

Management control systems and the strategic management of innovation

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ABSTRACT

Purpose - In this paper we seek to understand the strategic management of innovation by examining the effect that management control systems (MCS) have on innovation activities during the strategic change process.

Design/methodology/approach - We carry out a case study at an innovative company as they undertook a strategic change from closed innovation to open innovation. We use Simons' levers of control to frame the ways in which MCS were designed and used by managers and the effect MCS have on the innovation activities of organization members.

Findings - We found that while managers designed and used MCS to support a drive towards open innovation, organization members did not change their innovation activities. Instead, we found that the MCS that were developed enabled improvements to their closed innovation strategy. This led to a decrease in the time taken to develop new products which resulted in increased customer satisfaction which contributed to the achievement of organizational goals.

Originality - By focusing on the relationship between MCS and innovation activities in the strategic change process we shed new light on the ability of MCS to change the innovation activities of organization members. Even though the innovation activities at our case company did not change the interactions between the MCS enabled organizational goals to be achieved as they provided the necessary information infrastructure and motivated goal congruence.

Keywords Management control systems, Strategic change, Open innovation, Closed innovation, Innovation activities, Goal congruence

Paper type Research paper

1. Introduction

A stream of management accounting research has sought to understand the role that management control systems (MCS)¹ play in strategic change² (see for example, Abernethy *et al.*, 2021; Chenhall, 2005; Davila, 2005; Englund *et al.*, 2021; Kober *et al.*, 2007; Simons and Davila, 2021; Naranjo-Gil and Hartmann, 2007). This area is important to examine as it has been argued that “we know comparatively little about how tools and practices influence the processual dynamics in strategic change” (Kunisch *et al.*, 2017, p. 1046). In this paper we examine the design and use of MCS, which are the tools used by top managers to support strategic change, and the effect that these MCS have on the operational practices of organization members to better understand strategic management in practice.

Research by Abernethy *et al.* (2021) and Simons and Davila (2021) has shed new light on the link between MCS and the ways in which strategic, operational and performance change takes place. Simons and Davila (2021) carry out a case study and find that to implement strategic change managers need to link MCS, organizational structure, and cultural norms together to support organizational goals. Abernethy *et al.* (2021), on the other hand, report on a survey of Australian SMEs focusing on performance measurement systems and show that managers can support strategic change through the use of performance measures which influence the extent to which changes to operational activities are made in response to new strategic priorities.

While Abernethy *et al.* (2021, p. 642) argue that changes to a firm’s strategic priorities during the “initiation phase” is “strategic change” and that “operational change made to implement new strategic priorities” is “operational change”, we take the view that operational change is a part of the strategic change process. This is supported by Mantere *et al.* (2012, p. 173) who argue that strategic change “represents a radical organizational change that is consciously initiated by top managers, creating a shift in key activities or structures that goes beyond incremental changes to preexisting processes.” We also extend the managerial perspective presented in Simons and Davila (2021) by including an operational perspective which focuses on the key activities carried out by organization members.

We contribute to the literature by examining the relationship between MCS and the operational activities during the strategic change process in an innovation³ setting. We know that many MCS are commonly used in innovation settings to accomplish organizational goals (see for example, Akroyd and Maguire, 2011; Akroyd *et al.*, 2016; Barros and Ferreira, 2019, 2021; Davila, 2000; Feeney and Pierce, 2018; Frare *et al.*, 2021; Henri and Wouters, 2020; Müller-Stewens *et al.*, 2020; Pan Fagerlin and Löfstål, 2020). The management accounting literature has also shown that MCS can facilitate the implementation of strategy (Kober *et al.*, 2007; Otley, 2016) which are necessary to support changes to innovation activities (Bisbe and Malagueño, 2009).

In this paper we seek to better understand the strategic management of innovation by showing the effect that MCS designed and used by managers have on the innovation activities of organization

¹ MCS “refers to the mix of formal and informal procedures and processes used by management to facilitate the attainment of their goals and those of the organisation” (Kober *et al.*, 2007, p. 426).

² Strategic change is a dynamic process which involves various actors to enable organizations to remain competitive (Kunisch *et al.*, 2017, p. 1008).

³ We understand innovation in terms of Roberts (2007, p. 36) “innovation = invention + exploitation” which views innovation as the process of generating new product/service ideas and commercialising them.

members in a company who attempted to change from a ‘closed innovation’⁴ to an ‘open innovation’ strategy (Chesbrough, 2003; Chesbrough, 2019). An open innovation strategy has been said to leverage the expertise of external parties during innovation in order to improve the returns on investment from innovation activities (Chesbrough, 2003, 2019; Chesbrough and Crowther, 2006; Chesbrough *et al.*, 2006). Hence, organizations that embrace an open innovation strategy are effectively searching for and subsequently integrating external ideas, technologies and know-how into their innovations (Biswas and Akroyd, 2016; Chesbrough and Crowther, 2006; Chesbrough *et al.*, 2006).

One of the main arguments given in the innovation literature for companies to change from a closed to an open innovation strategy is so that they can maximize their return on innovation investment by using external ideas, technology, knowledge, which complements their internal innovation resources (Chesbrough, 2003; Chesbrough and Crowther, 2006; Tucci *et al.*, 2019; Van der Meer, 2007). This enables companies to decrease the time-to-market for new products which is an important measure of success in product innovation and supports organizational outcomes (Greco *et al.*, 2019; Moellers *et al.*, 2020).

The remainder of this paper is structured as follows. The next section presents our theoretical framework. In section 3 we present our qualitative research approach. This is followed by our case study findings in section 4 which first provides some background to the context our case company was facing and then shows the effect that MCS had on innovation activities during the strategic change process. Section 5 discusses these findings in relation to the literature and concludes the paper with a summary of the findings and directions for future research.

2. Theoretical framework

To examine the effect that MCS have on innovation activities during the strategic change process we use Simons’ (1995) LoC framework. It has been argued that this framework can help us to understand innovation practices as it focus on the tensions between the organization’s need for innovation and the need for the achievement of its goals (Tuomela, 2005). We do this from a practice perspective as Merchant and Otley (2020, p. 2) have stated that much of the research on MCS has lost its connection with practice as it is “motivated only by previous published work, which itself has become disconnected with the practical concerns of managers and systems designers.”

Using Simons’ (1995) LoC framework enables a holistic examination of the key strategic change variables used by top managers in practice: core values, risks to be avoided, critical performance variables and strategic uncertainties. Simons (1995) then links these to the practical concerns of managers and system designers who use belief systems, boundary systems as well as interactive and diagnostic MCS to manage operational activities (Curtis *et al.*, 2017; Ferry *et al.*, 2017; Simons, 1995). Thus, the LoC can provide a holistic way of conceptualizing the design and use of MCS and their impact on operational activities in support of strategic change (Ferry *et al.*, 2017). We show how this takes place in an innovation setting by examining the effect that MCS have on innovation activities as a company attempts to move from a closed to an open innovation strategy.

⁴ Closed innovation is based on the assumption that successful innovation requires control and ownership of the creation and management of ideas (Chesbrough, 2003).

The use of each lever of control has implications for operational practices (Ferry *et al.*, 2017), and thus the operationalization of the constructs is important “to enhance commensuration *within* the... framework” (Curtis *et al.*, 2017, p. 103, italics in the original). In this paper we use the conceptual definitions for each of the LoC and associated strategic variables following Curtis *et al.* (2017). For interactive control we seek evidence of MCS which “focus attention on strategic uncertainties and build internal pressure to break out of narrow search routines, stimulate opportunity-seeking and encourage the emergence of new strategic initiatives” (1995, p. 59) “rather than evidence of debate and dialogue” (Curtis *et al.*, 2017, p. 104). For diagnostic MCS we focus on “the formal information systems that managers use to monitor organizational outcomes and correct deviations from pre-set standards of performance” (Simons, 1995, p. 59). When combined, interactive and diagnostic systems can be used to formulate and implement new strategies which influence the innovation activities of organization members in terms of positive ideals and proscriptive limits (Simons, 1995). Thus, the interaction between interactive systems and diagnostic systems could also be important for strategic change (Ferry *et al.*, 2017).

