

Related Literature Review: Project Triad—The Virtual Project Coordination

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Abstract

The project triad is a concept model of coordination that consists of three (3) leading project team players, such as the project client, consultant, and contractor, agreeing and embracing the transparency transaction in a virtual environment, that's virtual project coordination (VPC). The main objective is to fill in the gap, issues, and problems in communication, specifically in coordination and cooperation. Moreover, to prevent the duplication of ideas, increase competitiveness, and seek improvement for operational effectiveness in virtual project management (VPM). This literature review will gather data from publications, studies, technical papers, etc., from 2013 to 2023 publications. The project coordination depends on how effective communication is used in the project. Therefore, the review analysis focuses on project communication, coordination, cooperation, delivery, uses, tools, and techniques. Mostly related to the latest coordination issue that leads to disputes and how cooperative the project team is, including the virtual environment. The research review will use statistical analysis under the guidelines with the processes of the C4 model (collect, check, calibrate, and complete), filter, process, and sort the gathered data. Then, take the objective (optimization), significance (importance), evaluation, and limitation (OSEL) of the research publication. As a result, a statistical analysis is most likely mentioned in the related publication with coordination issues; however, the effectiveness will depend on the software collaboration used in the 5D model for the project. Therefore, the project triad concept is necessary for the project, whether simple or complex, with the collaboration of related software. The relevant topic's idea may be improved, optimized, and innovated to pursue this concept to realization and better application.

Keywords

Coordination, OSEL, Project Triad, Virtual Team, VPC

1. Introduction

Reviews within the project communication with collaboration (Savolainen et al., 2018), particularly in coordination and cooperation, are essential to get closer to the issues that lead to disputes. Coordination includes brainstorming ideas for advancing goals with executives and business unit leaders, improving performance, and meeting customer needs in the project (PMI, 2021). It can also assist in business analysis, tendering and contract negotiations, and business case development.

In LNG industries, due complexity of construction (Shen et al., 2021), there are three (3) significant players to become the successful completion of the project, the project client (owner), the project contractors, and the project consultant. Each player has a specific functional role and significance, particularly in the project phase, in the EPC stage. The attributes of better communication are clarifying, coordinating, and cooperating.

Project Triad is a revitalized virtual coordination (RVC) concept within the project team. It can encourage transparency, eliminate/control overlapping, and cross-over the top coordination within the project team (Garomsa et al., 2019). It will help to minimize overpricing, material sub-standards (Ekwuno & Nel, 2022), and changes in the design during the execution. This concept will be discussed and simplified in the logical model analysis. In the case of project construction, coordination is one of the vital roles in the communication attributes for a successful project. With software development and collaboration (ErDOS & Nemeth, 2021), virtual coordination will possibly enhance effectively in the virtual environment (El Khatib et al., 2023).

In this research, the study review of the project triad concept will solidify and revitalize the virtual coordination for future studies. It introduces the beauty of this study and operation of virtual project coordination, moreover, revitalized in preparation for virtual application and implementation. Furthermore, the kin of this research should verify, review, and confirm the selection for a specific application. The researcher will encourage the kin to check and analyze the concept prior to the actual application.

2. Framework

The research review is within the publication in this project communication frameworks as stated in PMBOK (PMI, 2021) and includes collaboration, coordination, and cooperation (Badiru, 2008); however, it focuses on issues and transparency coordination in a virtual environment, sees below **Figure 1** in detail scope in this review (Colored and Continues Line) except for Dash Line as shown in **Figure 1**.

3. Data Collection

The researcher obtained articles on the project triad by searching four (4)

