



Project Team Absorptive Capacity and Capital Project Success: the mediation role of the Governance Framework

Wilson Guilherme Ramalho da Silva

General Manager for Capital Programs - Petrobras



Agenda

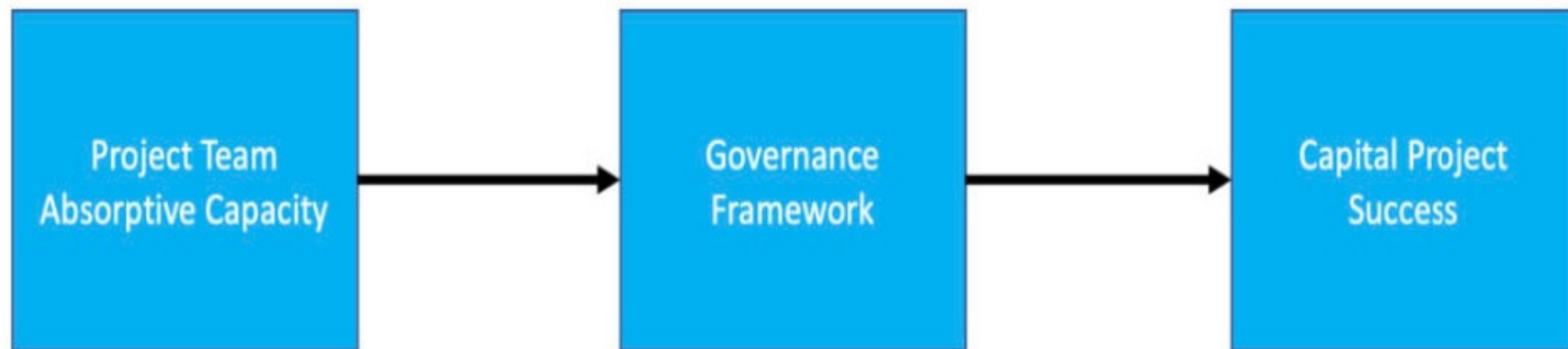
- Introduction
- Theoretical Framework
- Quantitative Analysis
- Discussions and Implications
- Limitations and Directions for Future Research
- Conclusion and Final Remarks

Introduction

Research Question and Objective

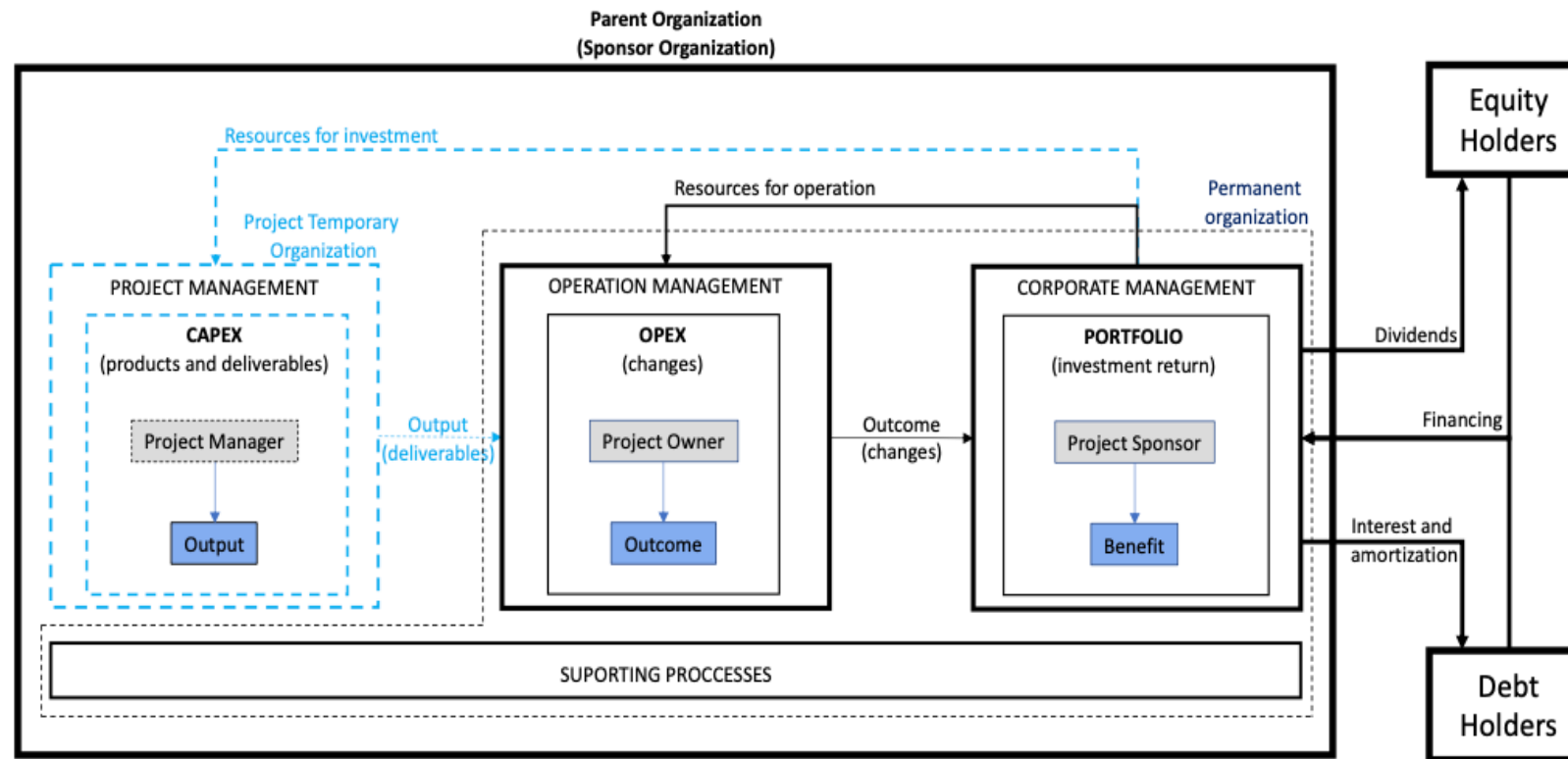
Research question: Does the **Governance Framework** mediate the relationship between **Project Team Absorptive Capacity** and **Project Success**?

Research objective: To propose a quantitative integrated model to investigate the impact of the **Project Team Absorptive Capacity** on **Capital Project Success**, assuming the mediation role of the **Governance Framework**.



Research Study Schematic

The observed phenomenon: Oil and Gas Capital Projects



Theoretical Framework



Theories and Concepts

Agency Theory as lens ([Mitnick, 1973](#); [Ross, 1973](#); [Jensen and Meckling, 1976](#)).