On the other hand, managers can influence idea search and exploration by using belief and boundary systems (Ferry *et al.*, 2017). Simons (1995, p. 34) states that belief systems are “(t)he use of control practices to communicate and reinforce systematically the basic values, purpose, and direction for the organization.” Thus, belief systems can be used by top managers to inspire and direct the search for new opportunities. In contrast, boundary systems are “(t)he use of control practices to delineate the acceptable domain of activity for organizational participants and establish limits, based on defined business risks, to opportunity seeking” (Simons, 1995, p. 34). When combined, belief and boundary systems can be used to frame the strategic domain of the activities of organization members in terms of positive ideals and proscriptive limits (Simons, 1995). Thus, the interaction between belief systems and boundary systems can also be important for strategic change (Ferry *et al.*, 2017).

In order to understand the strategic change process in our innovation setting we follow Kunisch *et al.* (2017, p. 1008) who argue that in order for strategic change to take place requires various actors which they call “change strategists, change agents, and change recipients” who enable “firms to seize (new) opportunities and/or cope with threats in order to become or remain competitive in the market place.” Our focus in this paper is to understand how a top manager (change strategist) designed MCS which were used by middle managers (change agents) to influence organization members (change recipients) to alter their operational activities, for strategic change to take place (Kunisch *et al.*, 2017; Mantere *et al.*, 2012).

Kunisch *et al.* (2017, p. 1026) argue that “(t)he pace and results of strategic change depend on change agents’ leadership and change recipients’ actions. These actions include the support of and/or resistance to strategic change by a firm’s members” but there is a “lack of knowledge about the actual tools and practices change agents use in strategic change” Kunisch *et al.* (2017, p. 1046). In order to better understand the effect that MCS have on innovation activities during the strategic change process in an innovation setting we examine a common strategic change which many companies are now considering, the change from a closed to an open innovation strategy.

Chesbrough (2006, p. 1) defines open innovation as “[t]he use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively... [and] assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology.” Van de Vrande *et al.* (2006) argue that when operating using an open innovation strategy,

organizations still generate ideas using internal resources, but they also actively scan the external environment (e.g., universities, research labs, customers, and suppliers) in search of new ideas, technologies and knowledge. Thus, open innovation provides strategic flexibility to the organization, which enables them to deal with market and technological uncertainties involved in innovation (Bogers *et al.*, 2019). Using open innovation adds complexity because as an organization collaborates with external parties they need to share information relating to particular projects. At the same time organization members need to make sure that some information remains confidential so that the organization does not lose its competitive advantage (Bogers *et al.*, 2019).

An important part of open innovation is the search for opportunities outside organizational boundaries. Such a search is dynamic and thus a balance needs to be struck between rewards and controls to simultaneously produce appropriate amounts of searching, screening and implementation (Lauritzen and Karafyllia, 2019). Therefore, even though open innovation could be beneficial for organizations, if not managed and controlled properly, it could also be detrimental to innovativeness as well as financial performance (Stanko *et al.*, 2017). Consequently, the challenge for management is to find the appropriate methods for the search and utilization of external knowledge resources (Bergman *et al.*, 2009) as well as pathways to advance internal ideas and technologies (Lauritzen and Karafyllia, 2019). Bergman *et al.* (2009) argue that organizations that have changed to open innovation require even more controls than organizations who still use closed innovation to achieve successful innovation as they have to continuously reconfigure structures and activities to match the changing business environment.

While it has been shown that organizations which search widely for new ideas and applications of new technologies tend to be more innovative (Laursen and Salter, 2006), open innovation can also face resistance from within an organization. This is due to the strong belief among organization members that they have the required resources and competences to undertake innovation themselves without any outside assistance (Chesbrough and Crowther, 2006; Chesbrough, *et al.*, 2006; Lauritzen and Karafyllia, 2019; Van der Meer, 2007; West and Gallagher, 2006). Therefore, organizations also need to change their innovation culture so that project teams are more open to external opportunities. A number of management accounting studies have shown how MCS can be used to help organizations change through the support of their culture (Akroyd *et al.*, 2019; Chenhall and Euske, 2007; Dent, 1991). MCS could thus provide a means for a strategic change to open innovation as they help collectives of individuals and organizational units, who may share only partially congruent goals, gain cooperation (Bisbe and Otley, 2004; Luft, 2016; Mahama, 2006; Ouchi, 1979).

We contribute to the management accounting literature by examining the effect that MCS (LoC), designed by top managers (change strategists) and used by middle managers (change agents) has on the innovation activities of project teams (change recipients). As such we create new research opportunities to examine the intersection between managers design and use of MCS and the ways in which operational activities are influenced by them during the strategic change process. In particular, we identify some of the reasons why innovation activities may not change as expected to support strategic change. We believe that this would also help practitioners understand how to better connect MCS to operational/innovation activities during the strategic change process.

3. Research approach

We adopt a retrospective longitudinal case study method (see for example, Akroyd and Kober, 2020; Scapens, 1990) in this research as it enables us to understand the ways in which MCSs influence innovation activities during the strategic change process. Our case study company, *Healthcare* (a pseudonym), is an innovative European based multinational company which manufactures and markets medical devices. *Healthcare* sells its products globally with sales and customer service operations in over 25 countries and exports to more than 65 countries. The focus of this paper is *Healthcare's* Technology Department which carries out the innovation activities for the organization. We believe that this is a suitable unit of analysis to examine the strategic change process as the Technology Department at *Healthcare* played a critical role in supporting the corporate strategy (Internal *Healthcare* document “Reorganizing statement from CEO”).

We use a number of data collection methods to understand the practices at *Healthcare* including interviews with key organization members⁵, a focus group discussion with project team members, internal and external documents, news reports, public presentations and company websites⁶. We collected data from 2006 to 2010, which covers the final year that *Healthcare* used closed innovation (2006) and the first four years of their drive towards open innovation (2007 to 2010). While this data is now more than a decade old, we believe that it is relevant to make a theoretical contribution to our understanding of the design and use of MCS in the strategic management of innovation as there is still a lack of research which provides insights into the processual dynamics of strategic change (Kunisch *et al.*, 2017). Our aim in this paper is to examine the effect that MCS have on innovation activities during an episode of strategic change from closed to open innovation.

When we visited *Healthcare* we sought to understand the ways in which MCS were designed and used to drive the strategic change process. For this reason, we focused our interview questions and collected documentation on what MCS had been changed and sought to understand the resulting effect on innovation activities and organizational outcomes. We began our study with an introductory meeting and product demonstrations with the technology scouting group director. This provided us with background information about *Healthcare* and its products. We then carried out interviews in the Technology Department starting with the vice-president, the ‘change strategist’, the technology scouting group director and the Technology Department Controller, the ‘change agents’. We then interviewed a project manager and had a lunch focus group discussion with project team members, the ‘change recipients’ (see Table 1).

We audio recorded the interviews, introductory meeting and focus group discussion and analyzed the transcripts by organizing them into themes using a thematic approach based on meaning (Alvesson and Kärreman, 2011). In order to be consistent with our grounded methodology we took a self-critical and reflexive approach in connecting strategic change, MCS and innovation activities discussed in the interviews, company documents and presentations, company websites and external documents (Glaser and Strauss, 1967; Miles and Huberman, 1984). This enabled us to use interviews to identify themes and check for potential discrepancies which we could investigate further using documentary evidence we had collected from the company. This involved revisiting

⁵ While we only carried out 4 interviews and a focus group discussion these included the Technology Department vice-president, the ‘change strategist’, the technology scouting group director and the controller, the ‘change agents’, and project managers and project team members, the ‘change recipients’.

