

A SYSTEMIC VIEW OF INTERNATIONAL PROJECTS WITH VIRTUAL TEAMS

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Abstract: *Systemic thinking is an instrument used in any field to understand the complexity of the changes and challenges that take place, and to discover the reciprocal links and conditions between the internal elements that determine the functioning of the system. Understanding how the international project with virtual project teams works as a system can help us better address the issues that arise in managing it, helping to increase the success rate. The international project with teams in the virtual environment, due to the diversity it embraces, in various aspects, especially at the cultural level, is considered a complex system, and can be seen as a system of systems. This term applies to systems in which interactions that could appear between different elements and deliverables are difficult to represent by a mathematical model or to be anticipated. In order to highlight the complexity of the international project system, we chose to represent project management in the virtual environment as a subsystem through the subsystems that compose it. This graphic representation can be used as a theoretical model of how to manage an international project with teams in the virtual environment.*

Keywords: international project management, virtual teams, systems.

1. Introduction

The globalization phenomenon is the determining factor of international markets emergence and development, characterized by rapid changes, as well as tensions regarding the need for quality improvement and cost reduction. International projects have emerged in response to these constraints, so their success contributes to the development and preservation of organizations in the international markets [6]. This global evolution of the business environment has also led to an alert development of virtual team management [7]. The traditional project is a unique process, consisting of a set of coordinated and controlled activities with initiation and completion dates, designed to achieve a goal in line with specific requirements,

including time, cost and resource constraints [10]. International projects are those that go beyond national borders, generally in terms of the purpose and nationality of the stakeholders [13]. An international project is more complex, dynamic and risky than a standard project. Virtual teams have become essential elements in successful organizations [3]. A virtual team is the one that performs most of its work remotely, through technology, as opposed to performing tasks in face-to-face present contexts [3] and share a work, product or common project goal [14]. Systemic thinking is the process of understanding how things interact with one another in a whole. In organizations, as well as in projects, the systems comprise individuals, structures and processes that

work together for an organization or project to function properly [4]. We believe that understanding how the international project system works can help increase their success rate.

2. The international project with virtual teams – a system of systems.

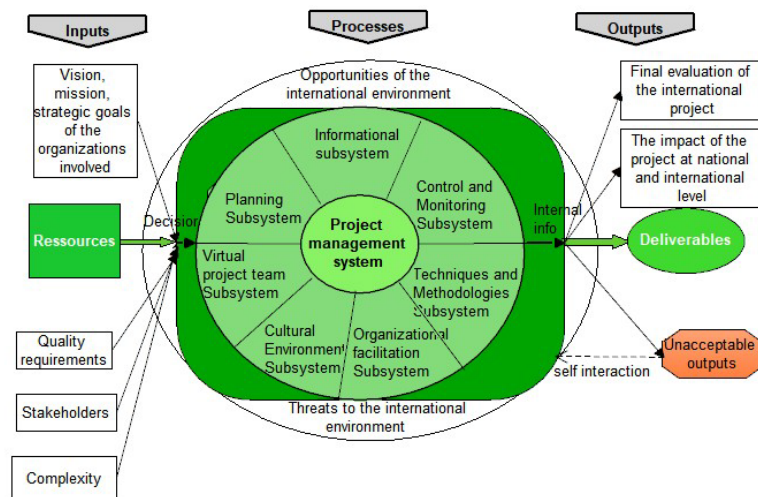
The system approach of the project, as an ensemble of interdependent and functionally correlated elements, having a common objective implies an interdisciplinary and holistic approach of the global circumstances and complex interactions [16]. The system seen as a set of interconnected things, will, over time, produce their own dynamic, objective, adaptable or revolutionary behavioural model. The system can be triggered, constrained or driven by external forces. But the system's response to these forces is characteristic of itself, and the answer is rarely simple in the real world [15].

The international project, due to its diversity, under different aspects, can be considered a complex system. Because complexity is a major feature of the international project, we will highlight it in the systemic representation, also as a difference from the traditional/standard project. A diverse system with multiple ways and redundancies is more stable and less vulnerable to external shocks than a uniform system, with low diversity [15]. What differentiates a complex or large-scale system from a simple one is, primarily, the presence of a system policy component, by which it is understood that the purpose, system objectives and performance indicator refers to the quantification of relative success in achieving the goal. The goal is about customer objectives [9]. Zhu J. and Mostafavi A. [24] have analyzed the ability of systems to withstand complexity by evaluating project performance based on the interaction between the complexity level of the project system and its ability to face complexity. The international project-complex system will be at a congruence