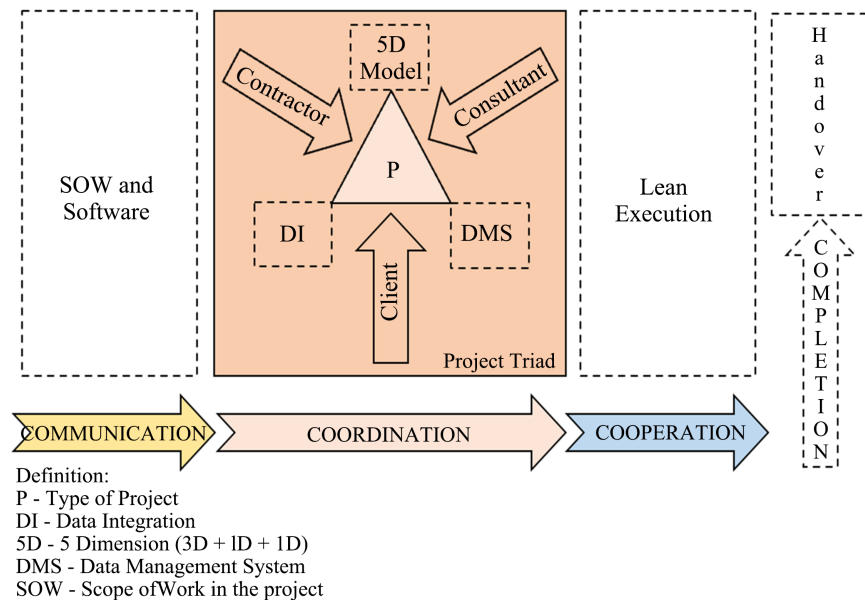


Figure 1. Scope of review.

primary areas: communication, collaboration, coordination, and cooperation, also called the Triple C model (Badiru, 2008), including collaboration. Although this project triad concept deals with a virtual platform specifically in the coordination area. All gathered data would be processed using the C4 flow model, a simplified qualitative analysis is shown in Figure 2. It should be classified and segregated based on the author's intention, Objectives, Significance, Evaluation, and Limitation (OSEL).

Collect. Collect, categorize, and itemize the data aside from the authors, such as the publication date, applied sectors, and study evaluation. The related publications should be included under project communication, collaboration, coordination, cooperation, and PM (E/CM, PM, VPM, vT, and vS). PM discusses related topics mentioning the four (4) C's (communication, collaboration, coordination, and cooperation).

Check. Check and classify the data. It should be checked and classified according to each critical issue that can help this research and future virtual coordination studies, as described in Figure 1.

Calibrate. Calibrate and clarify the data; it's evaluated according to research tools and comes with the study. If the data isn't in-line with the scope of selection/review, it should be changed from gathered data or rejected, look for other sources.

Change. Change and convert into OSEL identity; otherwise, waive or reject the data.

Complete. Clear and complete the data. It should be summarized into each objective (optimization), significance (strength), and limitation (feedback). It simplifies into an unconventional process and come-up with bona fide results in this literature review.

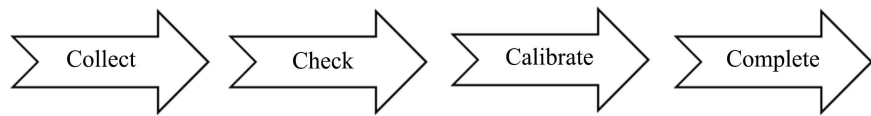


Figure 2. C4 flow model.

4. Related Work

The collected and gathered data are described in **Figure 3**. This review focuses on literature selection that addresses problems, issues, and challenges related to the Project Triad concept and structure. Most paper reviews aim to mitigate past project issues (Adham, 2023).

In **Figure 3**, the *statistical model* got the highest publication in this review study. Statistical data either respondent's opinions, historical accounts, or feedback from the experts are more likely in this project triad concept, the virtual coordination. Although other publications described in the form of *descriptive* and *model analysis* are also considered in this technical review.

The Triple C includes communication, cooperation, coordination (Badiru, 2008), collaboration, and PM in different studies. **Figure 4** shows the lowest and highest hits regarding this related technical study. Communication is the main attribute (Hynes, 2019) and essential for the project's success (Jha, 2010), should the manager possess it. Looking back, the cooperative team and engagement stakeholders (PMI, 2021) will solidify the projection of success even at the beginning of the project. The issues in the projects revolve around scope, cost, and time, then chain reactions occur. All "mis" such as mis-communicate (McMahon, 2001; Nicholas & Steyn, 2021), mis-coordinate (Oberlender et al., 2022), and mis-collaborate will messed-up the projects (Anantatmula & Rad, 2018).