⁶ Interviews were carried out in English and all internal and external documents, news reports, presentations and company websites were in English.

both the thematic analysis and the literature, which resulted in reorganizing material in order to match the patterns we were seeing.

Table 1: Case Study Data

<i>Healthcare site visit (2010)</i>
Introductory meeting and product demonstrations with Technology Scouting Group Director - 60 minutes
Lunch Focus Group with Technology Scouting Group Director and Project Team Members - 60 minutes
<i>Healthcare interviews (2010)</i>
Project Manager - 60 minutes
Technology Department Controller - 120 minutes
Technology Scouting Group Director - 60 minutes
Vice President for the Technology Department - 60 minutes
<i>Internal Healthcare documents</i>
Reorganizing statement from CEO (21 February, 2007)
Corporate governance principles manual (2010)
Corporate structure document (2010)
Enterprise risk management policy (2010)
Report from Corporate Executive Board on Theme Based Innovation Pipeline (2010)
<i>External Healthcare documents</i>
<i>Healthcare</i> Annual reports from 1998 to 2010
News articles on <i>Healthcare</i> 's innovation approach (7 news articles from February 2007 to December 2010)
Medicoindustrien report - MedTech facts and figure: Industry statistics 2008
<i>Healthcare presentations</i>
Goldman Sachs MedTech Conference (7 September, 2005)
Handelsbanken Conference Investment Ideas (01 December, 2005)
Capital Market Day Presentation (11 June, 2006)
CFA Company Day Presentation (24 May, 2007)
Capital Market Day Presentation (30 September, 2008)
Handelsbanken's 4th Annual MedTech (25 November, 2009)
Morgan Stanley European MedTech and Services Conference (26 May, 2010)
<i>Websites</i>
<i>Healthcare</i> 's company website
<i>Healthcare</i> 's customer website

The final storyline (Dent, 1991) emerged from our analysis using data triangulation (Denzin, 2009) which involved linking the interviews with the company documents we had collected. We then used Simons' (1995) LoC framework and Kunisch *et al.*'s (2017) processual dynamics of strategic change to carry out additional theoretical probing to understand how the MCS designed and used in the company influenced the innovation practices of organization members. As we carried out our analysis, we realized that while some MCS had been designed to enable a strategic change to open innovation, this change did not take place as top managers had expected. Instead, we found that the MCS had supported organization members with their closed innovation activities which we present in our findings below.

4. Findings

Research shows that it is important to understand the role that MCS play in strategic change (Abernethy *et al.*, 2021; Chenhall, 2005; Englund *et al.*, 2021; Simons and Davila, 2021). We do this by examining how MCS and organizational practices are implicated in the processual dynamics of strategic change (Kunisch *et al.*, 2017). Consequently, we present our findings starting with the background of our case study company (*Healthcare*) and their drive for strategic change. We then show how the design and use of MCS to support strategic change affected the operational practices of organization members.

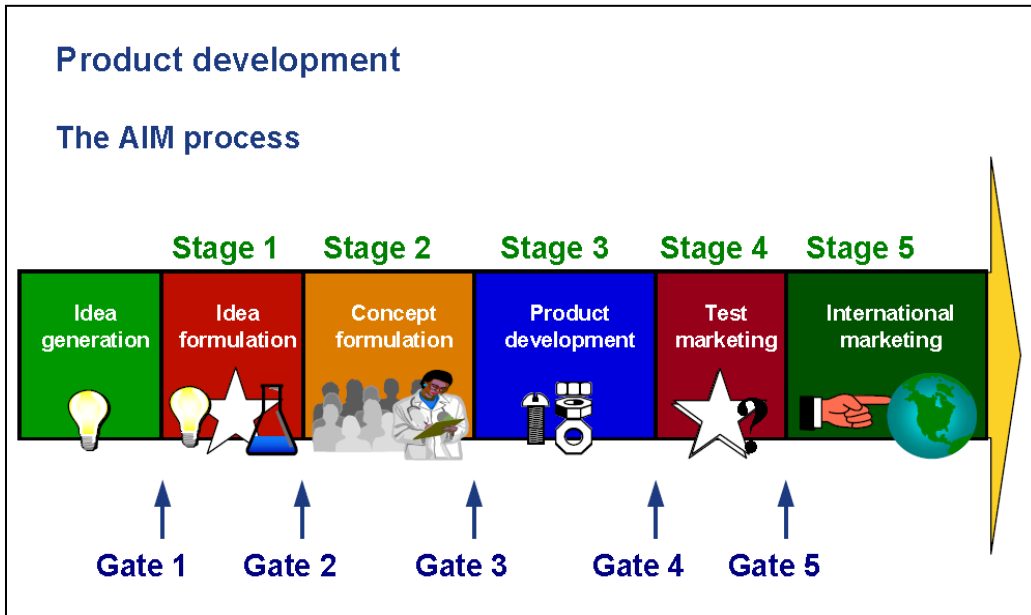
4.1 *Healthcare's strategic management of innovation*

According to the company's 2010 annual report, *Healthcare's* goal was profitable growth. All business areas and geographical regions were required to contribute to growth as well as profit goals. The strategy for the company to achieve this goal was to develop life-changing products before competitors (*Healthcare's* annual report, 2010). This was made possible by listening to customers to better understand their needs and respond by finding new ways to do things better together (*Healthcare* website, 2010). Therefore, the company's Technology Department played a crucial role in supporting *Healthcare's* corporate strategy. As stated in *Healthcare's* innovation documents, *Healthcare* had set targets of how much of its total revenue should come from new products. *Healthcare's* emphasis on innovation was also highlighted in a letter from the CEO published on the company's website which read, "*Our competitive strength and growth opportunities rely not only on the company's profitability, but equally on our innovative skills*"

It should be noted that *Healthcare's* history of making innovative products dates back over 50 years when closed innovation was viewed as best practice. Building internal capabilities by hiring the best people in the field and having the best laboratory facilities has traditionally been seen as a strategic asset (Chesbrough, 2003). Thus, organization members had inherited this culture of internal development from past members which was a contributing factor to the difficulties the company faced in implementing their drive towards open innovation.

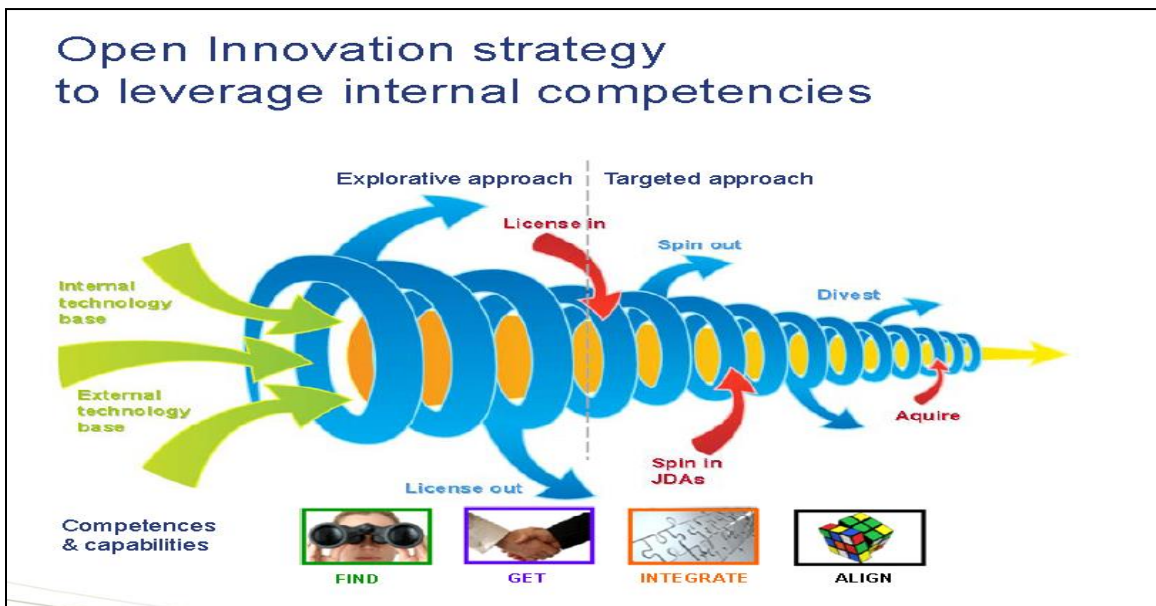
After a period of significant mergers and acquisitions, top managers recognized that *Healthcare's* growth was decreasing, and they were starting to experience delays which led to late product launches. According to the VP of the Technology Department (VP) launch dates were being missed as new products were taking approximately four years to complete, versus three years in companies in similar industries. These were seen as signs of the company facing a crisis that required immediate attention. As a result *Healthcare* hired a consultancy firm to analyze its operations and suggest what the company's Technology Department should look like. One of the recommendations in the proposal submitted by the consultancy firm was a change in strategy from closed innovation to open innovation, which *Healthcare* proceeded to roll out in 2007. As shown in the diagrams below, *Healthcare's* managers aimed to change from a closed innovation strategy (Figure 1), which was still used in the company up until 2006, towards an open innovation strategy which they aimed to use starting in 2007 (Figure 2).

