The Temporal Effect of Organizational Controls in an Uncertain Environment

Abstract

In this paper we explore the effect of organizational controls in an uncertain environment by focusing on their temporal dimension. We do this by examining a product innovation setting, which is difficult to control due to fast changing customer preferences and competitor actions. We focus on how the timing of two organizational controls – accounting-based budgets and operational-based roadmaps – influence mangers' actions. We show how these controls creates a space for the knowledge of managers to be made actionable thus influencing the tempo (timing and intensity) of product innovation activities. We carry out this research using a case study of Buffalo, a Japanese firm who is a market leader in the highly competitive computer peripherals market. Case study data was collected at Buffalo over a two-year period and included observations, interviews and company documents. We follow the situated practices of marketing managers who were accountable for the accounting-based budgets and product development managers who were accountable for launching products according to the operational-based roadmaps. At the start of the financial year budgets and roadmaps were linked as managers developed them simultaneously. During the year the budgets and roadmaps became disconnected when product development projects were delayed or when there were changes in the market. This opened up a space for the knowledge of managers to become actionable, thus influencing the tempo (timing and intensity) of product innovation activities. This facilitated organizational control and empowered managers to respond quickly to their highly competitive and uncertain environment.

Key words: Organizational control, Product innovation, Time, Space, Budgets, Roadmaps

Introduction

This paper explores the temporal dimension of organizational controls[1] in a product innovation setting. Many organizations view product innovation as a major source of differentiation and competitive advantage (Brown, 2008; Goto, 2009). New product innovations are not an accidental or exogenous event, but rather an organizational capability dependant process which consists of not only identifying and developing an idea but also transforming it to create value (Davila, 2005). Product innovation activities often take place in highly uncertain and competitive environments influenced by both internal and external pressures (Chapman & Hyland, 2004). The activities carried out in this setting are shaped not only by organization processes (Curtis & Sweeney, 2017) but also by organization members as they interpret and adapt to changing market conditions (Kodama, 2005).

Management accounting research has shown that organizations use controls to facilitate their ability to respond flexibly to their environment (Frow et al., 2010; Moll, 2015; Simons, 1995) which enables them to benefit from their innovation activities (Bedford, 2015; Bisbe & Otley, 2004; Jørgensen & Messner, 2009). In this paper we explore how the temporal dimension of accounting-based budgets and operational-based roadmaps creates a space for product innovation to emerge through their effect on the tempo (timing and intensity) of product innovation activities. According to Becker and Messner (2013: 157) "how organizations cope with the tension between timing that is accounting driven and timing that follows the requirements of operational activities is still poorly understood." This has recently been emphasised by Moll (2015) who argues that the interplay between management accounting control processes and product innovation control processes needs more research.

We examine the temporal dimension of accounting and operational controls in a product innovation setting through a case study of Buffalo Technology (Buffalo), a Japanese computer peripherals company who operates in a highly competitive and uncertain environment. We show how accounting-based budgets and operations-based roadmaps were used to manage the performance of different functions within the organization. We found that the interactions between these organizational controls opened up a space for the specific knowledge of organization members to be made actionable which influenced the tempo (timing and intensity) of product

[1] We define organizational control as the set of many formal and informal controls that are used by management to achieve organizational goals (Chenhall & Moers, 2015)

innovation activities.

The remainder of this paper is organized as follows. In the next section we review the literature which informs our theoretical perspective. This is followed by an overview of our case study site and data analysis methods. Our research findings are then presented followed by a discussion and some concluding comments.

Literature review

This section reviews the literature on temporality and the use of organizational controls in a product innovation setting. We then introduce our theoretical perspective which helps us examine temporal issues in organizations.

Accounting and temporality

The temporal dimension of accounting been addressed in the literature and shown to be an important part of many organizational practices (Chambers, 1989; Ezzamel & Robson, 1995; Giuliani, & Skoog, 2018; Hopwood, 1989; Loft, 1995; Nandhakumar & Jones, 2001; Parker, 2004; Takatera & Sawabe, 2000; Ushio & Kazusa, 2013). Understanding the effect that the time has in organizations matters because it focuses us on the "particulars that make knowledge actionable - what to do, at what point in time, in what context" (Sandberg & Tsoukas, 2011: 342). It has also been noted that by removing time from theoretical accounts empirical research often abstracts away from the flow of organizational life (Sandberg & Tsoukas, 2011) which hides "the nature and dynamics of accounting in its socio-cultural context" (Komori, 2015, p. 154). Orlikowski and Yates (2002) argue that temporal artefacts create social processes which establish timings that shape ongoing organizational practice. Collective action requires the alignment of the timing of activities in order to develop situated practices that other organizational members can understand.

Two conceptions of temporality have been presented in the literature - clock-based chronos time and action-based "kairos" time. Smith (1969: 1-2) notes that "chronos—expresses the fundamental conception of time as measure, the quantity of duration, the length of periodicity […]. The questions relevant to this conception of time are: "How fast?", "How frequent?", "How old?" and the answers to these questions can be given, in principle at least, in cardinal numbers or in terms of limits that approach these numbers. Another concept of time—kairos—points to a qualitative character of time, to the special position an event or action occupies […]. The question

especially relevant to kairos time is "When?", "At what time?" Kairos, or the "right time", as the term is often translated, involves ordinality or the conception of a special temporal position […]." Thaler (2014: 534) notes that Smith (1969) presents three important aspects that set Kairos time apart from Chronos time. These are its perception of the "right time for action as opposed to any possible time", understanding when a "critical point has been reached", and the way in which it opens up an "opportunity for extraordinary action that would otherwise be impossible to undertake."