5. Limitation

In this research, the review covered and focused only on project communication, collaboration, coordination, cooperation, and PM, including virtual PM environment for any field of the engineering construction project such as Oil & Gas, Petroleum refinery, Petrochemical, LNG & LPG/LNG Receiving Terminal project. The project triad concept is much valuable, especially in a complex project. Moreover, it would be better and appropriate for mechanical (piping/equipment), chemical, electrical, IT, architectural, civil, industrial, project management, engineering, and construction if the topic is related to the project and construction field. Moreover, further research and development are highly recommended for future implementation and specific applications. For more detail, see **Figure 1**.

6. Result, Discussion, and Summary

As the result of the investigation went through, issues mainly arose in related time (delayed) (Sherif & Abdelalim, 2023), cost (losing profit), and scope of work (SOW) (Oberlender et al., 2022). Project transparency is a project triad

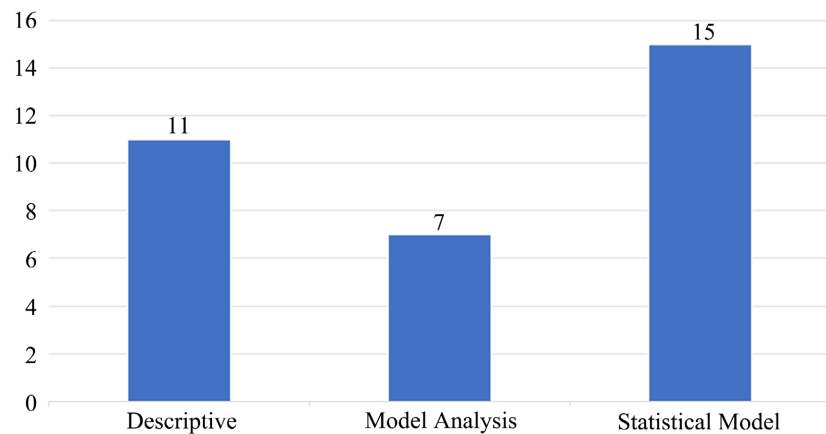


Figure 3. Study for review.

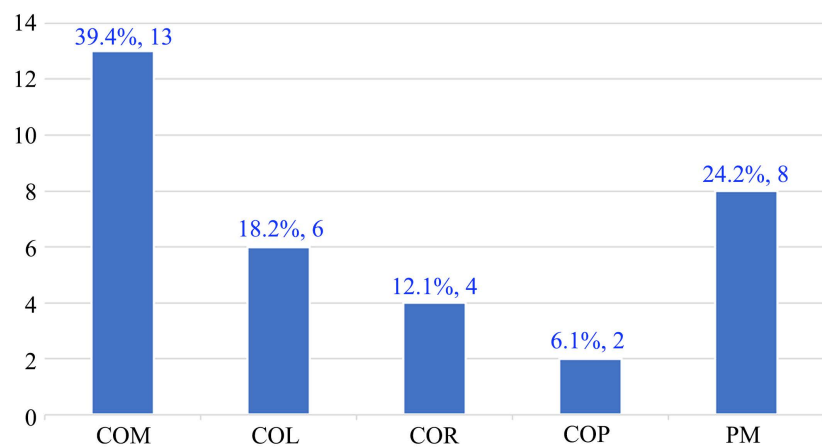


Figure 4. Research study published: areas of study.

concept's key objective since the execution will lead to the main players of the project. The client (owner), consultant, and contractor mainly contribute to this transparency issue.

The VPM (McMahon, 2001) and the execution guidelines (Ybañez et al., 2022) can ensure the project's smooth operation even in a complex project (Ybañez & De La Cruz, 2022). With the collaboration of specific software and the 5D model, transparency issues will be mitigated, minimized, and nearly eliminated.

From Figure 3 selections, in Figure 4, communication (COM) got 39.4% of the gathered publication, contributing to several issues and mitigation to strategize and resolve the disputed issues. Project management (PM) has 24.2%, collaboration (COL) has 18.2%, and the rest coordination (COR) and cooperation (COP) have 12.1% and 6.1%, respectively. Furthermore, all the data is essential in this review, although the number of publications is limited in this area of study.

