A Methodological Guideline for Project Supply Chain Management [1]

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Abstract

The aim of this paper is to outline the methodological process of project-orient supply chains. The project supply chain management (PSCM) methodological guideline will describe the elements, concepts, processes, etc. that are to be infused in most business activities as means for improving competition within a complex business environment. The paper presents a normative model to guide managers in the effort to manage their supply chains in order to bring substantial benefits through careful planning and execution.

Key Words: Project Management; Supply Chain Management; Project Supply Chain Management; Agility; Change Management; Complexity.

1. Introduction

1.1. Background to Research

With the increasing complexity of the business world crisscrossed with the hypercompetition – fueled by political turmoil, there has been an increasing focus on the ''core business'' among the project demand and supply chain actors in most industries. Hence, this necessitates an enhanced focus on the project demand and supply chain both for the projects development and operations phases.

1.2. Research Topic

The main mission of this research is to look into supply chain management as part of project management. Indeed, the focus on supply chain management in most industries of today's business world is usually perceived as means for improving the competitiveness of industry in general the concerned ''entity'' in particular (from a hypercompetition – market perspective).

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The paper aims to bring about a contribution to the project management of large-scale development and operation projects from concepts within the supply chain management field. The work will mainly revolve around:

- Developing a managerial concept that tackles projects supply chain management from a project management perspective.
- Highlighting what is of considerable relevance for supply chain management within the project management context.
- Developing both conceptual and methodological frameworks and projects that may be used as basis for future applications in project-oriented contexts.

2. Conceptual Outline of Project Supply Chain Management

2.1. Conceptual Contextualization

Project supply chain management (PSCM) may be understood as an artificial construction – given that it is a system being molded by goals and purposes to the complex environment in which lives. It should be noted that ''artificiality'' and ''complexity'' are inextricably interwoven hence, the fulfillment of purpose involves responding to : the goal, the character of the artifact, and the environment in which it operates (Simon, 1990). That said, new facts will need new systems of knowledge. Hence, within the context of project management – supply chain projects are to be reviewed with great care and detail with respect to their own complex system.

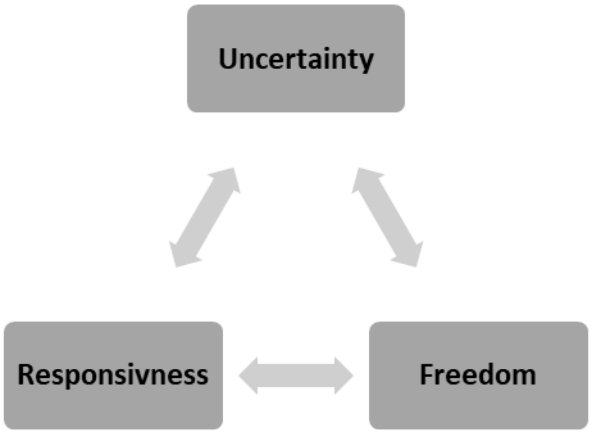
2.2. The Definition of Project Supply Chain Management

The characteristics of project supply chain management outlined above show that we have a project supply chain that is built up of one branch for the project object development and another branch for the project object operations. Seen as one, these two project supply chain branches constitute the entity that shall make the project as a business opportunity competitive.

Decrypting PSCM can be outlined as follows (Salmiah et *al*., 2020; Korpysa & Halicki, 2022) :

- ***Uncertainty***: Projects are usually uncertain and complex given the instability of today's business environment.
- ***Freedom:*** Projects usually benefit from freedom, both in scope as well as in their engineering and development.
- ***Responsiveness:*** Supply chain managers must remain vigilant to both anticipate and properly respond to changes and challenges (e.g. the logistics, procurement, operations, etc. strategies) given the uncertainty of the project environment.

Figure 01. The Cornerstones of PSCM



The idea is to have a supply chain management concept that takes into account the particularities of the project context's development and operations phases. This will help identify value enhancement opportunities throughout the lifecycle of the project.

In other words, PSCM will seek value enhancement in strategic large-scale projects through logistics' focus on demand and supply alignment by adopting (Wu, 2020; Kaswan et al., 2022):

- An agile approach to demand chain management in the project's development phase;
- A lean-waste approach to supply chain management in the operational phase.

