

What is the right supply chain for your project? An empirical exploration of the link between environmental uncertainty and innovation project management strategies

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Summary

Nowadays, in supply chains of all industries, innovation projects represent the key to maintain a competitive position in the market and are more and more characterized by internal and external collaboration. In this sense, supply chain integration choices are key for a successful project management. With the development of project management methods other than stage-gate, such as agile, opportunities for collaboration and integration has also evolved. By collecting data from multiple informants in ten focal companies in their supply chains, this paper explore the characteristics of innovation project management strategies – given by the combination of supply chain integration decisions and project management method – using the lens of the contingency theory (so considering the characteristics of the environment the supply chain operates in).

Keywords or phrases: *Supply chain integration; Project Management; Contingency theory*

Submission category: Academic working paper

Theoretical motivations

In modern markets characterized by intense pressure to exceed customer expectations, integration with supply chain partners becomes a critical element for achieving sustained competitive advantages (Zhu et al., 2018). For this reason, during the last decade, several supply chain scholars have focused their attention to study the possible forms of integration between the actors in the chain, aimed at establishing intra- and inter-firm connections through the alignment of objectives, information transparency, and linkages between process flows, in order

to ultimately improve supply chain performance (e.g., Flynn et al., 2010; Wiengarten and Longoni, 2015; Robinson et al., 2018).

This market environment pushes also companies to innovate their products and processes more and more frequently (Haus-Reve et al., 2019), and the ability to launch and manage innovation projects has become strategic for a successful market leadership (Prajogo, 2016). This emphasis on projects has made supply chain management (SCM) even more complicated. In an era of continuous digital transformation, supply chains are asked to introduce several technological developments (Kwak et al., 2018) and project management (PM) is becoming a strategic part of SCM, and the problem of how to design a suitable project supply chain is on top of management agenda (Gaudenzi and Christopher, 2016).

While the role of supply chain integration to manage day-to-day activities has been widely discussed in the past, much less rich is the discussion about *how* and *what* type of supply chain integration is required to manage successful innovation projects. Due to the inter and intra-organizational nature of projects, effective supply chain integration strictly depends on the ability of companies to collaborate with external partners in the supply chain (Ralston et al., 2017) and establishing a cross-functional project teams (Lambert and Enz, 2017), and a better understanding of the dynamics of this innovation implementation, from a holistic perspective, is therefore needed.

This aspect becomes even more relevant considering that, after decades of adoption of the traditional stage-gate PM approach, new ones are now gaining momentum (such as the agile and the hybrid; Conforto et al., 2016), and companies can now select and combine different methodologies that push different project supply chain configurations, in terms of tools adopted (Smith and Offodile, 2007) and, particularly, level of integration and coordination with supply chain actors (i.e., suppliers and customers; Jajja et al., 2017; Kim et al., 2018).

On one hand, the SCM literature claims that higher supply chain integration capabilities are needed to face diverse, changing and therefore uncertain environments (Lee, 2002; Goldsby et al., 2006; Sun et al., 2009; Sabet et al., 2017; Haartman et al., 2020; Zimmerman et al., 2020). On the other hand, the PM literature suggests that the ability to manage projects and introduce innovations reinforce the supply chain capability to respond quickly and effectively to changes in the environment, with some methodologies (e.g., agile PM) requiring more integration than the others (Gaudenzi and Christopher, 2016). This suggests that, similar to what happens to day-to-day supply chain processes, supply chain integration decisions at innovation project level can be better interpreted by embracing the concepts of contingency theory, suggesting that the peculiarities of a firm's internal and external environments must be considered when taking supply chain integration decisions (e.g., Flynn et al., 2010).

Research question and conceptual framework

Given lack of evidence in the literature about the relationship between PM strategies, supply chain integration decisions, and environmental characteristics, it becomes relevant to study how companies can manage the need to choose a suitable PM approach to foster innovation while operating in specific environments.

On these premises, the present research is grounded on the interconnection of two key aspects: supply chain integration in innovation projects and project management methods. These aspects are connected using the theoretical lens of the contingency theory, and the need

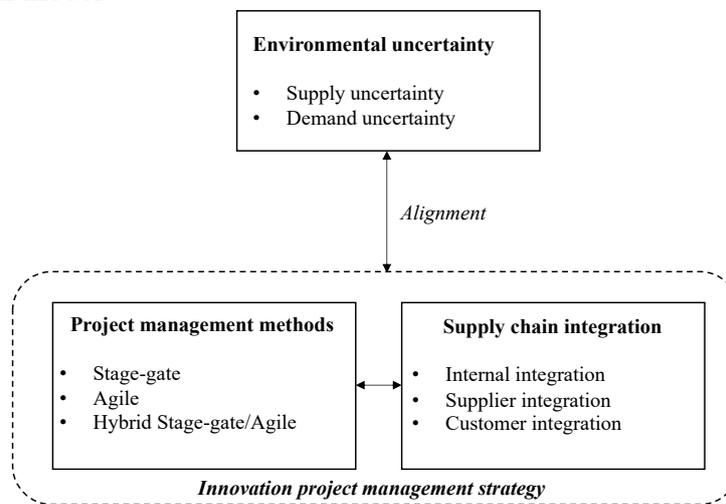
of alignment between the supply chain characteristics and the environment (Defee and Stank, 2005; Sun et al., 2009).

