes selected for outsourcing often involve IT-intensive tasks, it is understandable that much BPO research builds on IT outsourcing research (Hanafizadeh & Zareravasan, 2020; Lacity et al., 2016). However, BPO-specific topics, such as determining the appropriate contractual structure for a BPO relationship, have emerged as distinct themes (Ge et al., 2021).

Because business processes are closely intertwined with a firm's organizational structure, coordination and adaptation between client and vendor remain key challenges (Gopal & Koka, 2010). Most companies recognize that achieving such expectations depends on a collaborative and proactive partnership with the vendor, and they need to develop capabilities in vendor management. These coordination and boundary challenges motivate the use of modularity as a theoretical lens for analyzing outsourcing relationships.

Modularity

Complex systems are ubiquitous nowadays. Even apparently simple artifacts can be highly complex systems, so it is impossible for a single human being to create them. Even understanding parts of such a system can be a challenge.

Modularity is a set of design rules that can be applied to any system in any related field (Baldwin & Clark, 2000). Schilling (2000) describes it as the "degree to which components of a system can be separated and recombined" (p. 312). The underlying idea can be attributed to the "near-decomposability" concept of Simon (1962). Simon (1962) noted that any system could be decomposed into component subsystems to reduce complexity.

These smaller subsystems must continue to perform the functions of the original system while maintaining interchangeability. It should also be possible to recombine them in different configurations. These smaller systems are called modules. Baldwin and Clark (2000) define a module as "a unit whose structural elements are powerfully connected among themselves and relatively weakly connected to elements in other units." (p. 63).

The effects of modularity have been investigated in different settings. Modularity can enhance product variety, e.g., mass customization (Patel & Jayaram, 2014). It can improve performance in new product development and competition (Vickery et al., 2016). Other

researchers have investigated the role of modularity in coordinating outsourcing relationships (Mishra & Sinha, 2016). It has been implemented in product architecture (Campagnolo & Camuffo, 2010) and conceptualized in the context of organizational modularity (Eppinger & Browning, 2012; Soyer et al., 2018), service modularity (Avlonitis & Hsuan, 2017; Brax & Visintin, 2017; Eloranta & Turunen, 2016; Frandsen, 2017), and business models (Clemente et al., 2019). In our work, we focus on the modularity of business processes (Tanriverdi et al., 2007; Tu et al., 2004) and IT architecture (Tiwana, 2008a, 2008b) and thus contribute new insights to these literature strands.

Modularization of an enterprise architecture

In this study, we investigate the role of modularity in business process outsourcing (BPO). Building on the above definition of modularity, we apply The Open Group Architecture Framework (TOGAF) (Haren, 2011) as a reference to argue that BPO primarily occurs in the business and application/technology layers.¹ We use these layers to discuss how modularity can be applied to business processes as a core part of the enterprise architecture.

A business process is a “set of logically related tasks performed to achieve a defined business outcome” (Davenport & Short, 1990, p. 4). This emphasizes that business processes are not about how they work but what work is done, and that they consist of several subprocesses/tasks with clearly defined inputs and outputs, and with a definition of who executes them (Münstermann & Weitzel, 2008; Münstermann et al., 2010). Research on process modularity often combines it with product modularity (Jermisittiparsert et al., 2019; Thatte, 2013; Tu et al., 2004; Vickery et al., 2016). We define business process modularity as “the extent to which a business process is loosely coupled, mature, and standardized enough to be separated from a firm’s other business processes, executed independently, and recombined without loss of functionality” (Tanriverdi et al., 2007, p. 283).

IT architecture is the compilation of applications and how these and their subsystems are interconnected to each other (Tiwana & Konsynski, 2010). An application can be composed of different modules or plugins that communicate with each other via interfaces. The coupling inside the application is higher than outside. A measure of IT modularity is the “degree of decomposition of an organization’s IT portfolio into loosely coupled subsystems that communicate through standardized interfaces” (Tiwana & Konsynski, 2010, p. 290). Standardization refers to the extent to which

applications, data structures, and interfaces conform to shared rules or specifications, thereby enabling consistent and predictable interactions among system components (Weill & Ross, 2005). Loose coupling means that a change to one application (or module) does not inflict a change (or only to a minor degree) in other systems.

Using this conceptualization, both layers are hierarchical-nested subsystems of an enterprise architecture. Business processes and their supporting IT systems complement and mutually influence each other.

Building on these conceptualizations, we position IT detachability as a central concept linking process and IT structures to outsourcing decisions. While business process modularity structures the decomposition of organizational work into relatively self-contained units, and IT modularity structures the decomposition of the supporting technical infrastructure, IT detachability captures whether these structures allow a business process to be decoupled from its organizational and technical context and transferred across firm boundaries without loss of functionality. In this sense, IT detachability reflects the extent to which modular designs can be realized in interorganizational settings and thereby influences whether outsourcing is organizationally feasible, governable, and reversible.

This principle also guides the modular strategies of major enterprise system vendors. Platforms such as SAP S/4HANA, Oracle Fusion, and Salesforce exemplify how modular architectures decouple business and technology layers to facilitate selective outsourcing and integration with external services.

IT detachability

While modularity describes a system’s design logic – the decomposition of complex structures into loosely coupled, standardized components (Baldwin & Clark, 2000; Langlois, 2002) – detachability captures a system’s resulting separability across organizational boundaries. It refers to the extent to which IT and business processes can be isolated, transferred, or externalized separately without disrupting overall functionality or performance in organizational practice (Ge et al., 2021; Tanriverdi et al., 2007).

In essence, business process modularity and IT modularity provide the architectural foundation for detachability, while detachability reflects the extent to which these modular structures can be operationalized across organizational boundaries (e.g., the payroll process gets outsourced without the underlying IT system, with the vendor subsequently providing the payroll service using its own IT infrastructure). A highly modular system can, in theory, be detachable, but actual detachability also

depends on factors such as process ownership, data dependencies, and contractual governance (Tiwana & Konsynski, 2010). Collectively, these constructs describe how enterprise architecture structures shape organizational separability and thereby influence whether outsourcing arrangements become feasible, governable, and reversible.

The next section develops the theoretical logic linking modularity and detachability to perceived risks, benefits, and the intent to engage in business process outsourcing.

Hypotheses development

This study investigates whether modularity affects the perception of risks and benefits associated with business process outsourcing and its ultimate impact on engagement in BPO. In accordance with existing studies, for our dependent variable we use the intent to engage in BPO as a proxy variable for the actual engagement in BPO (e.g., Gewald & Dibbern, 2009). As stated before, we conceptualize our modularity antecedents as the modularity of business processes, the modularity of their supporting IT systems, and the detachability of a process from other processes and its supporting IT systems. Figure 1 visualizes the research model developed in the following chapters.

