

CONTROL MECHANISMS TOWARDS PROJECT SUCCESS

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Abstract: This study, based on a systematic literature review, aims to identify and analyze selected control mechanisms when project success criteria operationalize. The main theoretical contribution of this study involves identifying the dimension of control mechanisms in success criteria operationalization. The most easily identified control mechanisms in the data material were output control mechanisms, including process-oriented and stakeholder-oriented kinds. These control mechanisms also occurred more frequently than other control mechanisms. Another theoretical contribution of this study relates to the suitability of control mechanisms. The data material evidently illustrates that operationalization based on conceptualization increases the prevalence of behavioral and social control mechanisms, giving more space to focus on the important issue of selecting appropriate control mechanisms. A further theoretical contribution is that the measuring and evaluation of project success assumes a mix of different control mechanisms, supporting the view that project control should be multidimensional. This study evidences that it is not enough that this mix should include output, behavior, and social control mechanisms but should also relate these control mechanisms to project management success and product success as well as to long-term and short-term success. This mix should include generic elements as tailored control mechanisms.

Keywords: Control mechanisms, Project success criteria, Operationalization, Project success, Measurement, Project control

1. INTRODUCTION

There is extensive research on project success, as references in this article and in referenced articles testify. In this context, we distinguished between success factors and success criteria. Success factors refer to conditions, circumstances, facts, or influences that contribute to project success, while success criteria refer to principles or standards used to determine or assess a project's success (Lavagnon, 2009).

One success factor that has been noticed is control (Duarte et al., 2019; Rozenes et al., 2006; Schultz et al., 2013; Vaidyanathan, 2017), which links project control and project success: control leads to project success. Research in the area (Liu et al., 2010; Nieminen and Lehtonen, 2008; Olawale and Sun, 2015; Schultz et al., 2013) confirms this outcome. In various studies, it appears that aspects such as the situation that reveals the connection between project success and control, appear to be success criteria operationalization (Kabirifar and Mojtahedi, 2019; Rodrigues et al., 2014). This operationalization results in measures selection that become control mechanisms to measure and evaluate project success.

While much is known about success criteria operationalization, control mechanisms associated with this operationalization deserve more attention from researchers, which this study offers. The identified research question is: which control mechanisms entail the operationalization of success criteria? This study contributes to filling this research gap by investigating measures selection in terms of control mechanisms, which is further the purpose of the study.

A systematic literature review is the basis of this study (Macheridis and Paulsson, 2021; Xiao and Watson, 2019). The theoretical contribution of this study is to investigate measures selection in terms of control mechanisms to measure and evaluate project success.

The article has the following structure. After this introductory part about the study' 's background, research question and purpose, the subsequent two parts present the main concepts and methodology of the study, respectively. Findings follow. The final section presents conclusions and the knowledge contributions of the study.

2. MAIN CONCEPTS AND THEORETICAL FRAMEWORK OF THE STUDY

This part discusses the main concepts of the study – project control and control mechanisms as project success and success criteria.

2.1 Project control and control mechanisms

Project control refers to "the application of processes to measure project performance against the project plan, to enable variances, to be identified and corrected, so that project objectives are achieved" (Olawale and Sun, 2015:623). Project control requires accurate project management in order to measure and evaluate project progress towards project success. Control has to consider internal factors - e.g., project complexity and project scope - and external factors - e.g., economic development and uncertainty, contingencies that affect the application of control mechanisms across organizations (Lueg and Radlach, 2015).

Control is fundamental in management control, described as the specific mechanisms used in the control process to influence the behavior and decisions of people to work towards the goals and strategies of an organization (Liu et al., 2010; Merchant and Van der Stede, 2005; Nieminen and Lehtonen, 2008). The behavioral orientation of control means focusing activities during a project life cycle to directing employee behavior (Lueg and Radlach, 2015). At the same time, tensions can occur between compliance that may affect performance, and controls when they interact with each other (Scoleze Ferrer et al., 2019). Even when the focus is on specific project success criteria, tensions can arise, e.g., between project 'managers' management styles regarding budget overruns (Calisir and Gumussoy, 2004). Control can be exercised through control mechanisms that can be grouped into different modes. Such grouping is in formal and informal modes of control mechanisms (Lueg and Radlach, 2015; Malmi and Brown, 2008). Formal controls are written rules, systematic methods for planning and maintaining control and top-down initiated mechanisms that influence 'subordinates' actions/behavior, usually focused on rules, performance evaluations and result control. Informal control means unwritten rules, values, norms, work ethics

and management style that influence 'subordinates' behavior.

