

# Shaping Business Process Agility in Telecommunication 4.0

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**Abstract:** The study elaborates the relationship between antecedents and implication of business process agility on the business performance of telecommunication equipment companies in Indonesia. Diverges from prior studies on organizational agility, the study identifies that a complete market orientation of integrated product development (IPD) implementation maximizes organization's responsiveness toward the dynamics of customers' requirements and competitors' activities. Furthermore, exploratory case studies find that as Telecommunication 4.0 brings up new challenges and complexities created by open innovation and hardware-software decoupling, organizations need to leverage networking with partners and exploit organizational structure nimbleness to gain optimal product development capability. The conceptual framework is formed from both the exploratory case studies and systematic literature review. The case studies enable us to gain state-of-the-art views from practitioners in the industry, clarify the fuzziness and broad nature of antecedents, and integrate them into existing theories to acquire managerial insight. Aligned with market-based and dynamic capability theory, the originality of this study lies on how organizations exploit not only internal resource flexibility, but also how to access, configure, and leverage external network capabilities embedded in business partners.

**Keywords:** Business performance; business process agility; market-oriented; integrated product development; networking capability; nimble organizational structure.

## 1. Introduction

Started in the 21st century, Telecommunication 4.0 revolutionizes digital business with its smart and connected technologies with core functionalities at the cloud, big data analytics, pervasive mobile solutions, social and collaborative systems, internet of things (IoT), artificial intelligence (AI), quantum computing, and 3D printing [1]. It brings up a new requirement for the players to address hardware and software decoupling, open system, and virtualization issues as compared to Internet Protocol-based communication system of 3rd telecommunication revolution in 1969, early digital communication of 2nd telecommunication revolution in 1937, and analog communication of 1st telecommunication revolution in the 19th century [2].

The McKinsey report characterizes the telecommunication industry as having the highest degree of business environment instability and volatility that requires organization-wide agile transformations [3]. The increasing challenge of competition, rapid change in demand, technology complexity, and end-to-end complex solution requirement requires organizations to be able to respond and adapt very quickly. Stay agile in an ever-changing telecommunication environment becomes mandatory [4]. Prior agility studies in telecommunication industry

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mention that to success in gaining competitive advantage in a hyper-dynamic and competitive business environment, organizations must have the capability to adapt their actions and strategies very quickly and even influence the environment [5, 16]. As a result, the study on business process agility keeps receiving growing attention as it is considered as the key organizations' competence that positively influences business performance [7, 8, 9].

Identifying primary business process agility antecedents is crucial to provide academics and practitioners understanding how to shape business process agility and business performance in Telecommunication 4.0 era. This study is based on exploratory case studies and literature review to investigate the primary antecedents of business process agility and to develop a framework that can be further tested using a quantitative survey. The exploratory case study will provide state-of-the-art insight from practitioners of business process agility setup in the cloud computing era.

## 2. Literature Review

Business process agility in telecommunication companies is strongly associated with the organization's responsiveness in fulfilling the change in customer's demand for products and solutions. Therefore, integrated product development with correct strategic orientation is a crucial factor. The primary antecedents of product development, both external and internal, in the form of networking capability and nimble organizational structure respectively are elaborated.

Table 1. Variable, Definition, Dimension and Indicator.

<p><b>Organization Business Performance</b></p> <p>Business performance has always been the centre of strategic management as the prime objective of this discipline is to attain performance improvement [10]. The widely used definition in a business-to-business context and is adopted in this study is proposed by Le Meunier-FitzHugh and Lane [11].</p> <p>Definition: The extent of success of the organization at generating a high level of sales revenue, at generating high market share, at selling products with high profit margins, producing sales with long-term profitability. Adapted from [11].</p> <p>Indicator: The level of the organization success at generating a high level of sales revenue, high market share, selling products with high profit margins, producing sales with long-term profitability.</p>
<p><b>Business Process Agility</b></p> <p>Business process agility as the ability to respond appropriately to a dynamically changing environment is essential to organization survival [12, 13] and therefore receives growing attention [8, 13]. An agile business process contributes to achieving cost economies [9] and exploiting opportunities for innovation [13].</p> <p>Definition: Responsiveness to changes in demand, new product development, changes in product mix, product pricing, market expansion, supplier selection, IT adoption and diffusion. Adapted from [8, 13, 14]</p> <p>Indicator: Respond to changes in consumer demand, customize a product or service, react swiftly to new competitors' move, introduce new pricing scheme in response to competition, change the variety of products, adopt new technologies for better products, switch suppliers to benefit of lower costs and better quality.</p>

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### **Networking Capability**

Based on dynamic capability theory, organizations are suggested to have not only capabilities to exploit internal resources, but also permit them to access, configure, and leverage external network resources embedded in business partners [15]. By optimizing networking capability, organizations have the opportunity to leverage strategic network resources from networks partners, make it possible for organizations to integrate, combine, and optimize diverse expertise, capability, and knowledge [16, 17, 18].