Figure 1: Healthcare’s Innovation Strategy Until 2006



(Source: Healthcare’s Capital Market Day Presentation, 11 June, 2006)

Figure 2: Healthcare’s Open Innovation Strategy From 2007



(Source: Healthcare’s Capital Market Day Presentation, 30 Sept, 2008)

The proposed strategic change created a number of issues for members of the Technology Department. First, they did not understand the reason for the change to open innovation. As the VP said, “it is hard to argue against the recommendation that you should listen to other people outside, however, when you ask but why? The answer is lacking.” The VP went on to explain that

it was not that organization members did not have networks and did not talk to people outside the company before the drive towards open innovation. They did a lot of external engagement and given the history of the company and the nature of their products, organization members were always encouraged to form their own networks and share knowledge, especially with end users. However, what was new was that project teams were being told that they had to collaborate externally, and they could not understand why. This was because they did not see what value it would add to the company or how they would benefit from the change.

In addition to not understanding the reason for the drive towards open innovation, organization members also resisted the change because of the experiences they had in the past with external partners. According to the VP *“it has not been a recognition that came out of good stories internally in (Healthcare) that proved that this was a good idea.”* A third issue was that by moving to open innovation, the company was seen as taking away the interesting aspects of their job. The Director of Technology Scouting explained that:

“The [technology members] have been trained under the principle, you give me a problem and I will find a solution. That is what our training is about. If I cannot find a solution, I am a very bad engineer. And now you are trying to say well you are not the best one to find a solution. You have to find someone else who will help you find the solution. This does not seem right to them. They think because they are the specialists, they should do the fun things. Otherwise, they think they lose all the fun aspects of their job.”

This shows that at the beginning the general feeling in the Technology Department at *Healthcare* was that implementing open innovation was not necessary. Instead there was a strong feeling that external collaborations could do more harm than good. *Healthcare*'s managers quickly picked up on this resistance and realized that it was going to be difficult to implement open innovation when there was no desire from project teams to use external knowledge or technology. According to the VP:

“This is a game that is played on a 15cm field. I mean it is played between ears of people. I cannot force my organization members to pick up the phone and call somebody else if they do not want to. They can always invent all different kinds of reasons why they should not do it. I need to convince them to have a genuine interest and believe in this. That is the whole trick.”

The top managers at *Healthcare* responded to this challenge through a number of initiatives. According to the VP:

“(Healthcare) has been on a long journey to implement open innovation. There is nothing easy about this. It is hard work and communication in showing the way forward on how you want to do this is vital. And of course there are a number of systems that you can put in place to facilitate this but there are a lot of things you need to clarify. Just a simple thing as what can I tell. I mean that is a big uncertainty. We have a lot of competition.”

Management responded to the organization members' resistance by re-defining what open innovation meant for *Healthcare*, changing the organizational structure of the Technology Department and implementing ways to stimulate collaboration within the company as well as with external parties.

As explained by the VP, “*we started up the journey by defining what is open innovation to us and why we are doing it.*” There are many definitions of open innovation in the literature however, managers at *Healthcare* struggled to find a definition that would work for them that was simple enough to get the organization members interested in supporting the new innovation approach. According to the VP:

“We were struggling to get our own definition on why is it that we really [emphasized] want to do open innovation. I think we ended up saying well this is simply too complicated because you can put all kinds of definitions into this. So, we said open innovation is when you ‘seek input from somebody who is not from within (Healthcare) as part of your project’. That is open innovation. We are very modest, not anything fancy.”

The VP explained that they came to this definition after many discussions with managers from across the organization. The VP added, “*At one point we were in different degrees with people giving different points to open innovation where we had a partnership or a collaboration agreement or we were strategic partners.*” In the end it was decided that if a project teams just got input then they were on the right track. The VP added, “*Of course we would like to take that to a higher level. It is not the most bold definition that I have seen on open innovation.*” However, given his view on this definition one of the project managers stated:

“I would say it is a fairly broad definition. It can be at the idea phase when you are talking to a lot of end users and perhaps also having a group of end users that you are in very close collaboration with. It can be an entirely external project. So it is a fairly broad definition. And it is also if you are talking to other companies and universities. It is difficult to put some narrow boundaries on this definition. And I do not think you should.”

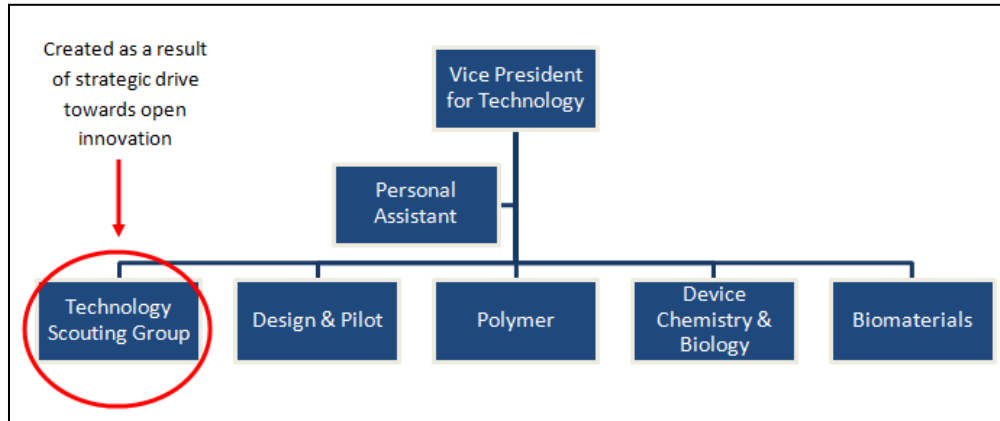
This suggests that *Healthcare*’s managers had come up with a definition of open innovation that was practical and accepted as reasonable by organization members from across the organization. However, defining open innovation was just the first step. Managers also made a number of other changes to support their drive towards open innovation.

The first change in the drive towards open innovation at *Healthcare* was a change to the technology group structure with the creation of the technology scouting group to support the company’s search for external innovation ideas/technology/knowledge (see Figure 3). This group consisted of six organization members from different backgrounds.

In addition to the creation of the technology scouting group, there had also been a change to the structure of innovation groups within *Healthcare*. As explained by one of the project managers:

“Previously we were a defined group of product managers and directors working with external innovation or open innovation if you like. But we have spread this group of people not to the entire organization but within all the groups [in the Technology Department] and I think that is very wise. Because that ensures that within all groups of the company, we have people that have worked with open innovation and have the knowledge about how to do it. There is of course the risk that you are diluting their knowledge when you are doing that.”