Another grouping is in the market mode of control mechanisms, which considers that price provides a basis for effective decision-making and that competition between actors should be controlled. The bureaucratic model of control mechanisms directs to personal surveillance and direction of subordinates by superiors with quantitative and qualitative rules that aim to control both behavior and outcome. In the clan mode of control mechanisms are an informal mode of control based on socialization that aim to control the shared values, attitudes and beliefs of individuals in an organization (Nieminen and Lehtonen, 2008; Ouchi, 1979).

A third grouping is in outcome, behavior and social control (Bonner et al., 2002; Jiang et al., 2017). Outcome control and behavior control are formal modes of control. Behavior control influence how subordinates should perform actions and behavior. The performance of behavior is monitored, evaluated and rewarded. Behavior control, within a bureaucratic framework, characterizes by a high reliance on written rules and standard operating procedures. Outcome control directs to measuring outcomes. Outcome control is exercised when target measures regarding efficiency, quality, schedule or others are set, monitored and evaluated. Behavior control differs from outcome control in the sense that it controls behavior and not the outcome.

Social control is an informal mode of control. Cultural control or clan control and self-control are used instead of social control or are included in social control. 'Subordinates' autonomy over work performance is the basis of social control. Subordinates have the knowledge to perform complex activities and socialize to act independently without formal controls. Control is exerted through, for instance, values, self-control and peer group control. Self-control focuses on self-regulation, emphasizing individual's actions in reference to perceived organizational goals. The basis of control is self-monitoring. Cultural control emphasizes values, attitudes and beliefs that influence 'subordinates' behaviors within organizations. The basis of control involves interaction, values and norms.

Different groupings of control modes overlap rather than being mutually exclusive. Different control mechanisms can

exist at different organizational levels, either individually or with others (Malmi and Brown, 2008; Nieminen and Lehtonen, 2008). In this study, measures selection is analyzed using behavior, outcome and social control modes, first because this approach most adequately reflects "processes to measure project performance" (Olawale and Sun, 2015:623), And secondly because this grouping provides an opportunity to exercise organizational control-related both to the project and to the involved organizations implemented a project (Nieminen and Lehtonen, 2008).

The number of control mechanisms used simultaneously, along with their frequency, e.g., monthly or weakly, as well as the intensity of control, e.g., the level of scrutiny to which the project is exposed in terms of questioning details and challenging results, all affect the control used, which means control degree (Gamage and Gooneratne, 2017; Gregory et al., 2013; Morris et al., 2006). Control degree can vary from tight to loose control, depending on factors such as environmental context, organizational culture, predictability, 'managers' attitudes toward control, hierarchical level and clarity of tasks (Merchant and Van der Stede, 2017; Nogueira and Raz, 2014). Tight control means a "high degree of assurance that employees will behave in the organization" 's best interests' (Merchant and Van der Stede, 2017:139). Control degree affects the coupling between control mechanisms and project success. Furthermore, control degree affects the degree of coupling within the project and the organization to which the project belongs, which puts emphasis on standardization, authority, autonomy and decentralization (Nogueira and Raz, 2014).

2.2 Project success and success criteria

Project success is difficult to define because different projects exhibit different sets of characteristics and contextual circumstances (Castro et al., 2021; Lavagnon, 2009; Thomas and Fernández, 2008).

The literature in this field (Lavagnon, 2009) distinguishes between project management success and project product success when defining project success. Project management success relates to project process, considering a project to be successful if it delivers project results with a pre-agreed level of quality within the given time and cost (Agarwall and

Rathold, 2006; Collins and Baccarini, 2004; Lam et al., 2008). Project product success relates to project outcome and how different stakeholders perceive project success. External stakeholders of project organization perceive project success as target cost and time, while project scope influences internal 'stakeholders' perception of project success. This difference of view also applies to categories of external stakeholders as customers and users, and categories of internal stakeholders as project managers and developers (Agarwall and Rathold, 2006; Chipulu et al., 2019; Davis, 2017).