Definition: The competency of an organization to purposefully search and find network partners, manage and leverage network relationships for value creation. Adapted from [16, 18].

Dimension and indicator:

- a. Finding partners: search locally, globally, and widely to find proper partners
- b. Managing partnership: navigate the partnership dynamics, fine-tune network partnership, constantly assess partnership and make adjustments, dynamically integrate networking activities into our business process.

Leveraging partnership: find partners to count on in time, be accessible to our partners timely, can get the needed assistance from our partners timely, partners can refer us to a third party who could help.

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### **Market-Oriented IPD Strategy**

Product development had been studied to be very important to establish organization value. Therefore, a systematic process of integrated product development (IPD) involving all relevant job disciplines including sales, marketing, and supply chain, manufacturing, logistics, procurement, and fulfilment is required [19].

Definition: Integrated product development that is strictly implemented based on complete market orientation. Adapted from [20].

Dimension and indicator:

- a. Complete market orientation: develop the right product, develop the product at the right time, develop the product at an acceptable price, value customers' needs more than force its own technology viewpoint.
- b. Design-to-value: optimize the solutions with a competitive price and performance, release products to market without overkill features and functionalities.

Organization-level resource sharing: share product development platform, share a common technology platform, share the technical expert, and set up "bridges" across different product lines.

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### **Nimble Organizational Structure**

Nimble organizational structure accelerates decision-making as it reduces the communication layers and bias. This structure enables the team member to create active collaboration in a conducive ecosystem of empowered people, so that team members perform their jobs more effectively [21].

Definition: Organizational structure built from the integration of nimble teams where the whole organization embraces the nimble mind-set and functions as an interactive network, not a top-down bureaucracy with just a few teams implementing nimble tools and processes. Adapted from [22, 23].

Dimension and indicator:

- a. Nimble discrete project teams: organize a project in iterative shorter cycles, measures performance at the end of each cycle, estimates how much time work will take, decides how to do the work in the iteration.
  - b. Nimble empowered (self-managing) teams: small empowered team, cross-function team, no management interruption during the cycle, goals are defined before each cycle starts, systematically inspect performance.
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### 3. Equations governing two-dimensional motions

Exploratory case studies are conducted to develop the conceptual framework rigorously. First, it will be beneficial at the initial stage to understand the primary antecedents from a practical point of view that influence business process agility, especially as the scope of agility topic in literature is broad. Second, it helps to clarify the relationship between various agility antecedents, and their relationship with agility and business performance. A case study is relevant and appropriate when the environment under investigation is complex and disordered [24]. The framework is developed from both existing literature and contextual field data from exploratory case studies [25].

Four large telecommunication equipment companies in Indonesia are selected for a semi-structured interview. These companies are multinational companies from the United States, Finland, Sweden, and China. These companies are selected because they are categorized as large companies, with more than 100 labours based on Indonesia Central Bureau of Statistics (BPS Indonesia) classification, having more than one product lines and multiple project teams that allow us to explore how they manage simultaneous and multiple projects within the organization.

The exploratory case studies are based on half an hour to one hour semi-structured interviews with members of senior leadership in each organization including Sales Head, Marketing Director, and Solution Sales Head of the selected organizations who are believed to have sufficient knowledge on both organization's strategy as well as the business process. The interview aims to obtain a deeper understanding of how organizations perceive agility in the hypercompetitive telecommunication industry, how organizations prioritize the agenda to become agile, and what strategic orientation needs to be adopted by the organizations. The respondents were asked to provide their perspective using the same questions. As suggested by Miles and Huberman [26] the case studies were analyzed through cross-case analyses to intensify generalizability as well as sharpen explanation. By defining the dimensions of business process agility, it becomes possible to develop the conceptual framework.

### 4. Developing the Conceptual Framework

The selection of variables for the conceptual framework presented in Figure 1 is developed through the exploratory case studies and strengthened by the extensive literature review, by identifying primary antecedents in shaping business process agility.

#### 4.1 Business Process Agility and Organization Business Performance

As business process agility enables organizations to anticipate or respond to the changes in the market promptly and with ease [13], it is expected to contribute in achieving superior organizations financial performance [8, 13]. Besides, with the responsiveness to switch suppliers to avail of lower costs, better quality or improved delivery times, organizations profitability and revenue will be enhanced [8].

