# Mediating Relations between Financial and Operational Concerns when Structural Interdependencies Are Significant

## The Development of Pseudo Micro-profit Centres at Kitanihon

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# Mediating relations between financial and operational concerns when structural interdependencies are significant: the development of pseudo micro-profit centres at Kitanihon

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## 1. Introduction

It is challenging to relate financial and operational concerns because accounting reports are neither 'very good at giving reasons why things went wrong' (Jönsson and Grönlund, 1988, p. 523) nor are they 'complete in the sense of describing or determining action' (Jordan and Messner, 2012, p. 552). This linking is particularly problematical among structurally interdependent organizational entities that, on the one hand, raise coordination and, on the other hand, challenge individual decision rights. The aim of this paper is to explore how relations between financial and operational concerns are constructed, sustained, and developed dynamically when organisations attempt to strengthen the financial concern on the shop floor through changes in organisational structure, transformation of roles in operations, and introduction of new accounting mechanisms. More precisely, the research question is, how are financial and operational concerns related when structural changes generate many interdependencies? There are two main motivations behind this question.

Firstly, recent studies have drawn attention to the power of accounting calculations as mediating instruments, where they help to link dispersed people, aspirations and domains (Christner & Strömsten, 2015; Jordan, Jørgensen, & Mitterhofer, 2013; Miller & O'Leary, 2007). However, to become a mediating instrument, it is likely that accounting may need itself to be mediated via for example complementary measurement systems, development of expertise and reconfiguration of responsibilities. This suggests that accounting not only carries the work of linking people, aspirations and domains, but also that people, responsibilities and other instruments help carry accounting in these linking activities. Put differently, mediation may be enabled not only by one instrument but also by a 'web of mediators' (Bødker and Andersen, 2005). Therefore, it may be useful to study the many mediating resources, instruments and people that help relate financial and operational concerns and constitute the power of accounting.

Secondly, through responsibility accounting, financial performance measures monitor the delegation of decision rights. Such monitoring assumes that responsibility centres are relatively independent, but this individualisation is challenging in cases of lateral or hierarchical interdependencies (Du et al 2013; Kilmann, 1983). Interdependencies increase "the noisiness"

of financial performance measures (Abernethy et al, 2004; Bushman et al, 1995), which makes the delegation of financial accountability more difficult and challenges the controllability principle (Merchant and Van der Stede, 2007). Interdependencies may encourage sub-optimization by increasing 'the risk of unilateral subunit decision making' (Lillis, 2002; p. 499) and generate conflicts between interdependent sub-units.

Concerns with mediation and interdependence are particularly critical in the case of Micro-Profit Centres (MPCs). MPCs are attempts at relating financial and operational concerns by increasing the number of operators sensitized to financial concerns through the multiplication of responsibility centres (Adler and Hiromoto, 2012; Cooper, 1995, 1996; Kaplan and Cooper, 1998; Miya, 1998; Sawabe et al, 2008; Takeda and Boyns, 2014) and the introduction of pseudo profit calculations. They make the delegation of financial accountability more difficult by creating very small and interdependent responsibility centres. How is it possible to relate financial and operational concerns with such a structural arrangement?

To study this research question, the paper analyses the development of MPCs at Kitanihon Electric Cable Ltd (hereafter 'Kitanihon'), a Japanese electric-wire manufacturer. It shows that the fate and power of MPCs, as an economizing endeavour, depends on the development of a continuously evolving 'web of mediators' made by mediating instruments, people and spaces. This web of mediators not only links, but also transforms entities and their relations. This includes accounting that forms, per-forms and trans-forms along the chain of mediation it helps to develop. This web of mediators also includes organizational structures, which - because of structural interdependencies – encourage collectivisation of financial accountability and of decisions about (financial) improvement activities. Instead of delegating financial responsibility, improvement activities were organised in action plans that were individualised and delegated. Action plans help mediate relations between financial and operational concerns by (continuously and tentatively) translating financial concerns into operational concerns and by transforming financial accountability into individualised forms of action accountability.

To develop our contributions, the paper is organised as follows. The next section analyses different ways in which relationships between financial and operational concerns, considered as a process of mediating, can be developed. It also considers structural issues raised by MPCs when trying to relate financial and operational concerns. Then, the case study and research methods are introduced and the web of mediators through which financial and operational concerns were related, is analysed. The last section discusses our contributions.

## 2. Relations between financial and operational concerns in the literature

It is uncontroversial to assume that relations between financial and operational concerns have to be developed and constructed. Relations are (managerial) problems rather than fixed causalities. Therefore, it may be useful to understand such relations as mediations and, before analysing the literature about relations between financial and operational concerns, it is useful to explain how mediation works.

## 2.1 Mediation and the study of accounting

Miller and Power (2013) suggested that 'much of what accounting instruments and ideas do is to link up distinct actors, aspiration, and arenas' (ibid, p. 557). They call mediation the process of relating separate entities, and 'mediating instruments' the tools, which allow such relating to happen.

Initially used in science studies and applied to machines (Wise, 1988) and models (Morrison and Morgan, 1998), the notion of 'mediating instruments' has recently drawn on in accounting studies to analyse how mediating instruments help link different domains and concerns. For example, tools such as Road Maps may help to link science, organisations and markets (Miller and O'Leary, 2007) or tools such as accounting calculations may relate venture capital, stock markets and science (Christner and Stromsten, 2015) or political ideals with more localised concerns (Kurunmäki and Miller, 2011). Mediating instruments also help to link separate actors such as dispersed project participants (Jordan et al., 2013) or actors belonging to different firms (Zahir-Ul-Hassan et al , 2016). By linking people, aspirations and arenas, mediating instruments produce coordination. They do so by becoming 'platforms for information sharing and dialogues' (Zahir-Ul-Hassan et al, 2016; p. 385), by framing decisions of multiple actors (Miller and O'Leary, 2007), by shaping and aligning expectations and interests among a group of participants and by triggering their commitment (Jordan et al., 2013).

Accounting scholars also identify some characteristics of mediation. Miller and Power (2013) suggest first that accounting as 'a mediating practice… links up different actors with a common narrative' (ibid, p. 581). They suggest that such narrative concerns 'economizing' which they define as 'the processes and practices through which individuals, activities, and organizations are constituted as economic actors and entities' (ibid, p. 560). While Miller and Power do not discuss how such narrative may work in mediation, they emphasize the frailty of linkages since 'the mediating role of accounting does not assume that linkages are permanent' (ibid, p. 583). This suggests that mediating, as a process of relating, is a continuous endeavour. Several scholars (Christner and Stromsten, 2015; Kurunmakki and Miller, 2011; Mennicken and Miller, 2012; Miller and O'Leary, 2007) also emphasize the political nature of accounting mediation by which accounting calculations help foster particular forms of interventions. In such political processes, accounting can also be transformed (Zahir-Ul-Hassan et al, 2016) and hybridised (Kurunmäki and Miller, 2011) through its encounter with other concerns. Accounting can therefore drift (Andon et al, 2007; Hopper and Quattrone, 2001) i.e. move and transform in such mediational process. Such a transformational view of mediation echoes Latour's point (2005) that "[m]ediators transform, translate, distort, and modify the meaning or the elements they are supposed to carry ..." (ibid, p. 39).

A few accounting studies do show that several mediating instruments, or a so-called "web of mediators" (Bødker and Andersen, 2005; Latour, 2005, p. 217) may be needed to link up dispersed actors and places. For example, Miller and O'Leary (2007) identified both Moore's Law and the Road Map as mediators that play different roles in mediating inter-organisational capital budgeting actions. Sometimes, different mediators are also attended to at different stages of a long decision process (Christner and Strömsten, 2015). Here, each mediator has different

(calculative) powers and engages different actors and aspects of a wider issue. The notion of 'web of mediators' suggests that accounting calculations, to become mediating instruments, themselves will be mediated through other mediators, which help produce, transform or even reduce the power of accounting. This suggests not only studying the performative qualities of calculative tools, but also how other things mediate the power of accounting. However, accounting studies about 'web of mediators' remain rare and focus only on artefacts as mediators.

It is thus useful to delve more into what happens if mediation is performed by a heterogeneous web of mediators made of human and non-human mediators. Bødker and Andersen (2005) develop such a model of mediation. It starts from the premise that every human activity is both instrumentally and semiotically mediated. Instrumental mediation aims at materially transforming the world, while semiotic mediation aims at making sense of the world, at producing interpretations. For Bødker and Andersen, both forms of mediation constantly intertwine in activity. Every human activity is also oriented towards a 'material or ideal Object' (ibid, p. 359), the transformation of which is mediated by mediators such as tools or machinery (instrumental mediation) and representations, which become signs through particular interpretations (semiotic mediation). For Bødker and Andersen, subject, mediator and object are 'functional roles' in activity. These roles are not specifically attached to human and non-human entities and can switch during the course of activity. For example, in health care, patients are usually the object of medical activities but, if a medical apparatus breaks down, repairing it temporarily becomes the object of activity. In the same way, while subjects are often humans in activity, artefacts can become subjects. For example, in the activity of steering a ship, Bødker and Andersen (2005) show that this can be done both manually by an operator on autopilot and by a VMS system controlling the autopilot. Applied to accounting, this implies that accounting calculations become mediating instruments when their uses are oriented towards some particular objects since, without objects, there are no instruments in such a view of mediation. Since mediator is a functional role in activity, this also implies that the status of mediator is not restricted to tools or 'mediating instruments' as usually referred to in accounting studies. People (see e.g. Hausvik et al, 2019; Hayes and Westrup, 2014) such as boundary spanners (Zahir-Ul-Hassan et al, 2016) and competences or spaces may also become mediators when helping relating economic concerns to other concerns in a form of 'heterogeneous engineering' (Law, 1987).