Another distinction made in the literature (Albert et al., 2017; Scoleze Ferrer et al., 2020) involves the link between project success and the point of assessment – short- and long-term success. When project management success relates to the assessment of project implementation, considering deadlines and budgets, this constitutes short-time success. If project success relates to the assessment of the effects of project results, this constitutes long-term success (Ciric et al., 2021). Project success is much about success measures (Park, 2019; Tripathi and Jha, 2018). Success criteria are used to measure project success, unlike success factors that facilitate the achievement of success (Collins and Baccarini, 2004; Moradi et al., 2020). The border between success criteria and success factors is not clear, e.g., one can see time-keeping requirements as success criteria in one project and as a success factor in another.

Two components together comprise project success (Collins and Baccarini, 2004; Lech, 2013), and have a positive relationship (Agarwall and Rathold, 2006). One is project management success criteria, which focuses on efficiency in project work, execution, monitoring and control of the project. Important criteria are meeting time, cost and quality objectives. The other is product success criteria, which relate to value deliverables to the users of the project outcome, leading to long-term impact. Important criteria are customer satisfaction with the functionality of project results and project owner satisfaction that the project result meets their strategic objectives (Lam et al., 2008).

Success criteria can be hard – i.e., time, cost, quality and economic success - or soft – i.e., as top management commitment, or participation by and satisfaction of different stakeholders (Albert et al., 2017; Himme, 2012; Joslin and

Müller, 2016). Different success criteria mean using different success measures (Manion and Cherion, 2009). At the same time, it is stated that success criteria can be generic in terms of project efficiency, stakeholder satisfaction and organization benefits (Chou and Hong, 2013; Castro et al., 2021; Rodriguez-Segura et al., 2016).

The link between project success and control mechanisms is usually about measures to manage and evaluate project success (Kabirifar and Mojtahedi, 2019; Meempool and Ogunlan, 2006; Tripathi and Jha, 2018). The basis of this formulation is the need to operationalize success criteria so one can apply it in practice. Operationalization allows success criteria to be measurable, whereby measures selection comes into focus. In this way, success criteria become understandable and practically measurable (Afzal, 2017; Klahm et al., 2014). One way to operationalize is by following an incremental approach, for example starting with several measures in order to choose the measures that are most appropriate for subsequent iterations (Ram et al., 2019).

3. METHODOLOGY

A systematic literature review is a basis of the methodology adopted, which is characterized by the use of explicit and rigorous criteria to identify, evaluate and synthesize all the literature on a chosen topic (Macheridis and Paulsson, 2021; Xiao and Watson, 2019).

We used the LUBsearch search engine with access to approximately 200 databases (including Scopus and Web of Science) and just over 78,000 journals to locate relevant scientific articles, supplemented with Google searches. At various times we repeated the search, while at the same time identifying the names of researchers publishing in this area.

We used the following criteria for the inclusion of an article. First, the focus of selected articles should relate to the purpose of this study. Second, selected articles should be peer-reviewed and published in scientific journals, meaning that a review of quality of the articles to establish their suitability for publication had already taken place. Publication of scientific journals also requires that authors declare that there is no ethical conflict involved in their study. Third, all

chosen authors had written their papers in English, which was the case in the vast majority of articles using the databases mentioned above. Fourth, the date range of publication was limited to articles published between 2000 and 2020, which is equivalent to the periods studied previously, e.g., Lueg and Radlach (2015) conducting sources 1988-2013 and Herschung et al. (2018) conducting sources, 2002-2012. The analysis indicates a recent increase in the number of studies in this field.

The literature search started with keywords based on the purpose of the study: "success criteria", "measures", "control mechanisms" and "project control", looked for in titles and as "search words". Different combinations of these keywords limited the time period from 2000 to 2020, and by adding "peer-reviewed", "academic journals", "articles in English" and using the built-in function in all LUBsearch actions that "exact duplicates are removed from the results", led to a final amount of 78 references. We found no further references when using other relevant keywords.

For each reference in the printed list, the title, the author and information about the publishing journal and publication year and subject were included. After reviewing the list and classifications, this led to the final selection of more than 95 articles, including not ones from the university database, LUBsearch, but also some from other search engines. Because of space limitations, it was necessary to substantially shorten, the reference list for this article.

