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The Application of Levers of control in Innovative Project Selection – A case study

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In order to gain competitive advantage in the global market, innovation has become a key part of organizational strategy, leading to a series of challenges in project selection. As effective tools for decision making, the management control systems (MCS) may provide a holistic approach to these management uncertainties.

The study looks at a leading company in the field of measurement instruments as a case to investigate how MCS were enacted in the project selection. The aim of this analysis is to provide practical insights and empirical data on MCS' role in the project selection in the context of innovation.

The study was conducted by applying the framework of Simons' four levers of control (LOC). Based on analysis of current project selection at the target company, how the four levers of control were enacted in the practice of project selection were examined in two aspects: the major challenges that need to be addressed and the multiple criteria for project evaluation. Afterwards, the dynamic tensions caused by those four levers which were important for the achievement of business strategies were also explored.

By examining the role of MCS in project selection in an empirical way, the study found that project selection criteria could be shaped through different sorts of controls and that balancing the use between different controls to generate dynamic tension is of great importance as overreliance on one set of controls can create challenges for an organizations project selection process.

Key words: management control systems (MCS), project selection, levers of control (LOC).

Contents

Figure index

Table index

List of Abbreviations

Abbreviation	Complete Designation
MCS	Management Control Systems
LOC	Levers Of Control
KPI	Key Performance Indicator

1. Introduction

In this chapter, the background and previous works concerning the study will be presented. Based on this, the objectives of the study will be determined, and research questions will be proposed as well.

1.1 Background

1.1.1 Management control systems in innovation

In the current business environment characterized by rapid technological changes and intensive competition, organizations are facing multiple challenges and innovation has become crucial, being increasingly viewed as a catalyst of value creation and a critical support for competitive advantage (Barros & Ferreira, 2019). However, it is still a challenge to manage innovation due to its high uncertainties, complexity and resource consumption. The questionsof how to balance freedom of creativity and effective use of resources, and how to efficiently manage innovative processes have drawn increasing attention of organizations.

Management control systems (MCS) are of importance in any organization, be it international or local, small or large. They play a key part in internal control and alignment with company's strategies. Recently, the consensus has recognized that MCS plays a positive role in innovation control (Barros & Ferreira, 2022). It can encourage innovative opportunity seeking, accelerate information flow, and support proper decision-making by means of various control systems.

1.1.2 Project selection in innovation

In order to gain competitive advantages over rivals and secure position in the global market, the development of cutting-edge products has become a central dimension in company' strategies (Bienengräber, 2019). In that case, how a company select the right products from a variety of options and how it ensures that the selected products match the organization's goals and really facilitate the success in future become integral questions. Project (or project portfolio) selection provides us a tool to solve these problems.

To select the right projects from various options is always a crucial decision especially when related to innovation characterized with risk and uncertainty. Project selection can be realized through a process of weighting and balancing among the factors that reflect the organization's objectives and priorities (Cheng & Li, 2005). An appropriate project selection is important

especially in the innovation setting, because it motivates the development of competitive products, maximizes positive outcomes such as profits and reputation, and eliminates or minimizes negative results, thus securing the long-term success of the organization (Cheng & Li, 2005).

1.1.3 The problems of innovation-related project selection

Project selection is a complex and challenging task especially in the context of innovation. Making a selection decision is not easy and there are potential problems and challenges.

Project selection is a process involved in multi-participant and divided into multi-phase. Various factors such as financial, technical, social and environmental issues, as well as decision-maker's preference have to be addressed simultaneously (Manyombé & Azondékon, 2021; Nowak, 2013). For an innovation-related project with high uncertainty and inadequate data, the project performance is difficult to measure and predict (Hertenstein & Platf, 2000). There is also the issue of how to optimize and allocate insufficient resources among potential projects. When the level of resource availability is lower than that of requirement over time, project selection becomes more difficult and complicated (Ghasemzadeh & Archer, 2000).

Beyond the aspects outlined above, problems may emerge from the use of the models and techniques for selection procedures. Many fail in application due to following reasons: inaccurate description of selection reality, inadequate treatment of risk, lack of the recognition and incorporation of decision-makers' preferences, uncertainty and multiple criteria, too sophisticated and time-consuming, data inaccessibility and so forth (Henig & Katz, 1996).

1.2 Previous works

1.2.1 Management control systems in innovation

Facing the management uncertainties brought by innovation, a number of studies have been conducted on the role of MCS in innovation. Barros & Ferreira (2019) and Bienengräber (2019) point out that most previous studies reveal the negative effect of MSC on innovation that restrains creativity and freedom in traditional meaning. Recently however, research has shifted to illustrate the positive impact of MCS on innovation as a process rather than a measuring tool.

In this new stream of research, the most common framework that has been widely used is Simons' levers of control (LOC). Baird et al., (2019) and Barros & Ferreira (2022) summarize

that the LOC theory provides a comprehensive MCS approach of balancing innovation and

efficiency by investigating the collaborative effect of the four levers of control on performance control and strategic initiatives motivation. Notably, the use of multiple controls has become a common theme, and analyzing integrated systems rather than separate systems has become the mainstream of MCS research in the context of innovation (Barros & Ferreira, 2022)

1.2.2 Project selection in innovation

Trying to solve the problem of decision-making in project portfolio selection, a large number of studies have been conducted in the past decades, which can be generally classified into two families: one concerns description of simple techniques to practitioner's advantage, while another focuses on quantitative decision-making support systems (Nowak, 2013). More specifically, the following categories are defined: "mathematical programming methods, econometrical methods, financial methods, statistical methods, multicriteria decision-making methods, total quality management methods, heuristic methods, fuzzy/grey methods, and others" (Turkmen & Topcu, 2021, p34).

These supporting techniques have their own advantages from different perspectives when dealing with the issue of project selection. As for innovation projects, multicriteria decision-making methods and mathematical programming are listed on the top of most frequently used methods (Turkmen & Topcu, 2021). It is also suggested that an appropriate combination of different kinds of theories and methods could be a better solution to cope with selection problems in the context of innovation (Feng et al., 2011; Turkmen & Topcu, 2021). Still, some of these existing models or techniques are not widely applied in practice due to various reasons, such as lack of accessible data to precisely describe the selection process, not adequately addressing the criteria and their interrelationships, providing well-structured solutions without fully capturing decision-makers' interests and preferences, the poor usability due to complex mathematical programming (Henig & Katz, 1996; Turkmen & Topcu, 2021).

1.2.3 The application of management control systems in project selection

Although MCS frameworks have been deployed in various empirical research to address the issues of management accounting and the relevance of MCS to innovation, the application of MCS in project selection setting has not gained much research attention.

Nowak (2013) discusses a new interactive approach based on Simons' LOC framework for portfolio selection in which a single portfolio is proposed to the decision maker in each iteration and decision-maker's involvement is highly valued. Manyombé & Azondékon (2021) draws

on the concepts of Simons' LoC model and proposes an adapted framework for a better project selection procedure when formulating the multi-criteria in multi-project context.

The attempt of applying MCS frameworks into the project selection process appears meaningful given the inherent association between both in the terms of purpose, features and function. Even if only a limited number of studies has been conducted, this research gap remains big and requires more efforts to be closed.

1.3 Objectives and research question

The purpose of this paper is to examine how different MCS interact to shape the project selection and prioritization process in the innovation domain. Simons' LOC theory is utilized as the main theoretic framework, and based on this, how the MCS are applied in the process of project selection and what effects they have on the project selection are discussed. A leading company in the field of providing measurement instruments and solutions is taken as a case.

The LOC theory provides a holistic way of conceptualizing, formulating and utilizing MCS. It emphasizes the inherent organizational tension between innovation and goal achievement for potential profitable growth (Simons, 1995). This paper seeks to examine these levers of control and connect their dynamic interplay to the business strategic concerns in the process of project selection.

Through this approach, the paper aims to

- Provide practical insights and empirical data on the role of MSC in innovative project selection in general and the firm-specific circumstances in particular;
- Applying the existing theory of MSC, and more specifically the LOC framework, by focusing the discussion on project selection and prioritization in the innovation context.

And the research question is put forth as follows:

- How are the Simons' four levers of control enacted in the project selection, especially regarding multi-criteria of project evaluation, at the target company?

2. Literature review

Relevant theories will be reviewed in this chapter to obtain a general understanding of the study, and provide the theoretic framework for empirical analysis. Two aspects will be covered:

MCS with the emphasis on Simons' LOC and project selection. Innovation will be the thread running through the whole chapter.

2.1 Management Control Systems

In the current competitive business environment, MCS have been applied as a tool to achieve organization's goals, and their effect on facilitating the implementation of strategy and supporting innovation has gained more and more acknowledgement (Barros & Ferreira, 2022).

