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LARGE-SCALE PROJECTS MANAGEMENT IN INTERNATIONAL BUSINESS ACTIVITY

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В статті аналізуються основні принципи управління великомасштабними складними міжнародними проектами. Завдяки детальному літературному обзору проаналізовані та систематизовані існуючи підходи. Охарактеризовано чотири тематичних сфери в межах проектного управління: керівництво проектом, невизначеності і ризики, проектні процеси та проектні команди. Класифіковано загальні причини невизначеностей та запропоновано шляхи їх вирішення.

Ключові слова: менеджмент міжнародних проектів, невизначеності у проекті, керівництво проектом, проекті команди.

In this article the main principles of managing large-scale complex international projects are investigated. The existing approaches are analyzed and systematized through the detailed literary overview. The four thematic areas within project research: project governance, uncertainty and risk, project processes, and project teams are discussed. The general reasons of uncertainty are classified and the ways of coping with them are proposed.

Key words: international project management, uncertainties in project, project governance, project teams.

Relevance of the problem. A recent stream of project research focuses on how to manage, organize and successfully deliver large-scale, complex and uncertain projects, including studies of megaprojects [1, 5], giant projects [6] and large engineering projects [11]. These projects are set up to deliver diverse investment objects such as airports, high-speed rail, offshore wind farms, aerospace, nuclear power, motion picture and drug development facilities. They are often late, excessively over budget and fail to meet original expectations. An inability to cope with the uncertainties involved can delay or disrupt progress. Some projects are so large and uncertain that cost overruns can destabilize the finances of project sponsors or even entire countries, as

in the billion-dollar overrun of 2004 Athens Olympics [4].

The oil and gas industry is project-based to a high degree as its core assets such as refineries, production rigs, and pipelines are built through projects involving dozens if not hundreds of firms and public organizations. In response to the discovery of oil in the North Sea at the end of the 1960s, the Norwegian Government initiated a nationwide programme of investment to develop its own national oil industry. By the 1970s and early 1980s, however, these strategic projects routinely faced severe delays and cost overruns – "giving rise to the question how can several firms and public organizations with differing cultures, goals, and experience be combined in the successful delivery of engineering intensive projects?" There was a need a more rigorous analysis of the root causes of the complex and uncertain challenges associated with oil and gas projects that went beyond conventional planning, scheduling, and control issues. Such questions apply to other industries and contexts where major projects play a crucial role such as, construction, shipbuilding, aerospace, and defence.

Theoretical analysis and empirical study of North Sea oil and gas projects, which were responsible for creating many of the forms of organization, governance, contractual approaches and routines still used on today's megaprojects.

Literature research. The following four thematic areas emerged as active discourses within project research: project governance, uncertainty (and risk), processes, and teams.

Thematic area: project governance This stream of project literature focuses on elaborating the nature of large and complex projects that may involve dozens or even hundreds of participating firms, each guided by their distinct (and often conflicting) goals and objectives. The underlying assumption shared by most (though not all) contributions addressing this theme is that traditional project management methods and tools are not sufficient for managing – or to put it more exactly – governing such large projects. Articles contributing to project governance research draw heavily from Stinchcombe's work [12]. Particularly noteworthy contributions include for example, I. Ruuska on project governance in challenging nuclear power plant projects [11], A.-P. de Man on how trust and risk can be balanced in project alliances [2], T.S. Pitsis on future perfect strategy for large Olympic games projects [10], on trust and contracting in the Channel Tunnel Project, on

effects of outsourcing structure on project performance and on the importance of establishing a shared culture for a large project.

Thematic area: uncertainty (and risk) Research on project risk and uncertainty represents another stream of research strong ties to Stinchcombe's work on Norwegian offshore oil. This area of project research focuses primarily on elaborating the nature and sources of uncertainty in large projects and developing techniques for coping with high levels of project uncertainty. Individual high profile articles representing this field of research build on Stinchcombe's work include the following on managing project risk and flexibility [5], on conflicts and sources of conflict in large and global projects [9], and on conflicts in global projects [7]. While some researchers focused on uncertainty in a single project-based industry and limited their analysis to a limited geographical area (North Sea), others have a broader and more international focus in their research [9], [7]. By adopting a broader focus later research on uncertainty in projects has highlighted many further sources of uncertainty, such as unexpected cultural conflicts between organizations representing different cultural backgrounds taking part in a joint project. They also propose many strategies and techniques for coping with uncertainty caused by cultural differences. On the other hand, some emphasize how under appropriate contextual conditions flexibility can be built into large infrastructure projects through the use of modular architectures [5], leading to improved ability to adapt to changing user requirements.