The analysis started with the identification of measures selection in selected articles. Assessing the research problem and purpose, methodology and conclusions as well as the structure and disposition of the article were important in this step. We specified that relevant studies required analysis of the management of the impact of control measurements. The next step was to analyze selected measures viewed as control mechanisms. In the same studies, the analysis was facilitated when the authors themselves (Detzen et al., 2018; Scoleze Ferrer et al., 2020) classified selected measures in terms of control mechanisms. In other studies, the basis of classification was definitions of different control mechanisms, as presented in the second section in this article.

4. FINDINGS

4.1 Selected control mechanisms

The findings of this study illustrate that, when investigating control mechanisms in success criteria operationalization, one has to consider that the studies in the field differ in several points, so we give some key ones below.

- refers to different project types as construction projects (Bower et al., 2002; Jiang et al., 2017), software / IT projects (Eng et al., 2012; Wang et al., 2006), and NPD projects (Bonner et al., 2002; Manion and Cherion, 2009);
- performed in different national contexts, such as North Amerika (Mathur et., 2014), Austria and Denmark (Schultz et al., 2013), China (Subedi et al., 2011), Ethiopia (Bayiley and Teklu, 2016), Portugal (Rodrigues et al., 2014) and South Korea (Park, 2009);
- employed different methodological approaches, such as quantitative based on questionnaires (Mathur et al., 2014; Kabirifar and Mojtahedi, 2019) and qualitative based on document review, project analysis, and interviews (Eng et al., 2012; Davis, 2017); and literature studies (Ernst, 2002). Some studies combined different approaches, such as interviews and surveys (Mahaney and Lederer, 2006);
- have different perspectives, namely those of organizations (Lech, 2003) and various project stakeholders, such as project managers, owners, clients, users, and community and project teams (Bonner et al., 2002; Davis, 2017);
- have different theoretical starting points, including Contingency theory, expressed in aspects such as project type, national context and project characteristics (see references above); Stakeholder theory, expressed through individuals such as members of the customer team, contractor team, developers, project managers and users (Agarwall and Rathold, 2006; Wang et al., 2006); Principal-agent theory; and stewardship theory, focusing on governance relationships between stakeholders as principals and agents (Gemünden et al., 2005; Joslin and Müller, 2016).

4.2 Levels of control mechanisms and patterns of success criteria operationalization

The findings of the literature review uncover two levels of control mechanisms, depending on how success criteria operationalize: one that include generic control mechanisms; and another that include tailored control mechanisms. These levels of control mechanisms relate to two success criteria operationalization patterns. The first pattern directs to measurement and measures selection primarily, through measures identification and ranking (Bayiley and Teklu, 2016; Davis 2006; Meempool and Ogunlan, 2006; Subedi et al., 2011). The second pattern shows that conceptualization of a certain relationship guides operationalization, e.g., the impact of incentive mechanisms on project success (Bower et al., 2002); the relationship between formal control, team adaptability and project success (Detzen et al., 2018); and the relationship of clan control to project success (Eng et al., 2012).

Both operationalization patterns include time-related, cost-related and quality-related factors, as well as customer-related control mechanisms. At the second level of control mechanisms, when conceptualization becomes the basis of the operationalization pattern, this increases the prevalence of behavior and social control mechanisms as team-based rewards (Bower et al., 2002), ethics-related (Scoleze Ferrer et al., 2020), culture-related (Rodrigues et al., 2014), social capital (Eng et al., 2012) and trust-related (Wang et al., 2019), to effectively assess project management success and project product success.

Table 1 illustrates the link between control mechanisms selection and operationalization based on conceptualization. The first column lists the author and publication year of the study; the second column lists the conceptualization of the studied relationship the third column lists selected control mechanisms usually expressed through items formulation scored using, for example, a five-point (Wang et al., 2006) or a seven-point-ratings scale (Gemünden et al., 2005). For reasons of space, we specified one to three items for the respective components of the relationship, which seems sufficient to show the link between control mechanisms selection and conceptualization of success criteria.

We used the LUBsearch search engine with access to

approximately 200 databases (including Scopus and Web of Science) and just over 78,000 journals to locate relevant scientific articles, supplemented with Google searches. At various times we repeated the search, while at the same time identifying the names of researchers publishing in this area.

