Performance measurement systems and improvisation

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Abstract

In this paper we investigate what happens when the temporal structures of multiple performance measurement systems (PMSs) fail to enable the coordination of organizational activities in a dynamic environment. We take an improvisation perspective as the organizational literature shows that improvisation can be used to restore coordination between internal clock time and external event time when prior coordination fails to meet the reality of the situation. We carry out this research at Buffalo, an innovative Japanese company who operates in a highly uncertain and rapidly changing computer peripherals market where the coordination of product innovation activities and adapting to a fast changing market are important to achieving organizational goals. As the timing of external events started to differ from expectations in the original plans, improvisation was necessary to recover the coordination by synchronizing activities with the tempo of the evolving external environment. Improvisation thus enabled experimentation within a limited time and space to enable new product strategies and action plans to be realized. Thus, improvisation can provide an understanding of the tensions between various dimensions of time, though the temporal structures of PMS, and their effect on organization members. This provides new understandings of how PMSs are used within organizations to synchronize their activities and react quickly to changes in rapidly changing and dynamic environments.

Keywords Temporal structure, innovation, coordination, synchronization, budgeting, roadmaps

1. Introduction

In today's rapidly changing business landscape, organizations must address the challenge of using performance measurement systems (PMSs). The management accounting literature shows that PMSs can serve multiple purposes such as planning, control, coordination and performance evaluation (Arnold and Artz, 2019; Bénet et al., 2023; Kober and Thambar, 2023) and are also important for strategy implementation (Ferreira and Otley, 2009; Islam et al., 2018; Simons, 2000).

As an organization "is, to a large extent, the organization of time" (Becker and Messner, 2013, p. 141) it is essential to understand the sequence in which activities are ordered over time (Becker and Messner, 2013). This is because the 'timing' of activities allows organizational members to coordinate internally as well as in relation to their external environments (Becker and Messner, 2013). This internal timing or sequence of activities is known as 'clock time' as the clock makes the passing of time visible (Becker and Messner, 2013) though calendar deadlines (Ancona et al., 2001; Crossan et al., 2005). On the other hand, there are external events which have their own timing, known as 'event time' which requires an organization to flexibly react to unexpected events (Crossan et al., 2005). Thus, event time is also important as it provides an "understanding of how, when and why members of a community or organization structure their activities over time and with what consequences" (Orlikowski and Yates, 2002, p. 692).

While strict adherence to a plan might tether individuals to the past, abandoning it entirely can create chaos in scheduling and coordination (Sailer et al., 2024). Because of this organizations need to find a way which allows for flexibility in dealing with the events when they are encountered. Crossan et al. (2005, p. 137) argue that improvisational processes can enable organization members to "creatively coordinate their actions in order to simultaneously adapt to unexpected events [event time] and manage calendar deadlines [clock time]." While PMSs allow organization members to coordinate their activities in relation to each other and the planned environment, there will be times when managers have to react to changes in the market that they did not expect. Thus, improvisation has been argued to be "meeting point of planning and opportunity, comprising a blend of strategy formulation and implementation" (Crossan et al., 2005, p. 131).

We use an improvisation perspective (Crossan et al., 1996, 2005; Miner et al., 2001; Miner et al., 2024) in this paper to understand how organization members can restore coordination when prior

plans fail to meet the reality of the situation. The improvisation literature shows that organization members improvise by combining different temporal dimensions in order to respond to and shape the environment (Crossan et al., 2005). Crossan et al. (2005, p. 135) argue that improvisational processes are achieved through the "synthesis between event-time and clock-time management" as this enables individuals to creatively coordinate their actions in order to simultaneously adapt to unexpected events and manage calendar deadlines." Central to an improvisation perspective is 'entrainment' (Ancona and Chong, 1996) which highlights the importance of understanding 'tempo' - which is a change and alignment of speed, and 'cycle' - which is the synchronization of cycles of activities (Becker and Messner, 2013; Crossan et al., 2005).

In this paper we focus on the temporal structures of two PMSs – budgets and roadmaps - and investigate what happens when they fail to enable the coordination of organizational activities in a dynamic environment. This is important as it has been argued that organizations need to have adaptive practices in dynamic and uncertain environments (Kober and Thambar, 2023; Taylor et al., 2019) to deal with the uncertainty about when events may occur (Geiger et al., 2021; Kodama, 2005). Because of this organization members will have only a limited amount of time to collectively agree on what actions to take to recover the situation (Geiger et al., 2021).

It has been noted that different PMSs can simultaneously have different temporal structures which operate on a different tempo and cycle (Becker and Messner, 2013). There are also uncertainties, which are unknown when initial plans of PMSs are developed, about how it is possible for organization members to know if/when an event is critical (Sandberg and Tsoukas, 2011). Thus, there is a need for more research to understand how organizations manage time with PMSs in these dynamic environments (Nudurupati et al., 2021).

The management accounting literature has examined the temporal dimensions of PMSs (see for example, Ezzamel and Robson, 1995; Hopwood, 1989; Nandhakumar and Jones, 2001; Robson, 1992; Takatera and Sawabe, 2000; Ushio and Kazusa, 2013). Hopwood (1989, p. 1) notes that "accounting undoubtably has been one of the factors implicated in the orchestration of organizational life on a temporal dimension". Research has also shown that the temporal structures of PMSs "not only monitor performance but also raise time consciousness" (Ezzamel and Robson, 1995, p. 153). These temporal structures of accounting calculations thus develop visibility for organizational activities (Robson, 1992).

The management accounting literature has shown that PMSs such as budgets and roadmaps are used to manage the activities of organization members (Arnold and Artz, 2019; Miller and O'Leary, 2005, 2007). Budgets, though, have been criticized for inhibiting creativity as they are focused on the internal clock time of activities making organizations slow to react to external event time brought on by changes in the environment (Hope and Fraser, 2000). For example, research has shown that the utilization of a conventional fixed budget within a dynamic business setting diminishes the organizational adaptability and capacity to address novel opportunities, challenges, and alterations in customer demands (Libby and Lindsay, 2003; Liyanage and Gooneratne, 2021).

Using an improvisation perspective we address the following research question. What happens when the temporal structures of multiple PMSs fail to enable the coordination of organizational activities in a dynamic environment? An improvisation perspective offers a holistic view where external events and internal organizational processes are viewed as being interconnected (Crossan et al., 2005). This approach emphasizes the importance of being prepared for improvisational action, leveraging improvisational agility to respond to unexpected events with speed and creativity (Abrantes et al., 2022). An improvisation perspectives enables new learnings about how the temporal dimensions of PMSs can reflect external information internally in order to understand the implications for events outside the organization.

