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FORMATION OF CROSS-FUNCTIONAL TEAMS IN SUPPLY MANAGEMENT SYSTEMS: EFFICIENCY FACTORS AND IMPACT ON CONSTRUCTION PROJECT IMPLEMENTATION

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Keywords: cross-functional teams, supply management, construction projects, logistics, project resilience.
Abstract. The article examines the specifics of forming cross-functional teams within the supply management system of construction projects. It analyzes the impact of organizational, behavioral, and digital factors on the effectiveness of team interaction, including coordination, responsibility distribution, and collective decision-making mechanisms. It is emphasized that the efficiency of such teams contributes to reducing logistical risks, improving supply reliability, and achieving project goals within established deadlines. The study concludes that the cross-functional approach in supply management is an effective tool for enhancing the resilience and economic efficiency of construction projects.

ФОРМИРОВАНИЕ МЕЖФУНКЦИОНАЛЬНЫХ КОМАНД В СИСТЕМЕ УПРАВЛЕНИЯ СНАБЖЕНИЕМ: ФАКТОРЫ ЭФФЕКТИВНОСТИ И ВЛИЯНИЕ НА РЕАЛИЗАЦИЮ СТРОИТЕЛЬНЫХ ПРОЕКТОВ

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Ключевые слова: межфункциональные команды, управление снабжением, строительные проекты, логистика, проектная устойчивость.
Аннотация. В статье рассматривается специфика формирования межфункциональных команд в системе управления снабжением строительных проектов. Анализируется влияние организационных, поведенческих и цифровых факторов на результативность командного взаимодействия, включая координацию, распределение ответственности и механизмы коллективного принятия решений. Подчеркивается, что эффективность таких команд способствует снижению логистических рисков, повышению надежности поставок и достижению проектных целей в установленные сроки. Делается вывод о том, что межфункциональный подход в снабжении представляет собой действенный инструмент повышения устойчивости и экономической эффективности строительных проектов.

Introduction

Modern construction projects are characterized by a high degree of complexity, a dynamic external environment, and the need for rapid decision-making under conditions of limited resources. In this context, effective supply management becomes an integral component of successful project delivery. Of particular importance is the use of cross-functional teams (CFT) that bring together specialists from various domains – logistics, design, procurement, finance, and construction – with the aim of enhancing coordination, minimizing logistical risks, and optimizing costs. Practical experience demonstrates that the integration of efforts within such teams facilitates faster adaptation to changing conditions and improves overall project outcomes.

The purpose of this study is to analyze the factors influencing the effectiveness of CFT within the supply management system of construction projects, as well as to identify the relationships between team cohesion and key project performance indicators, including timelines, supply reliability, and economic efficiency. The article examines the specific features of the formation and functioning of CFT and assesses their contribution to achieving project objectives in the construction industry.

Main part. Characteristics of the organization and functioning of the supply management system in the construction industry.

Supply management in the construction industry represents a complex and multi-stage process encompassing the planning, procurement, transportation, storage, and distribution of construction resources, ranging from building materials and equipment to components and engineering systems [1]. Unlike other industries, construction logistics is characterized by a high degree of variability driven by the project-specific nature of construction activities, the spatial dispersion of sites, seasonal fluctuations, market price volatility, and strict time constraints. These characteristics impose increased requirements for flexibility, responsiveness, and accuracy in supply-related decisions, which in turn leads to the growing importance of intelligent approaches to supply monitoring and auditing based on data analysis, automated compliance verification, and the early detection of deviations within supply chains [2].

Industry survey data, in particular the AGC/NCCER 2025 Workforce Survey, indicate that the performance of construction projects is influenced by multiple groups of factors, among which supply-related risks consistently stand out alongside labor constraints and regulatory-administrative delays (fig. 1).

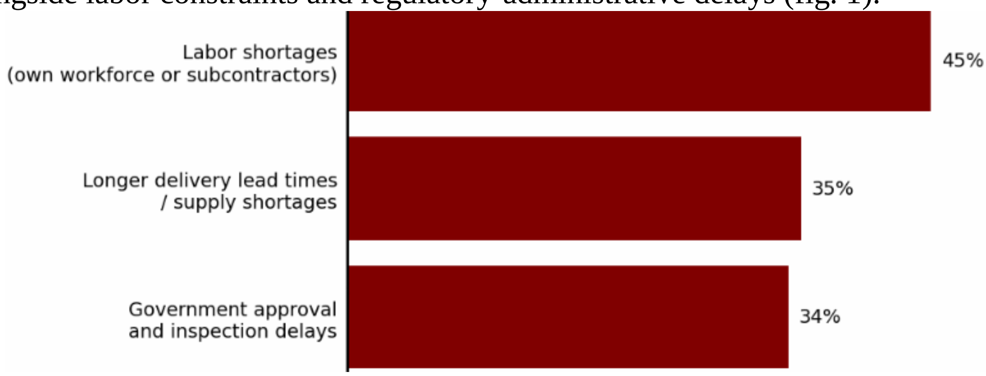

Fig. 1. Key factors contributing to construction project delays (share of firms reporting delays), % [3]

The presented data underscore the need for a more detailed examination of construction supply management as a project-oriented function that directly affects project timelines, costs, and overall implementation resilience. Accordingly, the key characteristics of supply management in the construction industry can be systematically summarized in terms of their operational manifestations and managerial implications (tab. 1).