The role and importance of control mechanisms at these two levels vary. At both levels, control mechanisms play a functional role. Control mechanisms at the first level tend to be generic and practical, e.g., all agree that customer satisfaction is a control mechanism, and thus, the choice of this control mechanism has practical benefits. This pragmatism allows accountability, as it facilitates follow-up performance using reporting systems. Control mechanisms at the second level are tailored and suitable. Tailored control mechanisms operationalized based on conceptualization mainly illuminate and generate better possibilities of exercising control, which becomes purpose-oriented, as with a selection of control mechanisms. These control mechanisms support consideration of e.g., project characteristics, environmental forces and power relationships between stakeholders.

4.3 Modes of control mechanisms and success criteria components

Identified control mechanisms relate both to project management success criteria and to product success criteria (Collins and Baccarini, 2004), as well as to short-term and to long-term project success (Scoleze Ferrer et al., 2020). Control mechanisms relating to time, cost and quality, or functionality (Carvalho et al., 2015; Griffith, 2006; Lam et al., 2008; Park, 2009; Rodríguez-Segura et al., 2016) focus on project management success, emphasizing the functional role of selected control mechanisms, e.g., follow up the project's progress in relation to the project's schedule. Even control mechanisms such as clan control (Chua et al., 2012) and process autonomy (Detzen et al., 2018), identified when selecting conceptualized control mechanisms, address project management success. Control mechanisms relating to product success criteria are the focus of stakeholders, mainly by highlighting the importance of stakeholders' goals and customer benefits (Chipulu et al., 2019; Jiang et al.,

TABLE 1. CONTROL MECHANISMS BASED ON CONCEPTUALIZATION OF A CERTAIN RELATIONSHIPS THAT GUIDES OPERATIONALIZATION.

Author, Publication year	Conceptualization	Control mechanisms
Bonner et al., 2002.	Formal (process control, output control, team-based rewards) and interactive (team strategic control influence, team operational control influence and management intervention) controls affect project performance. Project characteristics (product innovativeness, product program integration) affect project performance directly or indirectly through to affecting relationship control and project performance.	<p>Process control - the degree to which managers set and monitored processes, procedures, and work assignments for the team.</p> <p>Output control – the degree to which elements such as quality standards and product performance are goals for the team.</p> <p>Team rewards – individual members' promotion, recognition, and financial rewards.</p> <p>Team operational control – the extent to which the team influences decisions concerning the project's goals and objectives, deadlines, budget and selection of team members.</p> <p>Team strategic control – the extent to which the team has an influence over determining the project strategy, making modifications to strategy, and taking responsibility for developing the strategy.</p> <p>Management operation – how often management changes goals, available resources, or deadlines, and how frequently managers attempt to influence or intervene in team decisions.</p> <p>Product innovativeness – which of the following categories best describes their development project: new-to-the world, new-to-the firm, line extension, product modification, or process modification.</p> <p>Product program integration – the degree to which larger product programs within the company influence an item's strategy, processes, and/or development decisions.</p> <p>Project outcomes – the degree to which project meets its scheduled, budget and product performance objectives, and the overall level of satisfaction with the team's performance.</p>

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Chou and Hong, 2013.	ERP quality evaluation dimensions (system quality, information quality, service quality) affect system to use and user satisfaction. System use affects user satisfaction, both lead to corporate benefits.	<p>System quality – good ease of use, integration of systems, and system efficiency.</p> <p>Information quality – accuracy, timeliness and personalization.</p> <p>Service quality –data quality, service quality and assurance.</p> <p>System use –work integration, navigation patterns and use frequency.</p> <p>User satisfaction – recurring use, overall satisfaction-meeting demands and overall satisfaction-efficiency.</p> <p>Corporate benefits – cost savings, reduced search costs and time savings.</p>
Gemünden et al., 2005	<p>Project autonomy affects project success. Project innovativeness affects this relationship and project success directly.</p> <p>Autonomy includes three dimensions: structural, defined in terms of organizational separation and level of reporting; resource-based, defined in terms of size of the resource base and freedom of use; social, defined in terms of co-location of project team.</p> <p>Dimensions of innovativeness are market, technology, organizational and environmental.</p> <p>Project success includes terms of time, cost and quality.</p>	<p>An ordinal measure of organizational separation has three levels: (1) project organization; (2) location in a separate special unit within the organization; (3) location outside the organization.</p> <p>Measurement methods for project reporting level involve five levels: (1) Supervisor; (2) Head of R&D; (3) Head of Business Unit; (4) Venture Board; (5) Corporate Board.</p> <p>Size of resource base includes the extent of main organization's access to resources ("full access"); extent of financial means ("sufficiency"); extent of integration of experts from functional units.</p> <p>The degree of freedom in the use of these resources measures the freedom of resource use.</p> <p>Simply, whether or not co-location exists for the team the team determines locational autonomy.</p> <p>Market dimension - creates totally new and necessary customer benefit, including changes in customer attitude and behavior.</p> <p>Technology dimension - new technological principles; a quantum leap in performance.</p> <p>Organizational dimension - reorientation of corporate strategy; a new organizational structure.</p> <p>Environmental dimension - creation of a new infrastructure; alterations in regulations required to implement innovation.</p>