Jackson et al. (2011, p. 252) note that time is an evolving and durable object of organizational life. Timing establishes structures that can be steady or disjointed, tied to specific events, or emanate from complex and long-term factors (Ancona et al., 2001; Jackson et al., 2011). But they can also conflict with each other creating organizational tensions (Jackson et al., 2011). The manner in which such tensions are resolved may be deeply embedded in the structures that govern collaborative practices (Jackson et al., 2011).

Miller (2001, p. 393) adds to this by showing that "accounting accords a specific type of visibility to events and processes." Ancona and Chong (1996) show that budget-based control can provide regularity for organizational activities as it is based on clock-based time. The timing of product development activities, though, may require an action-based "kairos" time perspective as it requires activities to be done at the right time, at a critical point, opening up an opportunity for action (Thaler, 2014) so as to provide a space for new product strategies to emerge (Boyd & Madzima, 2017).

Accounting control and performance management

Accounting-based budget control has historically been viewed as an important organizational control mechanism because of its ability to act as a means of hierarchical command-and-control to implement planned strategy (Anthony, 1965). Hopwood (1972) was the first to examine the non-technical issues of budgeting with a focus on its effect on the behaviour of managers when used for performance management (Chapman, 1997). Subsequent research has highlighted how budgets can constrain idea creation, learning, and innovative capabilities (Brown, 2008; Emmanuel et al., 1990; Hope & Fraser, 1997; Merchant, 1990, 1997; Van der Stede, 2000) and can inhibit the ability of firms to adapt to unforeseen changes in their environment (Hope et al., 2011; Welbourn & Fathers, 2014). As a result, the use of budget control has been argued to be

unsuitable in highly uncertain product innovation settings (Ekholm & Wallin, 2011; Hope & Fraser, 2003).

Otley (1999), though, argues that we should not disregard the advantages of budgets. This is because budgets are an important part of organizational design and can help firms adapt to the ever-changing demands placed upon them and deliver against expectations set for them by many different groups (Chenhall & Moers, 2015; Merchant & Otley, 2007). Frow et al., (2010: 445) for example show how continuous budgeting can "avoid the inherently restrictive nature of budgetary control by enabling managers, when confronted by unexpected events, such as problems with the preparation and launch of new products, to consider, and if necessary implement, a revision of plans and reallocation of resources in pursuit of strategic organizational objectives." Even when budget targets are fixed Sandalgaard and Bukh (2014) illustrate that a budget still allows managers a lot of flexibility in how they achieve budget targets. This was noted by Hopwood (1972) who argued that since budgets can only capture the outcomes of organizational process managers can still control the activities giving rise to financial outcomes.

This enabling role of budgets has been highlighted by Ahrens and Chapman (2004, 2006) who explore how managers use of budgets combined with their local knowledge and experience allowed them to change their work practices in order to reconcile budget-based performance measures with local contingencies. However, in this situation managers did not have the ability to influence organizational strategy so they could only work towards making the formal strategy work through adapting their local practices. For this reason they faced ‘‘potentially harsh hierarchical control" (Ahrens & Chapman, 2006, p. 10).

Frow, Marginson, & Ogden (2010). On the other hand, explore how control and flexibility can be reconciled through the use of continuous budgeting. The idea of continuous budgeting is that the budget can be adjusted to take into consideration the changing external environment which in their case organization enabled managers to change their plans and expectations. In continuous budgeting, however, the budget is adjusted to take into consideration the changing external environment and is thus not a signal of performance.

Control in product development

Product development is often managed with formal control processes such as project milestones, reports comparing actual to plan, project budgets, project selection processes, project team

guidelines and product roadmaps (Davila & Foster, 2007, Davila et al., 2009). While these operational controls are often integrated into a holistic product development stage-gate process (Akroyd & Maguire, 2011; Hertenstein & Platt, 2000; Jørgensen & Messner, 2009) many firms only implement a subset of these operational controls (Davila & Foster, 2007, Davila et al., 2009). In the computer industry, for example, the use of product roadmaps is common as it helps organizations coordinate with technology roadmaps which have been around since the mid 1990's (Flamm, 2017). In the accounting literature Miller and O'Leary (2005, 2007) examine how organizations use technology roadmaps to better understand how they can link their assets to those of other firms to manage uncertainty. They show that roadmaps can be used to coordinate and establish congruence between individual investment decisions and overall organization strategy. This is because an organization may not know which of the new products they are currently developing will be successful and thus they need to focus on a larger portfolio of products. A 'system of assets' view can help a firm manage product proliferation and thus reduce the complexity of the situation. Miller and O'Leary (2005, 2007) argue that roadmaps coordinate designs to link with customers and firms with complementary products. Thus, firms operating in this industry aim to develop new products which consist of an extension to an architecture where the main benefit is the speed at which high volumes can be achieved in a short period of time.