Thematic area: processes A stream of literature within project research focuses on various processes that play a role in temporary projects. Project processes are somewhat paradoxical as all projects are inherently temporary, even though they affected by the activities that have taken place prior to the project [3], but processes represent a stabilizing element of continuity within project organizing. Some address processes for dealing with technical information in projects, in particular, emphasize the need to protect project members from information overload [15] and draw a link between characteristics of the organization and its capability to produce technical information [13].

Thematic area: teams A final subset of project research focuses on project teams. In particular, some authors focus on team level activities that took place in the construction of the Sydney 2000 Olympic infrastructure[10]. The

construction of such infrastructure is highly analogous to the construction of offshore facilities as in neither case the project team can rely entirely on careful a priori planning. Instead, the team must be able to navigate itself through or around different technical, environmental, organization, etc. challenges that it meets during the life cycle of the project.

However, among the thematic areas mentioned above the central one remains uncertainty and the question of how temporary organizations manage and reduce the uncertainty found in large and complex projects requires deeper consideration.

The aim of this article is to make an attempt to classify the uncertainties, to consider the main ways of managing them and to find out the key points of eliminating them.

Research results presented. The project management body of knowledge combines insights from several disciplines (organization theory, sociology, economics and business administration) and theoretical perspectives (contingency theory, transaction cost economics (TCE) and organizational routines) to study large offshore projects, such as the approximately $2 Billion Statfjord B oil platform project, carried out in the challenging and often treacherous conditions of the North Sea.

We should emphasize the following areas described now in greater detail: the decoupling principle, characteristics of offshore projects, innovation and routines in projects, and sources and management of uncertainty in projects.

The decoupling principle

The decoupling principle addresses the coupling between interdependence between project activities and choice of the governance structure of a project.

The principle relies on the following two underlying assumptions:

1. Dependence increases the flow of information between project activities.
2. When activities need to be executed rapidly in series (as is often the case in large engineering intensive projects), the need for reliable and fast communication structure is emphasized.

The heavy approvals system in place in offshore projects effectively hinders fast communication across organizations, but does not necessarily constrain intra-organizational communication. The efficiency of construction work is heavily dependent on the preceding design phase. Following this reasoning, most of the design and construction activities should be carried out within

the same organization (hierarchy). However, in practice the organization responsible for the design and the organization responsible for implementing it are two entirely different actors, implying that much actually much of the work carried out in offshore projects is in clear violation with the decoupling principle resulting in additional – and often – unnecessary – delays [12]. The decoupling principle closely linked to the discussion on make-or-buy[1] decisions within TCE literature [14]. The costs of information flow between legally separate firms may give rise to highly significant transaction costs in large and complex projects. The decoupling principle is also rooted deeply in the discussion of organizational dependencies and approaches used for coping with them. In particular, according to the principle a high degree of sequential interdependence is an inherent and unavoidable feature of complex projects as they consist of a complex network of interdependent tasks that need to be completed in a specific order over the project life cycle.

Characteristics of offshore projects

A central shortcoming in classic organization theory literature reduces its applicability in the context of offshore projects, namely the project organization is dynamic rather than static, and thus cannot be accurately described by an organizational chart. While standing orders may be used to direct activities in repetitive production, decisions constitute the primary means for reducing uncertainty in offshore projects. Interconnected activities represent a further characteristic distinguishing projects from stable production environments.

Following this line of reasoning, one can treat the project PERT diagram as a tool analogous to the organization chart of an organization operating in a repetitive mode. This view is interesting, as temporary instead of ongoing or permanent activity is considered as a key characteristic of project organizations. There is also the issue of conflicting objectives of different (organizational) actors involved in offshore projects as, for example, it may simultaneously be in the interests of one organization to maximize the amount of engineering drawings while another organization strives to minimize their number. For example, the Statfjord B production platform project where the owner's goal for profit maximization was in clear contrast with a governmental actor's goal of making sure that the facility will be as safe as possible to operate. While all large projects have a joint goal, such as the construction of an offshore facility, shared by all participating actors, each actor is also guided by its

individual goals, which may conflict with the goals of other project actors.