In order to answer our research question we carried out a case study at Buffalo Inc. (Buffalo), an innovative Japanese company who operates in a highly uncertain and rapidly changing computer peripherals market where the coordination of product innovation activities and adapting to environmental market change are important to achieving organizational goals. Buffalo used budgets to both coordinate marketing activities and evaluate the performance of marketing managers and roadmaps to coordinate the product development activities and evaluate the performance of product development managers.

Research has shown that different PMSs can interact with each other (Gerdin et al., 2019) and can thus affect organizational outcomes in ways which differ from the sum of the individual elements (Bedford et al., 2016; van der Kolk, et al., 2020). This is important to understand as the interaction between multiple PMSs can influence their impact within an organization (Cooper et al., 2019). Moll (2015) for example argues that we need to understand the interdependencies between accounting and operational performance measures. It has been argued that accounting PMSs can

support “changes to operational tasks and activities” (Abernethy et al., 2021, p. 1). These operational activities are shaped by the temporal dimensions of PMSs making time central to organizational performance especially in dynamic environments (D'Aveni et al., 2010; Kodama, 2005).

We found that both budgets and roadmaps in our case company Buffalo were based on clock time. Time was kept through the monthly budget targets which marketing managers were accountable and by the schedule on the roadmap which product development managers were accountable. Budget variances provided the marketing managers with an understanding of the effect that external events were having on the performance of the company. When it was clear that budget targets were not going to be met managers knew it was time to act. Action though was not easy as marketing managers had to convince the senior managers of their plans in order to change the roadmap, which the product development managers were accountable for. Thus, the product roadmap provided a way to respond to event time as the managers could add or remove projects from product roadmaps at monthly management meetings.

By focusing on the temporal structures of two PMSs – budgets and roadmaps – we investigate what happens when they fail to enable the coordination of organizational activities in a dynamic environment. This contributes new insights into how the simultaneous use of multiple PMSs can lead to improvisation (Cooper et al., 2019). We also contribute to the management accounting literature on how PMSs influence the activities of organization members in dynamic environments (Abernethy et al., 2021; Henri and Wouters, 2020; Kober and Thambar, 2023; Taylor et al., 2019). In particular, we show that PMSs can enable improvisation to achieve synchronization within an organization. In Buffalo, adapting to change in a particular department required synchronizing activities with the other department. In other words, adaptation disturbed the harmony and thus impacted organizational activities as organizational members had to synchronize with the tempo of organization activities in a more dynamic manner.

The remainder of this paper is organized as follows. In the next section we present the background literature on PMS in dynamic environments and our theoretical framing around improvisation. This is followed by an overview of our research methodology, case study site and data collection. Our research findings are then presented followed by a discussion of the results along with some concluding comments.

2. Background literature and theoretical perspective

2.1 PMSs in dynamic environments

Research on how performance measures influence the activities of organization members is a growing area of importance in the literature (see for example, Abernethy et al., 2021; Bénet et al., 2023; Henri and Wouters, 2020; Kober and Thambar, 2023; Taylor et al., 2019). Abernethy et al. (2021) carry out a first-year longitudinal study and found that PMSs influence the quality and impact of operational changes which resulted in improved firm performance. In an innovation setting Taylor et al. (2019) provide evidence that informal, organic PMSs involving open communication and peer monitoring can smooth the information flows between interdependent groups which leads to a lower reliance on formal financial controls, such as budgets. Kober and Thambar (2023) examine coordination at an organization during the COVID-19 and show that accounting can provide a trigger for other activities and thus helped managers make sense of their situation. Henri and Wouters (2020) show that when environmental uncertainty is high the use of accounting and non-accounting PMSs can complement each other which enables higher levels of product innovation.

We build on this literature by examining what happens when the temporal structures of multiple PMSs fail to enable the coordination of organizational activities. Our focus is on understanding how the difference between the expected and unexpected outcomes takes place in both accounting driven and operational driven spaces. While differences originate from the mismatch between the expected and unexpected outcomes, these differences also create the potential for innovation. This has implications for the temporal structuring of organizational life. Because of this, we view the temporal structures of PMSs as the context in which coordination is carried out as this involves the control of organizational tempo (Becker and Messner, 2013). PMSs aim to regulate the timing of activities such as planning and forecasting and can thus se seen as a way for organization members to bring the future into the present (Becker and Messner, 2013).

While it has been argued that organizational activities are structured and regulated at a fundamental level by their temporal structures (Blyton et al., 2017), the focus of the management accounting literature has been on clock time (Agndal and Nilsson, 2019; Anderson-Gough et al., 2001). For example Anderson-Gough et al. (2001, p. 103) argue “clock time is now a fundamental part of

many organizational control processes" and "built into cyclical routines such as budgeting." This could be due to the visibility of measures that can be seen in the way in which organizations coordinate, synchronize and sequence activities (Moore, 1963). Takatera and Sawabe (2000) examine how the time flow outside the organization and the time flow inside the organization are mediated by the accounting system. They argue that the time flow inside the organization can be changed through the accounting system to something different from the time flow outside the organization. Takatera and Sawabe (2000) focused on how the accrual system smoothed out the flow of cash transactions and thus the timing of when income and expenses are recognized in an accounting system. Takatera and Sawabe (2000) argues that the accrual system separates temporal structures inside the organization from those outside markets while connecting them by the cycle of the accounting period.

Budgeting has also been viewed as a rigid plan with a temporal structure that does not allow it to flexibly adapt to changing environment (Becker and Messner, 2013). This is because budgets reinforce the cyclical time which other organizational activities then synchronize to (Ezzamel and Robson, 1995), which could case managers to be unaware of changes taking place in the external environment (Becker and Messner, 2013). This could result in internal clock time and external event time becoming misaligned. How organizations overcome this misalignment is important to understand.

Agndal and Nilsson (2019) show how the temporal structures of tempo, sequencing and timing influence management control change in an inter-organizational relationship. They found that entrainment was a source of conflict and made management control change difficult in the interorganizational context they studied. This can also be seen in other organizational activities such as product development where clock time drives things like work schedules, lead times, start and finish dates with an understanding that both internal project related events and external events such as component availability and new technologies can cause project delays (Biesenthal et al., 2015).