Theoretical perspective

In order to explore the temporal dimension of accounting and operational controls we examine the situated practices of organization members in their particular setting (Garfinkel, 1967, 2002, 2005, 2006; Rawls 2002, 2005, 2006, 2008). By focusing on the practices of organizational members we can see how time is both experienced and accounted for in their everyday activities. This is because time exists as part of the relationship between ongoing interactions and is thus a feature of situated practice (Rawls, 2005). This understanding of the relationship between time and situated practices allows us explore how clock-based "chronos" time and action-based "kairos" time enables organization members to use their local knowledge to see when a critical point has been reached which opens up an opportunity for an action that they would not otherwise be able to take. This helps us understand how organizational members create and maintain their situated practices thus giving us insights into the meaning they give their practices through their local knowledge as these practices require judgment, improvisation and even artful work on an ongoing basis (Garfinkel,

2002).

Our aim in this paper is not to develop a social theory about the temporal aspect of organizational control as our research is grounded in the situated practices found in our product innovation setting rather than in relating social theories to these practices (Garfinkel, 2002). Instead we attempt to place the particulars that make the local knowledge of organization members actionable within a product innovation setting as "conventional conceptions of time are about social order, but they are not of it" (Rawls, 2005, p. 164).

Case study setting

Buffalo has been in business for about 40 years and has about 400 staff with annual sales of about ¥100 billion (£660 million). Buffalo is a subsidiary of Melco Holdings which is publicly traded on the Tokyo Stock Exchange. Buffalo operates in the computer peripherals market and develops and sells computer components and broadband equipment worldwide. Manufacturing was outsourced to firms in the local area. Many of Buffalo's products are the market leaders in Japanese and one is the worldwide market share leader.

Buffalo had a business headquarters (HQ), a sales division, a technology management department, a quality control department, a customer service (CS) department and an administration department. Within the business HQ were four strategic business divisions and a manufacturing department. Each of the business divisions had its own marketing and product development groups which managed a number of product categories. The manufacturing department was responsible for component parts procurement and the manufacturing schedule.

Each of the business divisions concentred on a specific segment of the computer peripherals market. The memory business division developed memory modules and flash memory devices such as USBs and SD cards. The storage business division developed storage devices such as hard disk drives. The BBS (Broadband Solutions) business division developed network devices such as LAN adaptors and wireless communication devices. While the NB (New Business) business division developed products that linked new technologies in the home such as NAS (Network Attached Storage) and digital TV set top boxes. The marketing members in each business division managed product categories and were responsible for meeting budget targets for both current and new products. Product development members planed and developed new products and were responsible for meeting the development schedule set out on the roadmap.

In order to understand the effect that temporal dimension of organizational controls had on the situated practices of organization members at Buffalo the authors carried out interviews, observed innovation meetings, and collected documents over a two year period (see Table 1).

Table 1: Case Study Data

Interviews	**61.4 hours**
Senior management	3 hours
Head office staff	4 hours
Sales managers	4.9 hours
Marketing group	18.5 hours
NPD group	31 hours
On-site observations	**3 days**
Documents	**106 pages**
NPD documents	86 pages
Administration	16 pages
Organization chart	4 pages

Note: All date was collected between July 2007 and October 2009

In total 39 interviews were conducted, with ten interviews involving more than one employee. All interviews were carried out in Japanese and transcribed into English (all the authors are bilingual in both English and Japanese). The interviews focused on the management of product innovation Buffalo which centred on the firms' budgeting and roadmapping processes. The interviews ranged from 50 minutes to 150 minutes in duration, with a total of 61.4 hours of interviews with senior management, head office staff, sales managers, division group leaders and personnel from each division's product development and marketing members (for a complete list of interviews see Appendix 1). In addition to these interviews the authors observed product innovation related meetings and activities, and collected a number of product innovation related documents from the firm. The interviews, except for the first three interviews and meeting observations, were taped and transcribed.

The data was analysed jointly by the three authors throughout and following the two year data collection period. This involved becoming immersed in the interview data by reading and re-reading the transcriptions followed by writing up notes and case descriptions (Witzel, 2000). Observations and internal company documents were then used to re-analyse the case descriptions so as to triangulate the findings (Modell, 2009). In the following section we report on the findings of our analysis.

The product innovation setting at Buffalo

The aim of this section is to outline the product innovation setting which Buffalo operates in. This includes the Buffalo's competitive environment, organizational controls, the annual planning process and their product development process.

Buffalo's highly competitive and uncertain environment

The marketing group leaders described Buffalo's competitive environment as being "turbulent" because there are "a lot of competitors" in the market. They also said that "uncertainty is high" because "it is difficult to predict market growth rates" due to changes in customer preferences. According to a marketing group leader one of the central aims of Buffalo was to gain market share by being the first to market with innovative new products. This was based on the knowledge that they would not be the market leader if they could not deliver innovative products on time, due to products having short life-cycles. According to a product development group leader "I understand the importance of new product launch timing. I understand that because of a delay of only half month or a month, market share may be taken by a competitor. Timing is very important." At the same time there was intense competitive pressure to cut the cost of current products due to narrow profit margins. According to a marketing group leader an assumption built into Buffalo's product development process was that "timely product changes were necessary to increase profitability."

Organizational control at Buffalo

The two mechanisms used at Buffalo to manage product innovation were; budgets which included sales[2], profit margin[3] and market share[4] targets and; product roadmaps which set the development schedule for both current product improvements and the new product plan. According to a marketing group leader "the roadmap acted as the action plan and a coordinating mechanism between the marketing and product development members".