Over the years, although a set of frameworks have been proposed, broadly or narrowly, there is no consistent conceptualization of what could be considered MCS and what constitutes MCS (Malmi & Brown, 2008; Strauß & Zecher, 2012). To examine the application of MCS in the project selection of innovative products, we adopt the definition of MCS suggested by Simons (1995, p5), *"management control systems are the formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities."*

The purpose of MCS is to provide useful information during the process of decision-making, planning and evaluation (Widener, 2007). MCS comprises both formal and informal control systems that work together. It consists of a wide range of tools and mechanisms for managers to make business decisions and ensure achievement of strategic objectives and maintain controls of personal behavior within organizations as well (Bisbe & Otley, 2004).

In this paper, Simons' LOC is used as the main theoretic framework to analyze the effect of MCS on project selection in innovation settings. The LOC enables top managers to control the key strategic elements in practice: core values, risks, uncertainties and learning, critical performance variables etc. Thus, it provides a holistic way of conceptualizing, formulating and utilizing MCS, meanwhile examining their impact on innovation activities in support of strategic change (Barros & Ferreira, 2022; Ferry et al., 2017).

2.1.1 The concept of LOC theory

According to Simons (1995), the LOC theory is constituted by four main clusters of control systems: *beliefs systems, boundary systems, diagnostic control systems* and *interactive control systems*. They interweave together and contribute jointly to the formulation and implementation of business strategies (Chiesa et al., 2009).

Beliefs systems and *interactive control systems* define and expand opportunity space, while *boundary systems* and *diagnostic control systems* emphasize attention and establish constraint

(Simons, 1995). There are both tension and interplay in between, however, by cooperating with each other, they transform unlimited opportunity space into a focused domain in which exploration and exploitation are encouraged (Simons, 1995). Consequently, control of business strategy is achieved from four aspects (Fig. 1) (Simons, 1995): *Beliefs systems* inspire both intended and emergent strategies and relate themselves to strategy as "perspective"; *boundary systems* define the strategic domain for the organization and relate themselves to strategy as "position"; *diagnostic control systems* focus attention on the accomplishment of intended strategies and relate themselves to strategy as "plan"; *interactive control systems* expand and guide opportunity-seeking leading probably to strategic emergence and relate themselves to strategy as "pattern in action".

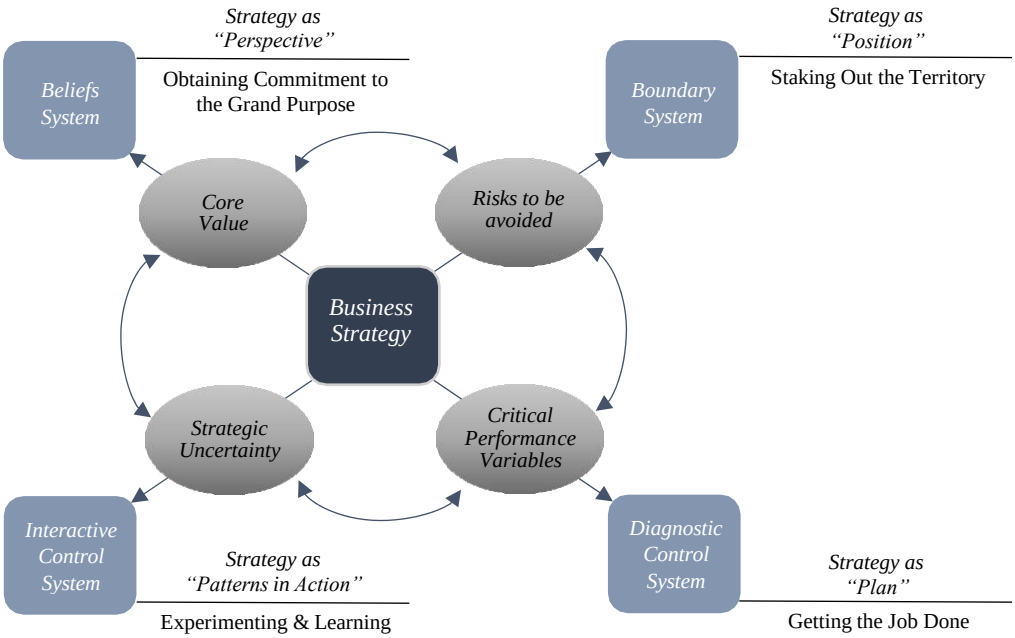

Figure 1 The dynamics of controlling strategy (adapted from Simons, 1995, pp. 159)

Belief systems:

Belief systems is a set of explicit definitions of fundamental organizational value, purpose and direction that are linked to the business strategy of a firm (Simons, 1995). They are created and communicated by means of such instruments as credos, mission statements and statement of purposes, and applied by top managers to shape, convey and enhance the core values, as well as to inspire and guide organizational search for new opportunities in line with these values (Simons, 1995). *Belief systems* are formulated from the symbolic use of information, and thus become more and more important in the current innovation context (Simons, 1995). This force

is positive because it reinforces commitment, stability and distinctive traits seen as beneficial for the organization (Simons, 1995). Core value is the key design variable (Chiesa et al., 2009).

Boundary systems:

Boundary systems outline the acceptable territory of opportunity-seeking activities and set limits to behaviors of organizational participants based on defined business risks (Simons, 1995). To put it simply, they impose strict guidelines on what can be done and not. Two types of boundaries are set up through identifying the risks related to business strategy of organization: *business conduct boundaries* and *strategic boundaries* (Simons, 1995). The former comprises various imposed codes of business conduct and is usually employed under the situation of high environment uncertainty and low internal trust (Simons, 1995). The latter emphasizes that opportunity-seeking behavior should be in line with strategic planning. *Boundary systems* play a negative force compared to *beliefs systems* and *risks to be avoided* emerges as the key design variable (Chiesa et al., 2009).

Diagnostic control systems:

Diagnostic control systems are the formal systems applied by managers to monitor organizational outcomes in comparison to preset standards of performance, and further correct deviations in the process (Simons, 1995). These feedback systems designed to ensure the success of achieving goals make up the backbone of traditional management control (Simons, 1995). *Diagnostic control systems* stand out from other systems with three distinctive features (Simons, 1995, p59): "the ability to measure the outputs of a process", "the existence of predetermined standards against which actual results can be compared", and "the ability to correct deviations from standards. Typical diagnostic control systems are shown in Table 1.

Table 1 Typical diagnostic control systems (Simons, 1995, pp. 61)

Typical diagnostic control systems	
Goals & objectives systems	Business plans
Profit plans & budgets	Expense center budgets
Project monitoring systems	Human resource plans
Brand revenue/market share monitoring systems	Standard cost accounting systems
Management-by-objectives systems	

The typical diagnostic control systems are illustrated in Table 1 and they are critical for organizations to fulfill intended strategies. The key design variable represented here is the *critical performance variables* which are the factors that must be implemented to ensure the success of intended business strategies (Chiesa et al., 2009; Simons, 1995). The *critical performance variables* are also known as *"key success factors" or "critical success factors".* This third lever represents a negative force due to two reasons: first, it focuses on mistakes and negative variances; second, the sign of the deviation is always lagging in the feedback signal for adjustment (Henri, 2006).

Interactive control systems

Interactive control systems are formal information systems used by managers to regularly and personally involve themselves in the decision-related activities of subordinates (Simons, 1995, p95). This is done by focusing organizational attention on strategic uncertainties, and forcing dialogue, debate and learning throughout the organization (Chiesa et al., 2009). By providing information input, it stimulates the flow of new ideas and initiatives, thus guiding the bottom–up innovation and the formation of emergent strategies (Bisbe & Otley, 2004; Henri, 2006).

Interactive control systems present the following characteristics: (i) the information generated by the system is an important and recurrent agenda for top managers; (ii) frequent and regular attention are required from all levels in the organization; (iii) data generated by the system are explained and discussed directly among different groups in organization; (iv) the system fosters continual challenge and debate regarding to data, assumptions and action plans. (Simons, 1995)

The interactive use of MCS represents a positive force due to the fact that it can expand and orient opportunity-seeking and learning throughout the organization (Henri, 2006). The interactive use of MCS not only fosters innovation but also enhances the impact of innovation upon performance. (Bisbe & Otley, 2004). Strategic uncertainties of top management attention and interest are the key in the design of interactive control systems (Chiesa et al., 2009).

Interrelation between belief and boundary systems

Beliefs systems and *boundary systems* are formal and information-based control systems with explicit statements of core value (Simons, 1995). They can be applied by top managers to inspire and direct opportunity searching and exploration (Biswas, 2021). With a series of routines and procedures, when being combined, these two systems define a strategic domain of activity for organizational participants, in terms of positive ideals and proscriptive limits

(Simons, 1995). Thus, the interaction between belief systems and boundary systems plays an important role for strategic change within an organization (Bisbe & Otley, 2004).

Interrelation between diagnostic and interactive control systems

"Managing the tension between creative innovation and predictable goal achievement is the essence of management control" (Simons, 1995, p91). As regards to the relation between the two types of controls, Henri (2006) and Biswas (2022) summarizes Simons' research as follows: Diagnostic and interactive uses of MCS, represent two intertwined and complementary applications in business practice. They operate simultaneously within organization but for divergent purposes. When integrated and interacting appropriately, they can influence the innovation activities and drive the formulation and implementation of new strategies in terms of positive ideals and proscriptive limits.