Absorptive Capacity Theory modeling the team capabilities ([Cohen and Levinthal, 1990](#); [Zahra and George, 2002](#)).

Theory of the Temporary Organization framing the unit of analysis ([Lundin and Söderholm, 1995](#); [Packendorff, 1995](#); [Turner and Müller, 2003](#)).

Project Success research studies reviewed to model the independent variable ([De Wit, 1988](#); [Shenhar and Dvir, 2001](#); [Turner, 2009](#); [Cooke-Davies, 2002](#); [MacLeod, 2012](#); [Zwikael and Smyrk, 2012](#); [Serra and Kunc, 2015](#); [ul Musawir, 2017](#)).

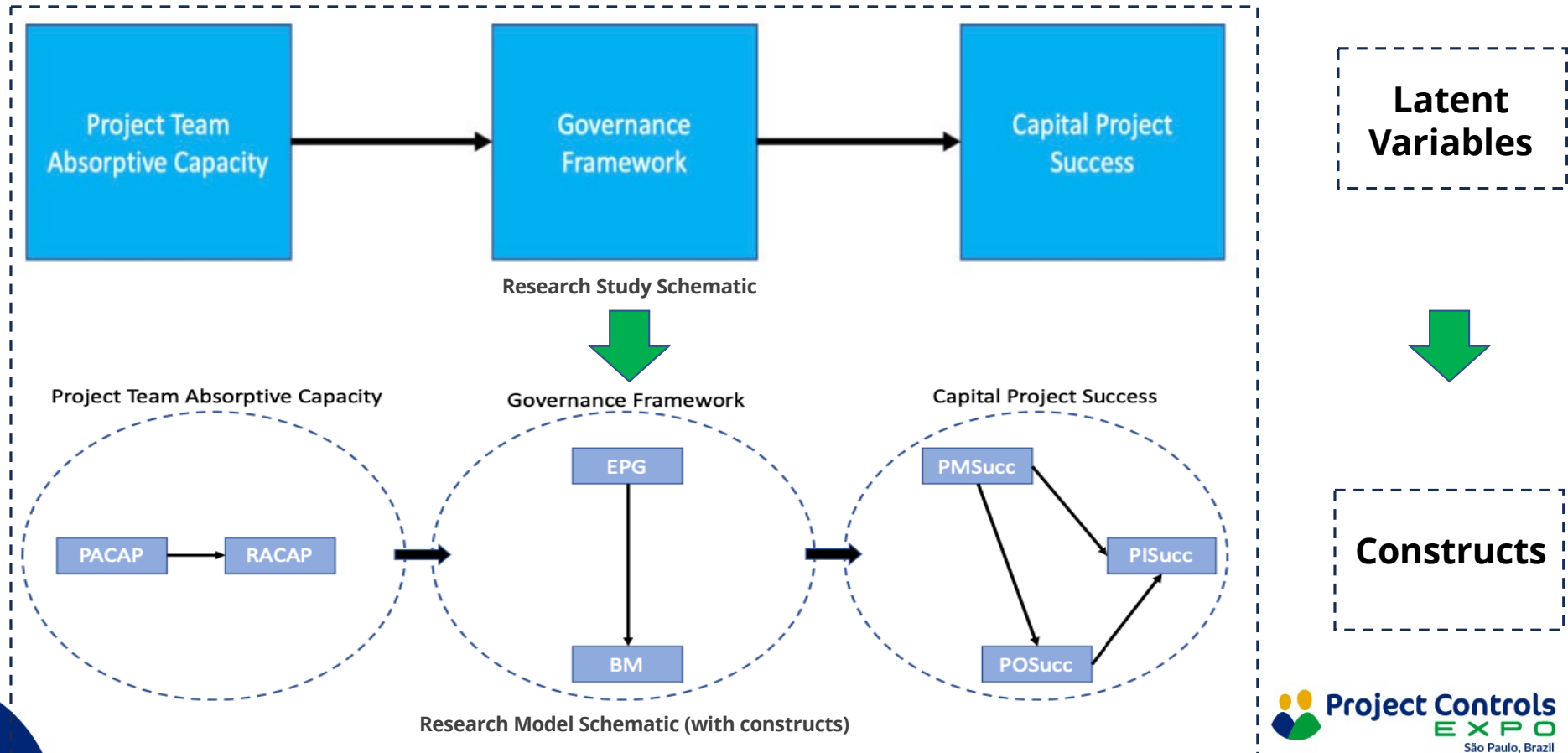
Project Governance research studies reviewed to model the governance framework. ([Müller, 2011](#); [Bradley, 2010](#); [Breese, 2012](#); [Too and Weaver, 2014](#); [Müller et al., 2015](#); [Joslin and Müller, 2016](#); [ul Musawir et al., 2020](#)).

Schools of Project Management for a multi-perspective approach ([Turner et al., 2013](#)):

- [Governance](#) (permanent sponsor organization authorizing a temporary project structure),
- [Behavior](#) (collective knowledge as the project temporary organization team capability), and
- [Success](#) (from producing a deliverable to generating value and benefits).



Quantitative Research Model



Adopted Constructs

Capital Project Success modeled with 3 constructs

(Zwikael and Smyrk, 2012; Serra and Kunc, 2015; ul Musawir et al., 2017):

- ⇒ Project Management Success (PMSucc)
- ⇒ Project Ownership Success (POSucc)
- ⇒ Project Investment Success (PISucc)

Governance Framework modeled with 2 constructs

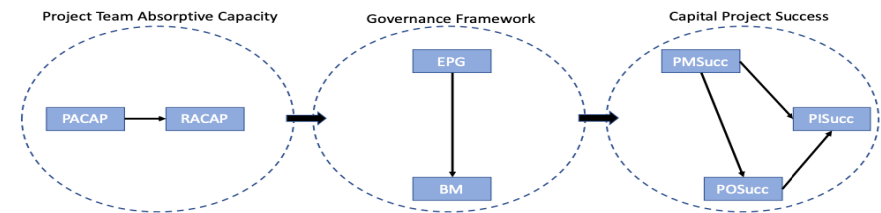
(Serra and Knuc, 2015; ul Musawir et. al, 2017):

- ⇒ Effective Project Governance (EPG)
- ⇒ Benefit Management (BM)

Project Team Absorptive Capacity (ACAP) modeled with 2 dimensions
(PACAP + RACAP):

(Cohen and Levinthal, 1990; Zahra and George, 2002; Flatten, 2011):

- ⇒ Potential ACAP (PACAP)
- ⇒ Realized ACAP (RACAP)



Project Success

Capital Project Success is modeled with 3 constructs (Zwikael and Smyrk, 2012; Serra and Kunc, 2015; ul Musawir et al., 2017):

Project management success (PMSucc)