Figure 3: Organizational Chart for *Healthcare*'s Technology Department



(Source: *Healthcare*'s Corporate Structure Document, 2010)

The idea behind this change was that this group of people had experiences with open innovation and could act as enabling agents motivating others in the company to consider seeking and incorporating external knowledge into their innovation projects. The role of these people was to drive discussions about the use of open innovation with project team members to help overcome some of the resistance towards this new approach. Moreover, another change was that organization members from different functions were now collocated so that all members working on a project were sitting together. As illustrated by the Technology Department Controller⁷:

“The marketing person responsible for the product now sits with the [innovation] guys responsible for that product. So they are sitting in project teams instead of I am sitting here, you are sitting in other department. I mean you have seen our building; you could be sitting 500 meters away from the person you supposed to work with.”

The aim was to change the silo culture that existed in the company and increase interaction between the different functions involved in innovation projects. Managers believed that continual interactions among members involved in projects helped them identify and resolve problems in a timely fashion, which prevented issues at later stages of the project delaying the launch of the product or service to the market. In addition to improved communication between project team members, the VP explained that managers at *Healthcare* also believed it was essential for project team members to communicate more with other organization members they did not usually work with, as well as with external parties. The purpose of this was to broaden their understanding and motivate them to embrace the concept of leveraging the knowledge of external parties to complement and enhance internal capabilities.

In the following subsections we present the ways in which the MCS that managers at *Healthcare* designed were used to drive the strategic change. We also examine the effect the MCS had on the innovation activities of project team members.

⁷ The Technology Department Controller was responsible for managing the financial aspects of the innovation process from idea generation to the commercialization of new products.

4.2 Strategic uncertainties at Healthcare

Strategic uncertainties relating to technological advancements of competitors and changing market trends were a key concern for managers at *Healthcare*. Failure to address these uncertainties in a timely manner could result in *Healthcare* losing customers to competing companies and negatively impacting *Healthcare's* profitable growth goal. Therefore, during the drive towards open innovation managers implemented a number of MCS designed to be used interactively such as a roadmap, technology foresight database, and a customer focused website.

The new technology scouting group were put in charge of creating a roadmap and a technology foresight database to help project teams find external technology intelligence to support *Healthcare's* drive to open innovation. The roadmap was a total mapping of where *Healthcare* was and where its competitors were. It covered different perspectives such as intellectual property, product, and marketing. The roadmap was used to identify the gaps in between *Healthcare* and its competitors. As explained by the VP:

“We actually map in our own patents and our competitors’ patents and products into a picture where we take our technology and divide it into segments. Each segment is subdivided and there we map it out. That is very interesting because it shows you clearly where we are strong, where we are weak, where they are weak and are there any green fields that we say this is a pretty interesting area but no one has really done anything there yet.”

The roadmap was part of the information used by managers during their CEO Business Forum, when they were discussing innovation themes and building strategic plans for the year. According to the Director of Technology Scouting:

“The roadmap comes before the innovation brief. What we do is we take those user needs and go into see what kinds of solutions are available in the market besides us. I mean maybe someone else has the solution... So, our results provide direct input in the innovation brief or the pipeline. So, it is more from the strategic point of view. They provide a more holistic picture.”

This was complemented by the technology foresight database which went into each of *Healthcare's* business areas and identified any disruptive technology coming up outside the company and assessed it to find out what that meant for *Healthcare*. As described by the Director of Technology Scouting:

“It is easy just to say there is a disruptive technology, but we are also doing assessments. So, we are not just stopping to say there is some company doing something. We actually go in and look at it deeply and ask what does that mean for (Healthcare). How far has that technology developed and what is its impact in our end user group, our customer base and is there something shocking or horror some that we have to do something or it is something we have to keep our eye on or something we can just forget.”

The next change was the creation of a website which was designed to be an open internet forum. This forum allowed end users to discuss their problems and ideas for new solutions to their problems. They could discuss these ideas with others as well as submit their ideas to be considered for further research and development. Managers' view on this was presented by the Director of Innovation in a report on *Healthcare's* website shortly after the website was launched in February

2009, which stated “*In this way [using the open forum], you can get many different perspectives on a problem, and different but related problems can come together and find a single solution. Users become co-innovators.*”

The website was also popular among end users. A report by the Director of Innovation stated that there were over 700 users registered, 200 message posts and nearly 80 innovative idea submissions in its first week and a half. However, as explained by the Director of Technology Scouting, “*People are very much active and we got a lot of input, but we do not know how to handle it.*” The VP elaborated on this “*In an internet forum, it works in a way that they really want us to go in and comment on it, but we are very reluctant.... I think of this fear of what I can say and what I cannot say. And I think that is a big issue.*”

According to the VP, there were a few reasons behind the organization members’ fear of commenting. Firstly, this was a public forum that could be viewed by anyone with an internet connection, including *Healthcare’s* competitors. Therefore, the organization members needed to be careful with what they were saying as it could be read by the competitors. Secondly, the discussions were about people’s real-life problems. Consequently, there were a lot of emotions involved and organization members needed to be careful that they did not insult or offend customers. Thirdly, their comments could create false expectations for end users. For instance, as described by the VP, “*they could also see this [employee comments] as a promise that we would actually have this product. But this was just a feedback so that is something that is unclear how we actually handle that.*” Therefore, to avoid these complications organization members preferred not to comment and neither did they incorporate the end users’ input into their internal innovation projects because of fear of proprietary issues in later stages of innovation projects.

Managers believed these platforms enabled organization members to identify appropriate partners and opportunities for external collaborations. For instance, the Director of Technology Scouting explained that the roadmap and technology foresight databases were designed to assist the partner selection process as they could help identify external parties with relevant ideas or technology. These databases were also used to store information about the links between partners and competitors. Therefore, *Healthcare’s* managers put in place appropriate infrastructure to support the search and selection of external partners which project teams could collaborate with.

While the website was a great success in terms of getting input from end users, this information had not been incorporated into *Healthcare’s* innovation projects. Similarly, while *Healthcare’s* technology scouting group had been successful in designing the roadmap and technology foresight database, this information had again not yet made it into innovation projects. To put this into perspective, the Technology Department Controller stated that from *Healthcare’s* portfolio of 20 innovation projects in 2010 only one was using the open innovation strategy while the rest were still using the closed innovation strategy. The Director of Technology Scouting explained that from training sessions and group meetings it appeared the organization members understood the concepts of open innovation and agreed that they should try to find ideas and technologies externally if they were not identified on the roadmap as one of *Healthcare’s* core competencies. However, when it came to practice, they wanted to do the projects themselves without any external assistance. This indicates that these MCS had not directly influenced the innovation activities of project teams.

4.3 Core values at Healthcare

Managers at *Healthcare* knew that it was important for organization members to understand the needs of end users. This enabled the company to respond to those needs by improving their product offerings and services in the shortest possible time in order to achieve its goal of profitable growth. It was equally important for the company to maintain customer loyalty and trust. As explained by the VP, *Healthcare* was “*providing for customer needs that were very personal in nature and so the customers needed to be able to trust the products and services they were using.*”

With a number of competing products available in the market, *Healthcare*'s managers recognized that if they lost customer trust, customers could easily switch to the competitors' products, resulting in *Healthcare* losing market share. Therefore, managers used belief systems to guide the behavior of organization members so they could better understand customer needs and thus maintain customer loyalty and trust. These included a mission statement, a vision statement, and a values statement.

Healthcare's mission and vision statement were contained in their corporate governance principles manual, which was reviewed once a year by *Healthcare*'s Board of Directors and Executive Management. *Healthcare*'s mission was to “*make life easier for people with intimate healthcare needs*” their vision was “*setting the global standard for listening and responding*” (Corporate Governance Principles Manual, 2010). The values statement stemmed from the mission and vision statement and was published on the *Healthcare* website. It defined the way *Healthcare*'s managers expected the organization members to think and behave with people outside the company, such as customers and suppliers, as well as with their colleagues within the company. Management's efforts to drive *Healthcare* towards open innovation involved the execution of the value statement through a ‘*meet the end user*’ program, and two internally focused initiatives known as the ‘*employee catalogue*’ and ‘*specialist academy*’. Management hoped that these interactions externally with end users and internally with colleagues would result in organization members being motivated to the idea of seeking input and improving their performance. Managers believed that the implementation of beliefs about behavior would help them change the internal culture so that organization members would place less importance on their personal interests and focus more on helping the end users.