Implications of perceived BPO benefits and risks on BPO intention

BPO decisions are mainly driven by the perception of benefits and risks (Gewald & Dibbern, 2009). Higher benefits drive BPO intention, while higher risks reduce

the intention. These are not the only determinants. However, since we are examining the effect of modularity on BPO, it is sufficient to focus on the risks and benefits, as these are influenced by modularity.² We use the perceived benefits identified as main decision drivers in previous studies: cost advantages, quality improvement, and focus on core competencies (Gewald & Dibbern, 2009). Cost advantages occur, for example, because the process can be sourced from multiple providers available on the market (which can reap economies of skill, scale, and scope). However, these cost advantages must be higher than the costs outsourcing introduces (i.e., negotiation or monitoring costs). If the chosen vendor specializes in this task, it can deliver better quality because of its superior capabilities. If the outsourced task does not lie within the firm's core competencies, it will allow the client's management to focus on these and react more flexibly to market changes. Taken together, we hypothesize:

Hypothesis 1a: Perceived benefits of BPO (in terms of cost advantages, quality improvement, and focus on core competencies) *lead to a higher intent to engage in business process outsourcing*.

The anticipated risks³ identified as highly influential to the decision to outsource are financial risk, performance risk, and strategic risk. Financial risk occurs when costs exceed the anticipated budget. The creation of contracts and the transition to the vendor can be more expensive than expected, or the costs of monitoring the vendor end up being higher than anticipated. Performance risk refers to the situation where the delivered quality from the vendor is lower than originally expected. This can happen, for example, by selecting an incompetent

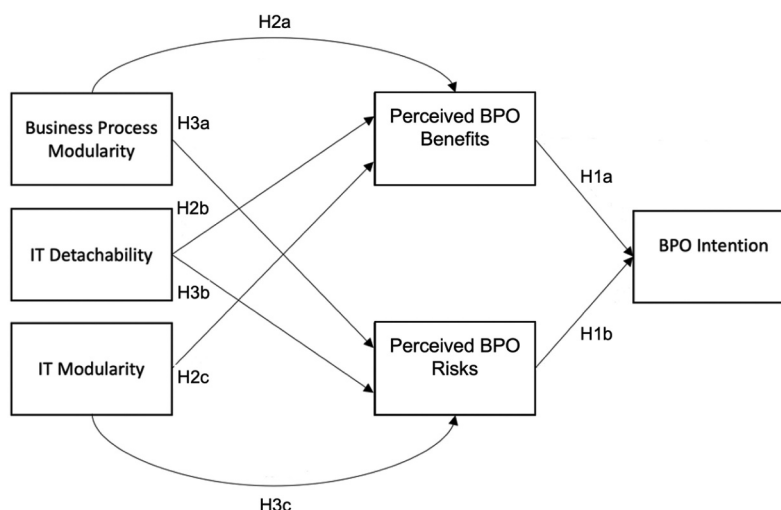


Figure 1. Research model. Source: Authors' own illustration.

vendor, through incomplete contracts, or opportunistic behavior. Strategic risks include losing the ability to respond to market changes, losing essential competencies required to execute the outsourced activity, or being locked into a vendor. Accordingly, we state our hypothesis as follows:

Hypothesis 1b: Perceived risks of BPO (in terms of financial risk, performance risk, and strategic risk) lead to a lower intent to engage in business process outsourcing.

Relationship between modularity and perceived BPO benefits

Next, we apply modularity theory (Baldwin & Clark, 2000) and later on transaction cost economics (TCE; Williamson, 2008) to explain how business process modularity, IT modularity, and IT detachability affect perceptions of the perceived BPO benefits and risks.

Modularizing a system results in interdependence within and independence across modules, so even though a system is split into different modules that are independent of one another, the modules still must provide all functions and work together. This leads to three concepts: abstraction, information hiding, and interfaces (Baldwin & Clark, 2000). Modules offer a simple abstraction and encapsulate their details, hiding their complexity from the rest of the system. To allow other modules to use the now hidden functions, the module offers an interface that simplifies access to these. In other words, complexity is hidden by the abstraction, while the interaction with the remaining systems is still possible via interfaces. Using interfaces, modularity fosters high independence or “loose-coupling” between the modules (Sanchez & Mahoney, 1996).

The separation allows modules to evolve independently as long as their interfaces remain the same (Baldwin & Clark, 2003). Modules can be substituted, leading to flexibility and rapid reconfiguration of the system (Baldwin & Clark, 2003). It also allows for mass customization (Hsuan Mikkola & Skjøtt-Larsen, 2004), as modules with lower specificity can now be recombined into a completely new system, as long as their interfaces match (Baldwin & Clark, 2003; Carlborg & Kindström, 2014).

In addition to the specificity of an asset, transaction costs include search and negotiation expenses, knowledge transfer and specification/design costs, as well as control, coordination, and adaptation expenses.

As mentioned above, modules have high interdependence within and independence across modules (Baldwin & Clark, 2000). This applies to an IT system’s components but also to business processes, where the module can be either the whole process or an individual task within a process, depending on the viewpoint. Increased independence increases analyzability, reducing a primary source of coordination costs (Ge et al., 2021; Mani et al., 2010). Further, the sourcing of business processes becomes more manageable as a modular business process is to some degree standardized, reducing search costs (Münstermann et al., 2010).

Independent and interdependent modules encapsulate the necessary information to operate, reducing the volume and homogeneity of information that needs to be passed between modules. This decreases the amount of information that needs to be passed between tasks or processes for business processes. Detachability therefore complements modularity by representing the operational realization of modular design in interorganizational contexts. Within BPO decision-making, it determines whether modular components can be separated from in-house infrastructure and transferred to external providers with minimal transaction and coordination costs.

For enterprise software, the amount of information that flows between modules decreases and becomes more uniform. Modular or detachable business processes are loosely coupled to their supporting IT and other business processes (Ge et al., 2021; Tanriverdi et al., 2007). The reduced number of errors resulting from standardized interfaces and encapsulated system elements (Langlois, 2002) reduces coordination effort, thus lowering coordination costs (Goel et al., 2023). Since only interface-relevant information needs to be exchanged across modular boundaries, knowledge transfer costs are reduced, too. Finally, this reduction in interdependencies also lowers monitoring requirements, thereby reducing control costs.