In this paper we focus on when prior coordination planned by PMSs fails to meet the changing reality. This will enable us to gain a better understanding of how coordination can be restored by synchronizing internal clock time and external event time. We examine what determines 'when' and 'how' the events outside the organization become meaningful information for an

organizations' internal activities vis a vis PMSs. Rather than viewing external events and internal organizational processes as being separate, we follow an improvisation perspective that views clock time and event time as "clock-event-time" which enables us to understand the impact of events that take place outside the organization on internal organizational activities (Crossan et al., 2005, p. 136).

2.2 *Improvisation*

Improvisation plays a crucial role in restoring synchronization in timing by bridging the gap between planning and action. By integrating clock time and event time in scheduling processes, internal and external pacing in synchronization processes, and linear and cyclical time in allocation processes, improvisation offers a means to address the challenges organizations face in managing time related phenomena (Crossan et al 2005).

The genesis of synchronization can be traced back to the domain of music, where it denotes the process of harmonizing (Barrett 1998, 2012). In a musical performance setting improvisation relies on individuals engaging in coordinated joint action to achieve synchronization in collaborative activities (Wiltshire and Fairhurst, 2022). This coordination involves covarying actions and behaviors for functional purposes (Wiltshire and Fairhurst, 2022). Understanding how musicians coordinate their actions during improvisation, especially in collective free improvisation, requires a combination of emergent and planned coordination mechanisms to address the challenges that arise in collectively improvised performances (Saint-Germier and Canonne, 2022). Studies have shown that joint improvised activities such as musical improvisation increase synchronization and coordination among participants (Goupil et al., 2021).

Recently, McEllin et al (2020) distinguishes two types of synchronization; interval-based and velocity-based synchronization. Interval-based synchronization describes situations when actors are "aligning the timing of their movements in such a way that they reach their end point at the same time", while velocity-based synchronization describes when "actor's movements are continuously aligned throughout the duration of the movement" (McEllin et al. 2020, p. 2). These two types of synchronization link to the temporal structures of PMS. While interval based synchronization is connected with cycle time, velocity based synchronization is connected to the tempo. Each PMS has its own distinctive temporal structure as argued by Takatera and Sawabe

(2020) and coordinates internal activities with external events though interval synchronization as dictated by the accounting period. Each PMS has its distinctive temporal structure which influences the way in which activities take place in time (Takatera and Sawabe, 2020; Becker and Messner, 2013; Kunzl and Messner, 2023). Thus PMS creates time and space separated and relatively autonomous from external events and activities while it connects them periodically. Various PMSs synchronize their activities with others on an interval-basis. PMSs facilitates coordination with each other by interval-based synchronization.

In the organization literature it has been argued that improvisation is not merely a metaphor but an orientation and technique that can enhance strategic renewal within organizations, bridging theory and practice (Abrantes et al., 2022). By engaging in improvisational activities, individuals can develop the capacity to synchronize their actions, fostering teamwork, leadership skills, and enhancing overall coordination for effective joint action (McEllin et al., 2020). Engaging in collective improvisation can enhance coordination by combining emergent and planned mechanisms, fostering teamwork and synchrony among musicians, thus improving joint action capabilities (Saint-Germier and Canonne, 2022).

Crossan et al., (2005) build an improvisation perspective and argue that there are a number of mechanisms that enable an improvisational process to integrate clock time and event time. First, the management approaches grounded in clock time inform an organization about the challenges and opportunities they may face, typically resulting in precise plans for scheduling and coordinating activities. At any point in time, these plans, along with the insights gleaned from the planning process, constitute the expertise that can be tapped into to facilitate effective improvisation. But, in order for organizations to manage event time it is necessary that they can respond to future circumstances. Because of this Crossan et al. (2005) state that activities are coordinated through clock time management to maximize synchronization, but that this takes place through the combination of clock time and event time. Crossan et al. (2005) argue that improvisation is possible because of the three roles that clock time plays. The first role "is a trigger for change", the second is that it "creates a shared calendar for change and, thus, serves to schedule activities and to maximize their synchronization", the third role "is a resource for change, providing organizational members with the temporal space they need to reflect on and conceive of that change" Crossan et al. (2005, p.135). On the other hand, there is event time which "focus on

flexibility, in order to respond to internal and/or external changes or events" (Crossan et al., 2005, p. 135).

An improvisation perspective can thus help us to understand what happens when things do not go according to clock time due to the impact that event time can have on an organization. This is because, while the concept of clock time can be seen in many processes, organizations also need the flexibility to deal with event time contingencies that arise both inside an organization and externally in the market. Below we ground an improvisation perspective within the relationships of the temporal structures of the multiple PMSs at our case study company.

3. Research approach

3.1. Case study company background

Our case study site, Buffalo, is a Japanese company who operates in the highly competitive computer peripherals market. At the time of this research Buffalo had about 400 staff with annual sales of about ¥110 billion (about US $1 Billion). Buffalo is a subsidiary of Melco Holdings which is publicly traded on the Tokyo Stock Exchange. Buffalo was organized around four strategic business divisions. The Memory division produced memory modules and flash memory devices such as USBs and SD cards. The Storage division produced storage devices such as hard disk drives. The Broadband Solutions division produced network devices such as LAN adaptors and wireless communication devices, while the New Business division developed products that linked new technologies in the home such as NAS (network attached storage) and digital TV set top boxes[1]. Each of the strategic business divisions had two departments – marketing and product development which were divided into a number of product categories. To support the activities of these business division the company had a sales division, technology management department, quality control department, customer service (CS) department, an administration department, and a manufacturing department, which was responsible for the production plan and parts procurement with manufacturing outsourced to local companies.

[1] We interviewed managers and team members from all four of Buffalo's strategic business divisions.

3.2. Data collection

In order to understand how the temporal structures of PMSs enable organizational activities to adapt in a dynamic environment the authors carried out interviews, observed meetings, and collected documents over a two year period (see Table 1).

Table 1: Case Study Data

Interviews	**63.5 hours**
Senior management	3 hours
Head office staff	4 hours
Sales managers	5 hours
Marketing group members	19.5 hours
NPD group members	32 hours
On-site observations	**3 days**
Documents	**106 pages**
Product development documents	86 pages
Administration documents	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. The interviews ranged from 50 minutes to 150 minutes in duration, with a total of 63.5 hours of interviews with senior management, head office staff, sales managers and personnel from all of the four strategic business division's product development and marketing groups (for a complete list of interviews see Appendix 1). In addition to these interviews the authors observed meetings and activities and collected company documents. Collecting data from multiple sources enhances the reliability of data and, thus, our understanding of the context which helps us to interpret the findings (Denzin, 2012; Fusch and Ness, 2015; Kodama, 2005). The interviews, except for the initial three interviews, and meeting observations were audio recorded and transcribed.