Bødker and Andersen (2005) point out that activities are mediated by 'webs of mediators'. These mediators may be 'either used simultaneously, connected in chains or organized in levels' (ibid, p. 354). For example, responsibility centres are a usual way through which accounting financially territorialises spaces and helps allocating responsibilities. However, 'economizing' individuals and their activities may be facilitated by many mediators other than accounting tools, such as job descriptions and human skills. Therefore, it is interesting to study how accounting can be made powerful through a whole 'chain of mediators'. As Bødker and Andersen emphasize, such 'multiple mediation' is necessarily heterogeneous, dynamic and involves both instrumental and semiotic mediation.

This view of mediation provides a useful perspective to analyse how financial concerns may be related to operational concerns. It draws particular attention to how many human and non-human mediators help making accounting powerful and produce changes in operations. The next section analyses some conditions, which may help to relate financial and operational concerns.

## 2.2 Mediating relations between finance and operations

Various forms of interventions have been suggested to help relate financial and operational concerns in the literature. They may concern the development of tools, of collective dialogical spaces and of expertise. While these forms of intervention are analytically distinguished here, they intertwine in the process of relating financial and operational concerns.

Some forms of intervention concern the development of tools to help relate financial and operational concerns. This may concern the disaggregation of aggregated financial measurements into detailed financial measures (Jönsson and Grönlund, 1988; Lind, 2001). This helps operators make links between their actions and their financial consequences (see e.g. Jazayeri and Hopper, 1999; Jönsson and Grönlund, 1988; Lind, 2001; Miller and O'leary, 1994). Likewise, non-financial measures may help complement and operationalise financial concerns by providing direct and actionable insights, which facilitate continuous improvement (Jazayeri and Hopper, 1999) and day-to-day control (Lind, 2001). They are assumed to be more understandable and relevant for operators (Johnson and Kaplan, 1987) and, thus, help relate aggregated financial measures to operational concerns (Jazayeri and Hopper, 1999; Vaivio, 1999; 2004).

Other forms of intervention concern the organization of collective dialogical spaces[1] where financial concerns can be related to other types of concerns including operational ones. Here, accounting calculations provide the motivation and timing to engage in collective dialogues (Ahrens and Chapman, 2007; Busco and Quattrone, 2018). They prompt discussions to find 'actionable data' (Osborn, 1998), stimulate a search for 'causal information' (Jönsson and Grönlund, 1988, p. 520) or motivate sequences of translation (Mouritsen et al, 2009). In this role, accounting measures help relate financial and operational concerns through a 'process of scrutiny, questioning and search' (Busco and Quattrone, 2018, p. 1) and facilitate compromises (Chenhall et al, 2013). Jönsson and Solli (1993) consider that these dialogical spaces are important to produce financial improvements since they help intertwining a paradigmatic and a narrative mode of understanding. The paradigmatic mode, typical of financial sense making, is 'suited for making sense according to principles abstract from context' while 'the narrative mode of understanding includes the weight of the context and is therefore better suited as a medium for relating human experience' (ibid, p. 316). By allowing the intertwinement of these two modes of understanding, the dialogical spaces may lead to hypotheses about how to improve financial results (Jönsson and Grönlund, 1988) or generate inventions about how to reconcile financial constraints with other concerns (Busco and Quattrone, 2018).

To facilitate the construction of links between financial and operational concerns in these dialogical spaces, the involvement of operational people matters (see e.g. Jazayeri and Hopper,

[1] These concern spaces, such as performance meetings, where participants from different background meet to discuss (financial) performance issues.

1999; Jönsson and Grönlund, 1988, Lind, 2001) since 'important knowledge about cost relations of production processes is located locally' (Jönsson and Grönlund, 1988; p. 530). The construction of these links may also be enhanced, Vaivio (1999) suggests, by involving functional managers and expert staff in performance meetings. It is also influenced by the temporal organization of accounting talks. Time lags between activities and their financial effects (Jönsson and Solli, 1993), or late or infrequent reports (Jönsson and Grönlund, 1988) make the formulation of these links challenging. To the contrary, a frequent and regular monitoring of measurements, a process that Vaivio (2004) calls 'systematisation', helps ensure 'a formal organizational relay' between 'measurements, their enactment and organizational actions' (ibid, p. 429).

Finally, relating financial and operational concerns can also be enabled by the development of people's ability to link the two concerns. This is usually referred to as 'hybridisation of expertise' (Kurunmäki, 2004) and may develop through 'partnership working' (Kurunmäki and Miller, 2006; Miller et al, 2008) or 'joint working' (Kurunmäki and Miller, 2011) between accountants and non-accountants, education of non-accountants in financial matters or involvement of non-accountants in accounting practices (Kurunmäki, 2004).

The above forms of interventions – the detail and translation of financial numbers, the development of collective dialogical spaces and the hybridisation of expertise – are complementary and intertwined mechanisms that help mediating relations between financial and operational concerns. As such, they all may be involved in the construction of a web of mediators that help develop these relations. They, however, do not consider how interdependencies between responsibility centres, i.e. what we call structural interdependencies, may affect the construction of these linkages. This is what the next section analyses through micro-profit centres.

## 2.3 MPCs as structural interventions to mediate financial and operational concerns

### *2.3.1 Sensitisation to financial concerns through multiplication of responsibility centres*

MPCs is a structural intervention, which creates new types of responsibility centres. Cooper and Slagmulder (1998) distinguished 'real' MPCs with actual revenues from 'pseudo' MPCs. Pseudo MPCs, the theme of the present paper, are cost centres converted into pseudo profit centres by using various surrogates for revenues such as transfer prices, estimated external prices, budgeted costs and mark-up over standard costs. The main rationale for introducing pseudo MPCs is to 'spread' the financial concern to the shop floor by sensitizing operators to the financial implications of their actions and by engaging them in cost improvements projects.

Compared with conventional responsibility centres, MPCs are small (5 to 50 individuals), which implies that a high share of operators may become MPC managers (Miya, 1998). MPC managers are provided with a pseudo profit-and-loss statement and, compared with conventional accounting reports, pseudo profits are simple and include only controllable costs (Cooper and Slagmulder, 1998). Pseudo profits can be produced by MPC managers directly,

without the help of the accounting department, and they are mobilised via frequent meetings in MPCs. They also circulate outside MPCs to top management and to other MPCs. At least monthly, MPCs' past improvement plans and their effects are monitored by top management and future monthly plans discussed and debated.

### *2.3.2 Responsibility accounting and interdependencies*

The small size of MPCs helps 'to spread' the financial concern on the shop floor and facilitates the construction of cognitive links between operational actions and their financial consequences. Yet, MPCs also make it challenging to delegate financial accountability and the construction of financial improvement projects.

It is challenging because MPC managers do not have the same authority as 'real' profit centre managers. They usually have limited hierarchical authority (Cooper, 1995, p. 283). They also lack authority in pricing, product mix, or output decisions, cannot usually change suppliers or negotiate purchase prices; and, for important changes in the production process or for capital-expenditure decisions, they need top-management approval (Kaplan and Cooper, 1998). Delegation of financial accountability is also challenging because MPCs' financial results are affected by other MPCs or by staff functions. These vertical and horizontal interdependencies (Du et al, 2013) raise controllability issues in relation to financial delegation (Merchant and Van der Stede, 2007). Delegation of financial accountability may also be risky because MPC seeking their own pseudo profits may lead to sub-optimization (Abernethy et al, 2004; Lillis, 2002). For MPCs, this risk is increased because of their small size and high interdependence. There is thus a need of 'coordinated independence' (Takeda and Boyns, 2014; p. 338) raising the question whether it is possible both to delegate the financial concern on the shop floor and to manage interdependencies?

The MPC literature suggests three considerations to help manage interdependencies. The first consideration concerns the emphasis on cooperation and collectivity in corporate culture (Adler and Hiromoto, 2012; Miya, 1998; Sawabe et al, 2008). This may be a safeguard against over-individualism from MPCs. The second consideration concerns the role of senior executives. By approving targets, improvement plans and investments proposed by MPC managers, senior executives can mitigate the risk of over-individualism. Senior executives can also help mitigate conflicts between different units (Adler and Hiromoto, 2012; Miya, 1998). The third consideration concerns the development of interactions with other MPCs or other units. Because of their limited size, MPCs do not have 'sufficient resources to succeed without support from others' (Miya, 1998, p. 111). This may lead to increased coordination and intergroup activities to improve financial results (Cooper, 1995). This echoes more general literature, where subunit interdependencies have been reported both to create conflicts and productive dialogues to resolve them (Merchant, 1987; Lillis, 2002).

While the above considerations are relevant for our empirical study, the study also indicates another possible way to engage operators in financial improvements while managing interdependencies. At Kitanihon, action plans, as a coordination and accountability mechanism, allow both the mediation of financial and operational concerns and the management of interdependencies. We develop this theme in the following section.

# 3. Case study and research methods

## 3.1 Empirical case

In the course of trying to find firms that had developed an MPC system, one of the authors came across the case of Sumitomo Electric Industries, Inc. (SEI), a major electric-wire manufacturer in Japan. SEI introduced its MPC system in 1996 with the help of an internal consultant named Yukiyoshi Deguchi. He was an employee of SEI and was in charge of introducing the MPC system in SEI related firms.

In 2000, the researcher contacted Deguchi to observe the in-house MPC training for MPC managers. After observing a few MPC classes, the researcher asked Deguchi to suggest a place to do a more in-depth case study. Deguchi suggested Kitanihon, one of the SEI related companies where senior managers were supportive of the MPC system. The author started the field study at Kitanihon in October 2001.

## 3.2 Research methods

Three major research visits were conducted in 2001, 2005 and 2009 at Kitanihon. These research visits included individual and group interviews. They also included observations of Deguchi's monthly consulting sessions, where he helped presidents to solve the issues they faced, observations of MPC's monthly performance meetings as well as participation in socializing parties after performance meetings. Research visits were also complemented by nine school visits between 2000 and 2009 where, at break time or during informal get-togethers after classes, one of the authors conducted interviews to catch up with the situation in the firm. Appendix A summarizes the different research methods employed and the people interviewed.