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Liu et al., 2010.	Management control and user contributions affect a Team's Task Completion Competency and this, in turn, affects Project Management performance.	<p>Management control - the extent to which software development first-line managers sign off on their schedules and cost estimates; the extent to which use is made of a mechanism for controlling changes to software requirements.</p> <p>User contribution - users are unavailable to answer development teams' questions; users are unaware of the importance of their role in successfully completing projects.</p> <p>Team's general task completion competence - an inability to work with undefined elements and uncertain objectives; an inability to work effectively as a team.</p> <p>Project management performance - ability to meet project goals, expected amount of work completed.</p>
Mahaney and Lederer, 2006.	Extrinsic and intrinsic rewards separately and together affect client satisfaction, perceived quality and implementation process, respectively.	<p>Project success - client satisfaction, perceived quality, implementation process.</p> <p>Client satisfaction – the project is used by its intended users.</p> <p>Perceived quality – this project will have a positive impact on those who make use of it.</p> <p>Implementation process – satisfaction levels were sufficient with the process by which this project was completed.</p> <p>Intrinsic rewards – pride, sense of contribution to organization.</p> <p>Extrinsic variables – favorable annual performance appraisals; project completion celebration; financial bonus.</p>
Pimchangthong and Boonjing, 2017.	Organizational factors and management practices affect IT project success (process performance, product performance).	<p>Organizational factors - organizational types; organizational sizes</p> <p>Risk management - risk identification; risk analysis.</p> <p>Process performance – Process control; project completed within budget and schedule.</p> <p>Product performance – Operational efficiency; the application developed satisfied users.</p>

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Wang D et al., 2019.	Control and trust affect social exchange norms, both directly and indirectly, and in return affect megaproject success. Reciprocity, negotiation and information sharing affect social exchange norms.	<p>Project performance - agreed with quality; timeliness; staying within budget.</p> <p>Control - strictly control and monitoring of target accomplishments.</p> <p>Trust - confidence that the other parties have high levels of integrity and honesty.</p> <p>Reciprocity - a partnership leader will help another leader if they help him/her.</p> <p>Negotiation - actively listened to everyone's ideas before making a decision.</p> <p>Information sharing – frequent exchanges of information among parties.</p>
Wang E et al., 2006.	Management control affects project success directly or through affecting User-IS Personnel interaction quality.	<p>Management control - extent of formal procedures used in the management review; extent that software development first-line managers sign off on their schedules and cost estimates.</p> <p>User-IS personnel interaction - complete training provided to users; quality communication between IS unit and users.</p> <p>Project performance - adherence to schedules and budgets; ability to meet goals.</p>

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2017; Liu et al., 2010). The selection of such control mechanisms becomes stakeholder-driven, considering stakeholder's specific interests, requirements and expectations. Such control mechanisms relate to product success and to long-term success.

As selected studies seem to confirm, a mix of control mechanisms (Malmi and Brown, 2008) seems to be the rule in the field. Identified control mechanisms, as named in the literature (Himme, 2012), are both hard, e.g., budget-related (Bonner, 2002), and soft, e.g., trust-related (Jiang et al., 2017) and clan-related (Eng et al., 2012). The results of the study show that control mechanisms complement each other rather than substituting for each other. The breadth of selected control mechanisms provides the opportunity to follow up project success components that different stakeholders emphasize. This, in harmony with the fact of diversity of selected control mechanisms, allows for the management of conflicting logic, depending on external

pressures, such as stakeholders' requirements and internal dynamics, as relationships within the project team (Gregory et al., 2013).