3.3. Data analysis

The data was analyzed jointly by the authors using a thematic approach (Alvesson and Kärreman, 2011). This involved becoming immersed in the interview data by reading and re-reading the transcriptions followed by writing notes and case descriptions (Witzel, 2000). We took a grounded reflexive approach in examining the temporal structures of PMS to investigate what happens when

they fail to enable the coordination of organizational activities in a dynamic environment (Glaser and Strauss, 1967; Miles and Huberman, 1984). To do this we first listed the PMS observed during our visits and discussed in the interviews – which were focused on budgets and roadmaps. We then used our improvisation perspective to analyze the ways in which organization members had to improvise and the ways in which activities were coordinated and synchronized.

Observations and internal company documents were then used to re-analyze the case descriptions we had written so as to triangulate the findings (Modell, 2009; 2010). Throughout this process the researchers organized the data into different themes which were informed by both the data and the literature. This resulted in an understanding of the actions and events which highlighted the ways in which the temporal structures of the budget and roadmap PMSs shaped the innovation activities carried out at Buffalo.

4. Setting the Scene – Buffalo's business context

In order to investigate what happens when the temporal structures of multiple performance measurement systems (PMSs) fail to enable the coordination of organizational activities in a dynamic environment we first set the scene by presenting the business context at Buffalo. We start by outlining the two PMSs that we found and then present the planning budgeting and product development processes. We also give some background about their incentive system and cultural controls which remained constant during our time at Buffalo. This enables us to highlight the dynamic process taking place between budgets and roadmaps. This helps us understand 'when' and 'how' the events outside the organization become meaningful information for their internal activities.

4.1. Buffalo's context

Organization members described Buffalo's competitive environment as being "turbulent" because there are "a lot of competitors" in the market. One marketing member said that "uncertainty is high" because "it is difficult to predict market growth rates due to rapid changes in customer preferences." According to another marketing member 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 an understanding that they would not be the market leader if they could not deliver innovative

products on time, due to products having short life cycles. This was supported by a product development member who stated that;

> "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."

To develop and launch new products on time Buffalo relied on external suppliers who provided the necessary hardware components. If there was a delay in the schedule for hardware components or their price did not decrease as expected projects could be delayed. There could also be delays in developing software for new products which was done internally in Buffalo. In the computer peripherals market the combination of external hardware components (at the expected time and price) and internally developed software is critical to the success of products. This holds not just for new products but also re-engineering current products, as costs always need to be cut as profit margins in the industry are tight. In order for Buffalo to keep on track marketing members were made accountable for budget targets while the product development members were accountable for the launch schedule on the product roadmaps.

4.2. The PMSs at Buffalo

We found two PMSs at Buffalo. The first were budget targets, which the marketing department were accountable for, while the second was roadmap schedules, which the product development department were held accountable for. The budget targets included sales, profit margin and market share. The sales information came from the internal shipping data which was updated three times per day. Buffalo also purchased information about market share based on POS (Point of Sale) technology used by all major Japanese retailers from two separate companies. The profit margin used at Buffalo was a gross profit margin percent (revenue - cost of goods sold)/revenue. The budget targets were broken down into daily and monthly sales, profit margin and market share targets, while the product roadmaps set the development schedule and resources needed for both current product improvements and for new products.

The product roadmaps were prepared by the marketing and product development managers for each product category at the start of the year. The roadmaps included details about all current products such as product specifications, the product concept, price and monthly sales as well as

the new product plans, with launch dates, product specifications, product concept, expected financial performance and staff assignments which were used to coordinate the project schedule. The roadmap was flexible and 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 to react to changing customer requirements or when parts and/or software for projects on the roadmap were delayed. According to a marketing manager;

> "The roadmap acts as the action plan and a coordinating mechanism between the marketing and product development areas."

4.3. The annual planning process at Buffalo

The marketing and product development managers in each of Buffalo's four business divisions started the annual planning cycle by gathering information and exploring opportunities around the availability of new component parts and changes taking place in the market. This resulted in a list of new product ideas which were considered by marketing managers as they constructed their budget targets.

The budgeting process started with marketing managers 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 and whether [component] costs will go up or down."

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

> "I 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 targets and product roadmaps for each product category was an iterative process as the products listed on the roadmap had to enable the marketing managers to reach their budget targets. This is because the senior managers were focused on budget achievement. According to a marketing manager:

> "Meeting the budget is important and senior managers will not be happy if we do not meet the budget."

4.4. The budgeting process at Buffalo

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

> "I have to consider how new products will 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 takes 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 performance due to the noise in the data would be too large."

This shows that at the start of the year the budgets of each division were linked to the projects on the roadmap which were necessary for the budget to be achieved. During the year only minor changes to the budget could be made, which meant that the only way to achieve budget targets when the market changed was by adding new projects to the roadmap.

4.5. The product development process at Buffalo

The product development process at Buffalo had three stages - concept design, development and commercialization. The concept design stage started with the analysis of market changes and

trends which led to the generation and assessment of ideas and selection of projects by marketing and product development managers. These product ideas were discussed at concept design review meetings which were held on a regular basis throughout the year. For product development managers the focus was on the resources a project would require and the project timeline while the marketing managers focused on areas such as marketability, feasibility, and profitability.

When marketing and product development managers decided to proceed with a project the product development manager would write up and submit a 'Plan Sheet B' while the marketing manager wrote up and submitted a 'Product Concept Sheet'. The Plan Sheet B set out the product development schedule but also included the development cost, target customer, specifications, competing products, schedule, product concept, selling point, positioning and components needed for the product. The Product Concept Sheet showed how the product would fit the market needs and help the marketing managers reach their budget targets and included the expected sales price, product cost, and monthly sales unit forecast. According to a marketing manager:

> "The concept sheet for a product which is expected to be high unit volume product is included in the budget. Deciding the price and profit margin for [product name] which has a market share of 30 – 40% of overall sales is included in the sales budget."