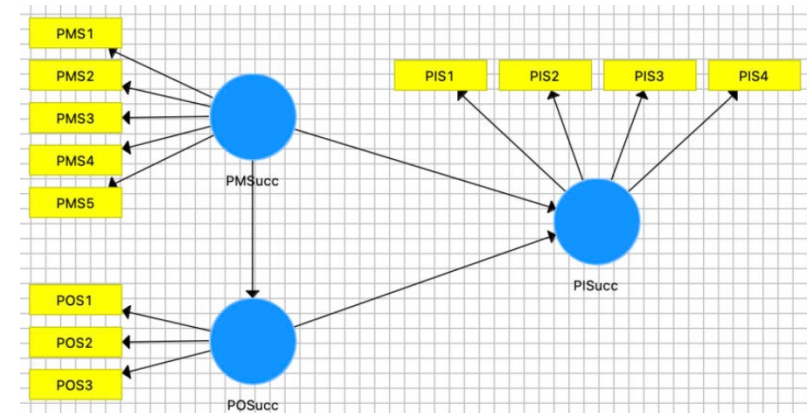
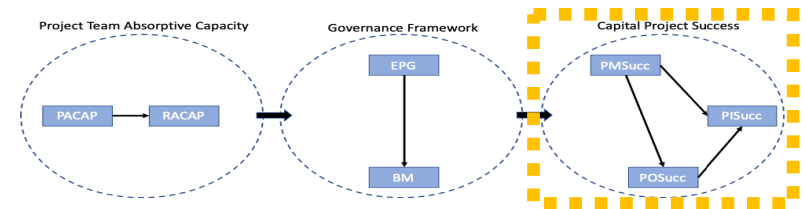
- Performance of the project manager in delivering the outputs.
- Objective: deliver the outputs on schedule (baseline delivery dates), within budget (baseline cost) and complying with customer specifications (required quality for pre-defined scope).

Project ownership success (POSucc)

- Performance of the project owner in using (or operating) the outputs.
- Objective: receive the outputs to realized the outcomes as stated and approved in the business case that has justified the project.

Project investment success (PISucc)

- Value generated by the project to the sponsor party.
- Objective: generate benefits (investment return) as per qualified and quantified in the business case that has justified the project.



Governance Framework

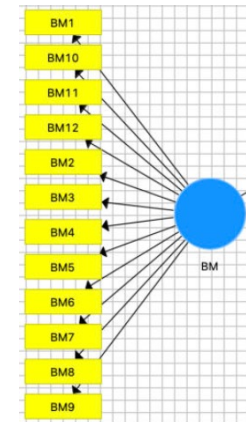
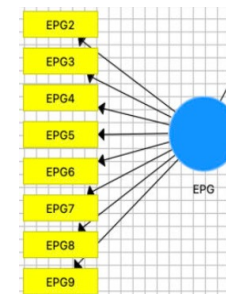
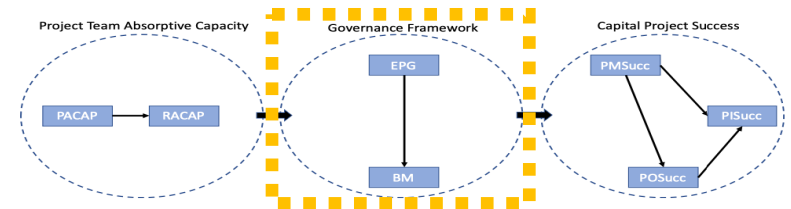
Governance Framework is modeled with 2 constructs:

Effective Project Governance (EPG; [ul Musawir et al., 2017](#))

- EPG encompasses the governing rules for project managers as Chief Executive Officers of their temporary organizations ([Turner and Müller, 2003](#)).
- It is “the bridging mechanism between corporate governance and project management” ([Alvarez-Dionisi, 2012](#)).
- It is set to govern the project management function; it is associated to the relationship between the project temporary organizations and its parent firm, the sponsor permanent organization ([ul Musawir et. al, 2017](#)), which encompasses the owner and the sponsor organizational structures.

Benefit Management (BM; [Serra and Knuc, 2015](#); [ul Musawir et. al, 2017](#))

- Benefits constitute the reasons and are the ultimate deliverables for the parent organization when implementing projects through temporary organizations ([Bradley, 2010](#)).
- BM incorporates governing practices and processes designed to monitor and control project benefits ([Breese, 2012](#)), stated within the business case that has justified the project.



Project Team Absorptive Capacity

Project Team Absorptive Capacity is modeled with the 2 dimensions of Absorptive Capacity (ACAP; [Cohen and Levinthal, 1990](#); [Zahra and George, 2002](#); [Flatten, 2011](#)):

ACAP (RACAP + PACAP)

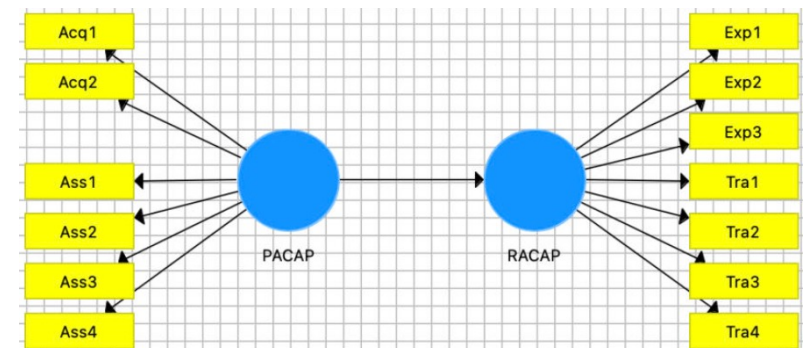
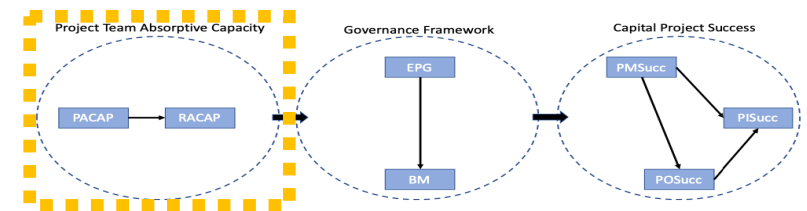
- It constitutes the capability associated to the collective knowledge of the project temporary organization team, i.e., the team of the agency that manages and implement the capital project on behalf of the parent sponsor firm, the principal party ([Zahra and George, 2002](#)).
- is associated to the project team's prior-related knowledge derived from the team previous exposure to projects ([Cohen and Levinthal, 1990](#); [Zander and Kogut, 1995](#)).

Potential Absorptive Capacity (PACAP)

- Capability associated to knowledge creation (acquisition and assimilation).