Meet the end user program: Organization members, both managers and project team members acknowledged that end user needs were a key part of the reason for *Healthcare*'s existence and innovation endeavors. As suggested by the Director of Technology Scouting, “*They [end users] are kind of an expert because that is what their life is about.*” Therefore, involving the end users in product development was pivotal for the company. However, before the focus on open innovation only certain groups of people in *Healthcare*, mainly Sales and Marketing, had direct associations with the end users. However, as explained in the 2007 annual report, one of the aims of the company was to drive a closer relationship with the end users. Hence, as part of the drive towards open innovation, the company set up a ‘*meet the end user*’ program where each employee met at least one end user on a regular basis to get to know the end user and understand the problems they face in their daily lives because of their medical conditions. This program was explained by the VP as follows:

“*Every employee in [the Technology Department] has a customer friend and it is a customer friend that they go out and visit. The idea here is not to go out and discuss*

products... it is about listening to the story of their life. What is your daily life like? What is important to you? It gives a lot of perspective and a lot of motivation.”

As stated in *Healthcare*'s 2007 annual report, the reports that the organization members submitted following their end user visits gave the decision makers a unique insight into what users wished for, their thoughts and dreams. This was important for the company as their strategy was to develop products and services that served the needs of people with intimate health conditions. Therefore, these reports provided valuable insights for the CEO Business Forum.

Internal networks: One of the issues identified by managers was a lack of interaction among *Healthcare* organization members at the project level. According to the VP, “*sometimes inspiration is not necessarily found on the other side of the earth. It can also be in the room next door.*” Therefore, *Healthcare* saw this as an area that could be improved and potentially help their drive towards open innovation. Consequently, the following two initiatives, the ‘*employee catalogue*’ and the ‘*specialist academy*’ were set up to help the company build internal networks and increase the level of interactions among organization members.

The employee catalogue was a searchable electronic database of all organization members in *Healthcare* accessed through the company's intranet. This catalogue showed what the organization looked like, where individual organization members were positioned, their contact details. More importantly, *Healthcare* had asked each employee to add three core competences that they acquired at *Healthcare* or from previous jobs or during their studies. This was explained by the VP as “*something where they say this is what I am pretty good at and you need to know. And that has been quite beneficial because people might not necessarily know that they actually have a colleague who is an expert in laser welding for example.*”

The notion behind this catalogue was that when organization members accessed the information in the database, they would realize that there is a large body of knowledge around them and it is not difficult to build networks with people they usually did not associate with. This initiative was complemented by the ‘*specialist academy*’ program where *Healthcare* got people who knew something about a specific area to give a one-hour university style lecture. This allowed people to share their knowledge with colleagues and also acted as a training session for the organization members. These lectures were also video recorded and uploaded onto the company intranet as a resource that people could access whenever they liked. Moreover, as suggested by the VP “*part of that is to conserve our knowledge and make sure that what we know is not lost when people transit out of the company for whatever reason and to make it alive so that people can actually see well oh ok he really knows about this.*”

The VP explained that the aim was to encourage organization members to network and collaborate internally with people that they usually did not work with. Moreover, the management's intention was to get the organization members used to searching and communicating with people while collaborating during innovation projects so that when dealing with external parties, they would already have had some practice. Managers believed that as a result, there would be less resistance to the idea of seeking input from external parties and incorporating external knowledge into their innovation projects.

But, the past experiences of organization members and their belief in their ability to figure out solutions and the fear of losing job satisfaction were all contributing factors to the resistance to managements' efforts to implement open innovation. Even with the ‘*meet the end user*’ program the ‘*employee catalogue*’ and the ‘*specialist academy*’ which aimed to alter the beliefs of project

team members so they would be more comfortable dealing with people that they usually did not work with, the innovation activities of project teams did not undergo a significant change.

4.4 Risks to be avoided at Healthcare

Healthcare faced risks from various sources. To enable organization members to identify and respond to the risks in a timely fashion, managers put an ‘enterprise risk management program’ in place where management compiled a list of risks that the company faced. A partial list is shown below in Figure 4. This program signaled to organization members what they needed to be careful of and what they needed to avoid.

Figure 4: Healthcare’s List of Enterprise Risks

Identify risks								
Market	Price	Competition	Innovation	Operations	Financials	Human Resources	Business portfolio and growth	Insurance / Accidents / Facility
Market developments & trends	Health care reforms / Reimbursement	Sales	Patents and Intellectual property	Product and process quality	Foreign currency exposure	Employee expertise	Business area portfolio / MA&D	Fire/Flood/
Key Players	Parallel import	Market share incl. NPD-rate	Key player / end user interaction	Global Supply Chain	Interest	Management / leadership skills	Market portfolio	Accidents towards key personnel
Government & Regulations		Product & Service portfolio	Clinical studies	Raw materials	Tax	Attractiveness to potential employees	Mentor integration	Accidents in production area
		Substitution areas		Suppliers		Employee satisfaction level		

LIST IS NOT EXHAUSTIVE

(Source: A partial list of risks from Healthcare’s Enterprise Risk Management Policy, 2010)

This list of risks was updated and monitored on a quarterly basis to capture any new risks that came to light and to identify any existing risks on the list that may require immediate action to be taken to mitigate negative consequences arising from that risk. One of the risks on this list that was particularly relevant for project teams was the risk of valuable information being leaked to competitors, allowing them to capitalize on it by taking Healthcare’s market share. To avoid this risk, organization members were required to get all external parties to sign a non-disclosure agreement to stop the spread of sensitive information. They were also required to negotiate issues around IP ownership at an early stage to avoid disputes at a later stage. Another risk identified by

Healthcare's managers was changing market trends, which related to the strategic uncertainties the company faced.

Non-disclosure agreements were used by the technology scouting group to help the company systematically identify external partners that the company could build strategic partnerships with in order to avoid situations where collaborative partnerships had failed in the past. As one of the project managers commented, *"Having intelligence looking for partners and having a list of that, I think is a very good way of handling external partners or open innovation in a structured way and ensuring that the knowledge is anchored in (Healthcare)."*

The Director of Technology Scouting explained that the external partners could have been suppliers, startup companies, or companies that had the technology that could be used for *Healthcare's* product lines but was originally developed for some other industry. Hence, there was a wide range of possibilities to explore. Therefore, *Healthcare's* technology scouting group used various methods of finding external partners with the required technology or expertise. However, according to the interviewees while *Healthcare* had taken these initiatives, these had not translated into successful collaborations at the project level. As explained by the Director of Technology Scouting:

"We have not run it for a very long time. We ran two e-postings. We reached the point where we got some very interesting partners. So, the next step is we go to discuss with them. So, we have not gone the whole way through yet. But you have to prepare. That is one of the challenges."

The Director of Technology Scouting went on to explain that IP was also an important issue when dealing with external partners:

"It is really kind of an interesting game because you can go in and say I have something interesting. You do not need to say concretely what your solution is. But that is really an art because you need to tell in a way we can think it is interesting and at the same time you are not giving anything away... It is really a tango. That is why it really requires the internal group. They have to have the competence to do that because you have to have the person to tango with. Otherwise you can never succeed."

Moreover, the technology scouting group needed to ensure they found appropriate external partners. As explained by the Director of Technology Scouting:

"First of all they have to meet the technological requirements and we look at kind of the history. If there is anyone we have had bad experience with before, then we do not want to try it again. Then we also look at their company structures, how is their economic situation, are their finances stable, is it a private owner company or is it a public one. Have they had experience working with another company or is this the first time?"