Tab. 1. Key characteristics of supply management in the construction industry and their managerial implications [4-6]

Characteristic	Operational manifestation	Managerial implications for supply management
Direct linkage between supply and construction schedules	Delivery timing is synchronized with construction and installation phases; work progress depends on supply reliability.	Increased requirements for schedule-driven procurement planning and continuous monitoring of deviations.
High sensitivity of projects to supply disruptions	Delayed material deliveries cause work stoppages and cascading risks across subsequent project stages.	Necessity of supply risk management, buffering of critical items, and rapid approval of alternative solutions.
Multi-contractor project organization	Simultaneous involvement of clients, contractors, suppliers, logistics providers, and engineering teams.	Higher coordination complexity and transaction costs; need for clear interfaces and shared decision-making mechanisms.
High share of non-standardized and project-specific materials	Procurement of customized items with limited substitutability.	Close integration of procurement with design and engineering functions; management of specification changes.
Limited shelf life and transport sensitivity of resources	Risk of damage or degradation during transportation and storage.	Tighter logistics planning, stricter transport and storage requirements, and precise synchronization with construction phases.
Need for cross-functional coordination	Continuous alignment among logistics, design, quality, finance, and construction functions.	Justification for the use of CFT to reduce communication gaps and enhance supply system resilience.

Characteristics of construction supply management summarized in table 1 suggest that this function is inherently cross-functional in nature, involving continuous coordination among design, procurement, logistics, construction, and financial units. Many of the identified challenges, such as the strict linkage between supply activities and construction schedules, high sensitivity of projects to supply disruptions, and prevalence of project-specific materials, occur at the interfaces between functional domains and cannot be effectively addressed within isolated organizational units. Given these conditions, the utilization of a CFT represents a structurally grounded method of integrating diversified competencies within a unified framework of decision-making with greater robustness and efficiency of supply management functions in construction projects.

CFT in the supply management system: conceptual foundations

Generally, CFTs represent a form of organizational cooperation in which specialists from different functional units are brought together within a single project or operational group [7]. In the context of supply management in construction projects, this form of interaction enables a comprehensive approach to planning, procurement, logistics, and the control of material flows. The primary purpose of CFTs is the integration of knowledge and competencies aimed at achieving shared project objectives, which is particularly important when addressing tasks characterized by a high degree of uncertainty and the need for interdisciplinary coordination.

The theoretical basis for the formation of CFT is the **concept of integrated project management**, according to which operational efficiency increases through horizontal interaction among functional units rather than through hierarchical task allocation (fig. 2).

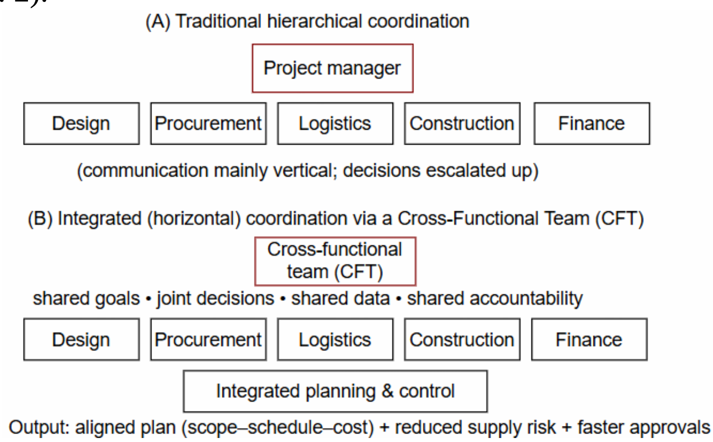

Fig. 2. Hierarchical and integrated models of functional coordination in construction projects

The application of CFT in supply management makes it possible to eliminate communication gaps between technical, logistical, and administrative units, thereby reducing decision-approval time and increasing the adaptability of the supply system to changing conditions. In addition, the cross-functional approach facilitates the formation of a unified information environment in which team members share responsibility and jointly participate in decision-making, which has a positive effect on the accuracy of demand forecasting, the timeliness of procurement activities, and the overall coordination of deliveries.