Firstly, diagnostic and interactive uses of MCS display counter-forces employed to balance the inherent organizational tension. Diagnostic use is like a single-loop process which acts as a prerequisite for the interactive use of double-loop process (Henri, 2006). While diagnostic systems as a mechanistic control support the achievement of predictable goals for intended strategies, interactive systems as an organic control stimulate search and learning for emergent strategies (Henri, 2006). They distinguish each other in terms of how to use feedback and measurement control systems: diagnostic control systems are used to monitor and reward the achievement of predefined goals through examining critical performance variables, while interactive control systems are used to expand opportunity-seeking and learning as participants throughout the organization respond to perceived opportunities and threats (Bisbe & Otley, 2004; Simons, 1995). More notably, in contrast to diagnostic controls, interactive controls emphasize strongly the frequent and regular involvement of senior managers (Bisbe & Otley, 2004). Furthermore, the diagnostic use delimits the role of performance measure only to a measurement instrument and thus constrains innovation and opportunity-seeking in organization, while an interactive use expands its role to a strategic management tool and thus foster innovation and emergency of new strategies (Henri, 2006).

Secondly, the joint use of MCS in both diagnostic and interactive ways generates dynamic tension which cultivates innovation and promotes the emergence of new strategies throughout organization. Dynamic tension incorporates not only contradiction but also interrelation, which implies not necessarily negative but instead possibly favorable to organizations (Henri, 2006). The dynamic tension created by joint use of MCS in two different manners reflects the

competition of positive feedback versus negative feedback, as well as complementarity of intended strategies and emergent strategies (Henri, 2006).

2.1.2 The balance within the LOC Framework

The central theme permeated through the whole LOC framework is the balance of four levers of control (Simons, 1995), which means these four levers have to work together in order to achieve the control of business strategy. As Kruis et al., (2016, p27) cited the result from previous studies (e.g., March, 1991; Raisch and Birkinshaw, 2008): "*The levers are said to generate positive and negative forces that jointly create a dynamic tension between innovation and strategic renewal on the one hand, and predictable goal achievement on the other, both of which need to be managed to secure the organization's long-term success.*"

Simons (1995) proposes three organizational dynamics that constitute the underlying principles of the LOC theory (Fig. 3): *the dynamics of creating value*; *the dynamics of strategy making and the dynamics of human behavior*. They cause organization tensions which should be balanced to fulfill the effective control of business strategy

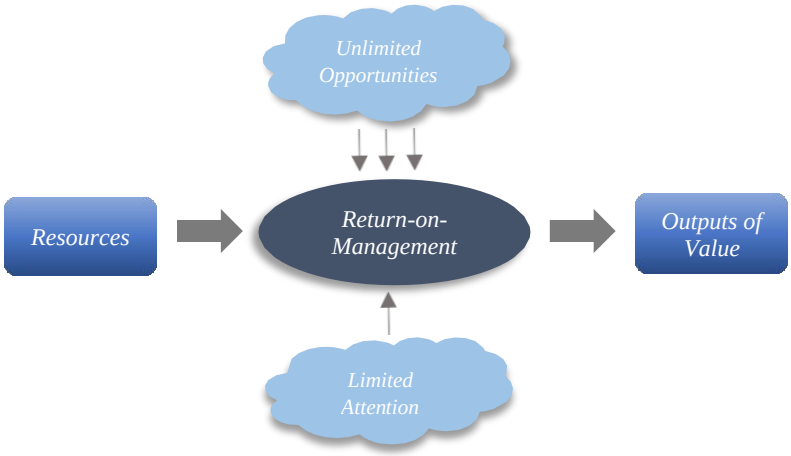

Figure 2 Balancing opportunity and attention (adapted from Simons, 1995, pp. 18)

As for the first dynamics of creating value (Fig. 2), Simons (1995) claims that only organizations with distinctive competence are able to survive. They can identify opportunities as well as organize existing resources to turn those opportunities into outputs of value. In the current technological innovation era, opportunities surge every day, from inside and outside organizations. However, without organizational attention which denotes the allocation of information processing capacity to certain issues, opportunities cannot be transformed into value. Given the unlimited opportunities and the limited organizational attention, how to keep

the balance between them and utilize organizational attention in an effective and efficient way is the pivot point for organizations success. To solve this problem, Simons (1995) puts the focus on the constraints of management attention and suggests the view of *"Maximizing return-on-management"*.

Regarding the second dynamics of strategy making, given the fact that MCS are tools to achieve business strategies, Simons (1995) begins with discussing two types of strategies: intended strategy and emergent strategy. Intended strategy is a top-to-down hierarchical strategy in which top managers formulate strategies while others implement strategies. It is more like a plan and MCS plays the role of monitoring progress. Unlike the former, emergent strategy can be regarded as a process in which strategies arise from all levels of organization and strategy-decision occurs throughout the whole organization. Intended strategy and emergent strategy are not the opposite side and work separately, instead both operate at the same time in organization. Balancing intended strategy and emergent strategy is the issue of balancing control and learning, which is the key to managing the tension between efficiency and innovation.

While discussing the third dynamics of human behavior, the problem of self-interested behavior cannot be ignored. Without management control, this central tendency of individual action will inevitably prevail and sacrifice the organization's objectives. For the question of how to eliminate the negative impact of central tendency and motivate human potential to dedicate, it corresponds to how to reconcile self-interest with the desire to contribute. Simons (1995) argues that strong managers can use control systems to create situations in favor of enforcing positive human traits and get over organizational blocks such as rigid regulations.

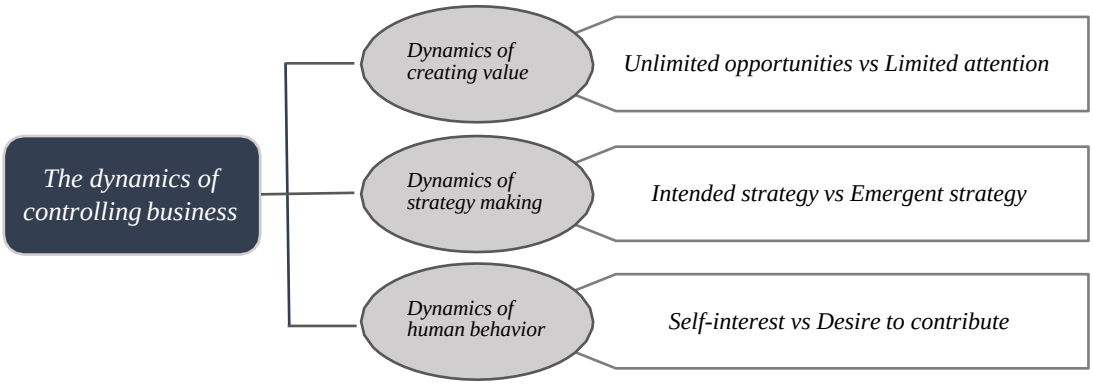

Figure 3 The dynamics of controlling business (Simons, 1995)

The concept of tension forms the basis of the LOC framework. According to Simons (1995), the essence of business strategy control is to manage the inherent organizational tension between creative innovation and goal achievement for potential profitable growth. More specifically, it is reflected in the contradiction of three groups (Fig. 3): *unlimited opportunity and limited attention*; *intended and emergent strategy*; *self-interest and the desire to contribute*. They are in correspondence to those three dynamics mentioned before and should be reconciled and balanced (see Fig). Simons (1995) points out that effective control of strategy requires not only the freedom for innovation but also the guarantee approaches to achieve preset goals productively. And in the process of overcoming organizational obstacles as well as activating human's potential to contribute to the attainment of organizational goals, MCS undoubtedly plays an important role (Table. 2) (Simons, 1995).

Table 2 MCS' role in balancing the inherent tension (Simons, 1995)

MCS's role in balancing the inherent tensions
To specify and enforce regulations for reducing the risk of temptation or pressure
To build and support strategic goals extension for individuals to create & search opportunities
To inspire and motivate human's involvement in opportunities for innovation stimulation
To encourage debate & dialogue for organization learning & breaking the status quo

2.2 Project selection

Project (or project portfolio, can be used interchangeably here) selection is one of the most important decision-making tasks conducted in organizations (Tian et al., 2005). In the current business environment featured with extensive competition, the selection of innovative projects occurs more and more frequently in organizations and is regarded as a challenging task with a complicated and knowledge intensive decision-making process (Tian et al., 2002).