level A, having to show a high capacity to cope with the complexity in order to meet performance objectives. The international project system, must be a flexible system that can adapt to the changing external environment, recreating the appropriate and necessary conditions to perform its specific activities. Over time, there have been different approaches to project complexity, one of them is Bosch-Rekvelde TOE structure [2]: technological complexity (objectives, aim, tasks, experience and risk); organizational complexity (size, resources, project team, trust and risk); the environment complexity (stakeholders, location, market conditions and risk). The international project can be seen as a system of systems. This term applies to highly complex systems, in which emerging interactions and deliverables are difficult to represent by a mathematical pattern or to be anticipated, and may not be capable of reflecting any particular design intent, for the better or worse. What can be done is an attempt to describe and to understand emergent behaviour, whether or not we can influence the results [9]. Both an approach to an external vision that reflects the interaction of the system with the environment and an internal vision that reflects the interaction between system components, is required [19].

2.1. Systemic representation of the international project with virtual teams - an internal vision.

Regarding the internal vision, is necessary to identify and to understand the processes in order to correctly enter the input-output events. We took as a starting point the definition of the project offered by Turner J. R. [21], where project is defined as an approach in which material, financial and human resources are organized in a new way to undertake a unique field of activity with a given specification in order to obtain



beneficial changes defined by quantitative and qualitative objectives, not counting the time and cost constraints. Also, this representation is based on the principles of system representation and analytical construction established by Wasson Charles S. [22] and the context diagram of system borders of Robertson J. and Robertson S. [18]. We have divided the international project system into inputs, processes and outputs. Generally, inputs and outputs are stimuli introduced into a system, which it transforms through processing functions – value added transfer – to produce outputs represented by products, secondary products, services or behaviour. The system must add value to the inputs, in order to produce responsive outputs that match the end user's operational needs [22]. The circle represents the active process of the system, including the opportunities and threats of the international environment, where the international project is carried out. The processes are very important, representing the second problem area, according to Scott Lindsay [20], which causes the project failure. The arrows indicate the information flow or the material flow produced, so as to represent the real movement of the data in the system. On the left side of the inputs, we specified the resources, considered assets such as

human resources, equipment, physical facilities or inventory, which have limited availability, can be programmed or leased from outside party. Resources are essential for project planning and orderly completion [23]. Determining the resources needed to run the project can be based on the following elements: historical data on previous similar projects; project manager's personal experience, experts (consultants, managers); published data (internet, articles, papers, professional magazines); parametric or dimensional formulas (complexity analysis, component/module counting, functional points); team analysis (Delphi technique, decomposition of future activities) [11]. We also represented the influence forces on the system, which can have an important impact on the project initiation. Thus we have identified: the scope, the mission and the objectives of the organizations involved, the stakeholders influence, the "quality requirements", as we consider that in the case of complex projects the threefold constraint used in the management of standard projects would be a limitation of the international project system effectiveness. The project cost and timing should be reassessed and foreseen after each stage of the project, leaving a margin of flexibility in order to cope with the changes that may occur due to its complexity. At the same time, we added as a factor of influence, "the complexity",

which includes the following elements: cultural, social, religious, language, political, legislative, economic, foreign exchange, infrastructure, technological, time zone differences, uncertainty, heterogeneity of stakeholders, virtual work environment, high volume of information, increased visibility outside the organizations that carry out the projects, due to the purpose and objectives. Another important influence on the system is represented by the mission, vision, objectives, interests of all organizations involved in the project. At the center of the diagram, starting from the system of systems idea, we chose to represent the management system and its subsystems, a chart adapted after Cleland D.I. [5]. On the right side of Figure 1, we have represented the main outputs as deliverables, which can be products and services that meet the quality requirements established in the project objectives. Deliverables represent any product, result or ability to achieve a unique, true service that is required to be produced to complete a process, phase or project [16]. We have also mentioned the project impact both at national level (where project organizations are located) and at international level through the aim and objectives. As secondary elements of this segment of the chart, we have represented the unacceptable outputs - which can be deliverables that do not meet the quality requirements or project objectives -, and also the final project evaluation information, as well as its impact, which can be used as important information resources for future projects. Interaction with itself is

a result of feedback received from the outside about the unacceptable outputs. This response to interacting with the external environment must be as precise and quick as possible to take corrective actions. Information may arrive too late or in a wrong place, may be inadequate, unclear or difficult to interpret. The action it generates may be delayed, insufficient, resource-dependent or inefficient [15]. Under these circumstances, it is possible not only that the objective of the action not to be fulfilled, but rather due to the repetition of similar conditions, including the aim of the system not to be achieved and thus we will be faced with a failed project. There is a very important principle that Meadows D. [15] mentions, that the information, which a feedback loop conveys, can only influence the future behaviour of the system. It doesn't have the ability to be fast enough to correct the behaviour that led to that feedback. Information sent in an incorrect way will generate incorrect behaviour, but feedback can generate decisions that will correct future behaviour so as to obtain the desired result. Management appears as processes adjustment process, based on feedback, by allocating the available resources, in the context of keeping under control all the operating sequences required to achieve the results projected in the paxiological structure of the system objective [8].