Sales Head of United States company states:

*“Aligned business process, which is customer centric, is the key requirement for telecommunication equipment companies these days.”*

Furthermore, a high degree of business process agility reflects the organization's swiftness to adapt toward market change, and therefore will improve product customization capability, improve delivery performance, and reduce reaction time [9]. It is therefore hypothesized that:  
**H1:** *Business process agility has a positive and direct effect on organization business performance.*

## 4.2 Networking Capability and Organization Business Performance

By cooperating with the right partners, organizations may obtain a valuable resource, information, and knowledge which finally improve organization performance [16, 27, 28]. Aligned strategies help organizations overcome the existing network structures constraints, attain high-performance portfolios from the synergy, central network positions, and superior organization performance [29]. Organizations also benefit at the portfolio level if having partners that are able to complement one another [28]. The Solution Sales Head of Finland company argues:

*“Developing new ecosystem, especially with new suppliers of the specific emerging component, or sub-products is important as new and complex solutions are now required by telecommunication operators.”*

It is therefore hypothesized that:

**H2:** *Networking capability has a positive and direct effect on organization business performance.*

## 4.3 Networking Capability and Business Process Agility

Networking capability allows organizations to gain the flexibility to leverage critical resources and business partners and to work across boundaries to reach strategic agility [30]. Rezazadeh [31] accentuates that by cooperation with partners, synergy can be achieved that accelerate the decision-making process. Partnership with agile organizations stimulates partners to achieve an equivalent level of capabilities, competencies, and flexibilities in their enterprise to conform with a rapidly-changing customer and market demands [32]. The Sales Head of Finland company asserts:

*“Telecommunication operators are now becoming more demanding; their requirements are becoming more complex. They are requiring telecommunication vendors to shield the complexity of dealing with network requirement. They expect one company as a single point of contact during project implementation to avoid the complexity of engaging with other smaller solution suppliers. Telecommunication equipment companies must have the ability to be able to create and leverage a partnership with business partners.”*

The same notion is also stated by the Sales Head of the United States company: Telecommunication system openness requires telecommunication companies to build partnership ecosystem with more diverse IT and software suppliers to make bundling complete solutions to customers (operators).

It is therefore hypothesized that:

**H3:** *Networking capability has a positive and direct effect on business process agility.*

## 4.4 Networking Capability and Market-Oriented IPD Strategy

Inter-organization networking capability had been recognized in the literature as a mean that can produce or improve value in relation to product development and innovation [33]. By leveraging network relationship, both parties will be able to generate differential returns that are beneficial for both as a totality [16, 27]. Capaldo mentions that by leveraging network ties, superior innovation can be achieved [27]. United States company Sales Head states:

*“The trend of the open system requires telecommunication companies to develop partnership ecosystem to bundle a complete solution effectively.”*

Jifeng Mu and Anthony Di Benedetto argue theoretically and demonstrate empirically that networking capability is a reliable predictor of new product development performance [16, 29]. The empirical results also indicate that organizations' sufficient networking capability to manage network dynamics is the critical variable that positively moderates market orientation and entrepreneurial orientation with NPD performance [18]. It is therefore hypothesized that:

**H4:** *Networking capability has a positive and direct effect on market-oriented IPD strategy.*

#### 4.5 Market-Oriented IPD Strategy and Business Process Agility

Organizations must focus on the development of technologies, system, and procedures that allow them to modify available products as a response to change in a dynamic marketplace [34]. As stated by the Sales Head of the company from the United States:

*“To be agile and win the market, first, the company must be having a customer-centric vision. We have to be able to understand customer requirements and come up with the solution that fits the requirements, both in term of price and features.”*

While Sales Head of Chinese telecommunication company states:

*“We have to understand the technology trend, today and in the near future, and customers’ plan and requirement. The customer is the first. By aligning both, the organization will be agile. When product customization is required, our organization shares a technical expert group to support it and set up “bridges” between different product lines if necessary.”*

New product development (NPD) and product adaptation contribute significantly to organizational effectiveness and responsiveness [35] by improving both product advantage and life-cycle flexibility [36]. It is therefore hypothesized that:

**H5:** Market-oriented IPD strategy has a positive and direct effect on business process agility.

#### 4.6 Market-Oriented IPD Strategy and Organization Business Performance

It is empirically proven that one of the important determinants for a sustained company performance is the success of continues development and launching of new products [20]. New product development strategy is essential for long-term business success [37]. The Solution Sales Head of Finland company states:

*“Today, telecommunication product is no longer globally defined from headquarter. It is important for telecommunication vendors to go locally to address the specific requirement to be successful in the market.”*

However, even though IPD has been widely used as a managerial approach to improving new product development performance only the complete market-driven strategy is proven successful [20]. It is therefore hypothesized that:

**H6:** Market-oriented IPD strategy has a positive and direct effect on organization business performance.

#### 4.7 Nimble Organizational Structure and Business Process Agility

When there is a rapid change in the business environment, the hierarchy creates difficulty that usually caused by distorted information from the bottom [23]. The solution head of Finland company states:

*“Organization structure and resource allocation must support an agile business process. Chain of command must be flatter to achieve faster response and minimize information bias.”*