A product roadmap was prepared by the marketing and product development group leaders for each product category. It included details about all current products such as product specifications, the product concept, price and monthly sales as well as the new product plan, with launch dates,

[2] Sales information came from the internal shipping information which was updated three times per day.
[3] The profit margin used at Buffalo was a gross profit margin percent (revenue – (cost of goods sold/revenue)).
[4] Buffalo bought information about market share based on POS (Point of Sale) technology used by all major Japanese retailers from two separate companies.

product specifications, product concept, expected financial performance and staff assignments which were used to coordinate the project schedule. The roadmap could be changed at monthly management strategy meetings where it was reviewed and approved by the senior managers. This allowed new product development projects on the roadmap to be adjusted when necessary.

A budget for each product category was prepared by the marketing group leaders and approved by senior management prior to the new fiscal year. The senior managers required that budget targets were stretch targets and the marketing group leaders needed to show that they could only reach the targets through the introduction of new products. According to a marketing group leader;

> "I have to consider new products which become the pillars of sales for the next fiscal year, because sales targets which I can reach with existing products will not be approved by senior management."

Once the budget had been approved the budget targets were fixed and could not be changed during the first half of the year. Prior to the start of the second half of the year, minor budget revisions were possible with senior management approval. According to one of the senior managers:

> "it took half a year to absorb the noise caused by seasonality and changes in trends… if the feedback time was shorter than half a year and the budget changed frequently, the fluctuation of the performance due to the noise in the data would be too large."

Because senior managers believed that it took at least six months for performance patterns to be captured so marketing group leaders were responsible for meeting these targets for each six-month period.

The annual planning process: constructing budgets and roadmaps

The marketing and product development group leaders in each of Buffalo's business divisions started the annual planning cycle by gathering information and exploring opportunities around the availability of new components using technology roadmaps and their knowledge of the market. This resulted in a list of new product ideas which were considered by marketing group leaders

during the budgeting process.

Budget construction started with marketing group leaders forecasting sales, profit margin and market share for current products listed on each of the product roadmaps.

> "First, when I prepare the budget I presume that the existing product line-up continues. For the existing line-up, I consider whether market share will increase or decrease, whether market size will go up or down, whether costs and prices will go up or down."

The new product ideas that the marketing and product development group leaders developed were then considered. This included an initial analysis of component availability dates and price trends which were used to calculate the expected market price for the new product ideas. According to a marketing group leader;

> "I then consider what new products to launch and when I will launch them… what I will do to grab more market share in low-share product markets. As a result, the market share target is set and sales units are calculated by multiplying market size and share target. Then I prepare the sales budget by multiplying sales units and expected price."

The development of the budget and roadmap for each product category was an iterative process as the products listed on the roadmap had to enable the marketing group leaders to reach the budget targets.

The product development process at Buffalo

The product development process at Buffalo started with a concept design review meeting. This meeting was jointly led by the marketing and development group leaders. This meeting focused on areas such as marketability, feasibility, and profitability. If the group leaders decided to proceed with the project the product development group leader would write up and submit a 'Plan Sheet B' while the marketing group leader wrote up and submitted a 'Product Concept Sheet'. These planning documents included the expected sales price, product cost, monthly sales unit forecast, monthly sales forecast, development cost, target customer, specifications, competing products, schedule, product concept, selling point, positioning and components needed for the product. The

'Plan Sheet B' set out the product development schedule while the 'Product Concept Sheet' showed how the product would fit the market needs and thus help the marketing group leaders reach their budget targets. The marketing group focused on the budget, while the product development group focused on the schedule on the roadmap. According to a product development group leader;

> "The budget is important for [the marketing group leader]. The schedule is important for me. I focus on development progress... We in the product development group just ask when and how [the marketing group leader] would like to prioritise the launch… Although some say that we, the development group, have to work towards the sales budget, I think that we should not be side-tracked by giving it too much attention"

Thus, it can be seen that the product development group has no interest in the budget, as they were focused on keeping product development projects on the schedule set out on the roadmap. The product development group used the predetermined roadmap schedule to order its activities. But, if all product innovation activities followed the product development group's way of doing things, new products would only be developed from the original product development plan without adapting to environmental change. This would have had a negative impact on Buffalo's performance as the market was highly competitive and uncertain.

The situated practices at Buffalo

This section presents the situated practices of organization member in Buffalos product innovation setting to show how the temporal dimension of accounting and operational controls not only enables the measurement of product innovation performance but also creates a space for the knowledge of organization members to be made actionable thus influencing the tempo (timing and intensity) of product innovation activities.

The situated practices of marketing group leaders

Each marketing group leader in Buffalo was responsibility for the performance of both new and existing products within the product category they managed. The marketing group leaders were accountable for sales, profit margin and market share targets. These targets were set in the budget

and used for performance evaluation which took place every six months.

Every morning the marketing group leaders checked the sales, profit margin and market share performance. They carried out variance analysis by comparing monthly actual sales, profit and market share performance against the budget estimates. The marketing group leaders identified problems and clarified the issues they were facing by first doing actual-budget variance calculations, and then by comparing the initial strategy and action plans with the variances. To resolve the problems and overcome the issues, with the aim of meeting the budget, innovation activities were critical. Marketing group leaders stated that:

> "To meet budget, I need to design and sell new products. I test whether or not I have been successful through the sales performance report… after all, if I do not reach budget, I have not been successful…So I have to consider what to do."