Identified control mechanisms refer to the measurement and evaluation project performance (Griffith, 2006; Olawale and Sun, 2015) such as exercising organizational control-related both to the studied project and to the organization that implemented the project (Gemünden et al., 2005; Nieminen and Lehtonen, 2008). This study confirms that these control mechanisms primarily address project management success criteria. Such actions and decisions primarily aim at supporting short-term project success, but since the purpose is also quality assurance of project results to implement project process effectively, a connection to long-term project success emerges, not only in ongoing projects but also in projects to be implemented in the future.

4.4 Control mechanisms and control degree

The literature names the amount of control mechanisms as a parameter to determine control degree (Gamage and Gooneratne, 2017). The studies included evidence that number and breadth of selected control mechanisms in studying projects are large, which indicates high control degree, or tight control. At the same time, views were expressed - such as, "upper managers would be wise ... to be very selective in intervening in project activities" (Bonner et al., 2002:243) - on whether tight control is appropriate.

The results of the study show that a diversity of genetic control mechanisms exist in organizations to deal with control during project implementation, involving both internal and external actors. Those control mechanisms support dealing with control related to project management success and to product success. The literature review shows that tailored control mechanisms support mainly dealing with control related to project management success and involve mostly internal project actors.

The two other parameters to determine control degree are frequency and intensity (Gamage and Gooneratne, 2017). Frequency relates to the amount of control mechanisms. It is close at hand, which is supported by the fact, that several control mechanisms are selected in the various projects to claim that the degree of control in terms of its frequency is high. The literature review provides limited possibilities to determine control degree in terms of intensity, in addition to an indication/ Based again on the fact that several and different control mechanisms are selected, the intensity of control can be high.

The selection of control mechanisms involving conceptualized operationalization determines the degree of coupling (Morris et al., 2016). The literature review illustrates coupling between project success and environment, e.g., national culture (Rodrigues et al., 2014) and reduction of time-to-market (Afonso et al., 2008); between project success and the organization implementing the project, e.g., strategic type of firm (Manion and Cherion, 2009) and upper management control (Bonner et al., 2002); and between project success and factors at project level, e.g., team adaptability (Detzen et al., 2018) and scheduling practices (Griffith, 2006). The degree of coupling (Morris et al., 2016)

in named studied projects seems to reflect not only firsthand, informal aspects, such as culture and informal communication, but also formal aspects, such as reporting project activity outcomes. In this manner, loose control becomes an implementation issue.

A shortcoming in many studies is that the focus is on selected control mechanisms, the impact of other control mechanisms on the conceptualized relationship, without considering extending to project success. For example, in a study (Detzen et al., 2018), the researchers choose to examine target rigidity and process autonomy, both as defined in terms of resources and cost targets, without considering how these control mechanisms relate to e.g., quality measures.

4.5 Forces behind selection of control mechanisms

We uncovered three frequently recurring forces involved in the selection of control mechanisms: project type, project stakeholders and project characteristics. More than one of these aspects can occur in the same study, e.g., different project types may mean different project characteristics.

In selected studies, the authors usually direct interest to a specific project type: product development projects (Manion and Cherion, 2009), construction projects (Meempool and Ogunlan, 2006) and software/IS projects (Liu et al., 2010; Mahaney and Lederer, 2006) are frequent. In these projects, measures for output control regarding project triangle - time, cost and quality - are common. The relation between project type and project success, as highlighted by researchers, point out project type as a critical factor needing to be operationalized for selection under control mechanisms (Park, 2009) or as a force that moderates the effects of control mechanisms (Martinsuo et al., 2013).

Stakeholders are another force that influences the selection of control mechanisms (Chipulu et al., 2019; Jang et al., 2017; Wang et al., 2006). The results of the study show that the role of such results selected control mechanisms varies, depending on function - e.g., control mechanisms of financial interest (Carvalho et al., 2015; Martinsuo et al., 2013) - and depending on the stakeholder - e.g., showing that the project sponsor's interest is satisfied (Chipulu et al., 2019).

Project characteristics also influence selection of control mechanisms. Control mechanisms aim to ensure that what characterizes a project is translated into project implementation and manifested in project results. A study (Gemünden et al., 2005) concerning the influence of project autonomy on project success in a NPD project as an illustrative example. The authors identify autonomy as a key characteristic of NPD projects. Table o1 presents the conceptualization of the relationship between autonomy and project success, considering project innovativeness and selected control mechanisms to operationalize this relationship.