2.2.1 The challenges in project selection

With various project options and limited resources, it's not easy for companies to select the promising projects with maximum positive outcomes and in line with the strategic targets as well. Project selection, especially for innovation, is a complicated and challenging task due to the uncertainty of candidate projects and the complexity of selection process (Tian et al.,

2005). The main challenges that organizations face during project selection process can be summarized as follows:

Multicriteria

Effective project portfolio management is among those critical elements determining the business success regardless of being profit-oriented or not (Nowak, 2013). It is a common recognition that maximizing the potential of achieving organization's strategic objectives is the top priority in the establishment of project portfolio. This conclusion leads directly to the decision-making problem of multiple objectives, namely multicriteria problem (Nowak, 2013). Various criteria associated with financial, technical, social and environmental issues are taken into consideration. Some of them are quantitative while others qualitative, some appear tangible while others intangible, causing the difficulty of being judged by unified standards (Manyombé & Azondékon, 2021; Nowak, 2013).

Uncertainty and risk

In the process of selection, in particular when involving innovation, the candidate projects reveal an uncertain nature. It is difficult to predict their future success probability and influencing factors (Tian et al., 2005). Meanwhile, project selection is a dynamic multi-phase decision-making process involving multiple decision-makers, so uncertainties can occur anywhere and anytime (Tian et al., 2005). All these uncertainty factors cause difficulty in making the selection decisions that contribute to the successful accomplishment of business strategies. (Manyombé & Azondékon, 2021)

Independency of projects

Instead of being separate, many projects show the interdependent characteristic. The comparison of projects thus cannot be conducted only in a separate way, but in a conjunctive way. That means you may have to evaluate a set of projects simultaneously rather than compare only a single project with others (Manyombé & Azondékon, 2021). From this perspective, it brings more trouble in searching for the optimal projects matching the strategic objectives of the organization (Manyombé & Azondékon, 2021).

Resource constraint

The constraint due to resource limitations such as finance, work force & equipment etc., is another challenge (Ghasemzadeh & Archer, 1998). The effect of this resource limitation is

sometimes ignored in the process of project selection, causing the result that some projects are selected but not completed as expected (Ghasemzadeh & Archer, 1998). Meanwhile, the waste of resources in organizations due to either inappropriate selection of projects or their improper establishment is large (Nowak, 2013). Both together weaken the growth possibility of the organization and undermine its competitive capability (Nowak, 2013).

Information problem

The availability, consistency, or reliability of data remains prominent particularly in the context of innovation, and without the complete and precise information collection, transfer and sharing, it becomes difficult to manage selection from numerous project options (Turkmen & Topcu, 2021). More specifically, the following challenges (although not an exhaustive list) faced by organizations have to be taken into account during the process of project selection (Table 3):

Table 3 Main factors to be considered in project selection (Ghasemzadeh & Archer, 1998)

Main factors to be considered in project selection
How to treat multiple and often-conflicting objectives
How to measure the qualitative objective
How to address a large amount of uncertainty and risk
How to make the tradeoff among those important factors
How to solve the projects interdependent of each other
How to allocate the limited resources
How to properly sort the enormous number of feasible projects
Others

2.2.2 Multiple criteria for project selection

Explicitly specified goals and objectives are critical for a successful project selection. Under the circumstance of multiple projects or project portfolio, there are a batch of objectives, thus a set of criteria instead of single one is required to ensure the selection decisions benefit the achievement of organizational strategies (Cheng & Li, 2005; Nowak, 2013). Multi-criteria analyses are imperative particularly for the project selection characterized by numerous project variables and complicated interdependencies in process (Cheng & Li, 2005). According to

Manyombé & Azondékon (2021), when put in the context of multiple projects, to gain a complete and correct assessment on the overall performance of project, a series of criteria should be treated as constraints and taken into consideration during the evaluation and decision-making process.

Strategic relevance

The criterion of strategic relevance is at the top to be formulated. Senior managers predefine the short-, medium- and long-term goals and objectives of the organization which serves as a referential basis. And then, under a multi-project circumstance, the project should be selected in line with those organizational strategies in terms of the brand image building, the market share growth, etc. This criterion can adopt different forms and may vary from one organization to another depending on such factors as organizational type, decision-makers' attitude and capability, and so on.

Financial profitability

The criterion of financial profitability is of the most importance for profit-targeted organizations. Net Present Value (NPV), marginal Internal Rate of Return (IRR), expected conditional gain, and net economic profit are the common instruments applied for project assessment. These indices present a precise picture of the opportunity profile from a financial perspective and can guide decision-makers to reach rational choices from project candidates.

Degree of uncertainty

The criterion of uncertainty and the associated risks reveals the fact that decision-makers still must face both operational and financial risks during the project selection process, despite the financial profitability already setting the constraint to it. In this instance, decision-makers are required to define beforehand the maximum risk level that the organization is supposed to endure in practice.

The nature of interdependence

The criterion of interdependence between projects is a decisive factor when a selection decision is made in a multi-project environment. How to determine relationships between different projects and how to dispose of scarce resources among them are the two questions to deal with. Therefore, the compatibility or incompatibility of different projects should also be considered in the light of the organizational strategy. (Manyombé & Azondékon, 2021)

2.2.3 Interactive decision-making in project selection

The knowledge about the decision-maker's preferences is the key to deal with a multicriteria decision-making problem (Nowak, 2013). Obtaining this knowledge through an interactive approach has been approved to be the most efficient and user-friendly route for decision-makers (Nowak, 2013). It is generally acknowledged that the more heavily the decision maker is involved in the decision-making process, the better he is able to comprehend the selection problems and his preferences (Henig & Katz, 1996).

Moreover, the problems raised from project selection illustrate dynamic rather than static features in practice, which is often neglected in the existing systems and models of decision-support (Nowak, 2013). Being fully involved in dialogue with project selection systems and anchoring their preferences in a stepwise manner, decision-makers can then be able to adapt to the changing environment and seek the best alternatives based on their own preferences (Henig & Katz, 1996; Nowak, 2013).

The interaction of decision makers with the system should carry on in all stages of the selection process, providing information to support the decision-making (Ghasemzadeh & Archer, 1998). The importance of this interaction lies in three reasons: (i) it is difficult to have the explicit knowledge about all decision makers' preferences in advance; (ii) involvement of decision makers in selection process stimulates the success of the selected projects; (iii) interactive decision making is regarded as the most efficient way to approach the exact decision makers' preferences (Ghasemzadeh & Archer, 1998).

This interactive approach is an iterative process to be close to the ideal solution that is described as the combination of the best achievable result for each independent criterion (Nowak, 2013). Through the repeated dialogue and continuous interactive procedure, the distance between proposal solution and the ideal solution is estimated, and the final solution meeting the decision maker's requirements is achieved (Nowak, 2013).

3. Method

In this chapter, the research methods used to conduct the study will be presented. Research design and data collection related approaches will be described, and the discussion associated with quality assessment will follow.

3.1 Qualitative research

Qualitative research according to Bryman & Bell (2015) views theory as a result generated from observation and research. It holds an epistemological position described as interpretivist meaning that the focus should be placed on understanding of the social world through an examination of the interpretation of that world by its participants, and an ontological position described as constructionist which implies that social properties are outcomes of the interactions between individuals, rather than phenomena 'out there' and separate from those involved in its construction.

Qualitative research method will be used to conduct this paper since the research topic of MSC is focused on the practical applications and results of practices and theory creating a need for the interpretivist understanding of epistemology as these practices and theories are exclusively used in a contextualized environment (i.e., firms and organizations). Since the aim of management control systems are not solely designed for measuring and rewarding performance but also facilitating a discussion, the social properties of individual interactions building towards the "current phenomena " are also not escapable.

In addition, our interest in and focus on how the discussion around innovation is impacted by MCS creates a necessity of first choosing and understanding a current discussion within project selection in a specific context which can only be done through thorough observations and examination of a real-world phenomenon.

3.2 Research Design

The case study method has remained a preferred approach in research design that involves "an intensive, detailed examination of a case" and interaction with the setting (Bryman & Bell, 2015). Yin (2009) defines the case study method as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context and addresses a situation in which the boundaries between phenomenon and context are not clearly evident". Two sets of alternatives are presented by Yin (2009) to determine the fit of a case study method to the research topic. These are the extent of control over behavioral events and the degree of focus on contemporary as opposed to historical events. Since we will be evaluating contemporary phenomena of how MCS affects the discussion of project selection within an existing context and have little to no control over behavioral events, the case study method is deemed the most suitable by Yin (2003).

3.3 Case study design

The five important components to create a well-rounded Case study design according to Yin (2009) are:

- A study's questions;
- Its propositions, if any;
- Its unit(s) of analysis;
- The logic linking the data to the propositions;
- The criteria for interpreting the findings.

Our study question is defined in the introduction section.

Yin (2009) suggests stating clear propositions as they direct attention of the study into specific areas of focus. Propositions bring with them important theoretical implications that need to be defended through gathering and understanding of relevant evidence. However, in specific cases where the aim of the study is more "explorative" there are legitimate reasons to avoid stating propositions. As this study falls into the "explorative" category focus will instead be shifted to explaining its purpose. That purpose being to understand how MCS affect an organization's discussions and mindset when it comes to different aspects of the project selection process, such as how innovation or financial metrics are considered.