> "I need to make up for any shortage (to budget target) with something. Although we have a high market share here in Japan, there are still a lot of things we can act on. For example, if there is a shortage of 1 billion yen, we can develop new products which will earn 1 billion yen or enter a new product market."

> "(When variance from budget occurs,) I can react by cutting the price so I can make more sales rather than profit, or by developing a new product which will increase sales. These are the things I control."

> "If profit margin is not earned...I have to consider how I can earn a higher profit margin. Do I reduce cost or not? Can I reduce cost of current products? Or do I need to introduce a new product? I consider all these options, and I plot and revise the roadmap, or incorporate my ideas into the projects on the current roadmap. I keep checking during all my activities."

This shows that there were various corrective actions that the marketing group leaders had learned based on their context specific knowledge. Corrective actions included analysis of parts procurement and manufacturing or changing the marketing strategy so as to enhance competitiveness - such as a price reduction. In the case of product concept problems, the current

roadmap plan was reconsidered along with the new product development strategy which was revised to adapt to market needs.

They also carried out consumer need analysis, examined product pricing, managed inventory levels and took part in new product planning activities. Once a month they presented performance reports to senior managers at business strategy meetings to show how they were progressing in relation to their budget targets. If the results showed that they were not likely to meet the targets in future periods, the marketing members had to identify the reasons and take steps to correct the situation.

In this way, accountability for budget targets created the social reality of the marketing group leaders' everyday activities. The budget affected the actions of the marketing group leaders who viewed innovation activities as the only way for them to meet their budget targets.

Situated practices of product development group leaders

Product development group leaders in Buffalo were responsibility for both improving existing products and developing new products within their product category. They were accountable for getting products to the market on time as set by the roadmap schedule.

Every morning the product development group leaders checked the progress of product development projects in relation to the roadmap schedule. They also carried out product planning, development of new products and improvements to existing products as well as technology scanning activities. If there were delays which affected their ability to meet the schedule on the roadmap, the product development group leaders had to identify the reasons and take steps to correct the situation. They would then provide updates to marketing group leaders.

In this way, accountability for the roadmap schedule created the social reality of the product development group leaders' everyday activities. The roadmap affected the actions of the product development group leaders who viewed innovation activities as the only way for them to achieve the roadmap schedule.

Disconnect between budgets and roadmaps

However, in reality unexpected events took place. This is because the development of new products is not easy to plan and carry out. For example, a product development group leader mentioned that produce development projects often faced delays:

"Product development does not always proceed as scheduled. Parts are not available as scheduled, for example, once a new faster chip was not launched on time. In some cases there are delays which we cause."

As a result of a delay in the development schedule of a new product on the roadmap, expected sales and profit margin may not be realized. Even when this happened the marketing group leaders remained focused on meeting their budget targets. According to a marketing group leader;

"After the fiscal year starts, I have to meet the budgeted amount. It does not matter if I do not meet budget for each product category as long as long as I meet the overall budget targets. Even though I prepared a schedule, if development of new products is delayed, I have to recover [the sales, profit and market share] with a different product. I can change strategy and adapt to the circumstances. For example, although I am going to strive during the winter season with a certain product line-up with certain prices, if one of the new products is not launched, I will just change the [product] line-up."

Thus, the roadmap lost its connection to the budget when the marketing group leaders could see that the product development projects on the roadmap were not going to enable the firm to reach its budget targets. When this happened, it created a space for the knowledge of the marketing managers to be made actionable which influenced the tempo (timing and intensity) of product innovation activities. This resulted in new products strategies being developed which resulted in new product development projects with the aim of synchronizing the roadmap with the budget.

An assessment of the differences between the roadmap and its consideration of action for regaining synchronization was needed to adapt to the budget. According to a marketing group leader;

"To be blunt, sales will come in under budget if nothing is done… This is caused by not launching a new product. But even if a planned product is launched, sales might not be as high as expected. Another possible reason could be that although units of X (a product category) increased, the price of Z (other category in this division) may fall significantly which could still cause a shortfall."

Thus, interruption of the roadmap was recovered in the short term by developing new product strategies which involved new product development projects with new concepts which helped to synchronize the roadmap with the budget. A marketing group leader stated that:

> "I received a request for a [product] from the Asia-pacific region. I judged that there was also a need in the Japanese market. When I thought back, all these [products] had the same construction. So I thought that we could open up and create a new market by launching the product that had a [different construction]."

As the above quote shows, marketing group leaders used ideas from many different markets. The example described above occurred because a space was created for a new product strategy which allowed a new innovation to emerge from discussions between marketing and product development group leaders as they attempted to re-synchronize the roadmap with the budget.

If market conditions were stable the budget and the roadmap schedule would remain synchronised but in reality, the timing of the budget was kept mechanistically following the yearly budget cycle, while the product development schedule followed the roadmap which was often interrupted by events such as the delay of software development, components and component prices which affected product development projects. For example, if component prices did not decrease at the expected rate it could lead to product development projects being halted until they were able to meet the cost specified in the product planning documentation (Plan Sheet B).