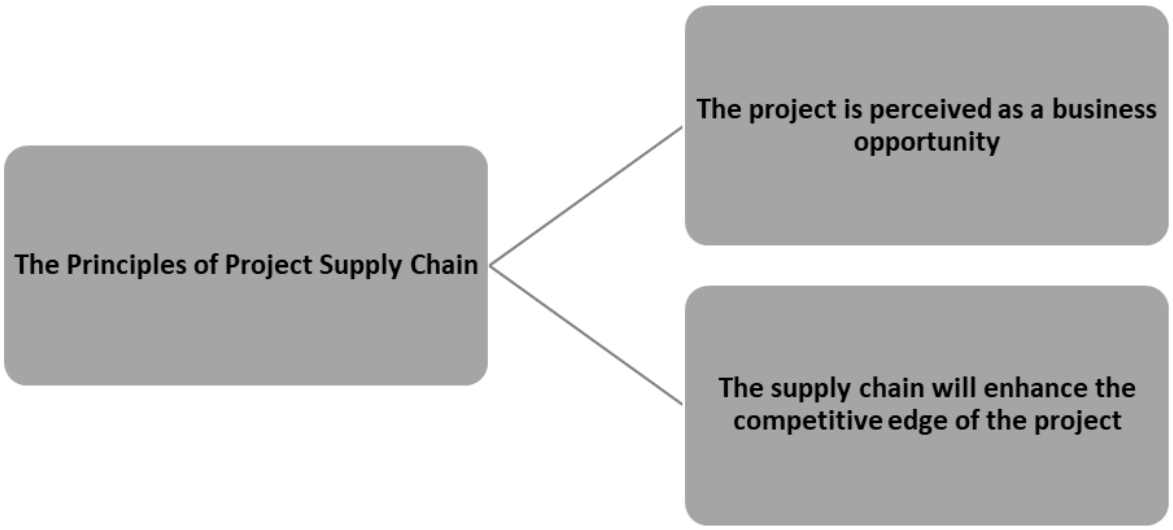
2.3. The Principles of Project Supply Chain

Based on the above, we have worked towards highlighting the principles of project supply chain management which frames the value generation process for the entity that shall undertake the project, throughout its lifecycle. The principles of PSCM will aim to build up the business foundation of the entire project:

- ***Principle 01***: The project is perceived as a business opportunity that can and must attract actors to participate in its execution and contribute to its success.

- ***Principle 02***: The supply chain will enhance the competitive edge of the project which will develop its value while capitalizing on the different aspects of both its internal and external environments (e.g. technology, laws and regulations, etc.).

Figure 02. The Principles of Project Supply Chain



2.4. The Characteristics of Project Supply Chain

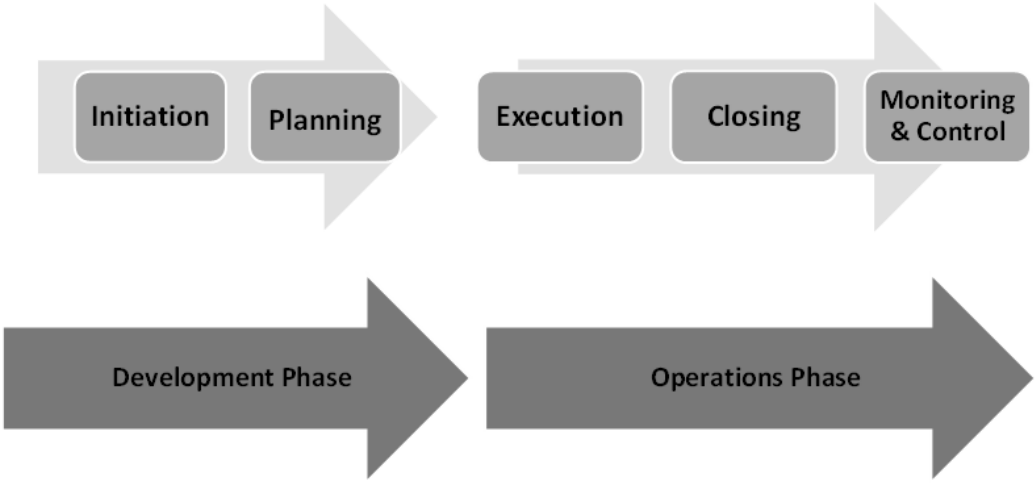
2.4.1. Project Life-Cycle

The first characteristic is the project life cycle – which is characterized by two distinctly different phases (Veres et *al*., 2019):

- ***Development Phase***: which is focused on developing a business opportunity as well as the project object – thus, enabling the project initiator (and/mor manager) to exploit the projects' business opportunity. It includes the Initiation and planning stages.

- ***Operations Phase***: where the focus is on ensuring the execution of project operations, generating value, ensure cost efficiency, and minimize risk. It includes the execution, closing, and monitoring stages.