The definition and limits of the "Case" is a problem many researchers face when starting to investigate their area of interest using the case study method (e.g., Ragin & Becker, 1992). The unit of analysis is partially built upon the research question and propositions, helping to further clarify the subject of research interest and the scope to be studied (Yin, 2009). This paper's units of analysis will be focused on middle to higher management within our target company that holds decision making power over the project selection process, that is to say mostly individuals responsible for setting the criteria for the project selection process. The reason for this choice being that this paper is primarily interested in understanding the link between MCS and its effect on what discussions are being had and what are prioritized within a project selection perspective. Thus, the subjects of interest will be the individuals in the center of these discussions and holding the primary power of making the final call on what measures are to be prioritized for the project selection process.

Since this study will have an "explorative" focus, the propositions are not clearly listed, creating a need to focus on new aspects and intricacies identified through the case which

contributes to the original purpose of this study. In this situation Yin (2009) recommends a descriptive approach to the case study as it "may help to identify the appropriate causal links to be analyzed".

Yin (2009) proposes five analytical techniques when interpreting the findings of a case study: (i) pattern matching; (ii) explanation building; (iii) time-series analysis; (iv) logic models; (v) cross case synthesis. Pattern matching and explanation building will be used as the main analytical techniques for this case as it describes a contemporary phenomenon in a specific point of time.

Pattern matching is the technique that compares an empirically based pattern with a predicted one (Trochim, 1989). When used in this explorative study, pattern matching is used to compare the predicted pattern of specific variables that is defined prior to data collection (Yin, 2003).

Explanation building tackles the problem that "a causal link might be complex and difficult to measure in any precise manner" (Yin, 2003). Since MCS in itself is a complex topic whose effect depends a lot on the context it is used in and minute details. The link between MCS and discussions around project selection therefore creates an even more innately complex and hard to measure situation. Explanation building bridges this gap by being an iterative process of building a proposition/purpose, trying to understand and compare the findings to that proposition/purpose, revising the propositions/purpose and repeat. It is important however, for explanation building to possess explanations that reflect some theoretically significant propositions since it is often the explanations are often constructed in narrative form which can be not so precise.

3.4 Data Collection

3.4.1 Interview subject selection

The subjects selected for the interview represent a broad sample of 14 participants spread across the management of the target company. The selection was intended to represent the overarching dialogue on project selection in different departments, to better allow for clarity on how product development and management control interacted in the company. Seeing as a single case study already limits the generality of the paper, it was thought to be of essence that the subjects guaranteed a more complete company overview, to avoid the risk of biased conclusions based on the experience of a single manager or project group. Similarly, the

vertical scope of the subjects meant that higher and lower organizational levels were allowed to challenge and corroborate each other, again providing higher reliability. Lastly, managers were the main focus of the study (with one exception), as they hold the crucial power over resources and project selection that forms a key part in understanding the effects of MSCs on innovation, as opposed to abstract psychological factors such as creativity which may be more suitable to research in another study.

3.4.2 Interview Method

Semi-structured interview was chosen to conduct our primary data collection method. Semi-structured interviews entail having a list of chosen interview questions covering topics of interest. Although, these do not need to be strictly followed as interviewees can bring up points that are worth following up (Bryman & Bell, 2015). The focus for the interviewer is placed on the interviewee's specific frames and understanding of the situation. Thus, the approach this paper takes is flexible in leaving leeway for the interviewee to go on a tangent and describing the events in great detail (Bryman & Bell, 2015). This method was chosen with the combination of our research question in mind as the topic of management control systems and their impact on the project selection process is an area prone to individual framing, description and interpretation. We are precisely interested in these individual interpretations and understandings to try and widen the understanding of management control systems in this context.

3.4.3 Secondary Data

Using multiple data sources can improve the quality of the data through "triangulation" (Dubois and Gadde, 2002). Internal documents and sources regarding the company structure, company strategy, and annual report of the parent company were used in combination with other documents and the qualitative interviews to form a comprehensive understanding of the company and context in question.

3.5 Validity and reliability

The quality of social science research has been commonly judged through 4 tests. Which include construct validity, internal validity, external validity and reliability (L. Kidder & Judd, 1986, pp. 26-29). As the case study method counts as a tool of social science research, these 4 tests will be conducted to judge the quality of this research.

3.5.1 Validity

Especially challenging for case studies is achieving construct validity since a common criticism is case study research fails to "develop a sufficiently operational set of measures and "subjective" judgments are used to collect the data (Yin, 2003)". Specifying the context studied using specific concepts and identifying measures that can be matched with these concepts are needed for construct validity (Yin, 2003). This paper pursues this by using multiple sources of evidence as recommended by Yin (2003).

Internal validity is mainly a concern for explanatory studies and is not relevant for exploratory studies such as this one according to Yin (2003). "External validity deals with the problem of knowing whether a study's findings are generalizable beyond the immediate case study" (Yin, 2003). This paper uses analytical generalization which focuses on generalizing a particular set of results to broader theory instead of statistical generalization as recommended for a single case study (Yin, 2003).

3.5.2 Reliability

The objective of reliability is to make sure that if a replication of the study is conducted it would arrive at the same findings and conclusions. This is to make sure error and bias is minimized. This should be approached by making as many steps of the research operational as possible to aid others when trying to replicate your research paper (Yin, 2003).

4. Empirical Study

This chapter will cover a brief introduction of a case company to give an overall background understanding. The challenges the company faced and the present situation of project selection will be conveyed from the interpretation of interviews conducted during the study.

4.1 Company overview and background

As a pseudonym, the target organization of this study will be called Measurement Co. Measurement Co is a subsidiary of a larger company but will be treated as its own company as it possesses all the necessary characteristics and are not dependent on their parent company for any commercial or development activity. This study focuses on the sections of R&D and product management as they are most relevant for the research question.

4.1.1 Company present and history

Measurement Co is the market leader with cutting-edge technology in the field of providing measurement instruments and solutions. It targets business-to-business customers and the product range ranges from targeted, sensitive equipment requiring precise design and production process to instruments with more general use cases that can be mass produced. The company'sproducts have traditionally been hardware focused although recently they have started developing software to complement their hardware products. The company has offices in different locations internationally with their head office residing in Stockholm. Measurement Co is currently attempting to better utilize its international network, furthering coordination and cooperation between units.

Throughout its history Measurement Co has a successful track record of both developing products in house and successfully integrating developed products through acquisitions. They have been able to constantly discover new markets and hold dominant position within existing markets through introducing new and improved products and technology. This has solidified its market leading position even through multiple financial crises and big technological shifts.

4.1.2 Market positioning

Measurement Co prides themselves in maintaining a higher than market average profit margin as they focus on providing premium products with state-of-the-art technology and designs. The company, while large, focuses on quality and customer value to profit from selling their products at a premium price. This model emphasizes the need for continuous product development and recognizing and taking advantage of new technological opportunities. In line with this, Measurement Co actively seeks cooperation with smaller firms and start-ups to stay sensitive to current trends and further its own R&D capabilities.

The main products of Measurement Co are its hardware, measuring instruments in a variety of types and prices, with accompanying software and aftersales solutions. Although balances between singular products and whole-system solutions, hardware and software vary from time to time, the sales of premium measurement instruments and continuous evolution of existing products constantly remains dominant in the company. Over the last decade, steps have been taken to increase the capacity of software development, strengthening the symbiotic relationship with hardware development, and contributing to a “platform” business model where different products are connected in an integrated network.

4.1.3 Company structure

Measurement Co is a hierarchical organization, forming part of a larger corporate entity as well as an industrial group. Within the organization, there are clear levels in terms of management, going from the general manager at the top to team leaders and project managers. The levels are connected by the highest-ranking manager in one section being present as a member in the management team one step above. The studied part of the company revolves around two divisions, R&D and Product management / Innovation / Technology, who both have an internal structure with smaller teams, project groups and specialized units. It is worth mentioning that there is a split between hardware and software solutions within these divisions. Measurement Co strives for cross functionality between divisions, with the final product normally being the result of cooperation between different departments.

4.2 The current situation of project selection

4.2.1 The challenges during project selection

As any company, Measurement Co faces some key challenges in the project selection. The most commonly reported was a lack of resources, expressed by a high-ranking manager as "The resources are super-booked, so some projects have to be canceled and (we) focus on current business". Still, employees in general expressed an understanding of this, as resource constraints are an issue in all organizations. More problematic, innovative projects are disproportionately affected by this, as shown in the illustrated quote referring to a lack of resources leading to a focus on "current business", for example non-innovative projects. In part, this is due to the expectation that innovative projects, through the innovation-coordination unit, should "borrow" resources from other divisions. Then, if these resources are booked, there may be none to borrow, and innovative projects are put on the sideline.