During the 2001 research visit, the focus was on motivational effects of accounting information in autonomous work teams (Kaplan and Cooper, 1998). The interviews and observations were conducted over two full days at the firm. Interview guides were sent to various MPC actors prior to the visit. Four types of people were interviewed: managers of MPCs – so-called MPC presidents; assistant managers of MPCs - so-called branch managers; senior managers and all members of one of the MPC units. A performance meeting of MPC units was also observed. While the results of the 2001 research confirmed the motivational effects of MPC implementation on presidents and branch managers, a difference of perceptions between MPC managers and other employees of the MPC units was observed. This divide later led to the modification of the MPC system.

The 2005 research visit was conducted to understand why and how the firm continued operating the system after initial implementation. Kitanihon's MPC system endured while many other SEI-affiliated firms had withdrawn from the system. From the stream of visits to the MPC training school and exchanges with attendees, the creation of a supportive environment for presidents from senior managers appeared plausible reasons for the continuation of the MPC system. A series of interviews was conducted at Kitanihon including retired senior managers who had started MPC implementation, newly appointed senior managers, costing staff as well as a newly appointed president, at the MPC school. The monthly performance meeting was

again observed, and the exchanges were noted. The 2005 research results confirmed that senior managers were relatively supportive of the MPCs. They also reported the start of a rotational system for the role of MPC president and branch manager. The study of this rotational system and its effects on the accountability process were included in the study.

In 2009, a final research visit was conducted to understand the degree of penetration of the MPC system among employees after the start of the rotational system. A group interview with presidents and branch managers, and individual interviews with a former and a newly appointed senior manager were conducted. After working hours, an informal interview continued over dinner with two senior managers and Deguchi, where the impact of the introduction of the rotation system was discussed.

After the 2009 research visit, all the evidence gathered since 2001 was examined to analyse how the development of the MPC initiative not only increased financial sensitivity at Kitanihon but also helped to sustain a collective and continuous generation of financial improvement plans. This analysis was particularly interesting because, in the meantime, all other SEI-affiliated firms had stopped the system.

### 3.3. Context of the study: emergence of MPCs within SEI and at Kitanihon

The MPC system started in SEI's north-eastern plant located in Kanuma city, Tochigi prefecture. Senior managers of the wire division accepted to experiment with the system. They appointed one of their operators, Mr Deguchi, to engage in this experiment. Deguchi was known as being full of ideas and having a strong personality. He became a driving force of what turned out to be a successful trial. This success and Deguchi's contribution became recognised both in SEI related companies and by practitioners and professors outside SEI.

It was decided to start an in-house MPC school in Kanuma city and to appoint Deguchi as MPC trainer and internal consultant. SEI related companies could pay the school fee and send their employees to the in-house training school. They could also pay a consulting fee (relatively low to cover Deguchi's labour costs) to have Deguchi visit them and get advice and on-site training.

Kitanihon demonstrated capacity to meet cost reduction requests from its parent company Northern Electric Power every year. Nevertheless, the head of the manufacturing department thought that the division should become more cost effective because fierce competition with foreign electric-cable manufacturers was expected. However, operators did not feel financially accountable. In the accounting system, the entire manufacturing group was considered one unique cost centre and only the head of the manufacturing group was responsible for manufacturing costs. The disaggregation of an aggregated financial report in small pseudo profits was thus considered as a good way to financially sensitise operators.

Operators were not regularly engaged in cost-improvement projects. Once a year, small groups of operators were set up and participated in what was called kaizen costing exercises. However, as reported by two senior managers, 'improvements were only for the event' and 'once plans were presented at the event, this was the end!' Except from this yearly event, cost improvement plans were mainly carried out by support functions such as engineering or maintenance staff. The MPC system was then also an opportunity to engage operators in cost-reduction efforts more continuously.

In January 2000, the system was formally taken on by the Manufacturing Group of the Electric Cable division at Kitanihon.

### *3.3.1 Organisational structure and initial form of accountability*

The Manufacturing Group was organized around manufacturing processes: drawing, annealing, stranding, vulcanising, insulating, twisting, sheathing and bundling (see Figure 1).

<Insert Figure 1 about here>

Each manufacturing process was headed by a team leader. Team leaders both worked as members of a process and were responsible for allocating work among operators. Manufacturing process units were held accountable for manufacturing a certain length of wires according to standard time. They regularly received feedback in the form of a number, which compared standard time and actual time, referred to as "efficiency" in the company. In case of negative results, operators felt bad, but they were not requested to analyse the cause of these results and to improve operations. This indicator did not energize many cost improvement initiatives.

### *3.3.2. New 'pseudo' MPC structure, roles and dilemma*

In 2000, the manufacturing group, a unique cost centre, was disaggregated and transformed into four (small) pseudo MPCs. This disaggregation was not modelled on existing manufacturing processes. Instead, the first three processes were grouped into a single MPC unit (called 'DASH'), supplying half-finished goods to three other MPC units organised by product type (by the diameter of electric-cable products): a large product company (called 'BPC'), a medium-sized product company (called 'APC'), and an OC[2] wire-products company (called 'OC') (see Figure 1). The reason for this grouping, as explained in the MPC textbook, was to depart from 'ordinary factory management' based on manufacturing processes to move to an organization by product type. This aimed at calculating a profit and loss account and pseudo profits per product type for APC, BPC and OC in order to sensitise operators to 'profitability.'

Four team leaders were appointed presidents of the four newly created MPCs. Presidents were taken off their operational duties to focus mainly on financial improvement plans. They had also to calculate pseudo profits themselves since this was not done by accounting staff. As a costing staff put it, the (unofficial) MPC system was considered as a 'virtual' system compared to ' the firm's formal standard costing system', which was considered 'real'.

The newly appointed presidents had mixed feelings about their new position. On the one hand, they were happy to be given the opportunity to be trained. On the other hand, the new role required them to deal not only with unfamiliar accounting knowledge but also with PC knowledge, as in their 50s, they had never touched a PC before. They all accepted the role of president mainly because they 'could not say no to the offer' (Ex-BPC president (in 2001)).

They also had mixed feelings because they did not have the same decision-rights as conventional profit-centre managers; nor were they as empowered as the name implied:

[2] 'OC' is a shortened form of 'outdoor cross-linked polyethylene'. OC cables are used as high-voltage power lines for electricity distribution.

> OC president (in 2001): At first, with the name 'president,' I thought: What is meant by president? Even now, I am not comfortable with the name; 'president' is only a name.

President had no hierarchical authority over operators included in their MPC, except for the operators from the process for whom they stayed team leaders. For example, in 2001, the appointed president of BPC was team leader of the insulating process. He had no hierarchical authority over twisting, sheathing, bundling although these processes were part of his MPC. He was also not necessarily knowledgeable about these other processes, which made it difficult for him to suggest improvement plans for these processes. For these reasons, presidents were assisted by so-called branch managers who were team leaders from processes about which presidents were inexperienced.

# 4. Constructing relations between financial and operational concerns

## 4.1 Building individual mediating capacities and a web of mediators to relate financial and operational concerns

The first presidents were experienced, skilled workers, recognised as technical experts by their colleagues. As team leaders, they knew about processing wires and were comfortable with the 'efficiency' indicator rather than with manufacturing costs.

Becoming presidents manufacturing costs became more important, as clearly communicated to them by the head of manufacturing (in 2001):

> What we always say to the presidents is that the MPC system is not like the former kaizen costing, in which responsibility is vague and no one would be blamed even if the results were not effective. I always make sure that the line of responsibility is clear to the presidents and that we must have real, effective results. I guess that they have completely different impressions of an MPC system compared with the former kaizen costing.

Delivering financial effects was important and, similar to Kurunmäki (1999, 2004), the making of presidents as financial-operational hybrids at Kitanihon implied their "accountingisation" (Power and Laughlin, 1992) through training in financial matters, involvement in accounting practices and through making them regularly accountable of pseudo profits. These three practices had their own organisational spaces: an in-house training school, an isolated room where presidents were gathered, and the creation of new MPC performance meetings. Together, these places were not only vehicles for 'accountingisation' but mediating places where presidents developed their capacities in relating financial and operational concerns (4.1.1). These places also helped develop a set of tools, which could help relate financial and operational concerns (4.1.2).

### *4.1.1 Providing presidents with mediating capacities*

The first MPC space was the in-house MPC training school. In January 2000, the first four presidents arrived at training sessions taught by Deguchi. Presidents attended intensive sessions for two full days at a time – in total, ten times over several months.

In training sessions, Deguchi dramatized the importance of financial matters. For example, at the beginning of the course, Deguchi asked presidents: 'How much do you earn in one day for your firms?' In this way, he asked whether their work merited their pay. He even asked them: ''Are you sure that you are not wage thieves?' He explained: 'If your firm goes bankrupt, your salaries will not be paid at all and you will be unemployed!' The students began to realise the notion of 'no corporate profit, no salary and no job security.' This point was central to Deguchi's philosophy. He wanted students to behave as if company money was their own. In training sessions, Deguchi also introduced new MPC terminologies such as sales, conversion costs or cost-volume-profit analysis. Presidents also learned to build three types of financial tools: their MPC's profit and loss statements, the total potential for improvements and its breaking down in categories of financial losses and the financial impact of specific improvement plans.

They started to produce these tools during training and continued using them for their MPCs since the accounting department was minding only standardised financial reports. Since PCs were needed to prepare pseudo profits and since, as one manufacturing senior manager recalled, 'when MPC system started, there were no PCs on the shop floor', presidents were removed from the shop floor and relocated, together, in a common room in the office building, a few minutes' walk from the factory. Since presidents were removed from the shop floor, branch managers, still located on the shop floor and attached to their operational work, were expected to ease the link between presidents and shop floor workers. Their main task in relation to MPCs was to monitor cost-reduction efforts.