According to a project manager, the ideal partners would have been ones that had the technological capabilities that *Healthcare* was searching for plus did not have any associations with *Healthcare's* competitors. However, these types of partners were hard to find so project teams still did not have a lot of interactions with external partners as they were still worried about a repeat of past experiences that they had encountered dealing with outside partners. This was because of the

highly competitive environment that *Healthcare* operated in, combined with the uncertainties associated with innovation projects.

4.5 Critical performance variables at Healthcare

According to the Technology Department Controller, there were three main MCS which were used diagnostically in *Healthcare's* Technology Department: quality, speed of development (time-to-market), and cost. As *Healthcare* operated in the medical devices industry, quality of its products was paramount. A number of industry regulations governed the standards of quality that needed to be maintained. To ensure compliance with these standards, managers at *Healthcare* put in place a quality management system which included compulsory quality control tests and monitoring systems that all innovation projects went through. To ensure all products fully complied with the standards before they were launched in the market managers designed rules around quality based on the regulatory and industry requirements. Managers took quality standards seriously and ran a number of compulsory quality management training sessions throughout the year for organization members. It also conducted quality audits of suppliers and had internal processes to ensure that organization members followed the rules.

Secondly, time-to-market with innovative products was critical for the company to reach its goal of maintaining market share. Therefore, to ensure that innovation projects were completed in the shortest possible time *Healthcare's* managers put in place a diagnostic control in the form of a time-to-market schedule. This schedule set out a launch date for each project, which was used by managers to monitor a project teams' progress. As explained by the VP, management's logic for this approach was that giving project teams a launch date encouraged them to change their innovation and make better use of external collaborations.

Cost was also a critical performance variable for the Technology Department. As *Healthcare's* goal was to achieve profitable growth, managers expected all functions to stay within their cost allocations. As explained by the Technology Department Controller, innovation costs were managed through the quarterly forecasts. These forecasts were reviewed and updated on a monthly basis to ensure that the function was on track.

The VP suggested that top managers believed that they could not directly force project teams to collaborate with external partners if they were not motivated to do so. However, by establishing the quality, time-to-market and cost guidelines, the managers were able to encourage project teams to think outside their comfort zones to meet more ambitious launch dates. The quality, time-to-market and cost guidelines shifted the accountability for not achieving goals to the project teams. Top managers believed that in the future this added pressure would result in project teams using all available resources to complete projects faster.

4.6 Inter-relationships between MCS at Healthcare

We found that MCS were purposely designed by managers to support their drive towards open innovation. These MCS, though, also influenced the design and use of other MCS at *Healthcare*. For instance, the MCS that were used interactively, the roadmap, technology foresight database, and end user website, were influenced by the belief system as all project team members now had an end user friend from the '*meet the end user*' program whom they visited and interacted with on a regular basis.

Our data suggests that project team members' activities that changed were those that were made compulsory by managers. For example, managers made it compulsory for every organization member to have an end user friend that they had to interact with. Organization members then had to write and submit a report to management about their interactions. The reason that managers implemented the '*meet the end user*' program was that it was fundamental to their belief system as they had to meet the needs of the end users by improving *Healthcare's* product offerings and services. This program, which encoded the company's beliefs, became part of project team members' innovation activities. This led to a better focus on diagnostic MCS as project teams could better understand the needs of the end users and appreciated the need for urgency in product development.

On the other hand, when project team members had the ability to choose to follow the MCS to complete their assigned tasks, they usually chose not to follow the MCS. The consequence of this was that the majority of the project team members' innovation activities did not change in response to the strategic change. Thus, the dominance of closed innovation continued while the use of open innovation was limited to those activities that were explicitly mandated by the MCS. Most project teams continued to research and develop the products and services entirely in house using internal resources and personnel.

The innovation activities of project teams were influenced by the MCS designed to be used diagnostically (quality, speed, and cost) which top managers hoped would influence the drive to an open innovation strategy. These led to a high level of customer satisfaction and a dramatic improvement in time-to-market which were critical performance measures and key drivers for *Healthcare's* profitable growth goal. Thus, while the innovation activities of project teams may not have changed in the way that managers had expected the end results were in accordance with management expectations as they resulted in the organization achieving their goals.

The VP attributed this disconnect to the degree of uncertainty felt by project teams relating to the information they had to share with external parties. The extremely competitive environment that *Healthcare* operated in made it difficult for project team members to collaborate with external parties without a real threat of the information being leaked to competitors. The intensity of *Healthcare's* competition was included in its enterprise risk management guidelines, which was an integral part of the day to day operations of the company. Hence, all project team members were frequently made aware of the threat. However, there was a difference in opinion about *Healthcare's* ability to deal with this threat, which explained the disconnect and lack of change in project team members' innovation activities.

Managers believed that the MCS used to delineate boundaries were effective ways of dealing with external threats, allowing the project team members to collaborate with external parties when appropriate. However, the project team members continued to be uncomfortable working with external parties because they believed the MCS used to delineate boundaries did not eliminate all the risks. Their opinion was that to be able to collaborate with external partners, they first needed to work on building trust with these parties. This would take time and so the project team members thought it would be more effective if they just got on with the job in house and got results themselves. According to one of the project managers and the Director of Technology Scouting, this attitude was one of the key reasons for the continued use of the closed innovation strategy in *Healthcare* despite the changes to the MCS used to drive the strategic change to open innovation.

5. Discussion and conclusions

In this paper we build on the recent MCS literature on strategic change (Abernethy *et al.*, 2021; Simons and Davila, 2021) by treating operational changes as part of the strategic change process, as suggested by Mantere *et al.* (2012). To understand the changes taking place we interviewed all the actors that influenced strategic change at our case study company: top managers (change strategists) middle managers (change agents) and project teams (change recipients) as recommended by Kunisch *et al.* (2017). This enabled us to understand how the design and use of MCS, which are the tools designed and used by managers to support strategic change (Kunisch *et al.*, 2017), affect the innovation activities of project team members. We do this by drawing on Simons' (1995) LoC framework to examine the design and use of MCS by managers and the effect that they have on the innovation activities of project teams during strategic change (for a summary of findings see Table 2 below).

While we found that the activities project teams carried out did not substantially change, the project teams at *Healthcare* were influenced by the interactions between the MCS designed for open innovation which led to improvements in the way in which the closed innovation strategy was carried out in the company. Thus, *Healthcare's* goal to achieve profitable growth by developing and marketing life-changing products and services before competitors was successful even though the strategic change to open innovation was not.

Our findings shed new light on the idea of balance between the use of MCS to both “exert control over the attainment of goals and also to enable employees to search for opportunities and solve problems” (Mundy, 2010, p. 499). As Kunisch *et al.* (2017) note, for a balanced use of MCS during the strategic change process to take place requires the participation of many different actors. Top managers need to design MCS which middle managers can use to impact the operational activities of project team members. While *Healthcare's* top managers developed the infrastructure required for project teams to seek information from external parties, there was limited use of open innovation practices by organization members. By 2010 *Healthcare* only had a few projects since the open innovation change was implemented in 2007 where project teams incorporated external knowledge or technologies during product development. Thus, it may not be the external search that open innovation seeks that leads to successful innovation but the balance between the diagnostic controls and the other LoC at *Healthcare* which simultaneously produced appropriate amounts of searching, screening and implementation (Lauritzen and Karafyllia, 2019). This is because the diagnostic controls focus organization members' efforts on the attainment of goals, which can empower organization members to find new ways to influence the use of other controls which supported their closed innovation strategy and thus worked against the drive towards a strategic change to open innovation.

We also add to the research by Ferry *et al.* (2017) who argue that the relationship between interactive systems and diagnostic systems as well as beliefs and boundaries is important for strategic change to take place. We show that while these systems did not lead to a strategic change the interactions between all the LoC did enable the company to achieve their goals. This builds on Simons' (1995) theorizing by highlighting how the interrelationship between all the LoC can still support positive organizational outcomes even when strategic change does not take place.