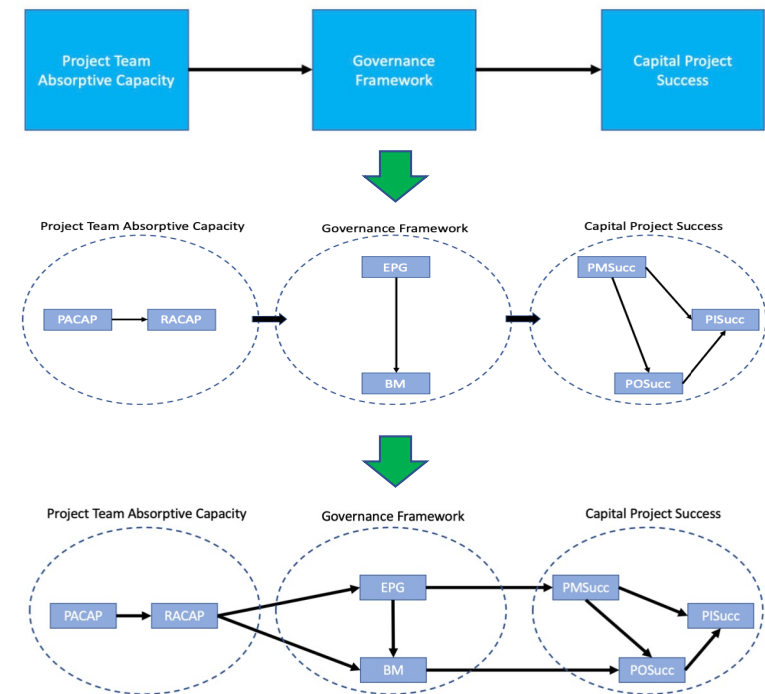
Realized Absorptive Capacity (RACAP)

- Capability associated to knowledge utilization (transformation and exploitation).



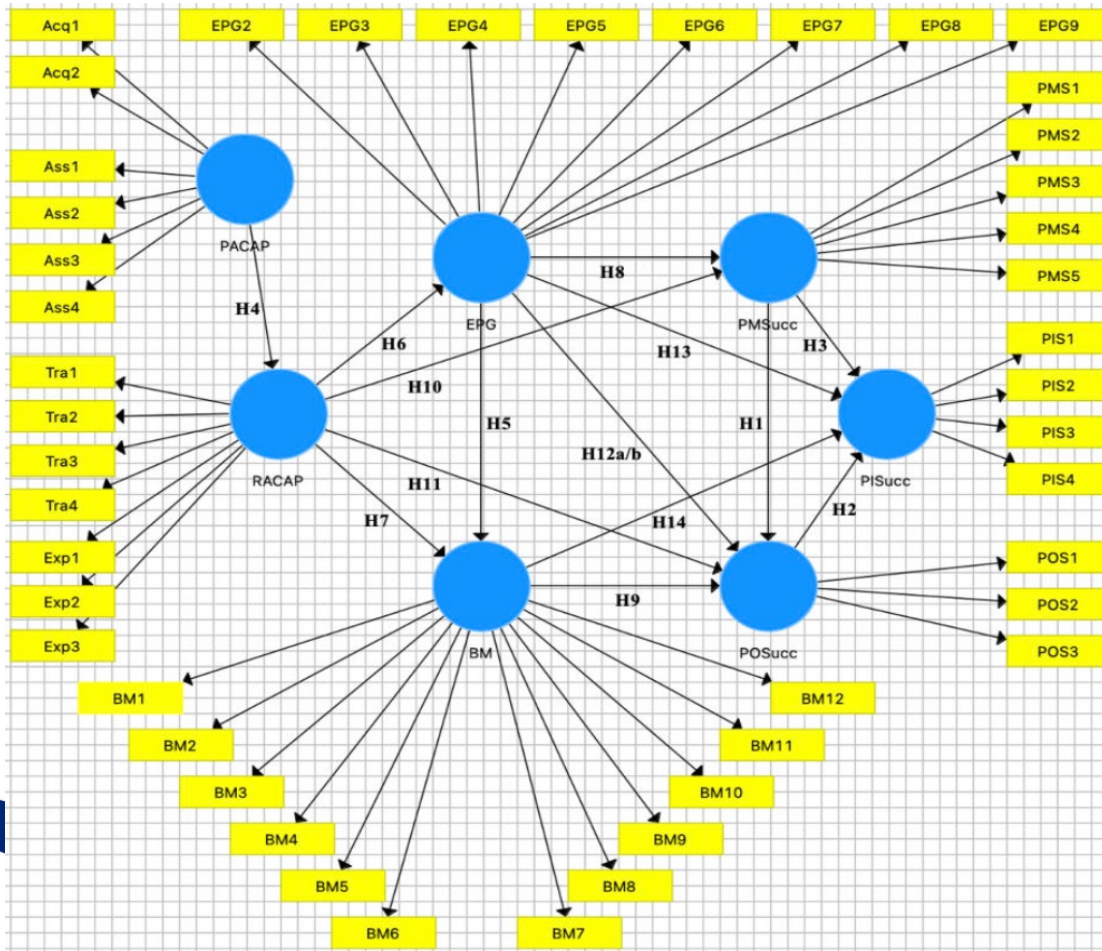
Consolidated Model with Hypothesis

Hypothesis
H1 – There is a positive relationship between project management success (PMSucc) and project ownership success (POSucc).
H2 – There is a positive relationship between project ownership success (POSucc) and project investment success (PISucc).
H3 – There is a positive relationship between project management success (PMSucc) and project investment success (PISucc).
H4 – There is a positive relationship between project team potential absorptive capacity (PACAP) and project team realized absorptive capacity (RACAP).
H5 – There is a positive relationship between effective project governance (EPG) and benefit management (BM).
H6 – There is a positive relationship between project team realized absorptive capacity (RACAP) and effective project governance (EPG).
H7 – There is a positive relationship between project team realized absorptive capacity (RACAP) and benefit management (BM).
H8 – There is a positive relationship between effective project governance (EPG) and project management success (PMSucc).
H9 – There is a positive relationship between benefit management (BM) and project ownership success (POSucc).
H10 – Effective project governance (EPG) mediates the relationship between project team realized absorptive capacity (RACAP) and project management success (PMSucc).
H11 – Benefit management (BM) mediates the relationship between project team realized absorptive capacity (RACAP) and project ownership success (POSucc).
H12a (H8-H1) – Project management success (PMSucc) mediates the relationship between effective project governance (EPG) and project ownership success (POSucc).
H12b (H5-H9) – Benefit management (BM) mediates the relationship between effective project governance (EPG) and project ownership success (POSucc).
H13 – Project management success (PMSucc) mediates the relationship between effective project governance (EPG) and project investment success (PISucc).
H14 – Project ownership success (POSucc) mediates the relationship between benefit management (BM) and project investment success (PISucc).