Through Deguchi's training, presidents gradually became sensitised to financial concerns. They also developed the ability to mediate between financial and operational concerns, learning to design and monitor operational action plans, which could improve pseudo profits. For example, in training session 2, they learned the '5 whys technique' to find the root causes of problems which had negative financial impacts and applied this technique to their own MPC. In session 3, they learned the basic pattern of problem solving: problem analysis, decision making among alternatives and setting up improvement targets, design of action plans, data collection and monitoring of the results of improvement plans. Over the different training sessions, they also learned techniques to identify, design and monitor improvement plans such as Deming's PDCA, the theory of constraints, process capability and statistics or the Kawakita Jiro method.

Thus, Deguchi both raised presidents' financial literacy (Kurunmäki, 2009) and their abilities in mediating financial and operational concerns. Deguchi was an important mediator in the MPC initiative. By teaching presidents both financial tools and techniques helping them design operational action plans, he helped them translate financial concerns into operational concerns and thus moved their identity from team leaders to presidents.

### *4.1.2 Developing mediating tools*

Deguchi visited Kitanihon once a month to discuss the problems encountered by presidents, and senior managers decided to hold a new monthly MPC performance meeting during his visits. For this meeting, presidents produced their MPC' profit and loss statements, based on data from the company's standard costing system. Participants at meetings other than Deguchi, included presidents, branch managers, senior managers, and some members of the MPCs as observers – usually around 20 people in total.

Monthly performance meetings were quite intimidating for presidents. While presidents usually stayed late in their MPC-dedicated room, they stayed even later as the day of their monthly performance presentations at the meeting approached. This made the financial concern an important concern for presidents, as for example reported by one president whose unit had shown a 'loss' since the beginning of the system:

> MPC president (in 2001): At first, I thought my unit would go bankrupt, because our unit had been in the red for about six months in a row. Although the other three units were in the black, my unit was in the red. So I was told off by the senior manager. But in September last year, it went into the black for the first time […] I can say it [profit] is the biggest concern for me!

Whereas, through the regular and public reporting of pseudo profits, presidents became sensitised to financial concerns, these concerns had yet to be translated into financial improvement plans to produce financial effects. Several mediating instruments, both financial and non-financial ones, helped such translation and influenced the design of financial improvement plans.

Deguchi requested from presidents the regular calculation of the total potential for improvement, sometimes referred to as the 'buried treasure.' This was the 'total potential for cost reduction' in 'absolute monetary figures' (excerpt from the MPC textbook). This amount was an ideal, not reachable, figure aimed at sensitising operators to financial gains potentially earned if facility, material or work hour losses could be avoided.

This broad figure was disaggregated by type of losses (i.e. facility, material or work hour losses) and further disaggregated by type of causes and each cause financially assessed. For example, facility losses[3] were computed as the difference between the maximum and the actual yield (lost time). Lost time was classified according to reasons for stopping facilities such as no orders, waiting time for the start-up of the facilities or troubles with the facilities. Each type of lost time was turned into financial values to help presidents visualize the causes with largest impacts on profit. Such disaggregation helped orienting improvement plans' proposals by indicating causes that could have important impacts on pseudo-profits.

Presidents had to suggest improvement plans to get rid of losses. They were then using the methods and techniques taught in the training centre to design potential action plans. Once action plans were formalised, they became listed in another mediating instrument, the so-called

[3] This also applies to the loss of materials and the loss of working hours.

'to-do-list'[4]. The 'to-do-list' was a list of financial improvement plans to be addressed by operators (and/or by staff functions) in practice. It was a hybrid tool, which included financial and operational information. Financially, the to-do-list reports the 'total potential for improvement' and, for almost all improvement plans, their expected monthly financial effects (column 3) and, later, their actual effects if plans prove effective (column 7). Operationally, the to-do-list included the name of the selected improvement plans (column 2), the person(s) in charge of it (column 4) and some details about the plan and its content (columns 5 and 6).

While the proposal of action plans was oriented by the financial calculation of losses, it became also oriented by a categorisation of action plans that developed, in an ad-hoc manner, and was reported in the first column of the to-do-list. It concerned general operational categories that operators could use to improve financial results. For example, in the November 2005' DASH to-do-list, there were 5 categories of 'improvement topics': reduce rejects, reduce material loss, increase production volume, promote multi-tasking operators, and actions lowering environmental damage. In the same way, the September 2005' VF to-do-list included three categories of improvements: the reduction of waste, the increase of production volume/speed and the avoidance of rejects. Such translation of financial concerns into operational categories helped to orient the search for action plans in potentially promising directions.

The to-do-list also mediated the prioritisation and implementation of actions. For example, in 2005, one MPC unit suggested an improvement plan aimed at avoiding rejects caused by irregularly twisted wires. Based on the number of rejects and on the manufacturing cost per unit, the president calculated monthly cost savings if rejects could be avoided. This helped prioritising action plans because not all suggestions could be undertaken concomitantly. The calculation of the potential financial impact (column 3 of the to-do-list) then served to select the most promising plans to undertake them first. Other suggestions would remain on the to-do-list but be undertaken later.

Finally, the to-do-list also helped to monitor the financial effects of all the action plans. Financial effects of action plans carried out were usually calculated by presidents and reported in the column 7 of the to-do-list. This could help them, as well as the participants of performance meetings, to assess the progress of MPC initiatives and their suggested effect on pseudo profits. This helped to (financially) legitimise the MPC initiative. However, the MPC profit-and-loss statement was a stand-alone system and the accounting department and other divisions were not always supportive of this system. They raised doubts about its adequacy in reflecting action plans' impact on corporate profit[5]. Therefore, general standard costing numbers were also reported in performance meetings to 'show the similar trend of up and down as the MPC measures' (Manufacturing group manager, 2001). The links remained quite loose, however, even if manufacturing managers believed that the MPC brought important increases of profitability:

> Manufacturing manager (2005): Yes, the profit has increased that much compared to the previous year. The products we make change slightly year by year, but at the beginning

4 'To-do-list' is the vocabulary used by people in Kitanihon. This artefact is not simply a list of action plans but, as we describe, contains various columns and may therefore appear more as a matrix than a list. We, however, keep the wording used by actors and explain in note 8 how we differentiate from the literature on lists.

5 For example, in a MPC-school-dinner, an accounting staff, although acknowledging presidents' behavioral changes caused by the MPC system, also considered that it was dangerous for amateurs to tinker with financial accounting figures on their own.

it (profit increase) was in hundreds of millions (of yens, or million dollars), and, after that, it has always been in tens of millions (yens, or in hundreds of thousand dollars)[6].

## 4.2 Collective forms of mediation and the management of interdependencies

Presidents developed suggestions for financial improvement plans. Yet, because of presidents' limited decision rights and because of vertical and horizontal interdependencies, presidents could not design and/or decide about action plans to be included in the to-do-list individually and sovereignly. Performance meetings became important places to manage interdependencies collectively (4.2.1.)

Performance meetings also became mediating places, where many mediating instruments (MPC profit and loss statements, total potential for improvement and its disaggregation, to-do-lists etc.), helped presidents and other attendants making links between financial and operational concerns. They, thus, helped building a collective mediating capacity and a heterogeneous 'web of mediators', made of mediating people and instruments. (4.2.2.)

### *4.2.1 Interdependencies and the mediation between financial and operational concerns*

The first generation of presidents could, as team leaders, draw on their authority to allocate financial improvement plans to operators. However, their MPCs had many vertical and horizontal interdependencies (Du et al, 2013). Thus, while presidents experienced pressure to deliver financial results, their limited decision rights and the many interdependencies affecting MPCs made them far less autonomous than conventional responsibility centres. This made it difficult to delegate financial accountability and the elaboration of improvement plans to presidents.

Vertically, senior managers' approval was required for improvement plans that involved additional expenses, capital investments or decisions affecting several MPCs. For example, an improvement plan aimed at reducing the set-up time of a machine was included in the to-do-list of the OC unit in 2005. Unfortunately, a delay in the product supply from DASH to OC occurred and hampered OC's improvement project. When Deguchi asked DASH president and branch manager about the cause of this lateral problem, it became clear that capacity was a problem, and in order to manage this, presidents' superiors had to be called in to make a decision. Senior managers then decided to reallocate some employees from other units to DASH to help them return to the normal production level. A month later, a test was made and set-up time was reduced from 5 to 3 hours with an estimated cost saving of 1 194 000 JPY.

Laterally, support functions such as engineering or maintenance units were important for many improvement plans. For example, in 2005, the OC unit estimated that almost 80% of improvement plans concerned facilities, which usually required efforts from staff functions.

[6] During the first two years, important and easiest cost reductions were made. This explains why later cost reductions decreased.

Initially, staff functions were not part of MPC. It is, for example, only in August 2001 that the maintenance unit (part of the engineering department) reluctantly[7] integrated the MPC initiative. At the request of Deguchi and of manufacturing managers, the maintenance unit was asked to 'come in to assist manufacturing.' This significantly improved the relationship between manufacturing units and maintenance unit and helped collectively discussing improvement plans, as the manufacturing manager (in 2005) mentioned:

> The relationship between engineering and manufacturing used to be: I am the person who runs the machine, you are the person who maintains the machine… when I called them, they wouldn't come at all! … It's true that once we formed units of MPC within the organization and started holding performance review meetings together, we started to feel closer to each other and things started to go in the right direction. When we do things in such an open manner in the performance review meeting, we can see that they are thinking that way, and that we need to do something about it. I think the maintenance department has changed the most!

Performance meetings became places to manage lateral and hierarchical interdependencies through the collective discussion of improvement plans rather than places to delegate and individualise financial accountability. Such collective elaboration could benefit from the presence of Deguchi and of other participants as suggested by the manufacturing manager considering that the performance meeting was a place where presidents 'can share ways of thinking towards the problems they face' and 'can spontaneously give suggestions to other units.' Managing lateral and hierarchical interdependencies triggered collective discussions and decisions about improvement plans.