These events influenced the ability of the projects on the roadmap to enable the firm to reach their budget targets causing the budget timing and the roadmap timing to lose synchronization. The only way to re-synchronize the roadmap with the budget was through discussions between the marketing group leaders and product development group leaders about new product strategies which would enable the marketing group leaders to meet their budget targets. Thus, the temporal difference between the budget and roadmap opened a space for the knowledge of marketing and product development group leaders to be made actionable in order to keep Buffalo on track and profitable and to facilitate and empower operations.

Synchronization of the budget and the roadmap

As shown above, marketing group leaders were very concerned about meeting budget targets, in particular the yearly and half-yearly targets, as they were used to evaluate their performance. Monthly milestones also influenced the daily activities of marketing group leaders as they had to report to senior management at monthly meetings where budget targets were analyzed and where the roadmap could be updated. Daily budget milestone were used as a tool for early problem detection. According to a marketing group leader, product strategy was formulated and new products were developed to meet budget targets.

> "I design and sell to meet budget… The budget puts a lot of pressure on me as budgets have deadlines. I have to launch the new products at the planned time. To do so, I have to meet the deadline. I do a design check, I then propose a plan. If I do not check this there will be launch delays. If there is a launch delay I may not reach the budget."

The budget targets acted on the everyday activities of the marketing group leaders, but the only way for them to act was to utilize the roadmap which could only be adjusted at monthly management meetings. While the budget created a reason to act it was the roadmap which created an opportunity for action. This enabled creative activities to emerge or be made possible so that managers could adapt flexibly to the budgeting targets through their everyday activities.

While the temporal dimension budgets and roadmaps created a space for marketing group leaders to create new product strategies they could only formulate new product ideas. To make these ideas actionable they had to persuade the product development group leaders and senior management that it was the "right time" to act. The marketing group leaders stated that:

> "The easiest way to persuade is to use numbers. For example, it is beneficial to launch earlier than competitors, because if we do not launch early we may lose market share because we cannot sell at the expected volume and price. This makes it easier to understand."

Marketing group leaders talked about how they were accountable for sales targets set out in the budget and the achievement rate when they were trying to persuade other organization members of their plans. The product development group leaders stated that:

> "When we form a plan… we have to make a schedule to finish the development according to the schedule as we have to make a profit. If we delay launching a new product we have lost an opportunity to make money."

Thus, development group leaders understood they were accountable to produce products on time in relation to the schedule on the roadmap which was influenced by the marketing group leaders' accountability which was dictated by the budget control cycle and budget targets such as sales, profit margin and market share.

Example of a temporality within a situated practice in a product innovation setting

One of the product group leaders gave us the following story which we present here as an example of how temporality influenced the situated practices in a product innovation setting.

> "The NAS product concept idea came from for the wireless router base with the addition of a hard disk which was a product of the NB Division based in Tokyo. We thought 'why don't we combine them into one product – if we could do it cheap'. A router (from the BBS Division) with a memory chip (from the PCC Division which is in Nagoya). This would enable us to get the functionality of a NAS with the simplicity of our current knowhow. The idea came from us getting together informally to talk about innovation ideas. But we then we had to find resources (people) to do the project. We aimed for the winter sales period (8 months from the start of the project) but we missed the deadline by 4 months – as the project took us 12 months. It was behind schedule because we had to get it to work on many different computers and so needed to have a wide specification which had to be programmed. We launched it with old chips because they are hard to change. It ended up only 3,000 yen more than a normal wireless router. It is Buffalo's first hyper speed router with a hard disk. Wireless routers are still growing as a category but they will peak soon so we will have to find growth in other places. At the start of the project we talked to the BBS group leaders and the BBS group leaders talked to the NAS group leaders and they were happy. BBS and the NAS firmware team did all the work. Marketing was a bit worried about what would happen but did not put up a fight. The concept stage was concentrated on the firmware (software) and we all talked about the functions. This is where we usually

battle but this time it went smoothly. The R&D people did drop a number of features though. The budget target is important but because we are in tough economic times – the base sales is the number of units based on an expected market share. We use that to calculate a market share number. Even if I do not reach the sales budget number, if I can show that I increased market share then I have a good argument to present to top managers. Once a project is on the roadmap the product development group manage the product. Marketing rates projects from the ones with the highest potential sales margin percentage to the lowest. Marketing has a long list of projects we want to do but we have few product development resources so we have to choose the ones we think will give us the best results, such as when a chip will be discontinued even if it is selling well. Of course if we are not selling many units of a product it will be discontinued. Budget pressure is high – if a project falls behind schedule we try to substitute a new project such as finding a new chip for an existing product so that we can decrease the price and increase the margin and market share. Scheduling is difficult as we are fast at finding hardware due to our connections with component suppliers. Firmware (software) we have to do ourselves. Marketing relies on product development as we do not know what parts can do so we rely on them for ideas on how these can work. We also rely on them to keep to the agreed schedule. I need to go and remind them when they are behind schedule. We (marketing and product development) will often get together informally to discuss the schedule. We have a manager (group leader) meeting with our section head every Monday where we can discuss our ideas and what functions can be added to the product. ODM (original design manufacturing) with firmware is what we really want in the future. We also want to find things that fit with what we have done in the past so that we can release new products quickly."