In this consideration, as discussed in the result, the four (4) C's and PM contributed much to this review by knowing the importance of every technical study

with the correspondence of the timelines and purposes. According to Ybañez et al. (2022), communication is one of the top seven (7) essential factors of VPM operational effectiveness. Constant communication improves things and a clear understanding through discussing even highly technical matters. Coordination, clarification, and cooperation with complete deliverables as scheduled (Ybañez et al., 2022).

Although the project triad is more about coordination, in Figure 4, data shows that communication is the highest percentage in the publication. Communication, coordination, and coordination are part of the virtual operational ladder (Ybañez et al., 2022), connecting project teams (including virtual teams) and clients. Project motivation is essential for cooperation through monetary incentives or rewards (Ybañez & De La Cruz, 2022).

Project Management (PM). Conventional and in a virtual platform, issues occur when teams face delays, cost changes, inefficient deliverable results, and poor performance in the overall assessment (Ybañez et al., 2022). In simplified and complex structures, team utilization with trust (Casey, 2010), overcoming fear (Casey & Richardson, 2008), and monetary incentives (Ybañez & De La Cruz, 2022) are essential factors of completion.

Communication (COM). Among collected data, communication is the most highlighted factor of project failure and success. The effect of quality allows inter-disciplinary communication (Zhang et al., 2018b; Musheke & Phiri, 2021); the higher the information processing, the higher the performance curve. A successful project lies in good communication (Mesmer et al., 2023). Enhancing global communication (Walker et al., 2018), establishing contracts, collaborating with software, and defining project requirements (Wu et al., 2017) are essential for mitigating risk impacts (Plowman & Diffendal, 2020). It's a core competency that brings the project team together with common goals, direction, and execution (Bizjak & Faganel, 2020).

Collaboration (COL). Trust and collaboration are essential factors for increasing the likelihood of project management (Bond-Barnard et al., 2017). In any infrastructure collaboration (Chen et al., 2018), the software, including a virtual environment, is one of the cheapest and most handy ways to achieve PM operational effectiveness. It considers the stakeholder and end-user (or customer) collaboration for the cost performance of the project construction (Xue et al., 2018; Melander & Tell, 2019; Yang et al., 2020).

Coordination (COR). The data address virtual coordination in typical practices, where disputes and low transparency are always present in the meeting. Team efforts significantly impact technical accuracy, especially dealing with a multicultural team (Walker et al., 2018). The flow of coordination between disciplinary teams should be internalized (Ybañez et al., 2022). Several techniques to track the delays and such analysis claims should be considered (Sherif & Abdellim, 2023). Processes require the well-coordinated intervention of experts to en-

sure that quality and safety are carried out (Postavaru et al., 2019).

Cooperation (COP). It's one way to overcome conflicts the cooperative spirit (Schweiger et al., 2020). The effect of suitable leadership styles should be good example followers (Renzi, 2020). Each team should directly follow project-in-charge requirements and specifications to avoid disputes and risk impacts (Ybañez et al., 2022; Trinh & Feng, 2020).

Below are the overall analytical ideas and views, evaluated and summarized in **Table 1**.

Table 1. Finding and summary.