Apart from resource constraints, a challenge according to organizational participants is the lack of data-driven KPIs, expressed by one as: "More data-driven or better KPIs would allow for better ways to evaluate and more correct decisions". While sales and profit function to showcase overall performance, they are general and difficult to efficiently apply to all projects. Furthermore, sales and profit are lagging indicators, meaning their predictive value is limited, a problem for making future predictions. As a further limitation of sales and profit, managers experience that the system favors short-term performance, "If management requires short-term revenue, we pick the fastest cash generating projects", which may sacrifice long-term potential

for short-term growth. Currently, the need to interpret and discuss strategic value and innovation to balance short-term financial considerations costs a lot of energy, time and leaves the door open for biased decisions, “Without data-driven KPIs some are heard more than others”. While some discussion is necessary to allow for adaptive and autonomous reasoning, the overreliance on interpretative work is seen to be challenging and allow for error.

4.2.2 The current selection criteria and applications

Measurement Co is a company with a product portfolio covering a wide scope, which results in the difficulty of multi-project or project portfolio when evaluating and selecting projects to be carried on. In this case, multiple criteria are required to meet this challenge during the selection process to ensure the decision benefits the organization and contributes to the achievement of organizational strategies. No matter what kind of criterion it is, qualitative or quantitative, gaining a complete and correct assessment is the most important. Thus, a set of criteria have to be taken into consideration:

Strategic relevance

At Measurement Co, strategy and strategic objectives act as guiding principles for evaluating projects, and the company has spent considerable effort raising awareness among employees.

“When choosing between two projects, we look at our strategy”. The quote shows strategy’s importance in selecting between projects. Still, even as the term “strategy” was often used in interviews, its meaning in practice requires further exploration. When strategy is mentioned, it usually refers to a specific strategic objective or the division's application of it.

Overall strategy is relevant, “The strategy is what provides the overall direction”. But it needs to be applied to be practical. This entails a discussion, since the strategic value is often difficult to determine and a broad vision needs to be converted into clear boundaries and instructions, visible in “... together with VP determine what directions and areas and determine what you should focus on, aligning with strategy and decide what should be prioritized and not”.

Essentially, the above shows how strategy is partly external yet requires interpretation into practical guidance. This process is vital, as “It is naive to simply do a business case, make an estimate for number of units, return on investment, but management can provide strategic goals, here we want to and believe we (should) do this”.

In context, the above refers to making a holistic analysis of project selection, incorporating strategic considerations. Combined with the preceding quote, it means strategy is a process as much as a guideline, evolving and taking form through interaction and context. In turn, this requires translating strategy into different criteria, the two most general being outlined below.

a. Innovation and growth

"The most important KPI is Growth" – VP.

The above illustrates that highest management prioritizes growth the most. To achieve this growth, new offerings need to be brought to the market. "The ratio of sales from new products" is a measure for this. It sets a goal of revenue from new products, in turn lowering reliance on older products. "The ratio between incremental and innovative projects" is also used to optimize the product portfolio. The degree of innovation or the difference of being incremental and radical is judged by the classification of "Time horizons."

Notably, different views on the relationship between innovation and growth emerged in interviews, mainly regarding short-term versus long-term optimization. On the one hand, "The KPIs should curb the RD department" expresses the view that innovation must not be over-done and more short-term oriented, as a result of growth and number of releases being short-term measures. On the other hand, "Innovation is the same as long-term prospering" advances the view that innovation should be long-term and requires substantial encouragement. This difference means the opinion of the degree of innovation differs in the firm. Regardless, there remains an issue in estimating the value of innovative projects, as innovative projects often lack reliable forecasts for economic performance. The predominant view is that innovation should be considered strategically and not financially, meaning there is limited opportunity for simple "choosing the better number".

"There are few good KPIs for innovation" illustrates this difficulty and represents the common sentiment. For innovation, the immediate financial return may be absent, "innovation is an exploratory operation" and instead projects may serve to create a prototype, identify a market opportunity or create capabilities for future development. In line with this, strategic considerations are vital to evaluate innovative projects, or as a manager said: "Instead of spending limited time accounting for small numbers you can discuss strategy and concrete stuff, such as the X market, which is better for innovation. The numbers are, regardless, so uncertain that it wastes time".

b. Building an ecosystem through digitalization

The company wants to further integrate their existing hardware business with software systems to develop an ecosystem that improves customer experience and simplifies the use of their hardware products. This is seen to be vital to long-term competitiveness, even if current cash–flows are limited. Thus, instead of financial measures, related projects require strategic interaction and analysis to make sense of the value of different ideas.

Or as one manager said: "In software, it revolves around whether or not it contributes to direct or indirect sales, that is so we sell more instruments or does it contribute to our ecosystem or similar". The quote illustrates the difficulty in creating accurate financial forecasts and identifying the role of software projects, where some may provide more indirect benefits to the company.

Here, an exploratory discussion on strategic value becomes critical. "Sellers focus on large orders, and software has lower prices, but it is important for long-term (performance)". The above sentiment affirms this, and how strategic considerations are integral to evaluation of software. Similarly, responding to the question of the balance between financial and strategic goals: "...so sometimes the software is free for instrument buyers, (we) make software for growth and competitive advantage". Again, this reiterates the larger concern for software-development, both as a complement to hardware and as the basis for future market advantage.

Financial profitability

For financial considerations, the most important are forecasted revenue and profit, "the expected gain in revenue", as said by interviewee. In practice, the financial evaluation may be more complex, e.g. incorporating cannibalization of existing projects, but revenue is key as it relates to growth. However, the weight of forecasts varies with the perceived accuracy. A key component of this is how novel a project is to the firm. Estimates (of sales, revenue and similar) are created based on past experience and customer data, meaning data is most available for well-known product types and markets. For products where data is absent, or hard to interpret, the result instead becomes estimates with limited usefulness.

The more well-known, traditional and iterative the project, the higher is the perceived reliability of financial estimates. In practice, this equates to estimates being the most accurate for hardware development, even more so for updated versions of existing products. For these, the financial estimates form a relatively sound base on which to make decisions. While not

constituting all that is considered, financial metrics are dominant in selecting what projects to undertake. Still, this is not universal, as more novel projects have less reliable forecasts due to the lack of experience and difficulty in securing customer input. In those cases, non-financial considerations become more important, such as the strategic importance or long-term benefits that are hard to calculate with precision.

Apart from novel projects, software projects are seen as suffering from inaccurate to impossible estimates. In software, the "product" is often not sold to customers directly, and instead it may be bundled with hardware or exists as a complementary service, both of which makes it entangled with other products and difficult to evaluate on sales. Then, in practice, the company cannot be too reliant on financial estimates for software development, less it runs the risk of making inaccurate decisions based on similarly inaccurate forecasts. Thus, compared to hardware, non-financial or non-quantifiable considerations are of higher importance in software, as the lack of reliable data forces other considerations to the forefront. Regarding these type of projects, novel and strategy, "You can make a hypothetical business case, but often you land in it being good strategically". Which summarizes that financial considerations may be seen as inaccurate.

Degree of uncertainty

In choosing between different projects, Measurement Co strives to achieve a healthy risk-reward balance. In practice, this means the company has to strike a balance between projects with uncertain outcomes and projects with predictable results, "We have to be able to take risks but not bet all resources on unsafe cards" as expressed by a product manager.

On a portfolio level, this is achieved by setting a goal that a certain larger percent of projects should be "safe", such as predictable and short-term, and a certain smaller percent should be innovative, such as riskier and less certain. The larger share of "safe" projects is in line with the sentiment "You need a mix of long-term and short-term focus, but (we) prioritize money now" expressed by a VP. The "safer" projects usually consist of updates, new versions of existing products, hardware with the most reliable forecasts in general or similar, with established financial return. In contrast, risky projects, often the same as innovative, may serve to build future capabilities or explore new business areas, and do not usually provide short-term or predictable financial return. For the overall risk level of the project portfolio, this ratio of safe-to-risky projects is crucial.

To facilitate planning and allow for some overarching classifications, Measurement Co divides projects into 4 horizons, going from 0 (routine maintenance and bug fixes, well-known, immediate), to 1 (projects building on existing products and capabilities, well-known, short-term), to 2 (projects new to Measurement Co but present elsewhere, new innovation, medium-long-term), to 3 (projects new to Measurement Co and the world, disruptive innovation, long-term). As the company sees a balance between horizons as necessary, "Horizon is a measure for evaluating projects" (high-level manager) and appears when comparing different options. This relates to the goal of a certain percent of projects being safer and a certain percent being more innovative, since the horizons are a principal way of categorizing projects into the two categories.

The Nature of interdependencies between projects

The goal for the ratio of sales attributable to new products, "Measurement of how good we are at earning fresh money", also contributes to the interdependence of projects, as it requires managers to continuously launch new products When the goal is in jeopardy, it incentives prioritization of short-term projects with immediate cash flows.

As a third interdependency criteria, the modularity of products has become important over the last few years. This entails splitting up larger projects, with long timeframes and broad goals, to smaller, shorter projects. In turn, this requires coordination between projects to allow for future combination and usefulness, described as key concern for project design. The process builds on discussion and subjective valuation and is context sensitive with the value of a project, with regards to modularity, being difficult to predict.