This shows how new product strategies at Buffalo were created by associating the achievement of budget targets with new product innovation ideas. Even though the budget targets were not adjusted for the changing environment the marketing group leaders still saw the budget as the target which they were accountable for. They used their knowledge about how to combine multiple complementary budget-variance calculations with their knowledge of the firms strategy, action plans and current market conditions. As a result, the connections between the budget targets, firm strategy, and action plans were continually re-synchronized which created a space for new

product strategies to emerge.

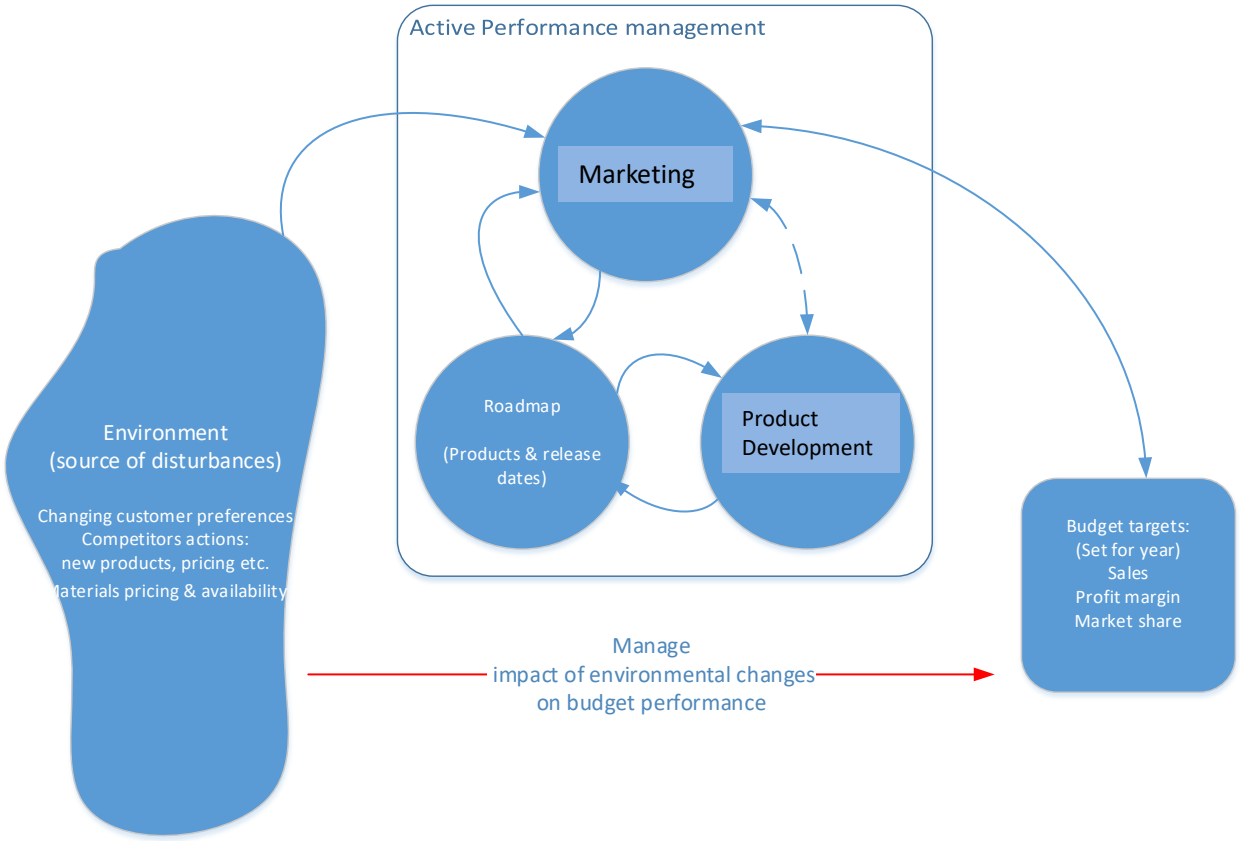
Discussion and conclusions

This paper reported on a case study of Buffalo, a Japanese computer peripherals company which operates in a highly competitive and uncertain environment. We explored the situated practices of organization members to understand the effect that the temporal dimension of organizational controls has at our case study site. We found that the temporal dimensions of the budgets and roadmaps enabled the knowledge of organization members to be made actionable in order to keep them on track and profitable and to facilitate and empower operations. We contribute to the accounting literature by showing how control and flexibility in a product innovation setting can be generated through the temporal effect that a budget and a roadmap have on organizational activities in a product innovation setting.

As can been seen in Figure 1 below budgets and roadmaps were based on clock-based time but they behaved very differently when they became disconnected. The budget at Buffalo produced a steady accounting control mechanism through the yearly and half-yearly targets and monthly milestones. The roadmap, on the other hand, could be interrupted by product development issues such as component parts availability and prices as well as changing consumer trends. Even though the budget was initially aligned with the roadmap the budget targets did not change during the year even when the market changed. As a result the budget and the roadmap become disconnected as the products originally plan for on the roadmap would not enable the budget targets to be met. When this happened the marketing and product development mangers had to improvise to re-synchronize the connections between the budget and roadmap. This opened up a space for action-based "kairos" time which enabled the knowledge of organization members to be made actionable. Thus, managers had to develop new product strategies which lead to new projects being placed on the roadmap with the aim of meeting budget targets.