5. KNOWLEDGE CONTRIBUTIONS AND CONCLUDING REMARKS

The purpose of this study was to identify and analyze selected control mechanisms when project success criteria operationalize. This study contributes to understanding how control mechanisms play a significant role in the design and implementation of project control to achieve project success. The main theoretical contribution of this study involves adding the dimension of control mechanisms to success criteria operationalization. We identify several control mechanisms in respective control modes: output, behavior and social control mechanisms. It is easier to identify control mechanisms in data material where output control mechanisms include process-oriented and stakeholder-oriented elements. These control mechanisms were most frequent than other control mechanisms in the chosen articles.

Another theoretical contribution of this study refers to the suitability of control mechanisms. The data material shows that output and stakeholder-oriented control mechanisms occur in both operationalization patterns. However, it is clear from the data material that, when conceptualization is the basis of operationalization, it increases the prevalence of behavior and social control mechanisms, which gives more space to focus on the important issue of selecting appropriate control mechanisms.

A further theoretical contribution is that the measure and evaluation of project success assumes a mix of different control mechanisms, supporting the view that project control

should be multidimensional. This study illustrates that it is not enough that this mix should include output, behavior and social control mechanisms but also needs to relate these control mechanisms to project management success and product success, as well as to long-term and short-term success. This mix should include generic as tailored control mechanisms.

We have pointed out certain difficulties found in the database employed, such as the diversity of the studies and limited information about control intensity. The literature review also did not always address control mechanisms in success criteria operationalization. To our knowledge, there are currently no studies relating to the issue of control mechanisms and success criteria, despite the fact that studies pay attention to measuring and evaluating project success. This research gap is a challenge to further research. The study presented here can be extended to investigate the practice of control mechanisms, especially how project management deals with control mechanisms during the different phases of project life cycle. The literature supports the need to investigate this research gap, as it highlights how the perception of project success can vary during the project life cycle, and, accordingly, how success criteria changes during the different phases of the project life cycle (Gemünden et al., 2005; Moradi et al., 2020).

Studies included don't refer to virtual or online projects. Accordingly, generalized control mechanisms discussed in this paper cannot encompass these type of projects. New research, therefore, needs to investigate the control mechanisms operationalizing success criteria when it comes to virtual and online projects, something that would be another research question that could reveal still more related aspects that require investigation.

6. PRACTICAL RECOMMENDATIONS

The selection of control mechanisms is central to assessing project process and the outcomes of this process. In this manner, project management can take a passive role, allowing others to evaluate them, or be proactive, by ensuring that those in such roles understand the benefits that deliverables can provide. The selection of suitable control mechanisms generates opportunities to manage external pressures and internal dynamics to achieve project

success.

The selection of functionally oriented control mechanisms addresses projects management success and product success for stakeholders, who have both expectations and requirements in a project. These control mechanisms facilitate comparisons between projects and are familiar to many stakeholders, offering advantages when discussing project success. The findings of this study show the importance of tailored control mechanisms when considering what characterizes a project or a project context, e.g., key stakeholder, project type or environmental condition. Competence development and ensuring quality in future projects, embedded as evaluation skills, are important when selecting control mechanisms.

The selection of control mechanisms highlights the need for both a project control system and controller involvement in project management settings that in turn have an impact on project success. The aim of a project control system is "to minimize the gap between project planning and project execution in order to achieve project aims, i.e., cost, time, and content" (Rozenes et al., 2006:5). Considering that project success is a multidimensional construct including many dimensions (Castro et al., 2021) the project control system has also to be multidimensional, integrating many control dimensions (Rozenes et al., 2006).

Project control system applications should include both the project management process, e.g., time control (Bower et al., 2002), and project results and effects, e.g., product functionability control (Olawale and Sun, 2015). Controller involvement has to include not only a functional role focusing on management accounting information and controlling activities such as planning and evaluating deviations in performance, e.g., delays, but also a cross-functional role to support management strategic and operational decision-making regarding, e.g., managing uncertainty and project risks, using both financial and non-financial information (Malagueño et al., 2021).

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CONTROL MECHANISMS
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