Specifically, the objective is to answer the following research question:

Why and how do focal firms differentiate their supply chain project management strategy specifically in terms of supply chain integration configurations and innovation project management methods in different levels of environmental uncertainty?

In order to explore this unexplored relationship, the underlying conceptual framework of the research can be represented in *Figure 1*.

Figure 1. Research model



Methodology

Considering the theoretical lens of the paper, we select case study as the main methodology to answer our research question. This methodology gave the research team the possibility to reach the actual decision-makers behind the definition of the project supply chain characteristics and the execution of projects, providing a deeper understanding of the organizational dynamics behind these decisions, which would have been very challenging if a quantitative approach was adopted.

Using both personal contacts of the research team, as well as consultation of newspaper articles, articles in the business press, websites and presentations at conferences and workshops (where innovation projects initiatives can be reported), we identified 12 possible companies to be involved in the research. Each company was contacted and given information about the objectives of the study, in order to understand if the company fits the hypothesized criteria. Although all of them represented potentially interesting cases, only 10 of them agreed to participate in the study, and to provide all the relevant information about their supply chain characteristics and project management approaches.

Table 1 summarizes the characteristics of the companies involved in the research.

Table 1. Sample respondents (the names of the companies have been anonymized for confidentiality reasons)

Company	Industry	Turnover	Employees	Informants
Ctech	Engineering	10.3 bln €	24,500	Global supply chain manager (CT1); project manager (CT2)
Icons	Informatics	79.6 bln \$	350,600	Head of Operations (IC1); Chief Information Officer (IC2); R&D manager (IC3)
Enlightening	Energy	76 bln €	30,950	Procurement manager (EN1); Supply chain manager (EN2)
Signal	Technology, Mobility and Services	83 bln €	372,000	Product manager (SI1); Demand manager (SI2)
Baker	Food	3.4 bln €	8,420	Supply chain director (BA1)
Vocal	Telco	49.5 bln €	98,996	Digital transformation manager (VO1); Vendor manager (VO2); Agile coach (VO3)
Bone	Industrial, Energy and Building Technology	78.5 bln €	407,000	Head of supply chain (BO1); IT manager (BO2); Program manager (BO3); Operations manager (BO4)
Smelter	Gas	2.6 bln €	3,000	Project innovation manager (SM1); Corporate strategy manager (SM2)
Bee	Logistic provider	80 mln \$	272	Logistic manager (BE1); Sales manager (BE2); IT manager (BE3)
Plasty	Plastic manufacturer	9.5 bln \$	21,000	Project manager (PL1); Product manager (PL2)

Preliminary findings

Our case-analysis suggests that companies characterized by similar levels of environmental uncertainty are likely to adopt similar project management methods.

We can therefore conclude the following:

Proposition 1. *When demand uncertainty increases, companies are more likely to abandon stage-gate methods for managing innovation projects, in favor of agile project management.*

Our case analysis also suggests that the level of supply chain integration at innovation project level seems to depend on the PM methods adopted (and, in turn, on the environmental uncertainty).

We can therefore conclude the following:

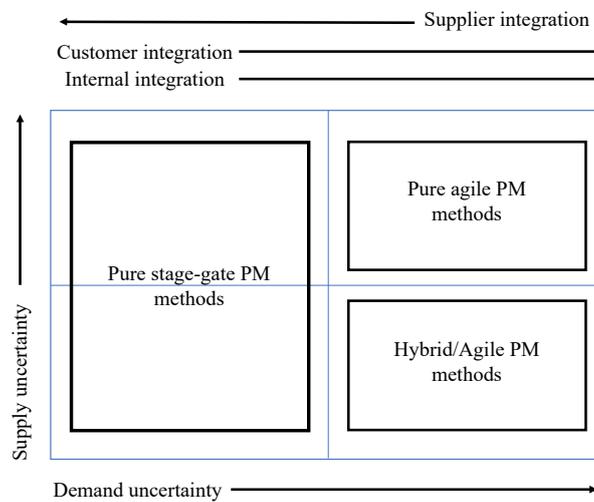
Proposition 2. *Internal integration is usually higher when hybrid or full agile methods are adopted, as they assign more responsibilities to the project team, thus requiring more frequent and flat communication within the team members.*

Proposition 3. *The level of supplier integration is usually higher when a stage-gate approach is adopted. Implementation of agile methods seems to make the supplier integration activities more complex and difficult to be managed.*

Proposition 4. *The level of customer integration is higher when agile or hybrid methods are adopted. Implementation of agile or hybrid methods seems to make the customer integration activities less complex compared to stage-gate.*

If we put together the main evidence coming from the case discussion, we can represent in *Figure 2* the existing relationship between PM methods, supply chain integration decisions, and environmental uncertainty.

Figure 2. Relationship between PM methods, supply chain integration, and environmental uncertainty



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