Figure 03. Project Life-Cycle



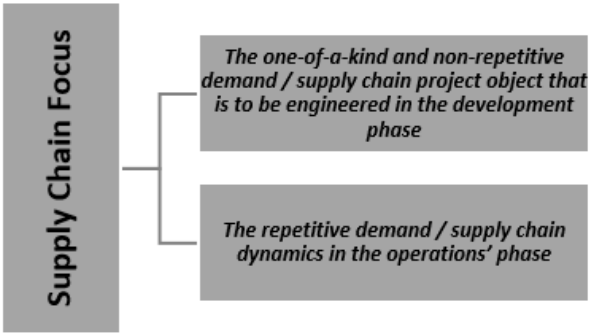
2.4.2. Supply Chain Focus

The second characteristic will be the supply chain focus which has two different working processes (Paul, 2016; Kaswan et al., 2022):

- ***The one-of-a-kind and non-repetitive demand / supply chain project object that is to be engineered in the development phase***. It should be noted that the ''project object'' development means the coordination of several activities (e.g. engineering, production, communication, etc.) to develop a unique ''result'' and exploit a business opportunity in an ''optimal'' way. The generation of the project object is thus a complex process that must balance the search for value enhancement and lean supply chain.

- ***The repetitive demand / supply chain dynamics in the operations' phase*** – where the supply chain focus is characterized by repetitive logistical drivers, driven by technical processes and predefined operations schedules – making the organizational processes lean.

Figure 04. Supply Chain Focus



2.4.3. Supply Chain Drivers

The third characteristic of project supply chain management is the ''logistics' drivers''. In other words, project officials' must review the main driver of the supply chain – on whether it should be demand or supply in both the development and the operations phases respectively (Paul, 2016) :

- ***Demand Management***: The main objective of the development phase is to develop a project object in the best possible way that generates or enhances value. The demand in the development phase is usually defined and changes through the evolution process by the implicated project actors. Each of the project actors have their relationships with suppliers of both short and long-term duration. It should be noted that in the process of engineering project value and specifying its object, each implicated party must draw on their own set of supplier relationships. As such, these suppliers not only take part in the supplying process, when a demand is specified, but also in specifying and defining the demand, as they support their ''customers'' with the ''value".

- ***Supply Chain Management***: Once the project object is developed and its operations commence, the setting becomes repetitive with compliance to the logistics operations and supply chain management. The focus is oriented towards the supply and project value will be enhanced through cost efficiency and reliable logistics support for the project operations.

2.4.4. Organizational Processes

The ''organizational processes'' is the forth characteristic which reviews both the agile dynamics in the development phase and lean elements in the operations phase. Indeed, when the project object is fully developed and set into operations, further value enhancement could be achieved through seeking cost-efficiency in the supply chain as is (Womack et *al*. 1996; Paul, 2016; Kaswan et *al.*, 2022). Hence, the logistics alignment of both supply and demand in the operations phase should be characterized by lean and removing waste from the supply chains.

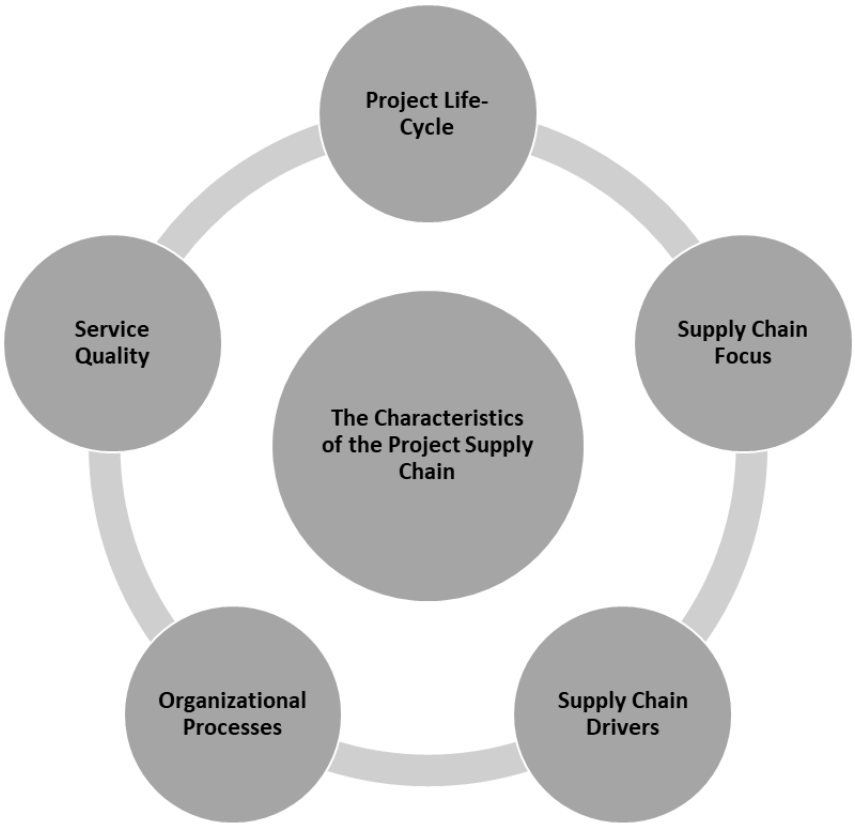
Organizational processes must be able to accommodate change(s) and manage uncertainties, exploit technological opportunities, while ensuring the best capitalization on resources (Goranson, 1999). Hence, organizational and control elements of project management have a major role in accomplishing it successfully (Morris, 1994).