Thus, CFT are characterized by a high degree of internal interdependence, whereby the performance of each participant directly influences the overall project outcome. This requires not only a high level of professional expertise, but also well-developed teamwork skills, communicative competence, and readiness for distributed leadership. Accordingly, the effectiveness of cross-functional interaction in the supply management system is determined not only by the structural characteristics of the team, but also by the quality of managerial and interpersonal processes within it.

Formation of CFT: structure, roles, and interaction mechanisms

The formation of a CFT within the supply management system can be treated as a project-level managerial procedure aimed at reducing coordination-related transaction costs and improving the consistency of decisions across material and resource flows. This approach involves defining team composition, assigning roles and decision rights, formalizing information flows, and establishing mechanisms of collective accountability for supply performance targets. In construction projects, CFTs typically include representatives from logistics and procurement, design/engineering, the production–technical function, finance, and legal support, together with the project manager. Such a configuration enables the integration of complementary expertise when decisions must be made under conditions of high uncertainty and strong interdependencies between project activities.

The **organizational configuration** of a CFT may be either formalized (e.g., within a project-matrix structure) or adaptive, evolving as the project moves across stages and as supply-related tasks become more complex. For example, during strategic planning, inputs are typically driven by project management and technical leadership, with finance providing feasibility and budget constraints. Once execution is under way, planning becomes more operational and requires stronger involvement from buyers, planners, engineers, and delivery control managers, while project and technical management mainly provide coordination and resolve escalations. For operability and control, roles and deliverables should be specified by function (e.g., logistics – routing and delivery time; engineering – conformance with technical specifications; finance – budget and cost of delivery), and decision-making methods should be defined for approving alternatives when deviations from the plan are required.

Interaction **mechanisms within a CFT** should be based on standardized data exchange, process transparency, and regular decision synchronization. These include structured coordination meetings and formal decision gates, and these can be enabled by a variety of digital management overlays such as ERP/SCM systems, collaboration workspaces and document workflows, and – where appropriate – BIM-supported coordination and supply monitoring. But perhaps most important is the role of digital communication tools. These can have a huge impact as status tracking services, notification software, audit trails, and digital reporting of performance (for example, SLA or OTIF) can all have a positive effect. In addition, externally oriented digital communications on delivery status and compliance can function as an instrument of brand trust management for contractors or developers by reinforcing transparency, timely stakeholder updates, and the reduction of perceived delivery and quality risks [8].

Accordingly, the effectiveness of a cross-functional team is determined not only by its composition and role allocation, but also by the maturity of its communication architecture, including digital mechanisms for coordination and control. A CFT designed on these principles tends to demonstrate higher adaptability, shorter decision-cycle times, and stronger collective accountability for timeline, cost, and supply reliability outcomes – capabilities that are critical for resource-intensive and high-risk construction projects.

Factors determining the effectiveness of cross-functional interaction

The effectiveness of CFTs in construction project supply management is shaped by a combination of organizational, behavioral, and technological factors that influence coordination quality, decision-cycle speed, and the achievement of supply performance targets. In a highly uncertain construction environment, particular importance is attributed to coordination mechanisms, role clarity, and collective decision-making procedures, since critical risks to schedule and cost typically emerge at the interfaces between design, procurement, logistics, finance, and construction functions (tab. 2).

Tab. 2. Key factors influencing CFT effectiveness in construction supply management [9, 10]

Factor	What it enables (mechanism)	Managerial effect on supply performance
Coordination and a shared information environment	Timely data exchange, transparent statuses, synchronized actions; use of PM/ERP/SCM tools and BIM-based coordination.	Shorter approval cycles, fewer handoff failures, improved control over deliveries.
Clear role allocation and accountability	Defined decision rights and responsibilities (e.g., RACI), ownership of outcomes by each function.	Lower conflict risk, higher execution predictability, reduced operational losses.
Joint decision-making under constraints	Cross-functional evaluation of alternatives during shortages, disruptions, or schedule deviations; integration of engineering, logistics, and finance perspectives.	More robust decisions during deviations; reduced cascading risks across project stages.
Leadership, facilitation, and executive support	Conflict resolution, prioritization, feedback loops, and escalation paths supported by management.	Faster decision cycles, higher discipline of execution, improved team adaptability.
Competence and collaboration culture	Teamwork skills, communication competence, trust, and readiness for distributed leadership.	Higher quality of coordination, fewer coordination bottlenecks, stronger resilience under uncertainty.
Digital tool maturity and process standardization	Standard workflows, unified documentation, audit trails; integration across procurement, logistics, and project controls.	Higher transparency, lower information asymmetry, better traceability of supply decisions.