Quantitative Analysis

Quantitative Research Model



Quantitative model (SMARTPLS - v.3.3.3):

- 7 Constructs
- 45 Items
- 15 Hypotheses





Data Collection

Data collection (from Dec/19 to May/20):

- 186 responses were received out of 449 demanded (41.4% response ratio).
- 173 were considered valid responses (93.0% valid responses; 38.5% effective response ratio).

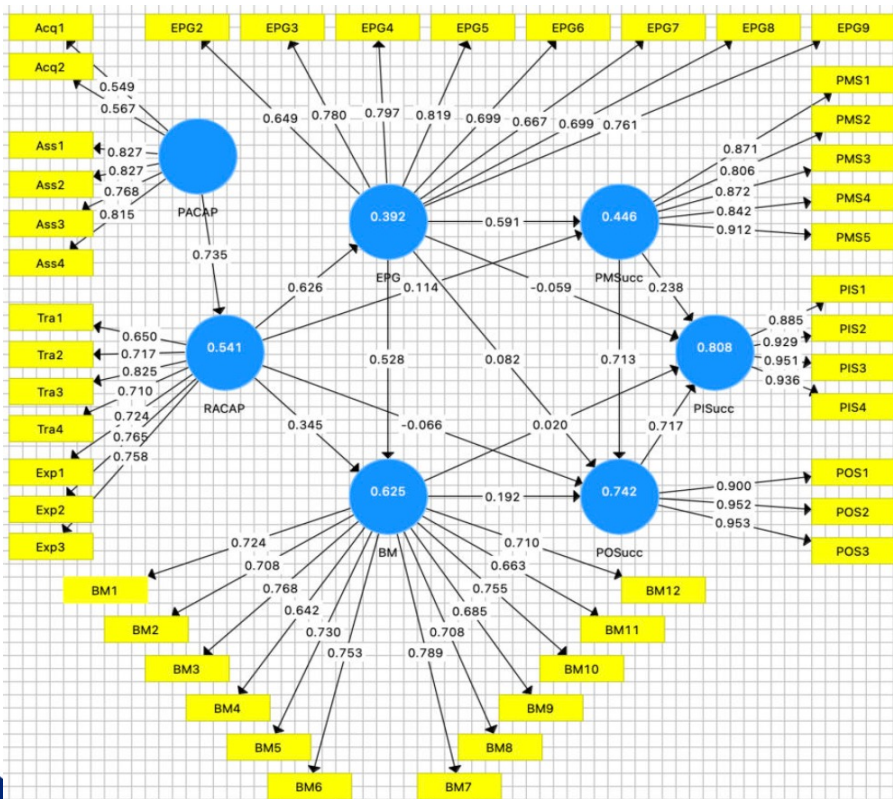
Project CAPEX (USD)	N	%
<0.5 million USD	4	2,3%
0.5 – 1 million USD	4	2,3%
1 – 5 million USD	12	6,9%
5 – 25 million USD	16	9,2%
25 – 150 million USD	14	8,1%
150 million – 1 billion USD	34	19,7%
>1 billion USD	89	51,4%

Respondent's PM* experience	N	%
>30 years	13	7,5%
20-30 years	24	13,9%
10-20 years	66	38,2%
5-10 years	49	28,3%
2-5 years	16	9,2%
<2 years	5	2,9%

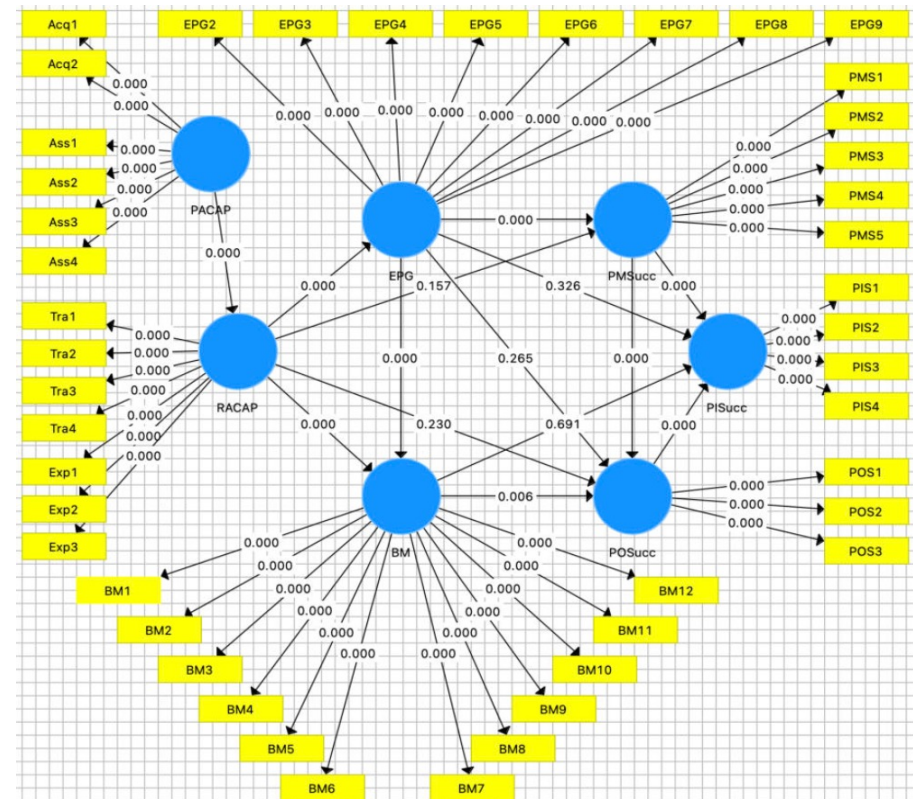
* PM = Project Management



Calculation



Research model as the "Calculation Report" (SMARTPLS)



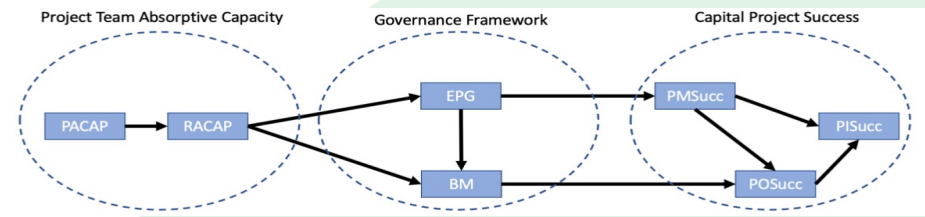
Research model as the "Bootstrapping Test Report" (SMARTPLS)

Results

After “calculation” and “bootstrapping” with SMARTPLS (v.3.3.3):

- All statistics parameters were within the adequate ranges; and
- No unexplainable spurious statistical issues have been detected.