Organizational agility necessitates managing development within the project demand / supply chain dynamic so that new processes are ready to be used for new working methods with a lean approach (Kaswan et *al*., 2022). This is done by reducing risk while tying to use resources to hedge the possibility to capture the best opportunities that are most likely to emerge (Goranson, 1999).

2.4.5. Service Quality

The final characteristic of the project supply chain is related to the service quality – a key aspect of the logistics mission, which focuses on prospective vigilance when engineering the development and operations phases. Project supply chain management will be measured in terms of logistics service availability, operational performance, and reliability (Bowersox et al., 1997).

Figure 05. The Characteristics of the Project Supply Chain



3. The Project Supply Chain Management Process

3.1. Context

The Project Supply Chain Management (PSCM) process will aim to address the questions that crisscross project management and supply chain management. The PSCM methodological guideline will put emphasis on describing elements and aspects that are part of the entire process for both its development and operations phases. The idea is to develop a normative model that can guide managers in the effort to develop and manage their supply chains (Lambert et *al*. 1998).

The application of a project supply chain management methodology can (Schneider et *al*. 1994; Ackermann & Eden, 2011; Paul, 2016):

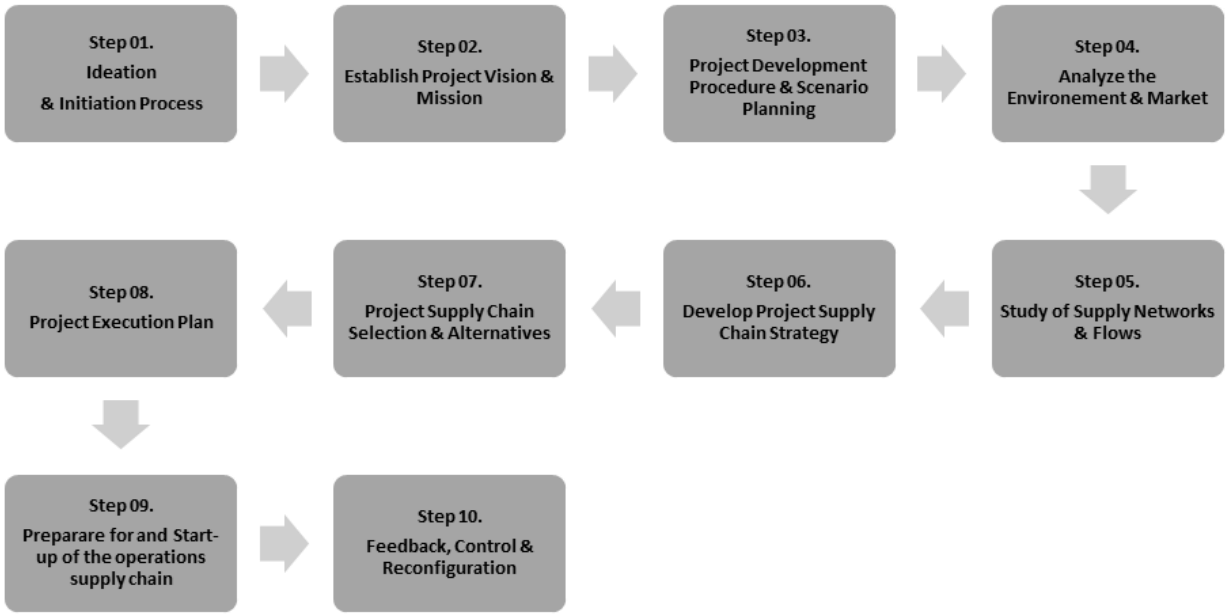
- Help with identifying the mismatch of strategy between the different supply chain implicated parities;
- Identify the KPIs in the supply chain conflicted with the satisfaction of end ''clients'';
- Review the lack of data between supply chains parties about the activities occurring within the supply chain that could have yielded business benefits;
- Improve the understanding of customer requirements further upstream in the supply chain;
- Rework the policies that caused distortion of true supply chain requirements;
- Check resources, data, technical, etc. requirements ;
- Etc.