### *4.2.2 Performance meetings as mediating places*

Performance meetings also became important mediating places where links between financial calculations and operational actions plans could be made collectively and continuously. In performance meetings, both the general structure of performance reviews and the analysis of detailed improvement plans intertwined, at an aggregated and at a detailed level, financial and operational concerns through the mobilization of several mediators.

The general structure of performance reviews was organized by the presentation material developed by Deguchi. They usually started from aggregated calculation of sales and monthly MPC profit and loss results before turning to the general list of action plans as reported in the to-do-list. Then, detailed plans were introduced, sometimes assisted by pictures of operational issues (e.g. of cables, of machines) or even of operators involved in improvement plans. Operational details concerned the analysis of causes that produced losses and of operational solutions but they were also intertwined with financial considerations.

For example, in the November 2005 OC presentation, in the stranding wire process, a machine often stopped due to the way the wire was connected. Pictures were shown about stoppages, and the president showed his financial calculations about the impact of the machine stoppage.

[7] The head of the engineering department considered that pseudo profit measures were less appropriate for maintenance than non-financial indicators such as the number of machine breakdowns and machine downtime.

He included the wasted material, the labour for the reprocessing of rejections and electricity to be used for the rework and came up to a financial effect of about 3 million yen (30 000 dollars). The president then proposed, with pictures, a new way to accomplish the connection of the wire to the machine and suggested how this could reduce machine stoppage to an acceptable level.

In the same performance meeting, the DASH president discussed the processing of a new type of copper wire on a twisting machine. This new wire resulted in frequent machine stoppages and in a lot of wasted wire. The president reported that, from April to October, an average of 4 tons of wasted wire occurred. The shop floor members (collectively in charge of the action plan) then compared the financial results between disposing and selling the wasted wire to a supplier and reprocessing the wasted wire into finished products. They found out that the latter would increase income by about 200,000 JPY and devised an improvement plan to rewind the wasted wire into a new bobbin at a speed of more than 138 kilograms per hour.

These two examples illustrate that analysis and design of action plans in performance meetings were intertwined with detailed financial calculations. The latter were used to assess potential savings *ex ante* or to report the financial consequences of action plans *ex post*. Such intertwinement between financial and operational concerns and between past and future actions also occurred on a more aggregated level in performance meetings. While 'sales' and MPC results intertwined with the general to-do-list at the beginning of presentations (past orientation), towards the end of MPC presentations, statistics about numbers and causes of operating issues were usually reported to orient the design of future actions plans and were intertwined with the targeted financial effects of future improvement plans (future orientation).

Performance meetings were mediating places where financial and operational concerns were related. In these mediating places, action plans complemented financial calculations by tentatively translating them in operational terms. Action plans were also variously linked with financial calculations, since the latter served motivating, orienting, selecting or assessing them. Action plans had yet to be 'completed in the world-of-action' (Jordan and Messner, 2012, p. 552).

## 4.3 Spatially mediating financial and operational concerns

To be completed in the world of action, pseudo profits and/or financial improvements plans had to move from performance meetings to the shop floor and/or to staff functions. At Kitanihon, the to-do-list helped transform financial accountability into action accountability. This happened both for MPCs (4.3.1) and for staff functions (4.3.2.). By mobilising the to-do-list, presidents and branch managers spatially mediated financial concerns discussed in MPC spaces and operational actions undertaken on the shop floor and in staff functions.

### *4.3.1. Making MPCs' operators accountable for financial improvement plans*

Initially, only few individuals on the shop floor, presidents and branch managers, were held accountable for MPC results. Monthly pseudo profits were posted on a notice board on the shop floor but were usually not commented by presidents. Operators' sensitivity for and involvement in the MPC initiative was low, as for example reported by one of them in 2001:

> A member of an MPC: I have never had any training about the MPC. Although I want to understand it, I am not sure I could do it. Besides, I have a feeling that I don't know what the MPC even is. Consequently, I have done nothing so far for MPC.

It was a challenge to involve operators because most of them considered MPC implementation an additional burden. They had to absorb the operational tasks of appointed presidents and improvement plans were on the top of their regular job. For example, an operator interviewed in 2001 pointed out that: 'I was appointed as in charge of some improvement items. But, when should I do it?... Actually, I could not both operate the machine and take care of improvement items'. In the same way, another operator complained that 'the workload increased more than what it used to be since the president tells me to do this and to do that'. The workload also increased because some improvement projects required operators to learn how to operate different machines. Many shop floor workers complained that they did not have the time to do this. For example, an operator from the stranding sub-process complained because he 'was ordered to operate machines of another sub-process' while he did not yet master all the machines of the stranding unit.

The first presidents responded to this situation mainly in two ways. The first way was to design and monitor improvement plans themselves to avoid adding burdens on shop floor workers. In the beginning, the to-do-list did not contain any names of individuals in charge of improvement plans. The manufacturing manager then requested, one year after the start of the MPC, to add a column with the name of operators responsible for improvement plans to involve them in the MPC:

> We've been talking about including ordinary employees for a long time to the MPC, and, at first, there was no names of branch managers or operators in the 'person in charge column'. Now we have to include the name of the person in charge. That's why we're talking about involving them this year. (Manufacturing manager, interviewed in 2001)

However, names could be noted as 'in charge' without any actual involvement of operators. This was for example, mentioned during the monthly performance meeting in October 2001, by a young employee from one of the MPCs who gave a presentation on behalf of his president:

> Young employee from an MPC: Even though my name is written down as a person in charge in the 'to-do list', to tell you the truth, I have not been involved in it at all.

Asked to comment about this remark, a president acknowledged that 'this is maybe because we are not involving members in the MPC system at the moment. So in the to-do-list, many plans are characterised as not carried out yet!'

The second way to carry out improvement plans was to impose them on shop floor workers. The first generation of presidents, branch managers and team leaders could use their authority to allocate action plans to operators. Many operators felt instructed by the presidents to 'do this and do that', as one of the operators reported.

While sometimes difficult and opposed to by shop floor workers, the monitoring of the 'to-do list' by presidents and branch managers, on the shop floor and in an ad hoc manner, ensured the link between the MPC initiative and the shop floor. This affected operators' accountability since they became accountable for the progress of improvement plans, in addition to efficiency.

### *4.3.2 Making staff functions accountable for improvement plans*

The to-do-list was also used by presidents to mobilise people from engineering and maintenance units. To do so, the presidents used their to-do-list and staff functions' own to-do-list to visit them and inquire about the progress of their action plans. This enabled presidents to account for the progress of action plans in performance meetings. Staff functions were mobilised by presidents, but also directly by MPC operators when some action plans implied conjoint work. For example, in 2005 in the DASH department, an improvement plan aimed at reducing the moving time of a specific bobbin to reduce set-up time. This was included in the MPC to-do-list as a joint effort between a Dash operator and the engineering staff. In the same to-do-list, another plan required working with engineering.

This increased the mobilisation of staff functions, in particular after the integration of staff functions in the MPC system, as acknowledged by the head of maintenance in 2005:

> In the past, the shop floor didn't communicate closely with us… Now that we are doing MPC, they ask us how the machine improvement' work is going, so we feel like we have to do it...

As he also commented, this increased enquiries by the manufacturing group about the completion of facility modification and the rate of completion of repair and modification: "Before, completion rate of facility modification was about 20 to 30%. Now the rate increased up to 60%!"

The manufacturing manager corroborated this in 2005 considering that 'if they (i.e. staff functions) had not both attended the MPC's performance review meetings, these enquiries would not have occurred!'

The to-do-list became a tool for presidents to inquire regularly about the progresses of improvement plans. It did not help delegating financial accountability to MPCs or staff functions but transformed accountability from financial accountability (i.e. pseudo profits) into action accountability (i.e. action plans on the to-do-list). By transforming accountability, the to-do-list helped to move the financial concern onto the shop floor and into staff functions.

## 4.4 The re-mediation of accounting tools and structure

While the difficulty of delegating financial accountability to MPCs existed at the start of the initiative because of organizational interdependencies, this difficulty increased when the role of president began to rotate. This affected accountability (4.4.1) and accounting structures (4.4.2). The development of the web of mediators also transformed and re-mediated accounting itself.

The first manufacturing manager considered that the initial low involvement of operators in the MPC system was an issue:

> Manufacturing manager (2001): Without the involvement of other members, what the presidents can do is limited..... I suggested to presidents that they should delegate the task of MPC to the members of the units (but it was not done). Thus, the results of the

> to-do-list shows "not done" for many improvement plans. Therefore, I talked to other staff and we should involve other members in the MPC system.

To ‘make the MPC system everyone’s concern’, as proposed by the initial manufacturing manager, it was decided to start a rotation in 2003. The role of president was to rotate among the workers every one to two years. The typical career path started with branch manager, then president. After that, some presidents took up the role of branch manager again, while others returned to being workers. As of 2009, 26 operators had graduated from the training school and 19 of them experienced being in the role of president (around 40% and 30% of all shop floor workers).

By rotating the role of presidents and enrolling more employees to the MPC school, the MPC system was gradually understood and even accepted by more employees. For example, a young operator, critical of the MPC system in 2001, later became branch manager, commented on his change of mind-set as follows:

> Cherry blossom’ branch manager (2009): ‘Before I attended to the MPC school, when I caused defects, I just thought “I made the defects (as a fact)”. Now (after I graduated from the MPC school), I would consider the same situation differently and would think of the loss caused by the defects.’

The rotation increased the number of operators able to relate financial and operational concerns but also changed human mediators individually and collectively.