Results have supported all 15 hypotheses.



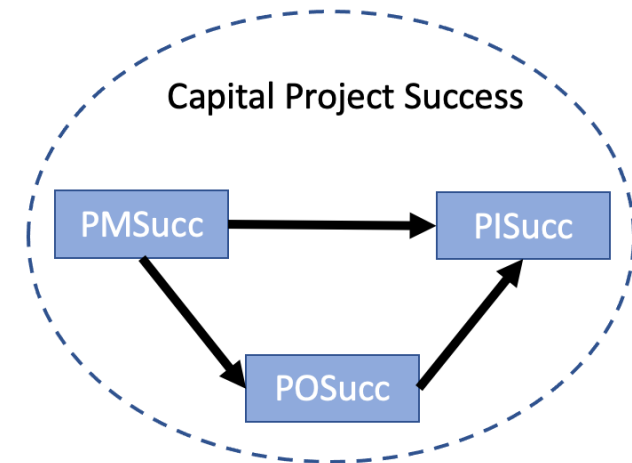
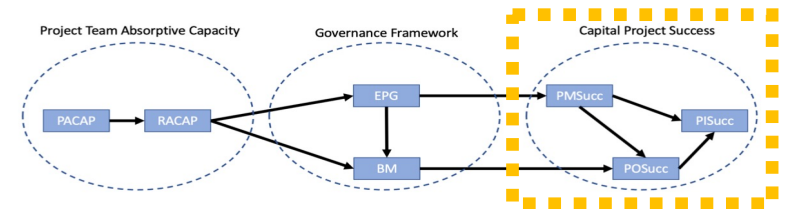
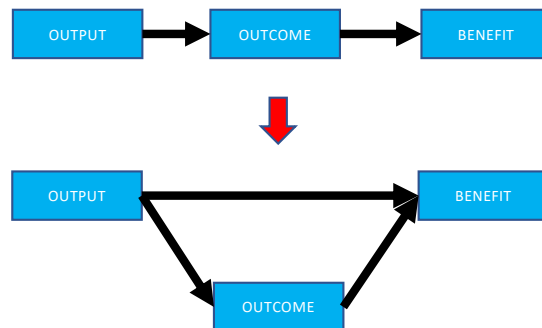
Hypothesis	Path coefficient	Result
H1 – There is a positive relationship between project management success (PMSucc) and project ownership success (POSucc).	0.713	Supported
H2 – There is a positive relationship between project ownership success (POSucc) and project investment success (PISucc).	0.717	Supported
H3 – There is a positive relationship between project management success (PMSucc) and project investment success (PISucc).	0.238	Supported
H4 – There is a positive relationship between project team potential absorptive capacity (PACAP) and project team realized absorptive capacity (RACAP).	0.735	Supported
H5 – There is a positive relationship between effective project governance (EPG) and benefit management (BM).	0.528	Supported
H6 – There is a positive relationship between project team realized absorptive capacity (RACAP) and effective project governance (EPG).	0.626	Supported
H7 – There is a positive relationship between project team realized absorptive capacity (RACAP) and benefit management (BM).	0.345	Supported
H8 – There is a positive relationship between effective project governance (EPG) and project management success (PMSucc).	0.591	Supported
H9 – There is a positive relationship between benefit management (BM) and project ownership success (POSucc).	0.192	Supported (1)
H10 – Effective project governance (EPG) mediates the relationship between project team realized absorptive capacity (RACAP) and project management success (PMSucc).	NA	Supported (2)
H11 – Benefit management (BM) mediates the relationship between project team realized absorptive capacity (RACAP) and project ownership success (POSucc).	NA	Supported (3)
H12a (H8-H1) – Project management success (PMSucc) mediates the relationship between effective project governance (EPG) and project ownership success (POSucc).	NA	Supported (4)
H12b (H5-H9) – Benefit management (BM) mediates the relationship between effective project governance (EPG) and project ownership success (POSucc).	NA	Supported (5)
H13 – Project management success (PMSucc) mediates the relationship between effective project governance (EPG) and project investment success (PISucc).	NA	Supported (6)
H14 – Project ownership success (POSucc) mediates the relationship between benefit management (BM) and project investment success (PISucc).	NA	Supported (7)

Discussions and Implications

Discussions and Implications

On Project Success (PS):

- The adopted framework was confirmed as adequate and adherent to the context of capital asset development projects, in line with previous studies (Zwikaël and Smyrk, 2012; Serra and Kunc, 2015; ul Musawir et al., 2017).
- The so-called “project flow of value” (PRINCE®), common knowledge within practitioners, is in fact a “project success triangle”, i.e., there is no full mediation of POSucc in the relationship of PMSucc and PISucc.



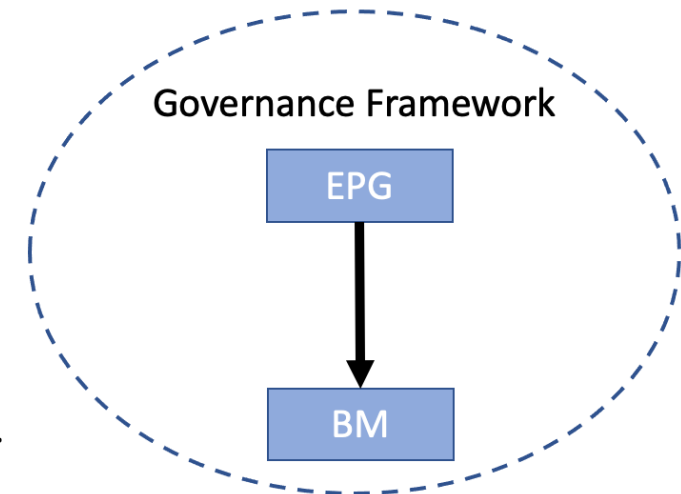
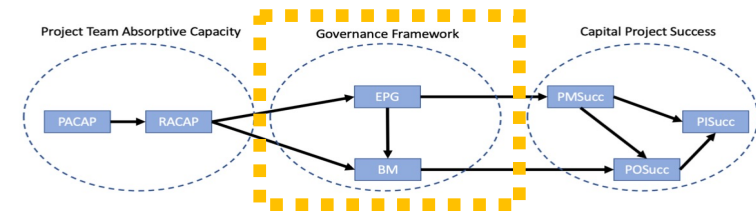
Discussions and Implications

On the Effective Project Governance (EPG):

- The mediating hypotheses were confirmed. EPG was confirmed as a key mechanism transferring the effects of ACAP to Capital Project Success.
- EPG was confirmed as having (strong) effect on BM ([Bradley, 2020](#); [Hjelmbrekke et al., 2014](#)).