During the development stage product development mangers at Buffalo developed prototypes and tested them to see if they met the technical specifications set out in the Plan B sheet while marketing mangers continually tracked and updated the market and customer needs. During this time the marketing managers also started preparation for the commercialization stage. During the commercialization stage the marketing managers focused on how the product would help them reach their budget targets, while the product development managers focused on the schedule on the roadmap. According to a product development manager;

> "The budget is important for [the marketing manager]. The schedule is important for me. I focus on development progress... We in the product development group just ask when and how [the marketing managers] would like to prioritize 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."

This shows that during the product development process the marketing managers were focused on how the launch of new products would impact their budget targets while the product development mangers were focused on keeping product development projects on the schedule set out on the roadmap as launching products on time was critical to their success.

While the product development group used the roadmap schedule to order its activities, 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 the changes taking place in the market. Eventually this would have had a negative impact on Buffalo's performance as the market was highly competitive and customer preferences were always changing. This required each group to focus on their own responsibilities while also recognizing that a change in schedule would affect the ability of the company to meet its goals.

4.6. The incentive system at Buffalo

Managers at Buffalo were given incentives based on a percentage of the overall company profit. This started with an evaluation of each department and then the sections within each department. It was then further divided into individual performance which was based on a holistic evaluation. This means the total amount of bonuses greatly varied with the overall company profits, and individual incentives were relatively vague, as they were preceded by department evaluations.

According to the document released by the Business Planning Department on April 21, 2003, the departmental objectives/target system became the criterion for evaluation. Under this system, each department set annual goals based on company policies. The aim of each department was to achieve these goals so as to contribute to the overall company objectives. The status, progress, and results of these goals were comprehensively assessed. In the business units, the objectives were set to achieve budgeted targets in sales, profit, and market share, but the understanding of their practical implementation varied among managers. For example, a division manager stated;

> "In this division, we don't actually implement the objects/targets management sheet (in the departmental bonus system). To evaluate, we need something, and that's the target management sheet, but we're not doing it... Previously, we used to have meetings with the executives and everyone would assign scores... That was the culture... Some people don't even know what they are being evaluated in the department evaluations... Current

evaluations are more about momentary feelings than a structured system.", "When asked about the evaluation system in a particular department, I was told it's based on personal likes and dislikes. Even if goals are achieved, one might only get a 'C' in the ABCD four-tier system. Such an evaluation is pointless. If we are to do it properly, we should display everyone's objectives and their achievement rates." The manager added, "If we want to seriously implement departmental goals, the rewards for working towards these goals should be clear. If it remains vague as it is now, pursuing departmental goals is just exhausting."

Because of the vagueness of the incentive system at Buffalo we did not find any evidence in our data that managers were motivated to achieve budget targets because of the likelihood of receiving a bonus. Instead, we found in our data that accountability to the Founder of Buffalo had a larger impact on behavior.

4.7. Accountability to the Founder

We found a high level of accountability and a high level of commitment to the Founder at Buffalo. At the time of our study the Founder was the Chairman of the company. This resulted in familial culture as the managers did not want to disappoint the Chairman. This type of culture has been highlighted recently in the management accounting literature by Akroyd and Kober (2020, p. 1) who show that "Founders who have a commitment blueprint aim to establish a workplace where employees feel an intense emotional attachment to each other and the firm and are passionate about the firm's vision." Thus, even if managers at Buffalo do not reach their budget target or did not get a bonus, we found that they were still motived to work hard as they wanted to please the Chairman.

The Chairman had a charismatic style and had led the company since its inception in an entrepreneurial way. The Chairman also had a micro-management style as he often asked project managers how things are going in their area. Because of this, managers felt that they were directly accountable to the Chairman even though they reported to other members of the senior leadership team. One manager stated that they were called "Once a week, at least". When asked "what the conversations were about?", the manager replied, "how is the product category you are handling?" The manager then stated;

> Actually, in the past, at the business strategy meetings, an ordinary employee would present in front of the Chairman. The Chairman would call people who attended those meetings and whom he remembered. ... After those meetings, several times, he seemed to think, "I can understand this category" ... During the calls, he is strict about the progress of the products and tactics. he asks, "How are you thinking and acting?", "That's wrong, What's the current progress?" "Is it moving forward?" "For the future roadmap, how will you operate or change that product with what concept?" He is really concerned and is quite stern when checking on tactics and specific products. But when there's something interesting, his tone is much more relaxed.

At Buffalo, the Chairman and President have a high level of communication with the product group leaders. They call the division managers to ask about things only known on the ground. From the recipient's perspective, there are times when you feel, "I don't know all the details," and the requests are tough, but it's really about being hands-on. As the company has grown there are things that are being lost and I think the Chairman and President want to maintain the hands-on approach that has always been there.

5. PMSs and improvisation at Buffalo

In this section we show how improvisation can explain what happens when the temporal structures of PMSs fail to enable the coordination of organizational activities in a dynamic environment. We take an improvisation perspective as the organizational literature shows that improvisation can be used to restore synchronization between internal clock time and external event time when prior coordination fails to meet the reality of the situation.

Since marketing and product development manager at Buffalo were accountable for different PMSs, marketing on the budget targets and product development on the roadmap schedule, their activities were not always synchronized. According to an improvisation perspective to achieve synchronization requires organizations to overcome the inherent tension between them through an understanding of both clock time and event time mechanisms together. Crossan et al. (2005, p. 136) call this "clock-event-time." In Buffalo adapting to change in a particular department required synchronizing activities vis a vis the other department. In other words, when there were events in

the external environment that could negatively affect organizational performance this impacted the activities and required organization member synchronize in a more dynamic manner.

The two PMSs at Buffalo – budgets and roadmaps - were based on clock time temporal structures. Crossan et al. (2005, p. 135) argue that clock time temporal structures can act as 1) a trigger for change, 2) a shared calendar for change, and 3) a resource for change. The marketing managers were accountable for three budget targets - sales, profit margin and market share of both new and existing products within the product category they managed. These targets were set in the budget by senior managers and were used for performance evaluation. Product development managers at Buffalo were accountable for the roadmap schedule set by senior managers and used for performance evaluation.

Budgets as a trigger for change: The clock time temporal structure of budgets were visible in the daily activities of the marketing managers. The first daily activity for marketing managers was to check the sales and market share performance of the products in their area. They then carried out variance analysis by comparing monthly actual sales, profit and market share performance against the budget estimates. The marketing managers said they aimed to identify problems and clarify the issues they were facing as early as possible by first comparing budget variance calculations, and then by comparing the initial strategy and action plans set out in the roadmaps with the variances. A marketing manager 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."