Loose coupling, encapsulation, and interfaces allow the reuse of modules. When interfaces remain unchanged (or when two modules utilize the same interface), it becomes possible to perform the same function differently using a different software module or to reuse the same software module for various applications. It also facilitates reusing the same tasks or whole processes. Reuse enables vendors to consolidate tasks from multiple clients (Beimborn et al., 2012). This consolidation is feasible when the

tasks within the process are standardized, allowing the same process to be applied to all inputs, or when consistent interfaces are employed, enabling different processes to utilize the same inputs and outputs effectively. Therefore, loose coupling facilitates the recombination and reuse of components, reducing the dependence on unique assets that are not easily transferable to other uses. Due to the reduced communication, interaction, or exchange required with the client's other process modules, the vendor can specialize in specific processes and optimize them (Tanriverdi et al., 2007). It can also employ specialists for specific tasks (e.g., HR specialists who are familiar with laws governing remote work situations) and invest in specific assets. It can internally redesign processes to improve quality, standardize them, and reap economies of scope.

Specializing on specific processes allows the vendor to deliver higher quality. This will enable it to complete jobs in less time and budget (Gomes & Joglekar, 2008). With specialized vendors, clients can access specialized market resources and source their processes at lower production costs or higher quality (Sanchez & Mahoney, 1996).

Finally, modularity helps define organizational boundaries because the interfaces represent the logical transitions between modules. This split-up and clear mapping of interdependences enables the identification of non-core competence functions (Beimborn et al., 2012). As an outsourcing decision is about a company's architecture and "functional scope," clear and precise boundaries between elements are beneficial for defining responsibilities and ensuring seamless integration and coordination between outsourced and in-house functions (Baldwin & Clark, 2000).

Summarizing, modularity helps achieve outsourcing-related production cost advantages and reduce transaction costs in multiple ways, which in turn makes outsourcing more favorable. Therefore, our next hypotheses are:

Hypothesis 2a: Modular business processes lead to higher perceived benefits of business process outsourcing.

Hypothesis 2b: Detachable business processes lead to higher perceived benefits of business process outsourcing.

Hypothesis 2c: Modular IT architectures lead to higher perceived benefits of business process outsourcing.

Relationship between modularity and perceived BPO risks

In addition to the positive effect of modularity on perceived benefits, we posit that modularity reduces the perception of the three types of risks: performance risk, financial risk, and strategic risk (Gewald & Dibbern, 2009; Hanafizadeh & Zareravasan, 2020; Lacity et al., 2016). Performance risk in BPO acknowledges the possibility that services may not meet expectations, which is particularly critical in the banking sector due to stringent regulations and governance requirements. Financial risk involves unexpected costs, like contract renegotiations. Strategic risk arises when outsourcing potentially compromises a firm's competitive edge by reducing control and flexibility over essential resources and capabilities.

Building on Tanriverdi et al. (2007), we argue that IT detachability captures the degree of loose coupling between a business process and its supporting IT systems (and other business processes). Transplanting the process onto another platform and working with the current one generates a need for communication and coordination.

As mentioned earlier, loose coupling, encapsulation, and interfaces allow reusing the same software module for various applications and facilitate reusing the same tasks or entire processes. This reduces the need for investments in unique, non-reusable assets, thereby decreasing the asset specificity. Lower asset specificity, in turn, increases a firm's bargaining power by reducing dependency on specific assets, making it easier to switch suppliers or partners if needed, effectively reducing strategic risks. This realized separability further carries implications for perceived risks.

Accordingly, detachability is expected to influence managerial perceptions of both the benefits (through increased outsourcing feasibility and flexibility) and risks (through reduced dependency and switching costs) associated with outsourcing.

Accordingly, detachability remains a distinct but complementary construct that bridges modular architecture and transactional outcomes.

Given the significance and intricacy of outsourcing arrangements, it is crucial to clearly define roles and responsibilities to reap benefits (Suresh & Ravichandran, 2022). Encapsulating details within modules and establishing loose connections between them helps define boundaries, as the interfaces represent the logical transitions between these modules. This facilitates outsourcing in several ways. As mentioned, modularity reduces the volume of information transferred while enhancing its homogeneity. This reduces the risk

of information leakage (Riordan & Williamson, 1985; Teece, 1996). Proprietary information can be encapsulated within the IT modules or the processes/tasks, and it only needs to be transferred when necessary for the software module or process. This simplifies the distribution of various software modules and processes to different suppliers, thereby decreasing the strategic risk of sensitive information being accessed by any single supplier. Secondly, modularity enables the efficient distribution of different information components to various suppliers, thus minimizing the likelihood of lock-in situations and reducing strategic risk (Hoetker, 2006).

A standardized process with clearly defined responsibilities and boundaries, articulated through well-defined interfaces, is a good foundation for specifying a service level agreement (SLA). From a legal perspective, SLAs are critical, as they also outline penalties in the event of discrepancies. Modularity helps mitigate the issue of incomplete SLAs, which often occurs when specific characteristics (now defined through modularization) are unknown at the time of creation (Benazeur et al., 2017). Loose coupling and interfaces allow the client to focus on output control (Tiwana, 2008a, 2008b). SLAs are frequently used to mitigate conflicts. Having stable and well-defined interfaces can provide an additional incentive to keep contracts up to date. Pre-defined modules assist both parties in precisely defining the scope of outsourcing and specifying metrics for measuring performance, reducing the risk of incomplete contracts (Davenport, 2005).

Incomplete contracts often necessitate renegotiations after the process has already been outsourced, and they also help form realistic expectations regarding the vendor's performance, thereby reducing performance and financial risk. A modular design offers a form of embedded control that allows a company to efficiently interact with multiple partners, aiding in sourcing from markets and significantly lowering the costs of enforcement, search and monitoring (Sanchez & Mahoney, 1996). By using interfaces, a modular design decreases the need for communication and knowledge sharing between the client and provider (Wang et al., 2009). Summarizing our risk-related arguments, we propose:

Hypothesis 3a: Modular business processes lead to lower risks of business process outsourcing.

Hypothesis 3b: Detachable business processes lead to lower risks of business process outsourcing.

Hypothesis 3c: Modular IT architectures lead to lower risks of business process outsourcing.

Methodology

Data collection and survey development

In designing our survey, we engaged the expertise of three researchers and four consultants from the banking industry. Afterward, to ensure the questionnaire's content validity, we conducted a preliminary assessment by pre-testing it with three bank managers and subsequently engaging in discussions with them to evaluate the results.