On the Benefit Management (BM):

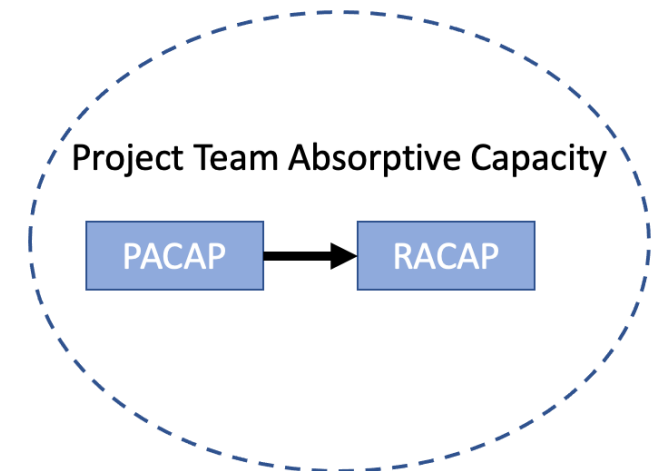
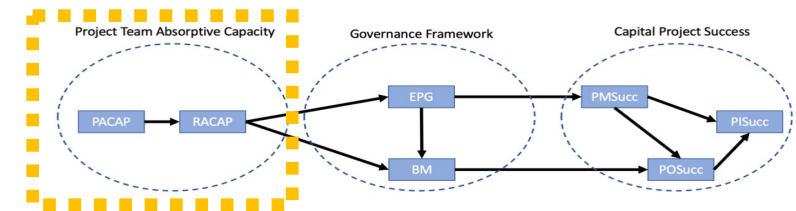
- The mediating hypotheses have confirmed BM as a key mechanism transferring the effects of ACAP and EPG to Capital Project Success.
- BM was confirmed as having effect on POSucc (weak to relevant).



Discussions and Implications

On Absorptive Capacity (ACAP):

- ACAP was confirmed as adherent to the context of capital projects, in line with relevant studies (Cohen & Levinthal, 1990; Zahra and George, 2002; Lane, 2006; Flatten, 2011; Leal-Rodríguez et al., 2014).
- PACAP was confirmed as a predictor of RACAP, in line with Leal-Rodríguez et al. (2014), and strictly adherent to the ACAP Theory (Cohen & Levinthal, 1990; Zahra and George, 2002).
- Project Team ACAP was confirmed as a collective human resource effector able to positively influence project investment success (Leal-Rodríguez et al., 2014; Zahra and George, 2002; Lane, 2006).





Theoretical Implications

- Project success: mediation of POSucc on the relationship between PMSucc and PISucc
- Absorptive Capacity: PACAP as a predictor of RACAP
- Governance Framework: EPG and BM as important bridges between temporary and permanent organization structures
- Proposed model for the phenomenon of Capital Projects:
 - 3 parties (PM, PO, and PS) linked but apart
 - 2 entities (Temp. and Perm. organizations)
- Relevance of knowledge practices in designing an effective governance framework



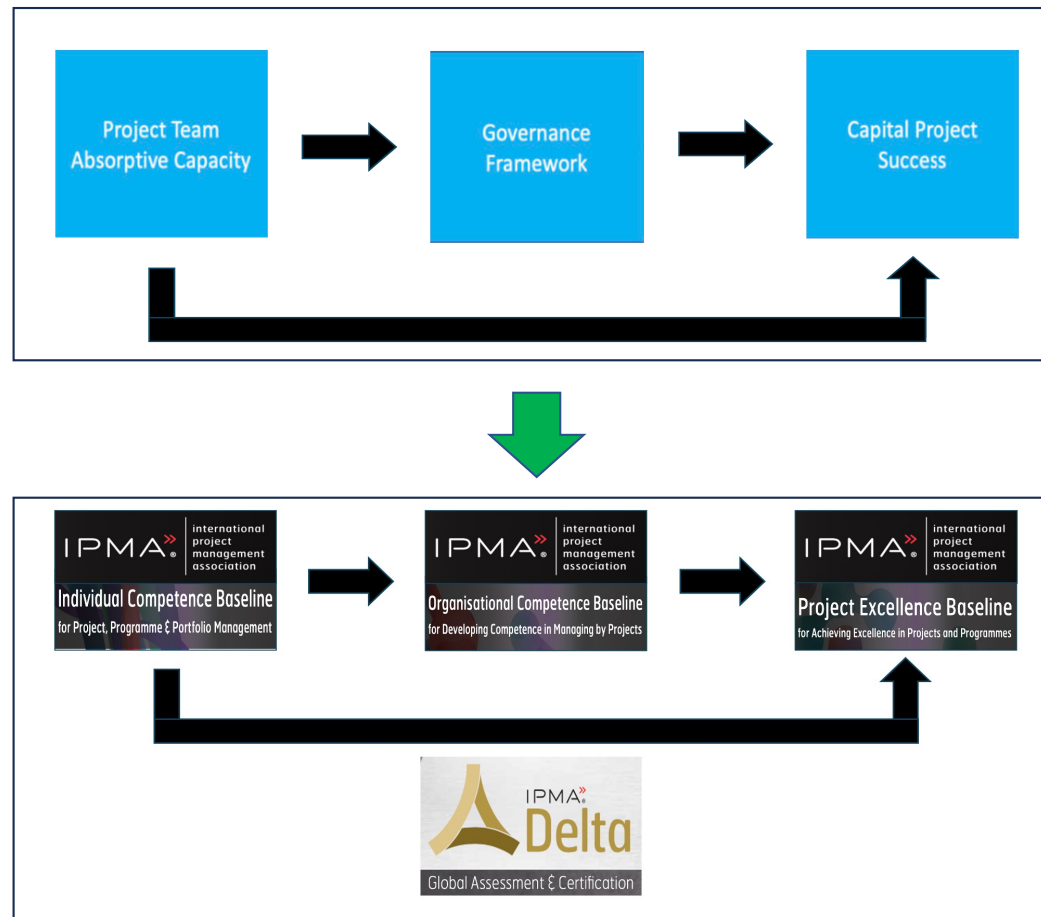


Practical Implications

- Expands understanding on the relationships between human resources factors (ACAP) and contextual factors (EPG and BM)
- Insights to improve the effectiveness of the firm's governance framework on:
 - Balancing responsibilities, authority, and accountabilities among the agent structures
 - Framing relationships between permanent and temporary organizations
 - Governing provisions to develop project team capabilities



Practical Implications



Limitations and Directions for Future Research



Limitations and Directions for Future Research

Limitations:

- Quantitative design limiting the investigation of complex relationships
- Variations due to culture, project size, governmentality, project typification
- Other independent, mediating, moderating variables do affect capital project success
- The study concerns to project success rather than failure

Directions for future research:

- Consider other 2 project success:
 - Strategy realization and preparing for the future
 - Stakeholders' satisfaction
- Virtuous circle with lessons learned retro feeding ACAP (preparing for the future)
- Effect of portfolio on PISucc: “doing projects right” and “doing the right projects”
- BM in Brazil: not well understood; not adopted as scientifically described; mainly associated to evaluating projects within a portfolio to rank the most economic attractive ones
- O&G capital projects are not regular projects



Conclusion and Final Remarks



Conclusion and Final Remarks

Research question was answered.