When there were budget variances the marketing managers first attempted was to cut the price of existing products or add new product functionality to the existing products. According to one marketing manager:

> "(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."

Thus, the budget at Buffalo acted as trigger for change as it helped the marketing managers to see when they needed to act.

Roadmaps as a shared calendar for change: The performance of the product development managers was measured based on their ability to get current product improvements and new products to the market based on the roadmap schedule. The product development managers checked the progress of product development projects in relation to the roadmap schedule daily. 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 the product development managers' ability to meet the schedule on the roadmap, the product development managers had to identify the reasons and take steps to correct the situation. In this way, the clock-based dimension of the roadmap focused the product development managers on the activities that would enable them to meet the schedule set by the senior managers. However, roadmaps are directly and significantly influenced by the external environment and thus were re-created monthly to reflect both internal and external events. The clock time roadmap created a shared calendar for change and, thus, served to schedule activities and to enable synchronization between the budget and the roadmap.

Budget and roadmaps as resource for change: As the marketing managers at Buffalo had to react to external events such as competitors' actions and customer preferences, they had to work with the product development and senior managers to synchronize their activities. Thus, if the product development managers were not meeting the schedule they had to think of different ways to solve the problem they were facing. This required constant communication with marketing managers as it could affect their ability to meet budget targets.

But just because there was an event was not enough as marketing managers had to convince both product development managers and senior managers of their plans. According to a marketing manager;

> "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."

It should be noted that while marketing managers had the authority to reduce the price of products in order to increase market share they had to get buy-in from product development managers to add new projects to the roadmap in order to increase sales or reduce costs. In order to change the roadmap they had to convince both the product development managers and the senior managers to get new project ideas onto the roadmap.

To achieve improvisation required a focus on "manipulative flexibility" (Crossan et al., 2005, p. 136) which was necessary "to respond to internal and/or external changes or events" (Crossan et al., 2005, p. 135). External events included changes in consumer preferences, competitor actions, parts delays or software issues. This is where the influence of the budget on the roadmap became important. For example, a product development manager mentioned that product 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, (such as software delays.)"

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

> "After the fiscal year starts, I have to meet the budgeted amount. It does not matter if I do not meet the budget for each product category as long as I meet the overall budget targets. Even though I prepared a schedule, if the development of a new product 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 have to adapt to the change."

Thus, when the marketing managers could see that the product development projects on the roadmap would not enable them to reach their budget targets they had to develop new product strategies. Even when the environment changed the budget did not change as it was set (for at least the first 6 months of the year). As a result of not achieving the expected budget results with the initial plan forced the marketing group leaders to try other ways to meet the budget targets. Because

of this an assessment of the differences between the roadmap and the budget was needed to adapt the environment. According to a marketing manager;

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

Thus, marketing managers realized that the only way to make sure that they achieved their clock time based budget targets was to develop new strategies. This involved making changes to existing products or developing new product concepts which would help to make sure that the products on the roadmap would enable them to meet their budget targets. A marketing manager gave an example of how improvisation worked.

> "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 managers got ideas from many different markets around the world. This enabled an innovative solution to emerge from discussions between marketing and product development managers as they attempted to make sure that the projects on the roadmap would enable marketing managers to meet their budget targets.

If market conditions were stable the projects on the roadmap would enable the marketing managers to meet their budget targets, but in reality the temporal structure of the budget, which was the marketing managers' measure of performance, was based on clock time following the yearly budget cycle. The budget variances that managers produced enabled them to argue for changes to the original plans set out in the roadmaps to capture the event time dimension of improvisation which enabled the marketing managers to show why action should be taken.

On the other hand, the product development managers followed the roadmap, as this was the product development managers' measure of performance. While the schedule also had a clock time

temporal structure it could be changed at monthly management meetings if there were changes in consumer preferences, competitor actions, parts delays or software development issues. 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. In this way the roadmaps enabled improvisation as managers had manipulative flexibility to react to external events.

As shown above, marketing managers were concerned about meeting budget targets which were set in the initial budget plan as they felt accountable to the Chairman who was the Founder of Buffalo. These plans were broken down into monthly milestones which marketing managers had to report on to senior management at monthly meetings. These monthly milestones were further broken down into daily budget milestones which were used by marketing managers as a tool for early problem detection. According to a marketing manager;

> "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 clock time dimension of the budget targets acted on the activities of the marketing managers, but the only way for them to act when things were not going as expected was to convince the product development and senior managers of their plans. If they could convince the other managers of their new strategies and action plans, they could not get the projects on the roadmap changed. This is where improvisation in Buffalo could be seen as the clock time temporal structures of the budget and roadmap failed to enable the coordination of organizational activities. Because of that it was necessary to use clock-event-time - through manipulative flexibility - with the budget creating a trigger for change while the roadmap created a shared calendar for change. This enabled improvisation through the activities that emerged or were made possible so that managers could adapt flexibly to their fixed budgeting targets.

Improvisation was not easy as it required the marketing managers to convince the product development managers and the senior managers that they had new product ideas to put on the roadmap and that it was time to act. A marketing manager 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."

Thus, it can be seen that the clock time temporal structure of budgets enabled the marketing managers to advocate for a change. Marketing managers 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. A product development manager 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."