Overall, cross-functional interaction becomes effective only when internal team processes are managed systematically and supported by a mature digital coordination layer. Importantly, the value of digitalization is not limited to communication speed: when supply data streams (purchase orders, delivery milestones, inventory movements, claims) are connected to management accounting and project controls, the organization gains a single basis for measuring deviations and tracing their cost impact. In this context, integrating machine learning into management accounting is methodologically justified as an extension of analytical control – enabling the early detection of anomaly patterns in spending and delivery performance, forecasting budget and schedule deviations, and strengthening proactive decision-making in supply management without increasing manual reporting load [11].

Impact of team effectiveness on construction project delivery

In construction, supply management functions as a cross-cutting domain in which outcomes are produced at the interfaces between design, procurement, logistics, finance, and on-site execution. For this reason, the effectiveness of a CFT is reflected not as an abstract organizational attribute, but through measurable delivery outcomes: schedule adherence, supply reliability, and cost performance.

This relationship is illustrated by the Dodge Construction Network / Lean Construction Institute Report Building High-Performance Projects and Teams [12]. Within the report's approach, a "typical project" refers to a specific project from the past three years that respondents consider representative of their organization's normal delivery performance (not a worst-case), while a "best project" refers to the best-performing project over the same period. Under this framing, "typical" projects are reported to finish late far more often than "best" projects: for example, owners report schedule overruns in 61% of typical projects versus 21% of best projects. A similar pattern is observed for budget performance: owners report budget overruns in 49% of typical projects compared with 17% of best projects. Importantly, these differences are accompanied by systematically stronger team dynamics on best projects: the share of respondents indicating excellent team chemistry, commitment to the same goals, and cohesive work to optimize the whole project increases from roughly 9-18% on typical projects to 47-68% on best projects.

From a supply-management perspective, this pattern is consistent with the fact that many delays and cost escalations originate at cross-functional junctions – late design changes affecting specifications, mismatches between delivery schedules and work packages, and slow approval of substitutions under market constraints. Where the CFT operates as a unified decision-making loop, alternatives (e.g., substitution of a constrained item, reprioritization of deliveries, or schedule resequencing) can be assessed and approved faster, reducing the likelihood of work stoppages due to missing critical components. A practical proxy for this integrated mode is early involvement of key trade contractors prior to design development, which is reported more frequently on best projects (28% among designers and 41 % among contractors) than on typical projects (10% and 25%, respectively).

Supply reliability, in turn, depends on how early the team can detect deviations and how rapidly it can align compensatory actions without losing project momentum. Evidence for the role of digital integration comes from the ISARC 2024 study Impact of Integrated Supply Chain Platforms on Construction Project Management, which examines the adoption of integrated supply chain platforms and reports statistically significant associations with improvements in time management ($p = 0.003$) and risk management ($p = 0.025$) [13]. In the SEM interpretation, the study provides examples of strong standardized relationships, including an increase in risk-management capability with higher adoption (example coefficient 0.87) and a relationship between adoption and reduced order errors (example coefficient 0.742). For construction supply management, the implication is that "team effectiveness" is strengthened not only by communication quality but also by a shared digital view of purchase orders, delivery milestones, exceptions, and approvals – reducing reliance on manual reconciliations and accelerating cross-functional decisions.

Cost performance is similarly sensitive to cross-functional maturity in supply management because procurement and logistics constitute a substantial share of construction expenditure. McKinsey notes that procurement in construction typically accounts for 40-70% of total company spending, and an internal survey of CPOs ($n = 101$) estimates savings potential of up to 12% from best-in-class procurement practices [14]. At the project-outcome level, Dodge/LCI likewise reports lower budget-overrun incidence on best projects compared with typical projects (for owners: 17% vs 49%). In operational terms, stronger CFT performance in supply management commonly reduces expediting and emergency logistics costs, minimizes idle time for crews and equipment, and improves inventory and payment scheduling through integrated planning across procurement, finance, and the construction schedule.

Thus, the impact of cross-functional team effectiveness on construction project delivery extends beyond interpersonal coordination and is increasingly determined by the maturity of the supporting information architecture.

Conclusion

The effectiveness of CFT in the supply management system of construction projects is determined by their ability to integrate diverse competencies, accelerate communication flows, and improve the quality of managerial decision-making. Such teams contribute to the reduction of logistics-related risks, enhance supply reliability, and support the achievement of project objectives within established timelines and at optimized cost levels. The key drivers of their performance include effective coordination mechanisms, transparent allocation of responsibilities, and collective decision-making practices. In practical terms, the implementation of a cross-functional approach in construction logistics represents an effective managerial instrument for strengthening the resilience and overall efficiency of project delivery.

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