Our questionnaire begins with a concise introduction that provides an overview of the specific business process under scrutiny, namely the credit handling process. Our target audience primarily comprised process owners, utilizing a key informant approach. This approach was selected to ensure that we obtained the most pertinent and informed responses, particularly when assessing the associated business environment. By focusing on specific business processes, we could ensure that our key informants possessed a high level of expertise concerning the interplay between business and IT units concerning the designated process (Schlosser et al., 2015).

The measurement items were all adapted from previous research. We adjusted them based on the insights from our pretests and interviews to fit the banking domain and the specific processes. The items measuring business process modularity and IT detachability were adapted from Tanriverdi et al. (2007), and IT modularity items were adapted from Tiwana and Konsynski (2010). The items measuring BPO intention and perception of process outsourcing risks and benefits were taken from Gewald and Dibbern (2009). We report the full item list in Appendix A.

Finally, our controls consisted of process type (type of credit), country, firm size (log of balance sheet total), bank sector (commercial banks, cooperatives, public savings banks), and age of the respondent as a proxy for experience (in years).⁴ The descriptive statistics for the controls are listed in Table 1. Additional descriptive statistics on the measurement items are in Appendix B.

Validating the measures

To ensure content and discriminant validity of the modularity survey items, we conducted a card-sorting experiment. Seven pairs of IT architects and process owners served as the jury. In the experiment, participants were presented with items and had to categorize them into a specific construct. The experiment explicitly allowed the assignment of an item to more than one category or no category at all. The resulting Fleiss' Kappa was .806. Due to the high value (higher than

Table 1. Descriptive statistics.

Sector		Country		Balance sheet total in Million €	
Private	13.37%	Germany	83.17%	612–948	20,78%
Public	26.73%	Austria	6.93%	948–1,320	21,78%
Cooperative	59.90%	Switzerland	9.90%	1,320–2,780	19,80%
Process Type		Age of informant (in years)			1,120–1,320
Real estate loans	55.94%	<35	8.37%	4,600–365,000	18,81%
SME loans	44.06%	35–44	36.95%		
		45–54	29.56%		
		≥55	8.37%		
		N/A	16.75%		

Source: Authors' own data and calculations.

0.65), we conducted only a single round of sorting (Moore & Benbasat, 1991).

To address the concern that process owners might not be able to give a sufficient response regarding IT modularity, we conducted another experiment with 23 pairs of process owners and their corresponding IT architects. Eighteen pairs were asked to complete the survey simultaneously without any communication between them; the other five pairs were asked to complete the questionnaire based on a scenario created from a textbook. In both cases, the answers from the process owner and “his/her” corresponding IT architect were highly correlated (for 18 pairs $\rho = .763$, for 5 pairs $\rho = .843$). This provides evidence that process owners can act as proxies for IT architects and sufficiently answer questions regarding IT modularity in our context.

Missing value treatment

Of the 202 received surveys, 90 questionnaires had missing values. As our sample is relatively small, with some variables having missing values above 5%, we chose not to use mean replacement or case-wise deletion. This would have resulted in biased results and reduced statistical power (Reitz, 2025; van Buuren, 2018). Based on the analysis of the dataset and the pretests with the experts' comments, we are confident that the missing data are MAR (missing at random). We inspected missingness patterns across constructs and control variables and did not observe systematic relationships between missing values and key theoretical variables. In this situation, multiple imputation or maximum-likelihood approaches have been shown to perform best (Graham & Coffman, 2012). Cleaning the dataset as suggested by Hair et al. (2014), for example by removing datasets with complete constructs missing, resulted in 168 treatable datasets. We employed multiple imputations by fully conditional specification (FCS-MI), which enables the imputation of both categorical and continuous variables using a set of conditional densities

to create a multivariate imputation model for each missing variable (van Buuren, 2007). This makes it especially powerful when no fitting multivariate distribution exists and therefore shows itself to be a perfect complement to PLSc-SEM, as PLSc-SEM does not assume multivariate normality. The approach creates multiple datasets in which the missing values are replaced by different estimates. We used the R statistics software for this treatment. To impute the data, we used the reference implementation “mice” (van Buuren, 2007). Following the suggestions to generate as many datasets as possible, we generated 80 datasets using 50 iterations with predictive mean matching (Morris et al., 2014). We then applied cSEM (Rademaker & Schuberth, 2020) and semirn (Ray et al., 2023) to each of the imputed datasets. Finally, we pooled the obtained estimates using Rubin's rules (Barnard & Rubin, 1999).

Data analysis

We assessed our research model using PLSc-SEM, which is preferred over PLS-SEM when the constructs are reflective (Benitez et al., 2020; Schuberth et al., 2023) and the primary aim is to elucidate the variation in dependent variables (Petter, 2018). PLSc-SEM is a non-parametric approach that does not rely on assumptions about data distributions. It is particularly well-suited for exploratory research, whereas covariance-based methods (CB-SEM) are more suitable for hypothesis testing (Dash & Paul, 2021). Recent work has refined reporting standards for PLSc-SEM. We therefore used the principal guidelines of J. F. Hair, G. T. M. Hult, C. M. Ringle, et al. (2021), which we interpret cautiously in line with recent literature (Benitez et al., 2020; Evermann & Rönkkö, 2023; Petter & Hadavi, 2022; Schuberth et al., 2023). In addition, we also conducted a validation of our model using CB-SEM, which yielded structurally consistent outcomes.

Prior to data collection, we conducted a power analysis. We opted for the inverse square root method instead of adhering to the commonly referenced rule

of thumb for determining the required sample size (Hair et al., 2011; Kock & Hadaya, 2018). This method evaluates the probability that the ratio of a path coefficient to its standard error exceeds the significance threshold of a test statistic at a specified significance level. Consequently, the results are contingent on a single path coefficient and are not influenced by the complexity of regressions within the models or the overall model size. According to the precomputed tables by J. F. Hair, G. T. M. Hult, C. M. Ringle, et al. (2021), a minimum sample size of 155 is necessary for a significance level of 5%, a minimum effect size of 0.2, and a common power level of 80%. Our sample size of 168 meets this requirement.