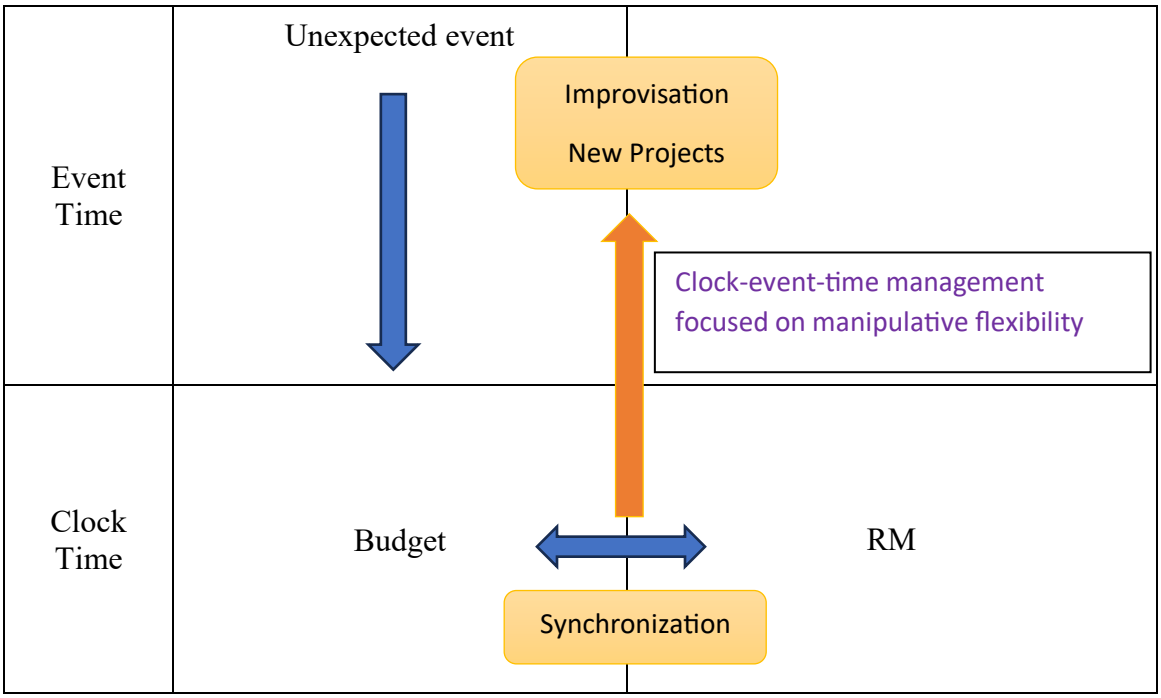
Thus, product development managers understood they were accountable for the clock time dimension of the product roadmap. This required them to develop new products on time in relation to the schedule on the roadmap. But they also needed to synchronize their activities with the marketing managers who were accountable for the budget targets. Thus, when an unexpected event took place it would first affect the budget as the targets would not be met. When this happened the marketing managers would strategize and come up with a plan that they would present to product development and senior managers. This is where clock-event-time management took place - focused on manipulative flexibility - so that new project could be started which would enable Buffalo to reach their goals (see Figure 1 Below).

An example of improvisation was provided by one of the managers who told us a story about a particular situation which we present here as an example of improvisation at Buffalo. Our aim is show how the clock time PMS temporal structures enabled event time to be recognized so that organization members could adapt to their dynamic environment.

The budget targets for this division were initially synchronized with the product concepts put on the roadmap which would enable the division to meet its targets. These are both clock time temporal structures which aim to get the organization thinking about what needs to be done at what point in time.

"The Y product concept (in a category which Buffalo had a large market share) was put onto the roadmap with the aim of launching it in the winter sales period (8 months from the start of the project). The budget target is important because we are in tough economic times. We started with the base sales, which is the number of units based on an expected market share. Even if we do not reach the sales budget number, if we can show that we increased our market share then we have a good argument to present to senior 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 they 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."

Figure 1: Temporal structures of PMSs and Improvisation at Buffalo



The project fell behind schedule and the marketing manager felt that they would not be able to reach the budget target (which needed to be achieved) so proposed a new project which required

improvisation. This is where event time and the clock time come together to enable manipulative flexibility and tempo synchronization.

> "Budget pressure is high so if a project falls behind schedule (like this one did), 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, but software is something we have to do ourselves. Marketing relies on product development as they do not know what parts can do so they rely on development people for ideas on how these can work. We all rely on product development managers to keep to the agreed schedule. I need to go and remind them when they are behind schedule. Marketing and product development managers will often get together informally to discuss the schedule."

The synchronization takes place at meetings where the marketing managers present their ideas for product development and senior managers.

> "We have a manager meeting with the section head every Monday where we can discuss our ideas and what functions can be added to the product. ODM (original design manufacturing) with software 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."

6. Discussion and conclusions

In this paper we investigate what happens when the temporal structures of multiple PMSs fail to enable the coordination of organizational activities in a dynamic environment. We use an improvisation perspective as this enables us to understand how organizations can overcome the inherent tensions between clock time and event time and synchronize the tempo of the activities when the cycle of the budget and roadmap is expected to be achieved.

From a clock time perspective we found that budgets set out monthly targets which marketing managers evaluated against actual performance. When there was a variance between budget expectations and performance the budget acted as a trigger for change. The roadmap PMS was also based on clock time as it set out the project schedule that product development managers are

evaluated against. The roadmap thus provided a shared calendar for change as it could be updated at monthly management meetings.

The clock time based budget and roadmap PMSs also sent out other signals with the budget variances signalling a trigger for change. The clock time dimensions of the budget targets, which marketing managers were accountable for, and roadmap schedules which the product development managers were accountable for also provided opportunities to understand event time as they created a shared resource for change. Thus event time created an opportunity for the knowledge of operational managers to be made actionable which enabled them to react to their dynamic environment.

This was a highly contested process at our case study company as marketing managers could not change the projects on the roadmap. Because of this the marketing managers had to convince product development and senior managers of the reasons to make a change. The implication of this findings is that PMS in themselves may not always set in motion other organizational events (Hopwood, 1972; Orlikowski and Yates, 2002; Yakura, 2002) if there is no mechanism for operational managers to act. Thus, in order for organizations in dynamic environments to improvise they need to have PMSs that enable a 1) trigger for change, 2) a shared calendar for change, and 3) a shared resource for change (Crossan et al., 2005).

Our findings show that budget based variance analysis can make other things visible (Miller, 2001), such as changing market needs, as they can show that things are not proceeding as expected, but there also needs to be a shared calendar for change, played by the roadmap at our case study company. It is this synchronization process - led by the tempo of the operational roadmap PMS that determined if and how change could take place. This can be seen in the clock time dimension of budget targets which acted as a trigger for change for marketing managers. We should note that improvisation could only take place due to the flexibility of the roadmap. This is because the roadmap could be changed at monthly strategy meetings with senior managers and thus provided a shared calendar for change. This shows that the interaction between the temporal dimensions of accounting and operational PMSs can enable improvisation and thus play a critical role in an organization facing a dynamic environment.

A key aspect of the temporal structure of budgets and roadmaps was the way in which they interacted as this provided a framework to interpret the environment. This in turn opened an opportunity for the signals from the market and organizational activities to be made visible. That is, new product strategies were enabled by improvisation which came from the clock time PMSs interaction with event time from the external environment. In the flow of time, budgets provided a fixed expectation of what performance should be while product roadmaps were flexible and could react to external and internal events which enabled managers to respond quickly to their dynamic environment. This shows that budgets may play an important role even in dynamic environments as they can provide a framework to interpret the environment so as to make the tensions between environmental conditions and organizational activities both visible, but also enable action. This may be a reason why so many companies still use budgets even though the Beyond Budgeting literature has argued that they may not be as useful in this context (Hope and Fraser, 2003; Hope et al., 2011; O'Grady and Akroyd, 2016, 2017).