Table 2: Innovation Management Issues and MCS at *Healthcare*

Strategic Constructs	Innovation Management Issues at <i>Healthcare</i>	Levers of Control	MCS at <i>Healthcare</i>	Effect of MCS on project team members at <i>Healthcare</i>
4.1 Strategic uncertainties	Innovation management at <i>Healthcare</i> had strategic uncertainties around technological developments by competitors and changes in end user needs that impacted <i>Healthcare</i> 's profitable growth prospects.	Interactive controls “Focus attention on strategic uncertainties and build internal pressure to break out of narrow search routines, stimulate opportunity- seeking and encourage the emergence of new strategic initiatives” (Simons, 1995, p. 59)	MCS at <i>Healthcare</i> designed to build internal pressure to break out of narrow search routines, stimulate opportunity- seeking. <ul style="list-style-type: none">- Roadmap- Technology Foresight Database- Data posted by end users to a company Website	Even though these MCS were designed to support open innovation they also supported the closed innovation activities of project team members. These MCS were influenced by the beliefs and in particular the ‘meet the end user program’ as now all project team members had an end user friend.
4.2 Core values	For <i>Healthcare</i> these core values were designed to help employees understand the needs of users and respond by finding new ways to do things better. Maintaining customer loyalty and trust were critical for <i>Healthcare</i> as customer needs were very personal in nature and hence the customers needed to be able to trust the products and services they were using.	Beliefs “The use of control practices to communicate and reinforce systematically the basic values, purpose, and direction for the organization.” (Simons, 1995, p. 34)	MCS which communicate and reinforce systematically the basic values, purpose, and direction <ul style="list-style-type: none">- Mission: make life easier for people with intimate healthcare needs.- Vision: setting the global standard for listening and responding.- Values: being focused on customers as well as colleagues.- These values were executed in the company through<ul style="list-style-type: none">o Meet the end user’ programo Employee catalogueo Specialist academy	Beliefs were used to influence project team members to include the idea of searching and incorporating external knowledge or technologies into their innovation processes. However, the Beliefs also supported some of the reasons to continue closed innovation activities.
4.3 Risks to be avoided	Valuable information leaking to competitors allowing them to capitalize on it by taking away <i>Healthcare</i> 's market share Refer to Figure 4 for examples of risks identified under the enterprise risk management program.	Boundaries “The use of control practices to delineate the acceptable domain of activity for organizational participants and establish limits, based on defined business risks, to opportunity seeking” (Simons, 1995, p. 34)	MCS which delineate the acceptable domain of activity for organizational participants and establish limits, based on defined business risks <ul style="list-style-type: none">- Rules on non-disclosure- Enterprise risk management program	These Boundaries had a strong influence on project team members as the competitive environment that <i>Healthcare</i> operated in made it difficult for them to collaborate with external parties without a real threat of the information being leaked to competitors.
4.4 Critical performance variables	Product quality Speed (time-to-market) Cost (product and development)	Diagnostic controls “The formal information systems that managers use to monitor organizational outcomes and correct deviations from pre-set standards of performance” (Simons, 1995, p. 59)	MCS which monitor organizational outcomes and correct deviations <ul style="list-style-type: none">- Quality management process- Time to market schedule- Quarterly forecasts- Stage and gate innovation system- Cross functional teams	The other MCS supported Diagnostic controls to motivate project teams to develop high quality products that met customers’ needs in less time which enabled <i>Healthcare</i> to improve performance even though project teams were still using a closed innovation strategy.

In line with Bergman *et al.* (2009) who show that a move to open innovation requires the design and use of more MCS. We found that the top managers at *Healthcare* designed and used a number of new MCS when they started their strategic drive to open innovation. Top managers then needed to respond to the resistance to the changes that took place which has also been highlighted in the literature as a potential issue (Kunisch *et al.*, 2017). In particular, the resistance of the project teams in the Technology Department, who did not understand the change. This was due to the strong belief among project team members that they had the required resources and competences to undertake innovation themselves without any outside assistance, which has been documented in the open innovation literature (Chesbrough and Crowther, 2006; Chesbrough, *et al.*, 2006; Lauritzen and Karafyllia, 2019; Van der Meer, 2007; West and Gallagher, 2006).

In order to change the innovation culture at *Healthcare* the structure of the Technology Department was changed to support project teams to be more open to external opportunities. The importance of culture in the design and use of MCS has been documented in the management accounting literature (see for example, Akroyd *et al.*, 2019; Chenhall and Euske, 2007; Dent, 1991). Thus, the design and use of MCS could provide a means for strategic change to take place through altering the structure and culture by helping collectives of individuals and organizational units who may share only partially congruent goals, gain cooperation (Bisbe and Otley, 2004; Luft, 2016; Mahama, 2006; Ouchi, 1979).

In practical terms, *Healthcare*'s drive for a strategic change from closed to open innovation began with a recommendation from a consulting firm. This caused internal resistance as the strategy had not emerged from organization members and was not supported by their past experiences. For this reason, the project team members could not understand the reason for the strategic change to open innovation. This led to a disconnect between the purpose of MCS and the effect that they had on operational activities. Project team members also had to make sure that information remained confidential which they argued was more difficult with an open innovation strategy. As noted by Bogers *et al.* (2019) it is important that an organization does not let ideas get out as it could cause them to lose competitive advantage. In the case of *Healthcare*, their main competitors were all within a few miles of their Technology Department. Thus, a practical reason for the failure of the strategic change process could be economic geography. It has been argued that it is important to take economic geography into consideration as there is a relationship between the "knowledge creation of individuals/communities, the knowledge coordination of organizations, and the spatial–institutional contextualization of knowledge" (Manniche *et al.*, 2017, p. 481). This is something that could have influenced project teams at *Healthcare* and is important for an organization moving to open innovation to understand.

In conclusion, the aim of this paper was to understand the effect that MCS have on innovation activities during strategic change in an innovation setting. As with previous research our case study findings show that MCS were designed and used by managers to deal with the challenges presented by the strategic change (Abernethy *et al.*, 2021; Simons and Davila, 2021). We build on these findings by expanding on the definition of strategic change to include operational activities. We show why the design and use of MCS by managers will not always lead to the successful implementation of a strategic change at the operational level. Instead, we found high levels of resistance to the strategic change which resulted in few changes to innovation activities. We also found that the MCS designed to be used to drive open innovation activities interacted in a way that helped organization members collaborate with others in the company. Thus, while the MCS did not lead to any inter-organizational relationships they helped organization members to create more

connections within the company which solidified the closed innovation strategy. This could have been because the MCS helped project teams to improve information flows (Davila, 2000; Henri and Wouters, 2020; Müller-Stewens *et al.*, 2020), which we know can improve the performance of closed innovation activities, resulting in improved performance by promoting goal congruence (Akroyd and Maguire, 2011; Kennedy and Widener, 2019).

We show that the design and use of MCS over a four year period influenced the perspectives of the project team members in relation to the need for urgency in product development and motivated them to be perform better. The MCS though did not change the project team members' perspectives in relation to the use of open innovation activities as few projects at this point in time included ideas from outside the company. This shows that while MCS can both supply the necessary information and motivate goal congruence towards organizational goals it may not be because the strategic change has been successfully implemented.

Future research could focus on understanding the relationship between the dynamics of strategic change and organizational outcomes by combining both the micro strategic change process as well as the macro organizational outcomes in other contexts. Research could also examine if MCS used in a coercive way have different effects on operational activities than MCS used in enabling ways (Ahrens and Chapman, 2004). In our case study we saw that enabling agents motivated others in the company to consider seeking and incorporating external knowledge into their innovation projects. While it did not lead to the expected changes it still resulted in positive organizational outcomes. This idea could be examined in more detail with studies on how MCS can lead to unexpected positive effects on other organizational innovations which involve other functions or sectors.

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