### *4.4.1. Changes in mediators and in accountability*

Rotation implied that promising young employees – regardless of years of service, age or rank in the factory – were appointed as presidents. Since they were not team leaders, they could not use hierarchical authority to instruct other operators to undertake improvement plans. This made it very difficult to make them financially accountable for pseudo profits and were therefore asked to focus more on action plans:

> New manufacturing manager (2005): I don't put importance on the financial performance for the presidents of the MPC units. Rather, I emphasize that they should consider why the improvement plans of to-do-list do not proceed according to plans and how they are carried out.

This was corroborated by the OC president in 2005, also present during the interview, reporting that: ‘I have never been blamed by him about the financial performance of the MPC… As long as we are doing our job normally, even if our profit and loss is in the red, as long as we don't have any major defects, it doesn't matter!’

President’s accountability moved towards improvement plans and the mobilisation of all people who might affect pseudo profits, whatever their location. However, because of their low status, the second generation of presidents attempted to involve operators mostly by nudging and sensitising them. For example, new presidents posted MPC news on the notice board and they proposed to check the material waste bins in order to sensitise operators to the financial consequences of waste or to educate young members of MPC units to the MPC system. Thus,

the choice of new types of MPC mediators both transformed presidents' accountability and the way they mediated financial and operational concerns.

### *4.4.2 Re-mediation of financial accounts and MPC structure*

The rotation also brought a re-mediation of accounting tools and structures to ease the acceptance of the MPC system. Operators complained about what they understood as misalignment between MPCs' and manufacturing processes because operators from the same manufacturing process were allocated to different MPCs. This was criticized by operators:

> MPC and BPC units in the first MPC organization chart in Kitanihon were artificially split. The two units were organized by products while they shared the same machine for processing the products. So, operators working on the machines did not feel that they belonged to the MPC units. (MPC' president, 2004)

Operators also complained that MPC boundaries were not aligned on the organisational chain of command. Operators had to report both to their team leader as sub-process members and to presidents as members of the MPCs. This made the chain of command complex and impeded collective learning.

> Being split by products in the first MPC organization chart, members working on the same type of machine were also allocated to different MPC units. They thus lost the opportunity to exchange their work experience about the machine. (MPC' president, 2004)

Thus, in 2004, at the request of new presidents, the MPC boundaries were partially re-aligned on the physical and organisational dimensions of operational processes.

This reconfiguration consisted in reorganising MPCs from product type to facility type. Two new MPCs (see Figure 2) – named 'Cherry Blossom' and 'VF'– were formed and they shared a single profit-and-loss statement. They produced the same products but took care of different manufacturing processes.

<Please insert Figure 2 about here>

Thus, financial calculations did not only help mediating the design and monitoring of improvement plans, but they became themselves re-mediated while relating financial and operational concerns. To ease the acceptance and operationalization of accounting by operators, accounting tools and structures transformed, following what Miller et al (2008) call a 'dual hybridisation' process. This modified MPC structure enabled more shop floor operators to accept the presidential role, to become financially literate and to engage in the development and monitoring of improvement plans.

## 5. Structural interdependencies and the development of a web of mediators to relate financial and operational concerns

The case of Kitanihon shows that many mediators such as people (e.g. Deguchi or presidents), organizational spaces (e.g. performance meetings) and various instruments ranging from financial calculations to action to-do-lists were involved in producing and delegating improvement plans. Relating financial and operational concerns was enabled by an evolving web of mediators rather than by a set mediating instrument. This web of mediators not only links, but also transforms entities and their relations by transforming presidents in financial-operational hybrids, financial accounts into actions plans and financial accountability into action accountability. This process has affinities with theories that emphasise the non-linear mode of change (Andon, Baxter, & Chua, 2007; Quattrone & Hopper, 2001; Revellino & Mouritsen, 2015) but makes accounting less centred in the web of mediators. While the MPC project is an economizing endeavour (Miller and Power, 2013), its fate and power depends on the development of many mediators, a development that transforms accounting itself.

The study also shows that the organizational structure mediates relations between financial and operational concerns. The multiplication of responsibility centres increases interdependencies and makes individualisation of financial accountability difficult. Managing these structural interdependencies led to consider financial accountability and decisions about action plans as collective endeavours in performance meetings. Financial concerns are not directly delegated to the shop floor or to staff functions but are (continuously and tentatively) translated into operational concerns through actions plans. Action plans mediate financial concerns and transform financial accountability into individualised forms of action accountability. The rest of the section develops and discusses these contributions.

## 5.1. Developing a web of mediators that link financial and operational concerns

The study shows that Kitanihon's MPC project unfolded a whole 'web of mediators' (Bødker and Andersen, 2005; Latour, 2005). Developing MPCs is not only a process of accountingization (Power and Laughlin, 1992) but one of linking the development of accounting with the development of operations and operators to engage the latter in cost reduction efforts. This was facilitated by the (continuous) development of a web of mediators that includes at least three different kinds of mediators.

First, the process developed several 'mediating instruments' (Christner and Strömsten, 2015; Jordan et al, 2013; Kurunmäki and Miller, 2011; Miller and O'Leary, 2007; Zahir-Ul-Hassan, Minnaar, & Vosselman, 2016). These are both accounting tools such as MPC pseudo profits, total potential for improvement calculations, detailed micro analyses of financial losses or gains expected from or realised on improvement plans, and non-accounting tools such as action plans on the to-do-list.[8] Each helps perform different actions that may ease some aspects of this

[8] There is a significant literature on the idea of the list but it is more about the politics of visibility and the ability to index the world (Stäheli, 2016) that is to decide what is visible and what is not. It is the 'representational' question of the politics of visibility (Strathern, 2000; Tsoukas, 1997) and the possibilities of surveillance. This is important but it already has a good grounding in the accounting literature. The to-do-list is not representational but propositional. It proposes something to do rather than seeing something. Clearly, there is a performative relation between seeing and doing, and, in our case, seeing develops through financial instruments and collective performance meetings that develop interpretations (Busco et al., 2007) while to-do lists are claims about the future.

mediating process. For example, MPC's pseudo profits and the total potential improvement help motivating the regular holding of performance meetings to conceive, discuss and assess financial improvement plans. The detailed analysis of financial losses and operational categories of 'improvement topics' on the to-do-list help channel and focus analysis and discussions of potential improvement plans. Action plans articulate how through financial assessment operational concerns are prioritised and selected. This suggests that what helps mediating between financial and operational concerns is not one single instrument but the construction and mobilisation of an evolving web of 'mediating instruments' at different moments, for different functions and in different places.

In this web, there is to no dominant instrument. Its complexity is different from that laid out by other research analysing the operations of mediating instruments (Christner & Strömsten, 2015; Jordan et al., 2013; Miller & O'Leary, 2007) which tends to focus on one or few instruments that are loosely coupled. In contrast, instruments included in the web of mediators discovered in Kitanihon are interdependent. They all help perform some actions that, as a network, make proposals about (financial) intervention possible.

In this web of mediators, action plans complement pseudo profits that may be able to indicate failing profitability but that are not able to suggest actions to meet this problem (Jönsson and Grönlund, 1988). Action plans thus tentatively transform financial concerns into operational ones and operate a shift from 'the content of reports to the content of activities' (Jönsson and Solli, 1993). Such shift triggers collective discussions, experiments or assessments, in performance meetings, in presidents' room, on the shop floor, or in support functions. Action plans are part of a web of calculations, propositions and prioritisations, but they do not dominate them. They sums up results of deliberations but emerge after many instruments and calculations that help orient and prioritise them.

Second, the study shows that the web of mediators also importantly includes a web of human mediators including Deguchi, presidents and branch managers. In particular, presidents were important mediators of the MPC initiative and ensured the continuity of efforts over the years. The importance of human mediators is hinted at in accounting studies by Zahir-Ul-Hassan et al (2016). They show that with structurally similar mediating instruments, changes in boundary spanners and in their rationalities could affect the form of mediation. This suggests that mediating instruments and their design are insufficient to explain how mediation happens. The study contributes to the accounting literature by drawing attention to three aspects related to human mediators.

One aspect is that the exposure of non-accountants to financial concerns through different means (Kurunmäki, 1999; 2004; Kurunmäki and Miller, 2006; Miller et al, 2008; Kurunmäki and Miller, 2011) is not a sufficient condition to develop their mediating capacities. At Kitanihon, presidents also learned to relate financial and operational concerns by learning techniques aimed at conceiving and developing financial improvement plans. They become mediators not only by raising their 'financial literacy' (Kurunmäki, 2009) but also by developing their mediating capacity i.e. their abilities in creating links between financial and operational concerns. So doing, operators are expected to become financial-operational hybrids through the role of presidents (and branch managers), even if they did not always welcome such position and experienced it as a strain. Mediation therefore also implies a 'politics of identity', where mediation transforms the identity of mediators. This politics of identity also applies to non-human mediators; action plans, once on the to-do-list, become operational-financial

hybrids since they are expected to produce financial improvements, even if such effect is not necessarily easy to assess.

Another aspect is that mediating between financial and operational concerns is not only a conceptual endeavour but also a spatial and temporal one. Some accounting studies have shown that some properties of accounting calculations (see e.g. Robson, 1992) could help spatio-temporal mediation by fostering their mobility and circulation as 'action at distance' (Latour, 1987). At Kitanihon, MPC accounting calculations are hardly mobilised on the shop floor and in staff functions. The spatio-temporal link between MPC spaces and operations is primarily made through the circulation of action plans. They, however, do not mediate alone. The permanent presence of branch managers on the shop floor and of MPC trained people in staff functions and the continuous circulation of presidents on the shop floor and in staff functions, as MPC ambassadors, energize the undertaking of financial improvement plans. These MPC human mediators thus also spatio-temporally mediate financial and operational concerns.

The third aspect is that the number and type of human mediators also affect mediation. At Kitanihon, both the number of presidents and branch managers and the involvement of other operators were initially relatively low. By deciding to make MPC 'everyone's concern' through the rotational mechanism, the initial manufacturing manager (later followed by the second manufacturing manager) affected the type of mediators since seniority and former hierarchical position stopped being prerequisites to becoming presidents. This changed the form of mediation since it made it difficult for new presidents to instruct other operators, as initial presidents could do. They thus had to develop other forms of mediation. This suggests that mediators do not simply link but shape and transform the way mediation is performed, while also transforming themselves.