2.2. Systemic representation of the international project with virtual teams - an external vision.



Figure 2. International project system representation, an external view. Source: Authors.

Through Figure 2, we synthesized the interaction between the international project system with the external environment, highlighting the external environment in a double hypostasis. In the first phase with the initial influence forces on the internal environment of the project system, and in a posterior stage including the deliverables of the system. The arrows indicate a reciprocal influence between the external environment and the internal environment of the system.

2.3. Systemic representation of international project management with virtual teams.

Figure 3 describes the international project management system, in the virtual environment, and can be used as a fundamental theoretical model of how an international project should be managed. In order to highlight the complexity of the system - international project, we have chosen to represent project management as a subsystem, through its subsystems.

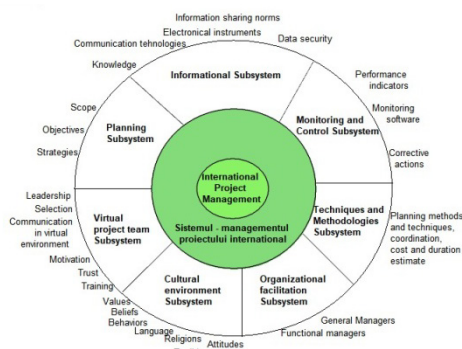


Figure 3. International project management system representation. Source: adapted after Cleland I. David, *Defining a Project Management System*, *Project Management Quarterly*, vol. 8, N° 4, p. 37-40.

The Organizational Facilitation Subsystem is an organizational construction that provides a focal point for the use of resources to support project objectives [12]. International projects are carried out as a result of the collaboration of at least two international organizations, so that from this support structure can be part, besides the project manager, the general managers

and the functional managers of the collaborating organizations.

The Control and Monitoring Subsystem includes the process of selecting project performance indicators, the feedback mechanisms and comparison between the planned performance with the actual performance, and the corrective actions needed to keep the project in the desired direction. Also important information on reviewing the progress of the project could come from the stakeholders.

The Informational Subsystem: it contains essential information (both formal and informal) for effective planning and monitoring of the project; identifying and evaluating knowledge information needed to take and implement managerial decisions within the project; the technologies used to communicate the information; rules for the use of electronic instruments to share project information; software and security measures to protect the data of the international project in the virtual environment. An information system is a system that assembles, stores processes and delivers information relevant to the organization, project, or society, so that information is accessible and useful to those who want to use it [1].

The Techniques and Methodologies Subsystem contains performance, planning, organizing, estimating costs and project duration techniques and methods. It may also include methodologies for assessing risks and uncertainties about resource use.

The Cultural Environment Subsystem: This is the international cultural environment in which project management is practiced, which includes the national cultures of virtual team members, characterized by values, beliefs, perceptions, attitudes, prejudices, assumptions, behavioural patterns, language, and different religions. This influences how the team members will act and react in different situations, how they think and feel, how they will communicate and react to motivation techniques. Education, team building techniques, team

trust, intercultural training, and the improvement of interpersonal skills can significantly improve the cultural atmosphere within the team.

The Planning Subsystem provides the necessary means to identify and develop strategies on the resources needed to support the project, and how these resources will be used during the project [12]. This includes the creation of a project plan that can become the performance standard on the basis of which the project progress can be monitored, evaluated and controlled, but also on the basis of which modifications can be made regarding the adaptation process to the environmental conditions, risks or opportunities which can influence the development of the international project. Here it will be established the purpose, objectives and strategies to be pursued.

The Virtual Project Team Subsystem includes all the elements related to human resources: team management and

management style adapted to the virtual work environment; determining the skills needed by each member of the virtual team, based on which the selection will be made; intercultural communication skills; motivational techniques adapted to the virtual work environment; virtual team building and trust techniques.

3. Conclusions. Through this paper we have tried to highlight the complexity of international projects in order to be understood and acknowledged by organizations and by international project managers with virtual teams, providing a theoretical model of how this type of projects works and how is managed, representing a basis for future research in this field. Other personal contributions and originality elements, which we must mention, are the analysis of international projects as a system of systems, and the external view of the international project systemic representation.

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