Results

Measurement model assessment

Validity and reliability checks

All theoretical variables in our research model were specified as reflective latent constructs. The reflective specification is consistent with prior studies on business process modularity (BPMoD), IT modularity (ITMoD), IT detachability (ITD), outsourcing risks (BPOR) and benefits (BPOB), and BPO intention (BPOI), where the indicators are assumed to reflect an underlying latent concept rather than form it. We assessed internal consistency, discriminant, and convergent validity of the constructs. To assess internal consistency, we checked the loadings of the constructs. Indicator loadings range from .686 to .900 (cf. Appendix A). With the exception of ITD2

(loading = .686), all loadings exceed the recommended threshold of 0.708. ITD2 was nevertheless retained because its exclusion would have reduced the explained variance (R^2) of the endogenous constructs. Internal consistency reliability is satisfactory for all constructs, with ρ_A values ranging from .759 to .905, composite reliability (ρ_C) values between .759 and .903, and Cronbach's alpha values between .759 and .902 (Benitez et al., 2020; J. F. Hair, G. T. M. Hult, C. M. Ringle, et al., 2021). The average variances extracted (AVEs) are above .5 (range: 0.54–0.71) and the discriminant statistics show that the square root of the respective construct's AVE (Fornell & Larcker, 1981).⁵ Discriminant validity is also supported by all HTMT2 values being below .85, with the highest observed value being .81 (Roemer et al., 2021) (cf. Table 3). Table 2 summarizes the reliability, convergent validity, and discriminant validity assessments for the reflective constructs.

Bias assessment (Non-response Bias & Common Method Bias)

To ensure that our data does not suffer from Non-response Bias, we compared the answers provided by individuals who responded immediately with those who responded after one or more reminders. We did this as suggested by Armstrong and Overton (1977), who argue that the answers given by individuals after being reminded share properties with those who did not respond at all. Since indicators revealed no significant difference, we do not expect Non-Response Bias to present a major problem.

Table 2. Construct based quality criteria.

Latent variable	ρ_A	ρ_C	Cronbach's alpha	AVE
BPO intention	.888	.885	.884	.719
Perceived BPO benefits	.905	.903	.902	.700
Perceived BPO risks	.898	.892	.890	.734
IT modularity	.867	.860	.858	.608
Business process modularity	.759	.758	.759	.520
IT detachability	.763	.762	.763	.516

Source: Authors' own data and calculations.

Table 3. Discriminant analysis: HTMT2 ratios.

	BP Mod	IT Mod	Process type	Sector	Firm size	Country	Experience	ITD	BPOB	BPOR
BPMoD	1									
ITMoD	.511	1								
Process type	.039	.108	1							
Sector	.017	.184	.025	1						
Firm size	.093	.041	.030	.183	1					
Country	.019	.062	.090	.264	.036	1				
Experience	.062	.009	.077	.049	.125	.032	1			
ITD	.237	.283	.002	.195	.143	.035	.023	1		
BPOB	.392	.364	.047	.161	.003	.010	.160	.003	1	
BPOR	.370	.392	.025	.028	.029	.062	.012	.148	.590	1
BPOI	.242	.278	.176	.078	.028	.105	.108	.024	.765	.615

Source: Authors' own data and calculations.

Another potential issue threatening the validity of the survey-based empirical results is Common Method Bias (CMB). Following the suggestions of Podsakoff et al. (2003), we used concise and clearly formulated items. After the data collection, we applied three procedures to uncover indications of CMB. First, we applied the Harman single-factor test, which did not reveal a single component accounting for the majority of overall variance (the largest component explained 36.5%) (Harman, 1976). Further, we included a theoretically unrelated marker variable (“Competition in our loans market is very strong.”) in our model that was linked to each construct of the original model (Lindell & Whitney, 2001). The resulting model test results did not show any structural differences in levels and significance of path coefficients or in the level of R^2 of the dependent variables. As a third method, we did applied the full collinearity assessment as suggested by Kock (2015). This method uses factor-level variance inflation factor (VIF) values, where values below 3.3 suggest the absence of CMB. In our model, all values were well below this threshold. Overall, this indicates that our data does not suffer from CMB.

Structural model assessment

Before assessing the structural relationships, we examined collinearity among the predictor constructs in the inner model. All inner VIF values were well below commonly used thresholds, indicating that multicollinearity is not a concern in our structural model (J. F. Hair, G. T. M. Hult, C. Ringle, et al., 2021).

Variance inflation factor (VIF) values for all predictor constructs were well below commonly cited thresholds (maximum VIF = 1.65), indicating an absence of collinearity issues prior to path analysis (J. F. Hair, G. T. M. Hult, C. Ringle, et al., 2021). Details can be found in Table 4.

To test the structural model, we used PLSc-SEM and applied the factor weighting scheme. To derive statistical inferences, we used bootstrapping with 10,000 bootstraps as proposed by J. F. Hair, G. T. M. Hult, C. M. Ringle, et al. (2021).

The results of testing our research model are presented in Figure 2 (and in more detail, including confidence intervals, in Appendix C). The model explains a substantial share of the variance in BPO intention and smaller, yet meaningful, proportions of the variance in perceived benefits and perceived risks of BPO, as indicated by these values: $R^2 = .661$ for BPO intention, $R^2 = .244$ for

Table 4. Collinearity check (inner VIF values).

	BPO intention	Perceived BPO benefits	Perceived BPO risks
Business process modularity		1.431	1.431
IT modularity		1.495	1.495
IT detachability		1.151	1.151
Perceived BPO benefits	1.649		
Perceived BPO risks	1.570		
Process type	1.025	1.029	1.029
Sector	1.151	1.226	1.226
Firm size	1.057	1.077	1.077
Country	1.090	1.119	1.119
Experience	1.065	1.032	1.032

Source: Authors' own data and calculations.

BPO benefits, and $R^2 = .253$ for BPO risks. In line with common guidelines (J. F. Hair, G. T. M. Hult, C. Ringle, et al., 2021), these R^2 values suggest that our model offers moderate explanatory power for the key outcome constructs.

The two hypotheses H1a and H1b predicted that higher benefits and lower risks of BPO will result in a higher intention to engage in BPO. We accept both hypotheses with $\beta = .602$ ($p = .000$) respectively $\beta = -.277$ ($p = .004$).

Hypotheses H2a, H2b, and H2c suggested that more modular business processes, higher IT detachability, and more modular IT architectures, respectively, lead to higher perceived benefits of BPO. With $\beta = .350$ ($p = .000$), we accept the hypothesis (H2a) that modular business processes lead to higher outsourcing benefits. The same holds for H2c (IT modularity) with $\beta = .214$ ($p = .048$). By contrast, the hypothesis that the detachability of business processes leads to higher benefits of business process outsourcing is not supported ($\beta = .181$ ($p = .170$)).

Finally, hypotheses H3a, H3b, and H3c predicted that modular business processes, detachable business processes, and modular IT architectures, respectively, lead to lower perceived risks of business process outsourcing. We find support for H3a, H3b and H3c with $\beta = -.289$ ($p = .019$), $\beta = -.316$ ($p = .006$), respectively $\beta = -.321$ ($p = .009$).