The rotation also increased the number of MPC mediators and the collective mediating capacity since the rotation produced a continuous enrolment (Callon, 1984) of operators over the years. One may hypothesise that such a growing web of human mediators helps explain the durability of the MPC project at Kitanihon.[9] The rotational mechanism also illustrates the dynamic character of the web of mediators, which continuously evolved over the MPC project.

Finally, the study shows that the construction of a web of mediators is enabled by mediating spaces. These become mediating resources because they gather and link people, expertise and tools that help mediating financial and operational concerns. This is the case of the training centre and of presidents' room where people visiting them became financially literate and learned techniques to design financial improvement plans. These places help their inhabitants develop their individual abilities in mediating financial and operational concerns. This is also the case of performance meetings that help relating financial concerns with operational action plans. However, performance meetings do not imply that participants have the capacity to mediate between the two concerns individually but rather that they can do so collectively. Therefore, what makes performance meetings mediating resource is not the development of 'accounting talks' (Ahrens, 1997) but of 'talks' aimed at developing financial improvement plans through the intertwinement of financial and operational concerns and through the gathering of different human and non-human resources to do so (Busco, Quattrone, &

[9] This study has not specifically investigated the reasons why other SEI-affiliated firms stopped the MPC system. However, discussions in MPC trainings mention, as possible explanations, the lack of involvement of and monitoring by senior managers and the lack of support of presidents from senior managers (both in time dedicated to MPC, in financial or career recognition).

Riccaboni, 2007). These mediating spaces suggest two distinct and complementary ways in mediating financial and operational concerns; one way in which people develop individual mediating capacities, the other way where it is the gathered collective, which develops such capacities.

Overall, the study shows the heterogeneity of the web of mediators and that the development of the web of mediators is both a continuous and indeterminate process (Andon et al., 2007; Quattrone & Hopper, 2001; Revellino & Mouritsen, 2015). New instruments (e.g. new action plans), new people (e.g. new presidents), new relations between shop floor and other organisational functions, and new identities continuously develop with and through the continuous construction of relations between financial and operational concerns. New mediators develop due to the general force of programmes of economisation (Miller & Power, 2013), and the development of new mediators affect the development of other mediators through adaptive processes. For example, the rotation implied a new type of presidents and changed the ways of engaging operators in action plans. It also ended up in transforming MPC structures and pseudo profit calculations to adapt them more to operational processes. Changes in some mediators may thus reverberate in various other changes, including in the transformation of accounting itself.

## 5.2. When structural interdependencies mediate relations between financial and operational concerns

Accounting studies have shown that three types of intervention - the development of tools, of collective dialogical spaces and of expertise – may help mediate relations between financial and operational concerns. This study adds to this by showing how organisational structure influences this mediation process. MPCs aim at increasing the financial sensitivity of operators through the individualisation and multiplication of responsibility centres (Adler and Hiromoto, 2012; Cooper, 1995, 1996; Kaplan and Cooper, 1998; Miya, 1998; Sawabe et al, 2008; Takeda and Boyns, 2014), but this increases structural interdependencies, which hamper delegation and individualisation of financial accountability (Lillis, 2002). To mitigate this dilemma, other MPC studies suggest a culture of cooperation (Adler and Hiromoto, 2012; Miya, 1998; Sawabe et al, 2008), intergroup activities (Cooper, 1995), and the role of senior managers (Adler and Hiromoto, 2012; Miya, 1998) to help manage interdependencies and handle the risk of individualism (Abernethy et al, 2004; Bushman et al, 1995; Kilman, 1982; Lillis, 2002; Merchant and Van der Stede, 2007).

This study shows an original way to face these challenges. It consists in considering financial accountability and decisions about action plans as a collective endeavour in performance meetings while delegating and individualising the execution of action plans. Turning financial accountability into a collective endeavour was not an initial design principle as there was strong pressure on the first generation of presidents to deliver financial results. However, the development of smaller organisational entities through micro profit centres, president's limited decision rights and the many lateral and hierarchical interdependencies that affect pseudo profits made it difficult to individualise financial accountability. Such individualisation was even more difficult with the low status of the second generation of presidents. Thus, because of structural interdependencies, financial accountability became a collective endeavour around a 'socialising form of accountability' (Roberts, 1991; 2001).

This socialising form of accountability in performance meetings helped manage interdependencies through the collective elaboration, decision and monitoring of action plans

by various actors (senior managers, staff functions and other MPCs) who could affect pseudo profits. Through action plans, accounting and accountability are transformed. They translate financial into action accountability. They also serve delegating and individualising action accountability on the shop floor and in staff functions by being assigned either to individuals, or to groups of individuals. Action plans are not a way of decoupling or loosely coupling financial and operational concerns (Tillema and Van der Steen, 2015). Both forms of accountability complement each other, from a motivational point of view, by helping mobilise different people in different places. Financial accountability energizes the continuous proposal of action plans, while action accountability energizes their undertaking on the shop floor and in staff functions. Both forms of accountability are also regularly addressed in performance meetings and attempts to reconcile actions plans with their financial effects often made.

The study also shows that accounting structures may be also transformed in this mediation process (see figure 2). MPC structures drifted (Andon et al, 2007; Quattrone and Hopper, 2001) and were partially re-aligned on the physical and organisational outlines of operational sub-processes.

## 6. Conclusion

This paper reports on a study of a firm's efforts to implement and mobilise micro-profit centres. Of particular relevance to this theme is, on the one side, the construction of relations between financial and operational concerns and, on the other side, the challenge to financial accountability and coordination when interdependencies are strong. In relation to these two aspects, the paper has two main contributions.

This research suggests that structural interdependencies matter when constructing relations between financial and operational concerns. It also develops the notion of mediation. It suggests starting from a 'web of mediators' (Bødker and Andersen, 2005; Latour, 2005) rather than from 'mediating instruments' (Christner and Strömsten, 2015; Jordan et al, 2013; Kurunmäki and Miller, 2011; Miller and O'Leary, 2007; Zahir-Ul-Hassan, Minnaar, & Vosselman, 2016). Starting the analysis from a 'web of mediators' allows connecting accounting research to organizing (Miller and Power, 2013) by considering the many mediators that help constitute the power of accounting, and without which the economizing enterprise may fail.

The study of the mediation of relations between financial and operational concerns also suggests some general characteristics of mediation. Mediation appears as a social, material, continuous, open-ended and political process. It is a social process since mediation is not simply an individual semiotic and intellectual process (Wise, 1988), as notably illustrated in performance meetings. It is also a material process where mediating instruments, people and places not simply connect different concerns but constantly give these concerns and their relations particular material shapes. Such material process is therefore also a 'material politics' (Law and Mol, 2008), which order the world in some ways and promote some particular forms of intervention. So doing mediating is not only about 'link(ing) up distinct actors, aspiration, and arenas' (Miller and Power, 2013; p. 557) but transforms mediated entities. As such

mediation is therefore an open-ended process since the web of mediators and the forms of mediation continuously evolve through the material/semiotic relations that constitute them.

Since mediation happens in the relations that constitute it, the analysis of mediation calls for 'relational ontologies' as suggested by Zahir-Ul-Hassan, Minnaar, & Vosselman, (2016). These ontologies suggest that things and entities, including accounting, are relationally constitued. These ontologies also provide a view of (accounting) change, which departs from dominant views of change where change is pictured as a linear process of transition where 'people move from well-defined situations A to B in a linear, predictable and ordered spatio-temporal framework' (Quattrone and Hopper, 2001, p. 427) or as a process of 'purification' (Andon et al., 2007) 'where change eventually decouples the 'old' and installs 'new' forms of organisational functioning' (ibid, p. 299). Rather our study of the evolving web of mediators and forms of mediations at Kitanihon suggest a view of change as 'relational and experimental drifting' (Andon et al, 2007; Quattrone and Hopper, 2001); a relational drifting where the financial concern is itself given particular shapes and may evolve through the relations, which constitute it.

Such relational drifting also concerns accounting. Accounting forms and trans-forms along the chain of mediation it creates. The financial concern forms through numerical signs (pseudo-profits and other more detailed measurements), is transformed into alphanumerical signs (e.g. action plans on the to-do-list) and trans-formed again into action plans developed on the shop floor or in staff-function. So doing, the financial concern forms and per-forms by trans-forming itself. Such trans-formation may also affect accounting tools and accounting structures. This resonates with what Miller et al (2008) call a 'dual hybridization' process since what mediates is itself mediated and transformed along the process of mediation.

Finally, this research helps to develop insights about the specificity of accounting mediation. It suggests that accounting provides an ideal/material object (Bødker and Andersen, 2005), which orients the construction of the web of mediators. In the name of pseudo profits, presidents are removed from their operational tasks, trained to MPCs, instructed to mobilise others; and organizational structures are modified, new mediating tools developed and MPC-spaces mobilised etc. Therefore, 'economizing' (Miller and Power, 2013) appears to be the generic object, which helps constitute the many mediators as a web of mediators. In such construction, accounting calculations play different roles in the development of operational actions: motivating, orienting, selecting or assessing action plans. They can thus be mediators of many different activities. They can also become objects of some activities when presidents produce pseudo-profits or quasi-subjects when accounting calculations regularly motivate the organisation of performance meetings and the filling-in of the to-do-list. This proposes that the status of mediator, or of mediating instrument, is not attached to specific entities, but points towards the role these mediators play in relation to the objects they help to push further.