The temporal dimensions of budgets and roadmaps opened up a space for the knowledge of organization members to be made actionable through the natural accountability of the marketing managers to the budget targets and product development managers to the roadmap schedule which was displayed through their daily activities.

Figure 1: Performance Management at Buffalo



A key aspect of temporal dimension of budgets and roadmaps was how they provided a framework to interpret the highly competitive and uncertain environment. This in turn opened a space for interactions between the signals from the market and performance management. That is, new product strategies were influenced by the movement between the timing of the budget and the timing of the roadmap. In the flow of time, budgets and roadmaps were used to manage the performance of different functions within the organization which opened a space for the knowledge of organization members to be made actionable which influenced the tempo (timing and intensity) of product innovation activities

This shows how budget control can provides a framework to interpret the environment so as to enable interactions between environmental conditions and organizational activities in a highly competitive and uncertain environment. Under the budget, action plans were repeatedly connected and disconnected at Buffalo. This repetition enabled the firm to reconcile flexibility and control

which lead to the emergence of new product strategies. While the budget was prepared in association with the organization's strategy, the budget targets did not change during the period. As a result the roadmap, which was the action plan, was updated when necessary causing the budget and the roadmap to become disconnected. However, by reformulating action plans through new product development projects needed to meet the budget targets, the connection was regained.

The budget control cycle at Buffalo helped create order in organizational activities, and created the social reality for other organizational activities. By examining the use of budget targets we found that at the start of the year the budget was initially synchronized with the roadmap. While the budget was kept mechanistically the roadmap was often interrupted by product development issues. To re-synchronize the roadmap with the budget new product strategies were created. That is, innovation was influenced by the movement between the timing of the budget based on the budget control cycle and the roadmap which was based on technology availability. This created a space for new product strategies to emerge through its effect on product innovation activities.

We also show how budget variances can be used by managers in a highly competitive and uncertain environment. Traditionally when we think of a variance we think about something that is not expected or planned for. While at Buffalo a variance was a signal about an unexpected change in the market that could not have been planned for. Even though the initial budget at Buffalo did not change in relation to the market the marketing managers knew they had to find new ways to research their budget targets. By examining the temporal perspective of two organizational controls - budgeting and roadmapping - we have been able to present new insights on process management beyond the shortening of ex-post feedback budget control.

Our final contribution is concerned with the agents of the accounting function. Our understanding of budgets has traditionally been based on a hierarchical command-and-control orientation used to implement planned strategy (Anthony, 1965; Chapman, 1997; Simons, 1995). In this command-and-control structure, senior managers are agents who employ budgeting to control lower level managers. However, in Buffalo, budget control was also used to send signals to managers that they needed to react quickly in their highly competitive and uncertain environment. This gave the lower level managers a more active role in the budgeting process which they used to create space for new product strategies to emerge, using budget control as a means as well as end. This contrasts with Frow et al.'s (2010) idea of 'continuous budgeting' where the budget was adjusted to take into consideration the changing external environment. By not

adjusting the original budget targets the marketing group leaders at Buffalo were motived to develop new product strategies to meet the changing needs of consumers which they were not able to predict at the start of the accounting period.

However, there are some points to note. Firstly, the time frames for new product development at Buffalo are very short. The average development time for a new product at Buffalo is often only a few months (although some are much longer). Therefore, new product development had an immediate impact on the performance of the organization. Finally, lower level managers at Buffalo had a high level of accounting knowledge. This was an important attribute of the marketing function in Buffalo. To understand more about the effect that the temporal dimension of organizational controls have in highly competitive and uncertain environments further examination into these issues is required.

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Appendix – Buffalo Interview Data

Affiliation	Group	Interviewee Position	Length of Interview
Planning		Assistant manager	120
Business Division		Manager	90
Business Division		Planning meeting	120
Business Division	Product development		60
Business Division	Product development	Group Leader	70
Business Division	Product development		60
Business Division	Product development	Group Leader	50
Business Division	Product development		65
Senior Management		Chief Technology Officer	50
Business Division	Product development	Group Leader	60
Business Division	Product development		50
Business Division	Product development	Group Leader	75
Business Division	Product development		65
Business Division	Product development	Group Leader	75
Business Division	Marketing	Group Leader	120
Business Division	Marketing	Group Leader	120
Business Division	Marketing	Group Leader	120
Customer support		Manager	120
Sales		Manager	120
Business Division	Marketing	Group Leader	120
Business Division	Marketing	Group Leader	120
Sales		Manager	80
Sales		Manager	95
Business Division	Marketing	Group Leader	90
Business Division	Marketing	Group Leader	90
Business Division	Product development	Group Leader	120
Business Division	Product development	Group Leader	150
Business Division	Product development	Group Leader	120
Business Division	Product development	Group Leader	90
Business Division	Marketing	Group Leader	90
Business Division	Product development	Group Leader	90
Business Division	Product development	Group Leader	120
Business Division	Product development	Group Leader	90
Business Division	Product development	Group Leader	120
Business Division		Assistant manager	120
Business Division	Marketing	Group Leader	120
Business Division	Marketing	Group Leader	120
Business Division	Product development	Group Leader	120
Senior Management		Director	135

Note: Interviews are shown in the order in which they were conducted.
All interviews occurred between July 2007 and October 2009.