Highly bureaucratic nature of hierarchical organizations requires decision cannot be made within a short time [38]. The Solution Sales Head of Sweden company asserts:

*“In order to be agile, there should be a higher number of slim customer-facing teams with more independent decision-making capability and lead significant actions.”*

A nimble and flat structure with decision-making decentralization offers advantages over an overly rigid systematic approach by leveraging the full spectrum of organizational competencies while harnessing the unique skills of individuals [39, 40, 42]. It is therefore hypothesized that:

**H7:** Nimble organizational structure has a positive and direct effect on business process agility.

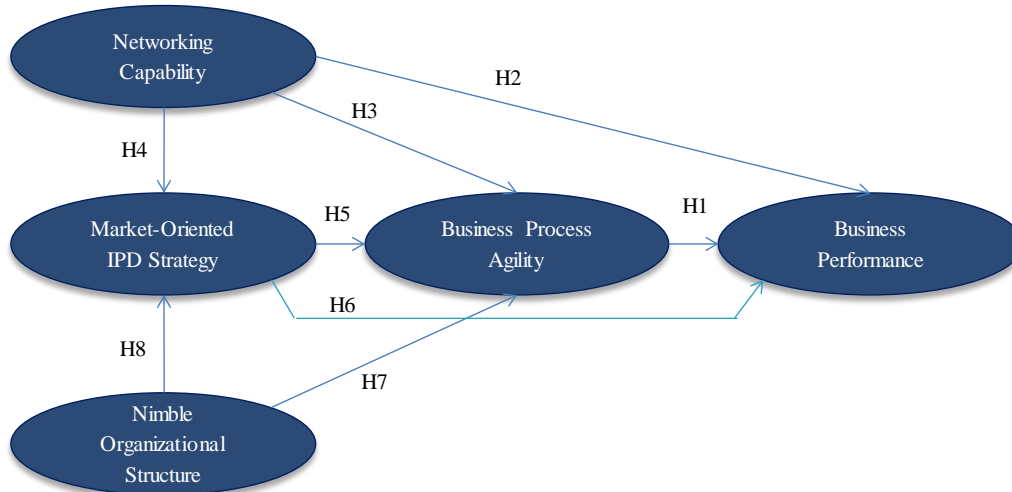


Figure 1. The conceptual framework: antecedents and consequences of business process agility.

#### 4.8 Nimble Organizational Structure and Market-Oriented IPD Strategy.

In a nimble organization, new product development can be assigned to the cross-functional and empowered team making it possible for the organization to orchestrate resources to develop product required by market [38]. Nimble organizational structure provides the capability to draw full talents during product development and involve customers in every stage of the process that creates innovation and value for customers [42]. The Sales Head of United States company states:

*“Sales and marketing personnel are now required to be supported by early involvement of operation personnel when discussing a solution with customers as he can provide additional insight about a revenue-generating solution for operators”*

The Solution Sales Head of Finland company argues:

*“Cross-functional teams that are capable of capturing customer requirement should be present within the customer-facing team to develop product and solution effectively”.*

Working in small and nimble teams, in short cycle, and the existence of clear view of customer positioning and expectation, allows nimble structure team to enhance existing products or solution to produce new products in short period [42]. It is therefore hypothesized that:

**H8:** *Nimble organizational structure has a positive and direct effect on market-oriented IPD strategy.*

## 5. Discussion

The positive effect of new product development and adaptation on organizational responsiveness had been discussed in past studies [35]. A study by Ravichandran [7] shows that the innovation capacity of the organization has a positive relationship with business process agility. In other studies [22, 42], Denning qualitatively elaborates how the organization achieves strategic agility and the core practices need to be owned by the organization applying agile network. This study highlights there is significant increase in the complexity, dynamics, and volatility of customer requirement in Telecommunication 4.0, and therefore organizations' capability to leverage networking with partners [16, 18] and to exploit internal organizational structure nimbleness [42] become crucial for the success of product development and organization responsiveness in offering solutions to customers. This study contributes to the growing body of research aimed at understanding the mechanism through which the three antecedents influence business process agility and organization business performance.

## 6. Conclusion

This study conceptually develops a comprehensive framework that links networking capability, nimble organizational structure, and market-oriented product development strategy to enhance organizations' business process agility for telecommunication equipment companies in the hyper-competitive telecommunication industry. Antecedents of business process agility are selected based on a literature review and corroborated by insight from an interview with executives in the industry, their dimensions are further developed, and their relationships are presented. The study diverges from prior studies on agility in several ways, thereby adding to the cumulative body of knowledge in this important research area. The conceptualization and investigation of the autonomous and joint effect of market-orientation in product development, networking capability, and nimble structure on business process agility highlight the importance of complementarities between antecedents and set standing for future research.

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