A further feature of offshore projects is the presence of a highly cumbersome system of approvals and supervision that consumes a lot of resources and results in a high level of bureaucracy and frequent delays. Offshore projects are often new-to-the-world, and as such are also characterized by complex technical challenges that must be solved through engineering [12]. The investment objects are unique and prior plans cannot be used. In such a situation, experience of involved actors helps to overcome challenges more effectively. The physical conditions for work are challenging due to weather conditions and space requirements that set an upper limit to the work force that can be present at the project site. Finally, as the composition of organizations involved in offshore projects is highly international, culture-related conflicts occur frequently as several different languages may be used in a single project, American firms use imperial measures while Norwegian firms rely on metric measurements, different standards for quality assurance can be found, etc.

Innovation and routines in projects

The successful organizations are designed to fit the complexity and uncertainty of their environment. Prior contingency-based research found that project organizations provide a good fit with more complex and uncertain environments. A project is a non-routine process for dealing with new and unique problems. Projects can be distinguished from stable, repetitive and predictable processes associated with high-volume manufacturing. The main difference between projects and repetitive production is that that the uncertainty about what to do in projects is resolved by decisions rather pre-programmed standing orders and planned production routines. Every aspect of a project must be administered as if it were an innovative response to an uncertain event. A project is a mechanism for reducing uncertainty.

However, the successful performance of a complex and uncertain project depends on many stable and repetitive routines found in large projects. He introduces the concept of organizational routines based on the work by to argue that projects contain many routines. Here he makes an interesting but often neglected contribution that “project routines” are the central source of efficiency and embodied learning in project organization. Project routines refer to the learning, experience and capabilities that organizations build over time to improve performance within and across projects. Such routines consist of

the tacit experience of managers and codified knowledge embodied in guide books, software tools and intranets for reuse on future projects, so that the efficiency built into routines does not disappear when a project is dismantled. Managers know what to do because they have performed the task in the past: "most of what one has to do is known – one did it yesterday" [12].

Sources and management of uncertainty in projects

Project uncertainty can be split into two categories: natural uncertainty and technical uncertainty. While the former refers to uncertainties such as weather, wave length, etc. the latter consists of the following three elements:

1. Scientific or technical uncertainty related to the technologies, materials and processes used in the project.
2. Uncertainty of project objectives (i.e. what project parameters to maximize and what parameters to minimize).
3. Uncertainty of engineering responsibility, i.e. in reality decisions related to project progress must be made without formal authorization due to delays characterizing the formal approvals process.

Taken together, these uncertainties give rise to considerable challenges in offshore projects that have to be tackled by the project organization (and by questions related to how the organization is set up by the project owner). A lot of emphasis should be made on contracts employed in offshore projects. Informed by "make of buy" perspective of TCE, the following features of offshore projects would support a "make" rather than "buy" decision:

1. A normal percentage of added work in a contract in the North Sea is 15-20 percent – largely explained by higher natural and technical uncertainty.
2. The specifications for projects are highly uncertain in their initial phases.
3. It is typical that repeated and significant changes to the projects scope need to be made after the early planning phases.
4. Predicting costs of different project activities and components is very difficult – leading to high incentives for contractors to add high risk premiums to their prices.
5. The evaluation of subcontractor performance (in particular, engineering) is highly difficult and often related to performance of activities carried out by external parties such as other contractors or public actors:

Claiming compensation for contractor defaults via legal mechanisms is

often unfeasible as it difficult to objectively identify which party had defaulted on its obligations.

According to the TCE framework such high degree of uncertainty, high asset specificity and low frequency of transactions would predict a hierarchical mode of organizing. However, the offshore projects carried out in the North Sea are organized as wide networks of organizations connected by contractual relations.

Thus, offshore projects appear to represent a unique combination of market and non-market governance mechanisms. Large and complex projects are hybrid settings containing predictable and uncertain elements. A promising vein of future research could focus on understanding how organizations balance their projects and innovation capabilities to tackle the varying conditions, predictable and highly uncertain found in large and complex projects.

Conclusion. Our analysis identified four distinct thematic areas within project research: project governance, project uncertainty, project processes, and project teams with uncertainty as the most important one. We should underline the interdependence between project activities and choice of the governance structure of a project. Whenever possible information authority and responsibility of two interdependent activities should be concentrated within a single hierarchy and not to be carried out across a market interface. Any uncertainties give rise to considerable challenges in offshore projects that have to be tackled by the project organization as they appear to represent a unique combination of market and non-market governance mechanisms.

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