Based on what industry requirements, what is needed is:

- A simple model for demand / supply chain management in a project;
- A new PSCM concept that is to be applied to large-scale projects;
- A framework that shows the whole value or ''total overview'' of demand / supply chain of a project;
- A structural and proactive approach that decrypts and understands the entire work structure of the project and its supply chain while taking into account the complex uncertainties of the business environment;
- A model that is able to show the details of the project and its supply chain.

The PSCM methodological process will be based upon the ten basic steps that are formulated based on the principles, characteristics and dynamic of both project management and supply chain management.

Figure 06. The PSCM Process



3.2. The PSCM Methodological Process

3.2.1. Ideation & Initiation Process

This first stage aims to outline the project by laying out a strong foundation for it. It is during this stage that the opportunity for the project is identified – hence, a project is developed to take advantage of that opportunity (Indelicato, 2009). At the end of this stage, the project manager should have a basic understanding of the purpose, goals, requirements and overall risks associated with the project (Volker & Eng, 2012; Newton, 2016).

3.2.2. Establishing Project Vision & Mission

The second stage will be to establish the basic project ''problem statement'' or mission – to be used as group framework for the ensemble of project supply chain. The project's vision is engineered to serve as a ''roadmap'' for the project development in compliance with the entire project strategy (Ackermann & Eden, 2011).

3.2.3. Project Development Procedure & Scenario Planning

The third stage of the process will be developed around each project's own portfolio of different organizational and technological requirements and change possibilities (Godet & Durance, 2011). Hence, it is of crucial importance to draw an overview of such alternatives, so that comparative analyses may be done among them for later selection of the best project

alternatives (Baumeister & Lim, 2021). This is done within the context of proactive scenario planning vigilant approach.

3.2.4. Environmental & Market Assessment

During this stage the project manager must review the ensemble of both environmental (internal and external) and market-related (industry-specific) particularities that will shape the project and supply chain planning (Boulocher & Ruaud, 2017). Here, project management and supply chain planning tools and processes are used.

3.2.5. Study of Supply Networks & Flows

The demand and supply chains for the different project supply chain alternatives are to be identified and analyzed to be able to evaluate and determine their competitive edge (Irfan et *al*., 2021). During this stage, the project management team will assess the project's needs and the features it requires – based on their understanding of the elements of the supply network and the needs and features required for its success.

3.2.6. Project Supply Chain Strategy Development

At this stage, the supply chain strategy for the entire project must be established. It should be noted that the project management team must develop an agile and resilient demand chain strategy for the development phase, and a lean and robust supply chain strategy for the operations phase, which supports and leverages the chosen development and operations project approach (Ackermann & Eden, 2011; Lavastre et *al*., 2016).

3.2.7. Project Supply Chain Selection & Alternatives

During this seventh stage, the project supply chain is selected. Given the large scale and complexity of the project as well as the many constraints (e.g. time, budget, etc.), the challenge is to identify the most appropriate combination of projects that can ensure the highest ROI. Thus, project selection is the process of evaluating and choosing projects that both align with an organization's objectives and maximize its performance (Rodebaugh & Snee, 2002). The idea is to prioritize the project supply chain plans and make a choice through rankings or scores, based on certain specified criteria.

3.2.8. Project Supply Chain Execution

At this stage, the project supply chain is selected and executed. The focus is turned toward the logistics and resources management involved in project development and execution. The execution process is based on a project execution plan (PEP) which will strategize the management and realization of the project's actions (Gupta & Nguyen-Duc, 2021). This is done through thorough, meticulous and practical steps that address the project scheduling, monitoring and controlling needed to bring the project deliverables. The PEP must be compliant with the requirement of all the implicated project parties (Richardson et *al*., 2022).

3.2.9. Project Supply Chain Operations start-up

At this stage, the project team needs to commence supply chain operations start-up. Such activities will take into account the project object's requirements as well as the opportunities presented by the supply chains (Wei et *al*., 2021).

3.2.10. Feedback, Control and Reconfiguration

This is the last stage of the project where processes are implemented to review project implementation and results obtained as compared to initial planning and anticipated deliverables (Perrier et *al*., 2018). The aim is to identify which processes are central to project supply chain management processes through control and network analysis. The objective is to implement change control and corrective actions (reconfiguration).

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