Research objective was achieved.

Existing and consolidated theories and concepts were confirmed as relevant.

ACAP was confirmed as key capability of a project temporary team able to influence Project Success.

The study has closed important gaps in the literature on directions about the way ACAP and EPG and BM, in a combined way, influence Project Success.

The proposed theoretical model contributes to “theory in practice” once it frames the phenomenon as it is in practice adopting consolidated constructs.





Conclusion and Final Remarks

Thesis Document:

DOI: [10.13140/RG.2.2.33735.78244](https://doi.org/10.13140/RG.2.2.33735.78244)

Additional readings:

- [Typical oil and gas industry \(basics\)](#)
- [Project Success: A Holistic Approach](#)
- [Framing Capital Projects in Upstream, Midstream, and Downstream Petroleum Segments: Complementing](#)
- [Oil and Gas Asset Lifecycle: A Comprehensive Overview](#)
- [IPMA + PMI + PRINCE2 + APM: Designing Effective Project Governance Frameworks](#)
- [Competence Over Credentials: Driving Project Success with IPMA Certification Framework](#)



Construct's Measurement Scale

Construct's Measurement Scale

Absorptive Capacity (ACAP)	Potential ACAP (PACAP)	Acq1	The search for relevant information concerning the project was the every-day business in the project environment.
		Acq2	The management, including the project manager and the functional managers, has motivated the project team members to use information sources outside of the project environment.
		Acq3	The management, including the project manager and the functional managers, has expected that the project team members deal with information beyond the project environment.
		Ass1	In the project environment the ideas and concepts were communicated cross-functional.
		Ass2	The management, including the project manager and the functional managers, has emphasized cross-functional support to solve problems.
		Ass3	In the project environment there was a quick information flow, e.g., if a project unit or function obtains important information it communicates this information promptly to all other project units or functions.
		Ass4	The management, including the project manager and the functional managers, has demanded periodical cross-functional meetings to interchange new developments, problems, and achievements.
	Realized ACAP (RACAP)	Tra1	The Project Team members had the ability to structure and to use collected knowledge.
		Tra2	The Project Team members were used to absorb new knowledge as well as to prepare it for further purposes and to make it available.
		Tra3	The Project Team members successfully linked existing knowledge with new insights.
		Tra4	The Project Team members were able to apply new knowledge in their practical work.
		Exp1	The management, including the project manager and the functional managers, has supported the development of prototypes and/or tests (to anticipate information and / or potential performance).
		Exp2	The management, including the project manager and the functional managers, regularly reconsiders technologies and adapts them accordant to new knowledge.
		Exp3	The management, including the project manager and the functional managers, has had the ability to work more effective by adopting new technologies.

Construct's Measurement Scale

Governance of Projects (EPG)	EPG1	The management board of the sponsoring firm had overall responsibility for the Governance of projects.
	EPG2	Disciplined governance arrangements were applied throughout the project life cycle.
	EPG3	Roles and responsibilities for the governance of projects were defined clearly.
	EPG4	The project's business case was supported by relevant and realistic information that provided a reliable basis for making authorization decisions.
	EPG5	A clearly defined criteria was used for reporting project status and for the escalation of risks and issues to the relevant organizational levels.
	EPG6	Decisions made at authorization points (or gates) were recorded and communicated to the relevant stakeholders.
	EPG7	The project had a project owner who was the single point of accountability in and to the organization for realizing project outcomes and benefits.
	EPG8	The project had a project manager who was accountable to the project owner for achieving project objectives and deliverables.
	EPG9	The parent firm sponsoring the project fostered a culture of frank internal disclosure of project management information.
Benefit Management Practices (BM)	BM1	Expected outcomes (the changes and / or upgrades provided by project outputs) were clearly defined.
	BM2	The value created to the sponsor firm by the project outcomes (the changes and / or upgrades provided by the project outputs) was clearly measurable.
	BM3	The strategic objectives that project outcomes (the changes and / or upgrades provided by the project outputs) were expected to support the achievement of were clearly defined.
	BM4	A business case was approved at the beginning of the project, describing all outputs, outcomes and benefits that were expected from the project.
	BM5	Project outputs (project products) and outcomes (changes provided by project outputs) were frequently reviewed to ensure their alignment with expectations.
	BM6	Stakeholders were aware of the results of project reviews and their needs were frequently assessed with a view to make changes.
	BM7	Actual project outcomes adhered to the expected outcomes planned in the business case.
	BM8	Activities aiming to ensure the integration of project outputs to the regular business routine (training, support, monitoring, and outcomes evaluation) were executed as part of the project's scope.
	BM9	After project closure, the sponsor firm kept monitoring project outcomes in order to ensure the achievement of all benefits expected in the business case.
	BM10	From the first delivery to the project's closure, the sponsor firm performed a pre-planned, and regular process to ensure the integration of project outputs into the regular business routine (including outcomes evaluation).
	BM11	A project benefits management strategy is applied throughout the firm that sponsored the project.
	BM12	A project benefits management strategy was applied for the project under analysis.

Construct's Measurement Scale

Project Success (PS)	PMS	PMS1	The project satisfactorily met the budget goals.
		PMS2	The project satisfactorily met the schedule goals.
		PMS3	The project satisfactorily delivered the required outputs.
		PMS4	Undesired outcomes were managed and avoided.
		PMS5	The project was successful in achieving the project plan.
	POS	POS1	The project's outputs have supported the business to produce the target outcomes.
		POS2	The project's outcomes adhered to the outcomes planned in the business case.
		POS3	The project was successful in realizing the business case.
	PIS	PIS1	The project's outcomes supported the achievement of overall project objectives.
		PIS2	The project has provided the expected return on investment.
		PIS3	The project was successful in realizing its investment objectives.
		PIS4	The project was a total failure in realizing its investment objectives. (- / data already treated to: The project was not a total failure in realizing its investment objectives.)

Wilson Guilherme Ramalho da Silva

E-mail:

wguilherme@petrobras.com.br

wguilherme@outlook.com

LinkedIn:

[linkedin.com/in/wilson-guilherme-974a7a](https://www.linkedin.com/in/wilson-guilherme-974a7a)



**Thank
You**