Predictive power and out-of-sample prediction

To assess the model's out-of-sample predictive power, we applied the PLSpredict procedure as recommended by Hair et al. (2019). The Q^2_{predict} values for the indicators of BPO benefits and BPO risks are all above zero and range between .03 and

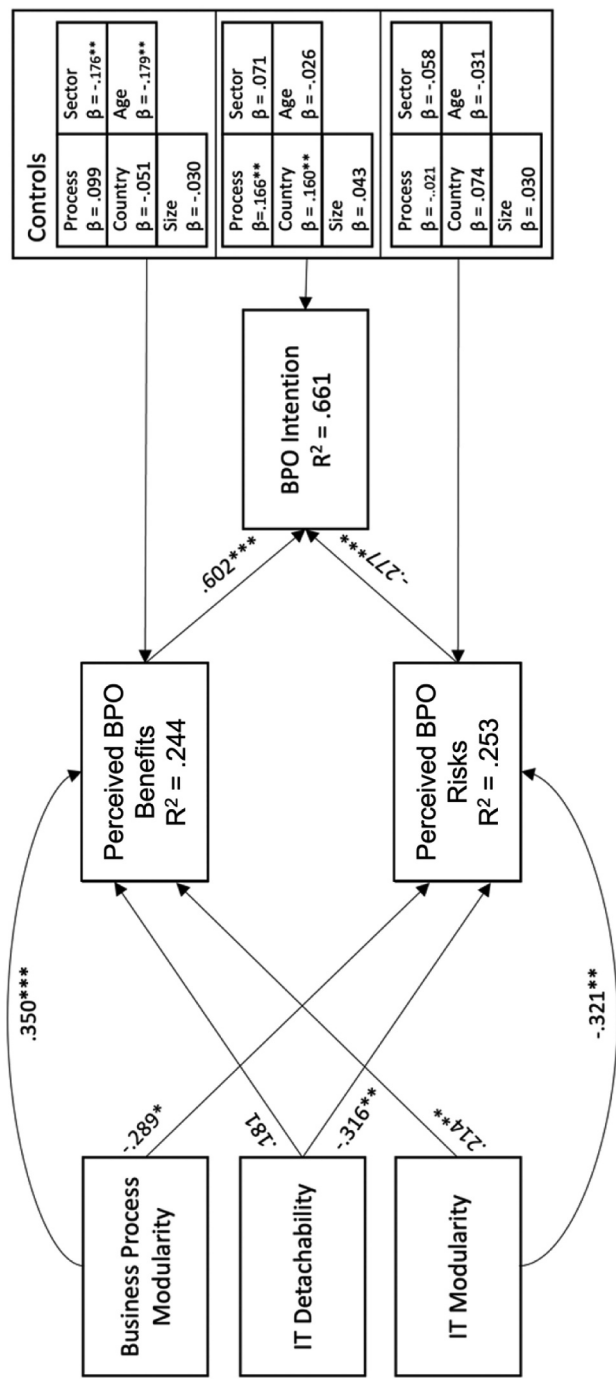


Figure 2. Estimation results. (standardized path coefficients with significance levels, R^2). Notes: $N = 168$. ***, $p < .001$; **, $p < .01$; *, $p < .05$. (two-sided t-tests, based on 10,000 bootstraps). Source: Authors' own illustration.

Table 5. Prediction metrics.

Name	MAE target	MAE benchmark	RMSE target	RMSE benchmark	Q2 predict
BPOB1	.722	.754	.944	1.002	.095
BPOB2	.851	.870	1.062	1.097	.080
BPOB3	.893	.931	1.133	1.184	.039
BPOB4	.851	.872	1.053	1.082	.126
BPOR1	.798	.951	.986	1.167	.073
BPOR2	.846	1.019	1.054	1.224	.030
BPOR3	.818	.965	1.019	1.225	.088
BPOI1	1.024	1.032	1.245	1.265	-.000
BPOI2	.854	.845	1.056	1.053	.043
BPOI3	.942	.965	1.158	1.185	.023

Source: Authors' own data and calculations.

.13, and for almost all of these indicators the PLS model yields lower MAE and RMSE scores than the linear benchmark model (Table 5). For BPO intention, the Q^2 _predict values are close to zero, and one indicator shows slightly higher prediction errors than the benchmark. Overall, these results indicate low to medium predictive power, with meaningful predictive performance for BPO benefits and risks and limited additional predictive power for BPO intention.

Model fit assessment

The assessment of overall model fit indicates that the geodesic distance ($dG = .382$, critical value = .535), the standardized root mean square residual ($SRMR = .067$, critical value = .073), the Euclidean distance ($dL = 1.478$, critical value = 1.719), and the maximum likelihood-based distance ($dML = 1.835$, critical value = 2.732) all fall below their respective 95% critical values (Table 6). We report these model fit indices for completeness and interpret them with caution, as global goodness-of-fit is not a primary evaluation criterion in PLSc-SEM (J. F. Hair, G. T. M. Hult, C. Ringle, et al., 2021).

Effect sizes

The effect sizes (f^2) range from .039 to .675 (excluding controls), indicating the full range from very small to very strong effect sizes (see Table 7).

Table 6. Test for overall model fit.

	Test statistic	Critical value 95%	Significance level 95%
dG	.382	.535	Do not reject
SRMR	.067	.073	Do not reject
dL	1.478	1.719	Do not reject
dML	1.835	2.732	Do not reject

Source: Authors' own data and calculations.

Table 7. Effect sizes (f^2).

		Dependent Variable		
Independent Variable	Effect sizes (f^2)	BPOB	BPOR	BPOI
BPMoD		.119	.082	
ITMoD		.042	.097	
ITD		.039	.122	
BPOB				.675
BPOR				.151
Controls:				
Process type		.013	.001	.083
Sector		.035	.004	.013
Firm size		.001	.001	.005
Country		.003	.007	.072
Experience		.043	.001	.002

Source: Authors' own data and calculations.

Multiple mediation analysis

To test whether perceived risks/benefits mediate the relationship between the different types of modularity and BPO intention, we used the recommendation from J. F. Hair, G. T. M. Hult, C. Ringle, et al. (2021). This procedure allows testing for multiple mediations in PLSc-SEM by utilizing bootstrapping to evaluate the significance for direct paths and to assess the significance of indirect paths.