Interactive decision-making in project selection

Besides above four selection criteria, as an overarching component, the project selection at Measurement Co builds on discussion and interactivity between participants. This includes a process of weighting different factors, such as strategic value, financial considerations and risk, since the relationship may not be apparent or static. As one interviewee said, "Concrete KPIs are missing, so we have to discuss evaluatory", showcasing the need to substantiate reasoning through discussion to avoid personal bias. Still, how important discussion and interactivity is varies with the type of project in the company. Financial considerations, in terms of forecasts, are of greatest importance in traditional hardware projects, where they are seen as the most reliable and thus suitable as a basis for decision-making. Here, the interactive nature is limited,

even if it is present in the form of strategic considerations which are always related to product development in some way. In other types of projects, such as software and innovation, the financial forecasts may be of limited value, instead prompting a higher importance for strategic considerations and overall risk-management. In this way, the project selection process always includes a discussion, if just on how to choose the measure to evaluate on.

5. Analysis

In this chapter, the challenges and current situation of project selection at the target company will be analyzed based on the theoretical framework. How the combination of four levers of control is enacted in the decision making of project selection at the firm level will be presented. Finally, the dynamic tensions in the project selection raised by the four levers will be explored.

The target company is a leading player in the field of technology-measurement industry. Featured with technology advantage and product novelty, the successful project selection plays a pivot role for the company to achieve its long-term strategies.

5.1 LOC in the challenges during project selection

Having a product portfolio ranging from hardware to software, mature product to updated versions or complete innovative product, project selection is always a complex and challenging task for the target company. The challenges faced by the company can be interpreted from the perspective of four levers of control and their interrelation.

As summarized in the empirical section, the main challenges during the process of project selection are the limited resources available for the potential projects and the lack of accurate performance measures for project assessment.

Resource constraint

Regarding the first challenge, when facing unlimited opportunities brought by innovation, the resource constraints guide the company to organize the existing resources on the projects that benefit the company most. With this interplay and counterplay between beliefs and boundary control, organizational attention is allocated to realize the so-called “maximizing return-on-management”. Notably, when the resources scarcity is at the high level, the most resources are transferred into the “safe” projects, leaving smaller room for opportunities to be turned into the outputs of value, as sometimes seen in the company. In this case, organizational attention

cannot be assigned in line with business strategy, and the innovative projects can be heavily affected and suppressed to a certain extent.

Lack of accurate performance measures

Regarding the second challenge, only simplified key performance indicators (KPIs) are used at the company, which can be regarded as the application of performance measures in a diagnostic manner to relate itself to the intended strategy. Critical success factors such as sales and profit that are relevant to beliefs and strategic boundaries are communicated throughout the process of project assessment. However, without sufficient and precise data, this measurement appears unreliable when predicting innovative projects, partly because it only gives an overall evaluation, partly because it lags behind the real performance achievement. The situation leads to the involvement of more and more interactive control in the performance measurement of potential projects. A lot of discussion and debate are conducted in the company to determine the value of candidate projects, which is both time and energy consuming. In addition, the shortcomings of the existing KPIs, such as short-sightedness and inability to handle excessive risk often cause the company to pursue the short-term results even at the expense of sacrificing the long-term benefits.

5.2 LOC in the multiple criteria for project selection

Under the circumstance of multiple projects and project portfolio, multiple criteria are required for decision making at the target company due to numerous project variables and their complicated interdependencies during the process of project selection. The criteria that need to be addressed by the company can also be explained from the perspective of four levers of control and their interrelation.

Strategic relevance

Four levers of control work together to contribute to the achievement of business strategy in an organization. Thus, this criterion is closely associated with all the four levers. According to Simons (1995), the essence of business strategy control is to manage the inherent organizational tension between creative innovation and goal achievement for profitable growth, articulating precisely the actual state of the target company, namely fostering the development of competitive products and accelerating the growth of economic outcomes. In line with the

variety of functions laid forward by Simons, several functionalities of strategic relevance can be identified.

While not overly present in the findings, the company's self-described identity as a premium, innovative company functions as the main belief system. This takes form in managers praising the beneficial nature of innovation, and although it is hard to separate the common, positive attitude towards innovation from the innovation requirement of top management, it does seem to be present in creating a will to seek out novel, long-term oriented projects, as evidenced by managers mentioning the necessity of innovation. Based on this, it functions as inspiratory support and a belief system. Through the designation of what business areas, in terms of industry, the company should partake in, strategy also functions as a boundary system, although this was not overly relevant to the study. This absence of mention of the importance of comparing ideas to designated business areas indicates participants are well-aware of this and that it is a non-issue.

More importantly, strategy both forms an important criteria for project selection and constitutes a challenge to interpret and apply. As stated by managers, financial estimates are often insufficient for decision-making, especially for software and innovative projects, meaning the selection process must incorporate strategic value. However, as shown, this process involves discussion and interpretation. Even when a strategic goal is relatively clear, the process to determine strategic value involves substantial ambiguity and room for contextual interpretation. This need to dynamically determine strategic value necessitates high managerial attention and sensemaking skills. As such, the system generates information important for managers, it requires continuous and high attention from managers and the generated data is discussed explanatory by different actors, fulfilling three of the four criteria set out in the literature review for an interactive control system. For the last criteria, it seems strategic considerations do challenge assumptions, as evidenced by the recurring mention of "discussion" and the understanding of innovation, an area with a high-degree of strategic discussion, as an "exploratory" exercise. Based on this strategic evaluation forms a principal interactive MSC in project selection.

Financial considerations

Financial considerations, such as the forecasted revenue and profit of proposals, appear as the key diagnostic MCS in project selection. Financial profitability is of essence to the target company in determining projects and the distribution of resources among selected projects. Its

importance in the selection process does depend on its reliability and verifiability, with innovative projects allowing less financial decision-making, whereas financial profitability is more dominant for well-known projects. However, this is a question of determining the reliability of the estimates rather than problematizing the underlying numbers. When present, financial estimates are valued as they allow for a comparison of a quantified number, with the highest number equating the best choice. Thus, this is in line with the diagnostic system's characteristic of predictable input-output relationship and management action and management-by-exception, sure evidence of diagnostic control.

Uncertainty management

Boundary and diagnostic control plays the important role in solving the uncertainty problem inthe project selection. Uncertainty management includes several key boundary systems for activities within target industry. The first is risk-consideration, i.e. managing uncertainties. The criterion of uncertainty is a risk-consideration that defines and communicates specific risks to be avoided. Since portfolio-requirements prescribe a certain percent of "safe" and a certain percent of innovative projects, this is a boundary system as it clearly limits managerial choices. The requirement delimits an acceptable risk-level, with the core being to focus mostresources on "safer" projects. However, simultaneously, the system also functions as a boundary for innovation-work within the firm. This is as the system requires a substantial shareof projects to be innovative, again limiting managerial action although this time with the intent of encouraging innovation and avoiding a "too low" risk level. Thus, together, the portfolio requirement functions as a boundary system for risk as well as for innovative activities.

In adhering to the risk-limitations (boundary system), the risk estimation for projects may also constitute a diagnostic control system. Due to portfolio requirements, the risk-level is limited, meaning project selection is interdependent for fulfilling portfolio criteria as a whole. Going by the time horizons, a key classifier, projects may be rejected or accepted depending on their risk level, which, when the portfolio-requirements are known, will constitute a diagnostic interaction with automated response to the classification (i.e. the risk-level is too high, thus a horizon 3 project is rejected due to being too risky in a diagnostic fashion).

The nature of interdependencies

Both boundary and interactive control are involved when dealing with the interdependency among projects or project portfolio. As an additional boundary system, the ratio of sales from

new products serve to delimit organization action to continuously undertake new projects. In practice, this means managers can not solely focus on current operations and must allocate resources and attention to product development.

The requirement of modularity requires a broad perspective and relating projects to related undertakings. This process is not straightforward, as it requires attention, discussion and is built on complex interplay of projects, meaning the system is closer to an interactive control system than to a diagnostic. This is also visible in the subsequent dynamic evaluation of projects.

Interactive decision-making

Besides the above criteria, interactive decision-making is also important in the process of project selection. At the target company, project selection building in an interactive manner is very common, and its frequency varies with the type of project. The high emphasis of interactive decision-making is placed upon those in which reliable forecasts for economic performance are difficult to acquire, innovative and software projects being two typical examples. When selection decision-making comes to this type of project, besides the frequent involvement of senior managers, the discussion about assessment criteria such as possible profit, potential market and so forth is regularly conducted among the all-level participants throughout the company. In addition, Measurement Co also holds innovative events, where employees work on creating debates and generating new ideas. These regularly recurring events provide a chance for the innovative initiatives associated with project selection to emerge and continue.