Under the temporal structure of the budget, action plans were repeatedly disrupted at Buffalo as the budget targets were kept fixed for the first 6 months of the year, and even then only minor changes were allowed. While the budget was prepared in association with the organization's product strategy, the budget targets did not change during the period. As a result the budget and the roadmap become disconnected, when the projects on the roadmap would not enable the marketing managers to reach their budget goals. This created tensions as the product development managers did not inherently care about the budget as their measure of performance was the roadmap schedule. However, the connection between the budget and the roadmap could be regained by the marketing managers by developing new strategic action plans in order to meet the budget targets. These strategic action plans could not be implemented without the support of the product development and senior managers. Because of this the marketing managers had to persuade other managers that it was time to act.

By examining what happens when the temporal structures of multiple PMSs fail to enable the coordination of organizational activities in a dynamic environment we have contributed new insights into how the simultaneous use of multiple PMSs can lead to improvisation (Cooper et al., 2019). We also contribute to the management accounting literature on how PMSs influence the activities of organization members (Abernethy et al., 2021; Henri and Wouters, 2020; Taylor et

al., 2019). We show that PMSs influence the quality and impact of operational changes (Abernethy et al., 2021) through the budget as there was no incentive in our case company for product development managers to change the projects on the roadmap. Contrary to the findings of Taylor et al. (2019) we show that formal PMSs like budgets and roadmaps can also increase the information flows between interdependent groups as they can enable improvisation to occur.

We build on the findings of Kober and Thambar (2023) by showing that while accounting can act as a trigger for other activities there needs to be an operational PMS in place that enables improvisation so that activities can be synchronized with the accounting PMS. Finally, in relation to Henri and Wouters (2020), we support and add new insights to their finding that when environmental uncertainty is high the use of accounting and non-accounting PMSs can complement each other and can result in higher levels of product innovation. We show that this takes place because of improvisation as the "synthesis between event-time and clock time management is achieved through improvisational processes that enable individuals to creatively coordinate their actions in order to simultaneously adapt to unexpected events and manage calendar deadlines" (Crossan et al., 2005, p. 135).

It was through the interaction between the temporal structures of budgets and roadmaps that gave managers opportunities which they used to improvise by creating new product strategies, using budget control as a means as well as end. This contrasts with Frow et al.'s (2010) idea of 'continuous budgeting' where budgets were adjusted to keep up with the changes in the external environment. By not changing the original budget targets the marketing managers at Buffalo were forced to develop new ways of meeting the changing needs of consumers which they were not able to predict at the start of the financial year when budget targets and product roadmaps were constructed.

Finally, our findings advance our understanding of budgets which 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 seen as agents who employ budgeting to control lower level managers. While this certainly took place in Buffalo, budgets were also able to send signals to managers that they needed to react quickly to their dynamic environment. Thus, while budgets many be a fundamental clock-based

PMS (Anderson-Gough et al., 2001), we also found that they could open a space to react to event time which enabled improvisation as they created both a trigger for change and a shared resource for change. Budget variances acted as a signal that action was necessary if budget targets are to be met, since budget targets could not be changed. As argued by Lestón (2013) it is clock time which gathers together the material factors which enables managers to know that event time is important. But without an operational PMS mechanism like a product roadmap, which give managers a shared calendar for change it is easy to see how budgets in themselves may be harmful in dealing with a dynamic environment.

In conclusion, using a case study of Buffalo, a Japanese computer peripherals company who operates in a dynamic environment, we explore what happens when the temporal structures of multiple PMSs fail to enable the coordination of organizational activities in a dynamic environment. We found that marketing managers were only accountable for fixed budget targets which had a clock time temporal dimension. These targets provided both a trigger for change and could be used as a shared resource for change when variance analysis showed that they would not meet their targets. Product development managers, on the other hand, were only accountable for the clock time aspect of the roadmap schedule, but this PMS was designed to be able to react to changes in the market as well as issues with internal product development issues. While the roadmap gave the managers at Buffalo a shared calendar for change and a resource for change it was the budget which provided them with a trigger for change as it signaled that the company would not reach its targets without taking corrective action. Thus, we found that it was the combination of accounting and operational PMS which both had clock-based temporal structures which provided a signal that things were either as expected or not going as expected. Event time could be seen when the unexpected happened and opened up an opportunity for action that would not otherwise have been possible. While this did create tension between the synchronization of the tempo and cycle of the PMSs we found that the two departments were able to improvise and react to external events in their dynamic environment.

Appendix 1 – Buffalo Interview Data in Chronological Order

Affiliation	Group	Interviewee Position	Length of Interview
Planning		Assistant manager	120
Business Division		Manager	90
Business Division		Planning manager	120
Business Division	Product development	Engineer	60
Business Division	Product development	Manager	70
Business Division	Product development	Engineer	60
Business Division	Product development	Manager	50
Business Division	Product development	Engineer	65
Senior Management		Chief Technology Officer	50
Business Division	Product development	Manager	60
Business Division	Product development	Engineer	50
Business Division	Product development	Manager	75
Business Division	Product development	Engineer	65
Business Division	Product development	Manager	75
Business Division	Marketing	Manager	120
Business Division	Marketing	Manager	120
Business Division	Marketing	Manager	120
Customer support		Manager	120
Sales		Manager	120
Business Division	Marketing	Manager	120
Business Division	Marketing	Manager	120
Sales		Manager	80
Sales		Manager	95
Business Division	Marketing	Manager	90
Business Division	Marketing	Manager	90
Business Division	Product development	Manager	120
Business Division	Product development	Manager	150
Business Division	Product development	Manager	120
Business Division	Product development	Manager	90
Business Division	Marketing	Manager	90
Business Division	Product development	Manager	90
Business Division	Product development	Manager	120
Business Division	Product development	Manager	90
Business Division	Product development	Manager	120
Business Division		Assistant manager	120
Business Division	Marketing	Manager	120
Business Division	Marketing	Manager	120
Business Division	Product development	Manager	120
Senior Management		Director	135
TOTAL			**63 ½ hours**

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

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