The results of this analysis (details in Table 8) show that the indirect effects of modularity (IT, process, and detachability) on BPO intention are significant for business process modularity (through benefits and risks), IT modularity (through risks), and IT detachability (through risks). The direct effects indicate that all three types of modularity have a direct effect on BPO intention. We also find partial mediation for business process modularity via benefits and risks of BPO, and via BPO risks for IT modularity and IT detachability.

Interaction analysis

Although we had not hypothesized interaction effects between the different types of modularity and checked for consistency and validity, we performed a test to empirically control for the existence of such

Table 8. Mediation analysis.

	Path	Estimate	CI lower percentile	CI upper percentile	Mediation type
Indirect paths	Business process modularity → Perceived BPO benefits → BPO intention	.218	.084	.367	Partial
	Business process modularity → Perceived BPO risks → BPO intention	.083	.016	.172	Partial
	IT modularity → Perceived BPO benefits → BPO intention	.127	−.006	.265	None
	IT modularity → Perceived BPO risks → BPO intention	.092	.016	.204	Partial
	IT detachability → Perceived BPO benefits → BPO intention	.110	−.041	.276	None
	IT detachability → Perceived BPO risks → BPO intention	.095	.026	.192	Partial
Direct paths	Business process modularity → BPO intention	.291	.127	.481	
	IT modularity → BPO intention	.218	.050	.384	
	IT detachability → BPO intention	.196	.012	.410	

(standardized path coefficients with confidence intervals).

$N = 168$. (two-sided t-tests, based on 10,000 bootstraps).

Source: Authors' own data and calculations.

Table 9. Interaction effects.

Path	Estimate
IT detachability * IT modularity → Perceived BPO benefits	.061 (.852)
IT detachability * IT modularity → Perceived BPO risks	−.026 (.964)
IT detachability * Business process modularity → Perceived BPO benefits	−.159 (.891)
IT detachability * Business process modularity → Perceived BPO risks	.026 (.964)

(standardized path coefficients with significance levels).

$N = 168$. (two-sided t-tests, based on 10,000 bootstraps).

Source: Authors' own data and calculations.

a relationship since existing literature has found interactions between product and process modularity (Vickery et al., 2016). Specifically, we wanted to check if IT detachability, which essentially captures the dependence between business processes and IT applications, impacts the effect of modularity on the risks and benefits of BPO. We used the two-stage approach from Chin et al. (2003), as suggested by J. F. Hair, G. T. M. Hult, C. M. Ringle, et al. (2021). However, based on the results (see Table 9), we can rule out any interaction effects.

Discussion

First, both perceived benefits and perceived risks significantly influence BPO intention (H1a and H1b supported), with perceived benefits showing a substantially stronger effect (cf. big difference in path coefficients and f^2). This suggests that managers at financial institutions prioritize business value over risk considerations. Further, respondents who perceive their business processes and IT architecture as more modular also perceive greater potential benefits from BPO (H2a and H2c). Managers may find it mentally easier to more directly associate the effects of modularity with perceived benefits, while the effects of perceived risks are often indirect, time-delayed, and occur during already in-place outsourcing agreements, such as the reduction in governance costs or the mitigation of uncertainty-related risks, where

modularity could have an impact. This aligns with the results from Gewald and Dibbern (2009), who found that perceived benefits tend to be overestimated. Additionally, it resonates with the findings of Ge et al. (2021), who identified a considerably stronger effect of business process modularity and IT detachability on pre-costs (adaptation) compared to post-costs (coordination). This also is in line with our finding that the modularity of business processes influences the intention to outsource directly and is mediated via perceived risks and benefits.

With respect to H3 (perceived risks), our findings show that IT modularity and IT detachability both have direct effects on BPO intention. At the same time, these relationships are partially mediated by perceived risks, while no significant mediation occurs via perceived benefits. This finding is intriguing, as IT detachability essentially captures the extent of dependencies of a business process to its supporting architecture. In particular, the results related to business process detachability contrast prior findings reported by Tanriverdi et al. (2007), whereas the effects associated with IT modularity are largely consistent with existing literature. A possible explanation for this is that process owners may find it easier to perceive the short-term benefits of outsourcing when it comes to the modularity of business processes rather than taking the IT architecture into account. From the viewpoint of supporting IT and the effort required to decouple processes from it, the

advantages in terms of mitigating potential risks appear to be more important (such as the flexibility to source a process back).

Interestingly, we do not find a significant relationship between IT detachability and perceived BPO benefits. This suggests that while IT detachability influences BPO intention – primarily through its effect on perceived risks – it does not contribute to increased perceptions of outsourcing-related value. One possible explanation is that the benefits of detachability, such as reversibility and reduced vendor lock-in, are perceived more as risk-mitigating safeguards rather than as drivers of value creation. In contrast to IT modularity, which may be associated with performance gains and reuse potential, detachability appears to be more defensive in nature, shaping perceptions of flexibility rather than direct benefit. Although the direct effect of IT modularity on perceived benefits is only marginally significant, the overall pattern of results suggests that IT modularity primarily shapes outsourcing decisions through reducing perceived risks rather than through increasing perceived benefits. This distinction is important and supports a more nuanced understanding of how different modularity concepts affect outsourcing decisions.

The direct effects of modularity on BPO intention, which are not mediated by perceived risks and benefits, can be explained by other effects, such as business process standardization. Business process standardization is frequently associated with business process modularization and has been recognized as antecedent of outsourcing by previous studies (Goel et al., 2023; Münstermann & Weitzel, 2008; Münstermann et al., 2010).

Theoretical contributions

This study extends prior research on modularity and outsourcing by offering a more differentiated view of how process and IT structures shape outsourcing decisions. Consistent with earlier work, process modularization facilitates outsourcing decisions by reducing coordination complexity (Susarla et al., 2009; Wu & Park, 2009). At the same time, our results provide a more nuanced perspective on IT modularity and process detachability. While Tanriverdi et al. (2007) and Ge et al. (2021) identified both constructs as enablers of outsourcing through cost reduction, our data suggest that their effects are not uniform. Specifically, IT modularity primarily increases perceived outsourcing benefits, whereas process detachability shows a more differentiated influence that does not fully replicate prior results. This indicates the importance of conceptually

distinguishing modularity and detachability when analyzing outsourcing intentions. Moreover, where earlier theoretical contributions emphasized modularity as a governance mechanism for outsourcing (Sako, 2003), our empirical evidence substantiates these claims and highlights their practical relevance in the financial services sector. Finally, our study complements the recent case-based insights of Benazeer et al. (2025) by providing large-sample, quantitative evidence, thereby strengthening the empirical foundation for understanding how modular IT and business processes shape outsourcing intentions. This also highlights the need to distinguish between modularity as a structural design principle and detachability as the extent to which such structures can be realized across organizational boundaries.