5.3 The dynamic tensions in project selection

As summarized in literature review, the four levers of control cooperate and generate the dynamic tensions of organization that should be reconciled and balanced to achieve the effective control of business strategy (Simons, 1995). Likewise, the target company has a variety of forces to be reconciled and balanced to fulfill strategic goals. Among those, the following four major tensions closely associated with innovative business strategy are at the most concerns of top managers.

Balance between unlimited opportunity and limited attention

The divergence between limited attention of the organization and unlimited opportunities in the marketplace creates a need for management to use controls to direct organizational focus on specific projects that provide the most return. The balancing of beliefs and boundary

controls aims to create an environment where limited attention is placed on projects with the most predictable return while still being able to explore the new opportunities of promising projects.

The use of boundary systems at the target company can be seen at a strategic level that guides management attention into specific predetermined areas, while beliefs systems mitigate the negative force and allow participants to explore and search for new opportunities. Boundary controls are used in contradictory fashion in our case, with some boundary controls setting a certain larger percent of how many projects should be "safe" to secure predictable revenue streams, and on the other hand, an equally important criterion setting a certain smaller percent for the selected projects that need to be innovative. This seemingly contradictory boundary control at the company emphasizes the balance between selecting safe and innovative projects. The beliefs control which promotes individual autonomy is further used to enhance this dynamic. It enables individuals to pursue projects independently as long as they satisfy the criteria set up by the boundary system.

The combination of boundary and beliefs control creates organizational tension that leaves room for participants to choose projects according to their preference on one hand, and defines the limits for selecting scope from an organizational level on the other hand. This caters to individual interests and creates innate motivation, while simultaneously have a general organizational direction with the balance between safe and innovative projects at its focus.

Balance between intended and emergent strategy

The balance between intended strategy and emergent strategy is actually that between creative innovation and preset goals for potential profitable growth. It is illustrated by the dynamics between diagnostic and interactive controls. Their interplay can create organizational tension that supports and nudges organizational participants to either apply intended strategy or inspire emergent strategy.

The use of diagnostic and interactive controls varies between divisions and functions within the target company. Distribution ratios such as ones measuring the newness of a product, how innovative or how they fit within specific time horizons are given as a diagnostic control from management forming a purely intended strategy when it comes to the composition of products of the company. However, the distinctions between different categorizations of the ratios (such as the degree of innovation) are largely descriptive and open for interpretation. The lack of a clear diagnostic definition opens the door to discussion and debate on different interpretations

of innovation. When it comes to choosing individual projects, financial diagnostic controls are heavily used when they are reliable as in the case of hardware division where financial projections such as market size and sales play a big role when deciding between hardware projects. On the other hand, whilst financial projections are also made to a degree in software and innovation focused projects, less emphasis is placed upon them. Instead, financial projections are shifted towards an interactive nature, being a part of discussions around how projects link to strategic objectives and future growth goals.

These dynamics create an organizational tension within the company where diagnostic controls are strong when present, but a lack of diagnostic controls creates gaps where interactive controls kick in and creates a freedom to build emergent strategy. The focused intended strategy on product composition and financial diagnostic systems when present creates a clear direction on where the company wants to go, whilst the best way to reach their goal is left more to the participants of the organization to decide.

Balance between short-term profit and long-term growth

The balance between short-term profit and long-term growth is actually another reflection of the interrelation between beliefs and boundary control in the practice of project selection.

As declared in the empirical section, long-term growth is the most important strategic goal and a top priority at the target company. To build long-term capability requires the development of new products to explore new markets or expand existing markets. "The ratio of sales from new products" is set as a measure to control the revenue from new products, lowering reliance on existing products. Meanwhile, the business must be able to make immediate profit to maintain the normal operations and daily routines in organization. "The number of releases" is one of the measures to secure the earning from existing products.

During the interviews, there is a difference of opinion regarding the relationship between innovation and growth, with the short-term oriented on one side, and the long-term focused on the other side, illustrating the dilemma of how to keep the balance between them. Innovation may bring potential long-term prosperity, but without short-term profit, long-term growth cannot be sustainable or even achievable. Balancing between them is the key to managing the tension between efficiency and innovation, as well as opportunity and attention.

To better balance short-term and long-term return and achieve the most rational allocation of limited resources, projects are divided into different risk-levels according to the degree of

innovation. A more specific measure “the ratio between incremental and innovative projects” is used to optimize the product portfolio. The degree of innovation or the difference of being incremental and radical is judged by “Time horizons”. With these routines and procedures of control, a strategic domain of project selecting activity for participants is defined, in terms of positive ideals and proscriptive limits.

6. Conclusion and discussion

A final conclusion of the study with focus on the objective and research questions will be summarized in this chapter. Then the further study avenues on this topic will be suggested and the limitation of this study will also be discussed briefly in this chapter.

6.1 Conclusion

Previous studies on management control systems and innovation focuses on the use of MCS in balancing efficiency and innovation. Studies also show that the project selection is a complex but integral part of bringing out innovation. However, few studies have been done on the role of MCS in shaping the project selection process. The purpose of this study is to address the gap in study that exists between MCS and project selection in an innovation context and answer the research question:

- How are the Simons’ four levers of control enacted in the project selection, especially regarding multi-criteria of project evaluation, at the target company?

To answer this research question, this paper explores and interprets the empirical findings on multiple criteria in project selection from a single exploratory case study through the lens of Simons’ four levers of control.

Through interpretation and analysis of the empirical case, it appeared that selection criteria was used as more than a single lever of control. The criteria of strategic relevance was used especially as both positive and negative force, creating an organizational tension where the strategy both encourages innovative activities within certain predefined boundaries.

The balancing of different levers of controls were often used with the organizational dynamic and tension it creates in mind. The interplay between belief and boundary controls as well as diagnostic and interactive controls were both created with one dominant control and the other mitigating the dominant controls negative impact. The challenges the company faces were

usually a result of the dominant control lacking opposition when determining the project selection process. The lack of data-driven diagnostic controls was an example of this, resulting in interactive controls dominating the selecting process, and creating the challenge where too much organizational attention was needed for decision making of project selection.

The usage of the levers and their importance when selecting projects are also not necessarily related. In our case, boundary controls act as a limiting force, defining within what areas the interactive process can take place. However, the controls with the most frequency of usage seems to be the one with most directed management attention. Other controls can be important but at the same time require less attention and as they are regarded as common sense amongst organizational participants. In our case, interactive controls were used most frequently for project selection, creating a process where most of the decisions were made through discussion and debate. Whilst the boundary controls were important, they were something people automatically thought about in the discussions.

As a conclusion, the study shows the presence and importance of interplay between different levers and the effect they may take on to affect the project selection process.

6.2 Further studies and limitation

The connection between MCS and project selection for the innovation context made by this study is quite new, leaving room for future studies and limitations. Although the method of exploratory single case study is quite interesting in trying to understand this connection in depth for the first time, multiple case studies could be done to provide more generalizable findings.

While this study explores how the different levers of controls can be used from the lens of the four selection criteria, it does not make normative conclusions on what controls or combination of controls work best for each selection criteria when trying to achieve innovation.

A study that explores the best practices of using MCS to affect project selection could be of interest. However, the complex and context dependent nature of project selection might make it challenging to identify an universally applicable design.

This study touches upon how controls are used to affect project selection for a market leading innovative company only within the measurements industry. Future studies could be done within different industries and companies to find if there are industry or company context specific findings that could be extrapolated.

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Appendix: Interview record sheet

Interview Record Sheet

Thesis: *The application of LOC in innovative project selection – a case study*

Topics:

1. The management control challenges during the project selection especially in innovation contexts
2. Criteria and their application in project selection.

Selection criteria:

1. Being related to the project selection process.
2. Being representative of the certain division.

Form: semi-structured interview

Interviewer: Jacob Norell, Angyan Liu

Interviewee	Function / work responsibility	Note	Time	Place
1	Sr. Director Product Manager	Follow-up interview	2022-09-22, 13:00 - 14:00 2022-10-05, 15:00 - 16:00	Teams
2	PMO Manager		2022-09-23, 11:00 - 12:00	Teams
3	VP R&D		2022-09-26, 10:00 - 11:00	Teams
4	VP Innovation & Technology		2022-09-27, 11:00 - 12:00	Teams
5	R&D Project Manager		2022-09-28, 09:30 - 10:30	Teams
6	VP PM		2022-09-28, 13:00 - 14:00	Teams
7	Project office manager		2022-09-30, 11:00 - 12:00	Teams
8	Innovation Coordinator		2022-09-30, 14:00 - 15:00	Teams
9	Innovation Consultant		2022-10-03, 15:30 - 16:30	Teams
10	Sr Director & User Experience		2022-10-10, 15:00 - 16:00	Teams
11	Project Manager		2022-10-11, 09:00 - 10:00	Teams
12	Project Manager		2022-10-12, 10:20 - 11:10	Teams
13	Product Manager		2022-10-24, 18:30 - 19:30	Teams
14	Product Manager		2022-10-27, 10:00 - 11:00	Teams