Areas	Objectives (Optimization)	Significances (Strength)	Limitations (Feedback)
PM	Acknowledge the new finding for the new partnership implementation (Nevstad et al., 2018), especially for the virtual environment (Farina et al., 2018; Ybañez et al., 2022).	The factor of project success in partnership implementation is trust (Casey, 2010), communication, commitment, collaboration, and coordination (Ybañez et al., 2022).	Expect more challenges and effects of implementation (Bhat et al., 2017; Yang et al., 2019).
COM	Explore and understand the cross-field through ICT (Lappi et al., 2018), multicultural approach (Walker et al., 2018), SM tools (Kanagarajoo et al., 2019), improvement effectiveness (Yang et al., 2019), etc.	The benefits of ICT (Lappi et al., 2018), 3D (Yang et al., 2019), SM tools (Kanagarajoo et al., 2019), etc. to improve information quality for conventional/virtual global communication set-up (Zhang et al., 2018b).	Implementations violate project privacy (Zhang et al., 2018b) (Arora, 2023). Utilization might differ in project cycle (Kanagarajoo et al., 2019). More study in level of implementation analysis (Dinis et al., 2020) and smooth application (Du et al., 2020).
COL	Identifies and develops an IPD method (Zhang et al., 2018a), 3D virtual collaboration model (Erdos & Nemeth, 2021), OSC cost performance (Xue et al., 2018), etc.	The governance mechanisms: formal contracts and trust including goodwill trust and competence trust (Zhang et al., 2018a). Collaboration space, suitable, and modified agile software development methodology (Erdos & Nemeth, 2021).	More attention was paid, and it needed recommendations for improved project performance (Chen et al., 2018).
COR	Managing projects raises multiple tensions (Schweiger et al., 2020) and understanding the causes of delays and claims in construction projects (Sherif & Abdelalim, 2023). Balance and build quality, budget compliance, and execution time (Postavaru et al., 2019).	Successful megaproject using the following four (4) dimensions, 1) efficiency, 2) customer, 3) business/financial, and 4) society. The three (3) major elements, 1) strategic vision, 2) total alignment 3) complexity adaptation. (Shenhar & Holzmann, 2017)	This process requires well-coordinated interventions of experts (Postavaru et al., 2019). This may lead to the ability to embrace the adoption of several, also diverse perspectives (Schweiger et al., 2020).
COP	Examine the impact of leadership style on project execution (Renzi, 2020).	Transformative leadership styles use emotional intelligence to motivate project team members (Renzi, 2020).	A balance of cooperation and assertiveness is required (Schweiger et al., 2020).

Definition: 3D—3 Dimension, SM—Social Media, OSC—Off-Site Construction, IPD—Integrated Project Delivery, ICT—Information & Communication Technology.

7. Conclusion

The data gathered from various researchers are categorized into COM, COL, COR, & COP (4 C's). These 4 C's are essential ideas, points to ponder, and execute the project triad concept with the high transparency objective in the area of communication and coordination. PM (E/CM, PM, VPM, vT, & vS) discusses related topics, especially communication, collaboration, coordination, and cooperation. Aside from the conventional approach, as stated in PMBOK's (PMI, 2021) and EMBOK's (ASEM, 2019) regarding four (4) C's, the project triad is intended for the virtual environment. However, it's not limited to the virtual platform only, it can be helpful for both environments, conventional/traditional or virtual.

Table 1, based on OSEL (Objective, Significance, Evaluation & Limitation), although evaluation in OSEL is the type of study conducted. COM got the highest among the other C's; however, all C's are interrelated, particularly to the project triad concept. It was understood to be distinct from other reviews. This OSEL establishes targets, objectives, and limitations and tracks issues/gaps to build the bridge toward this project triad coordination and conventional practices. Communication and collaboration are the architecture of project structure, while coordination and cooperation are the foundation of project success. **Figure 1**, the project triad, a transparency concept with a collaboration of a 5D model, DMS & DI, will help the successful project completion in a virtual environment.

Maintaining positive relationships (Bhat et al., 2017) among team members is essential to the project, whether in a conventional or virtual environment. Furthermore, as stated in **Table 1**, concerns from other related publications will help this project triad to be successfully implemented and applied. However, it may be helpful in this review if more concerns and new ideas correspond to the actual implementation and application of the concept.

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Conflicts of Interest

The authors declare with confidence that there are no competing and conflicting interests in the publications of this research paper.

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Nomenclature

4C: Communication (COM), Collaboration (COL), Coordination (COR), and Cooperation (COP)

5D: 5 Dimensional

ASEM: American Society of Engineering Management

C4: Collect, Check, Calibrate, and Complete

DI: Data Integration

DMS: Data Management System

E/CM: Engineering/Construction Management

IT: Information Technology

IoT: Internet of Things

LNG: Liquefied Natural Gas

LPG: Liquefied Petroleum (or Propane) Gas

OM: Operation & Maintenance

OSEL: Objective (Optimization), Significance (Importance), Evaluation, and Limitation

PCM: Project Control Management

PM: Project Management

PMI: Project Management Institute

RVC: Revitalize Virtual Coordination

SOW: Scope of Work

VPC: Virtual Project Coordination

VPM: Virtual Project Management

vS: Virtual Software

vT: Virtual Team (including Global, GVT)