Our findings offer several implications for theory. We contribute to research on outsourcing decision-making by clarifying how different forms of modularity affect intention formation. In doing so, we expand existing theory that links modular structures (e.g., service interfaces) with outsourcing potential (Benazeer et al., 2017). Existing research on the effect of product modularity on outsourcing so far has produced controversial and contextually bound findings. Studies in the automotive industry suggest that modularity cannot replace coordination mechanisms if the complexity of the examined system is too high (Cabigiosu et al., 2013). These studies show that standardized interfaces alone do not always enable a clear division of tasks or responsibilities. In contrast, in our setting, where business processes are well-known and standardized, we find positive effects of IT and business process modularity on BPO intention. This may be due to the substantially lower complexity of the traditional banking processes examined in this study. This may also explain why prior findings on modularity and outsourcing have been context-dependent.

Beyond outsourcing decisions, our findings also have broader implications for organizational boundary design and governance. By shaping the extent to which business processes can be separated from their technical and organizational context, modular enterprise architectures influence which organizational capabilities can be externalized, recombined, or reintegrated across firm boundaries. This increases firms' flexibility in designing sourcing arrangements and governance mechanisms. Highly modular and detachable processes can be governed more through standardized interfaces and output-based contracts, whereas tightly coupled processes require stronger relational coordination and hierarchical control. Thus, our findings suggest that enterprise architecture modularity not only influences outsourcing intention, but also shapes the

range of feasible governance and available to firms (Nikou & Plugge, 2025). While not the main focus of our theoretical contribution, we also replicated key parts of Gewald and Dibbern (2009) using updated PLS-SEM methodology and reporting standards (Benitez et al., 2020). This strengthens the structural validity of the original findings and contributes to ongoing methodological debates in PLS-SEM (Evermann & Rönkkö, 2023; Schuberth et al., 2023) because it also validates other research that used this work as a foundation.

Managerial implications

Beyond these direct contributions to the literature, our findings also speak to the broader political, social, and practical implications of outsourcing. While such implications are commonly discussed in the outsourcing literature, our findings suggest that modularity influences how these implications materialize. From a political perspective, modular architectures allow firms to more effectively comply with regulatory requirements (e.g., standards, sector-specific rules) by retaining sensitive parts of their processes (i.e., modules) in-house while outsourcing others. Socially, modularity accelerates the redistribution of work, as detachable modules are more easily offshored, while employees in the home organization must increasingly develop coordination and architectural skills.

From a practical standpoint, managers can use modularity as a decision-making tool, outsourcing only those modules where risks are manageable. Further, the development of interface definitions holds a role in shaping productive contract negotiations. Specifically, the identification of modular structures can assist in crafting necessary Service Level Agreements (SLAs). As modularity helps with the splitting of systems, it helps to create precise requirements for outsourcing partners, reducing the likelihood of conflicts and ambiguities during contract negotiations and establishing a path toward more transparent and efficient collaboration with outsourcing partners. This aligns with the findings of Benazeer et al. (2017) case study, suggesting that more work should be done on modularizing the components to be outsourced, and extends Sako's (2003) recommendation, who proposed modularization as a viable strategy before outsourcing.

Thus, we strongly advise viewing modularization as an essential preliminary step before outsourcing, as it can substantially enhance the quality of outsourcing decisions and performance. In summary, incorporating modularization as an initial step equips companies with a deeper comprehension of their operations, enabling them to

make well-informed outsourcing decisions and elevate the quality of their outsourcing partnerships.

Limitations and future research directions

Like all empirical studies, our research holds some limitations. First, our findings are limited in generalizability, as we only examined two processes in one specific industry (i.e., the financial services sector). Replications in other industry contexts would therefore be advisable. In addition, modularity is not a yes-or-no decision, but rather a continuum, typically characterized by a U-shaped curve that ranges from a too-small degree of modularity to the ideal degree of modularity, and then to a degree of modularity that is too high. The question is, therefore, what constitutes an appropriate degree of modularity to support outsourcing. This is inadequately measured even with the multidimensional constructs used in this study.

Another potential next step would be to see if the complexity of the analyzed business processes (and scenarios) has an impact on the effect of modularity (Sako, 2003). Since studies examining *product* modularity and outsourcing have found alternating high levels of modularity and outsourcing over time, it would be interesting to see if this pattern also holds in a BPO context (Fixson et al., 2005). We believe that more research on the relationship between modularity and outsourcing is necessary, as also advocated by Lacity et al. (2016). Our main finding, i.e., modularity having a positive impact on engagement in BPO, is likely applicable to other forms of outsourcing as well. Since the literature provides controversial findings on this relationship, we believe that this study makes a valuable contribution to the discussion on outsourcing, particularly in the context of BPO.

Conclusion

BPO remains a highly relevant topic, as new formats like BPaaS are as present as ever, despite some decline of traditional BPO (Deloitte, 2023). However, the failure rates are still high. Overall, this study demonstrates that modularity – both at the IT and business process levels – plays a central role in shaping perceived benefits and risks and, ultimately, outsourcing intention using data from the financial industry and a PLSc-SEM model. By clarifying differential effects of IT modularity, business process modularity, and process detachability, the study advances outsourcing theory and offers practical guidance for organizations aiming to structure processes effectively before outsourcing. We showed that both the modularity of business processes and the underlying IT

architecture positively contribute to perceived opportunities and at the same time lower perceived risks. Additionally, our results indicate that IT detachability influences outsourcing intention chiefly by lowering perceived risks, whereas its effect on perceived benefits is not statistically significant. These findings suggest promising directions for future research on modularity as a strategic design principle for outsourcing in an increasingly digital and service-oriented economy.

Notes

1. For a better understanding, we use the term “layers” instead of TOGAF’s terminology of sub-architectures /subsystems for business, applications, and technology.
2. For example, the degree of clients’ outsourcing experience, vendors’ domain experience, degree of internationalization, or knowledge formalization, which are further well-researched BPO decision determinants (Lacity et al., 2016), are not directly related to the modularity argument.
3. Adapted from Gewald and Dibbern (2009)
4. For reasons of privacy and compliance, we have refrained from collecting gender information.
5. We report these measures despite the valid critiques because they are frequently requested by reviewers and show the general suitability of the model.

Author contributions

CRedit: **Andreas Reitz:** Conceptualization, Data curation, Methodology, Writing – original draft, Writing – review & editing; **Daniel Beimborn:** Methodology, Supervision, Writing – review & editing.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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