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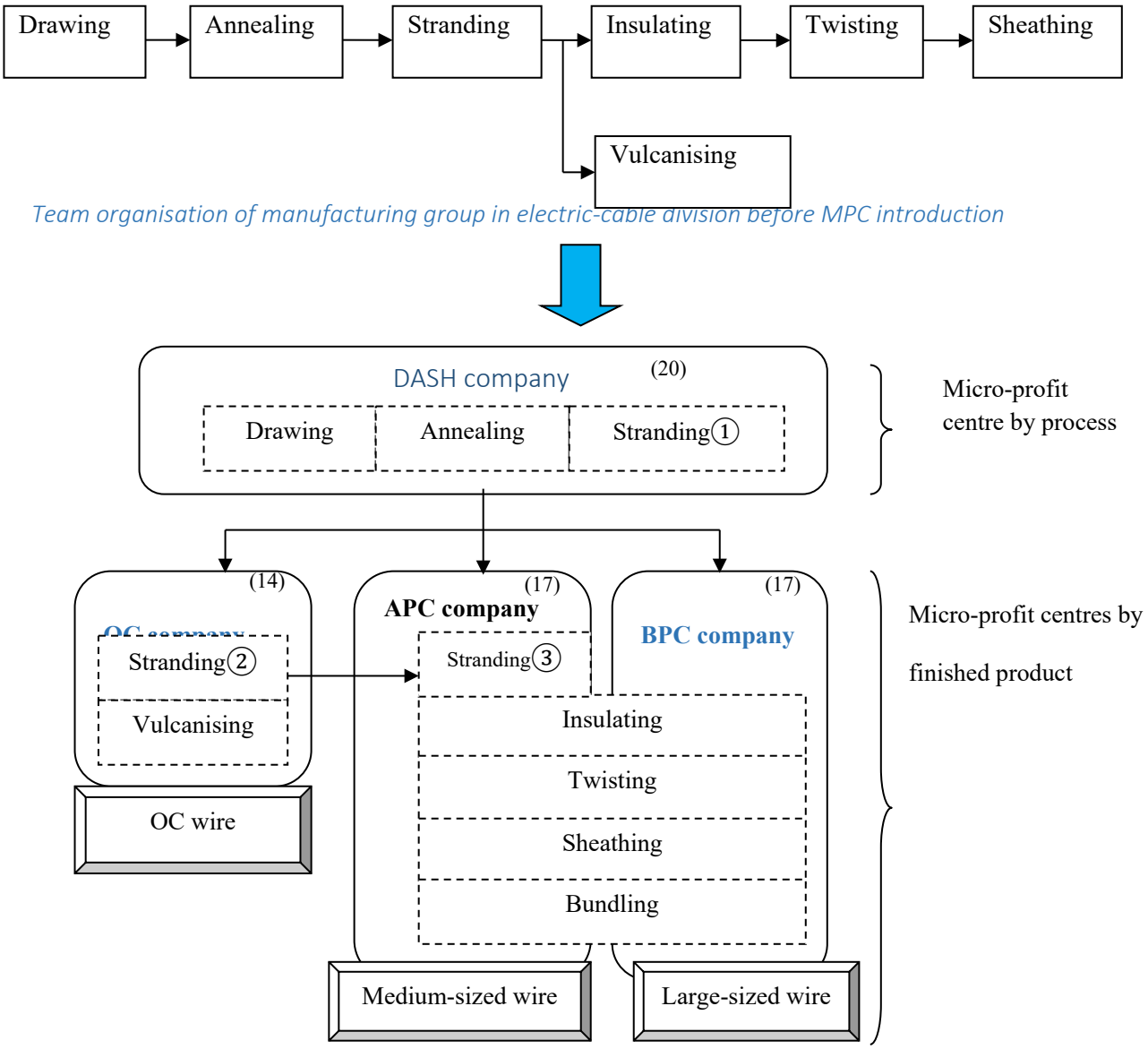
**Figure 1: MPC organisation chart of a manufacturing group in an electric-cable division between 2000 and 2004**

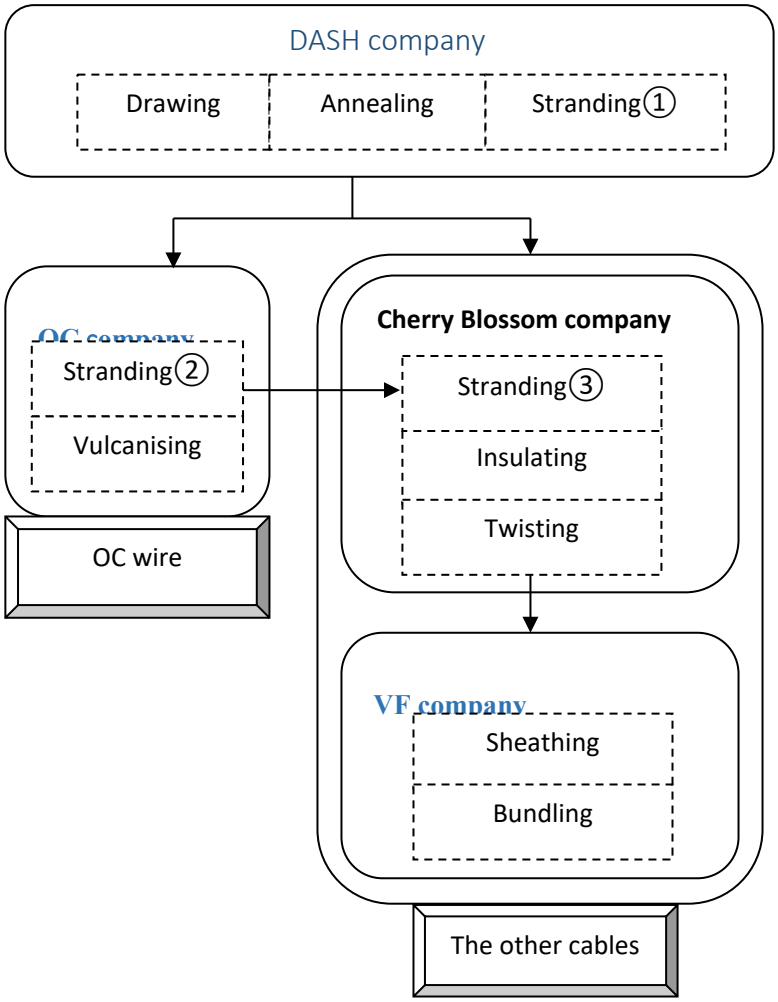



※ 'DASH', 'OC', 'APC' and 'BPC' are the names of each MPC. (APC was called 'MPC' at Kitanihon, but has been renamed here to avoid confusion with the generic abbreviation we use for 'micro-profit centre'.)

※ Arrows indicate the production flow.

※ Numbers in parentheses show the number of employees in units.

*Figure 2: MPC organisation chart after reorganisation between 2004 and the present*



# Table 1: Extract of The Dash To-Do list (As of November 2005)

↓(Front page - 13 Items)

(completed: 0 item) (in progress: 9 items) (stopped and others: 4 items) — DASH Company: Drawing wire shop — nov-05

| N° | Improvement topics (Clearly state the expected effects!) | Financial effects ('000 yen/month) | Person in charge* | September 2005 Plan | September 2005 Content | September 2005 Results/effects | October 2005 Plan | October 2005 Content | October 2005 Results/effects | November 2005 Plan | November 2005 Content | November 2005 Results/effects | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1 reduce rejects** | | | | | | | | | | | | | |
| ...** | | | | | | | | | | | | | |
| **2 tackle the challenges of zero material loss** | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | |
| **3 Production Volume increase** | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | |
| **4 Promote multi-tasking operators** | | | | | | | | | | | | | |
| ... | | | | | | | | | | | | | |

↓(Back page - 9 items)

(completed: 0 item) (in progress: 4 items) (stopped and others: 5 items) — DASH Company: Twisting stranded wire shop — nov-05

| N° | Improvement topics (Clearly state the expected effects!) | Financial effects ('000 yen/month) | Person in charge* | September 2005 Plan | September 2005 Content | September 2005 Results/effects | October 2005 Plan | October 2005 Content | October 2005 Results/effects | November 2005 Plan | November 2005 Content | November 2005 Results/effects | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **5 reduce rejects** | | | | | | | | | | | | | |
| 5-1 | Avoid reject at twisting process | 1 470 | K.<br>W. | Continue to research causes | unexecuted | | Continue to research causes | unexecuted | | Continue to research causes | | | Calculation method : Time for rewinding wire to bobbin x wire speed x conversion costs. Expected to be completed in December |
| 5-2 | Avoid operation stoppage of (machine) YR150 caused by adhesion of Kraft paper and curing pat | To be calculated by using the minutes to change the tape | C.<br>N. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **6 Tackle the challenges of zero material loss** | | | | | | | | | | | | | |
| 6-1 | Reduce work-in-progress (in whole DASH) | ... | K.<br>N. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 6-2 | Reduce wasted wire | 1 696 | All shop members | Choose the product which is produced in large volume and measure the present wasted wire volume | unexecuted | | Choose the product which is produced in large volume and measure the present wasted wire volume | machine has recently produced copper wire, but it causes much wasted wires | Since rewinding the remaining wire is time consuming, the rest was disposed. | Rewind the remaining wire and reuse for the products even if it requires overtime | | | |
| 6-3 | Avoid making stains on the wire when stranding process is finished at 3S05 machine | 16 | K.<br>I. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 6-4 | Avoid rejects caused by deformed wire at 3S03 aluminium 210mm2 machine | Calculate | N.<br>A. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **7 Production Volume increase** | | | | | | | | | | | | | |
| 7-1 | Make 3S03, 05 stranding machines "no length" | 1 782 | I.<br>W. | | | | | | | | | | |
| 7-2 | Reduce moving time for 3S06 bobbin moving crane | Calculate from reduced time | N. | Have a meeting with production engineering section and find problems | Change bobbin lifting height from 1100mm to 830mm | Shortens lifting-up time by 6 seconds saved costs: 150 ('000 yen) | Have a meeting with production engineering section and find problems | unexecuted | | Have a meeting with production engineering section and find problems | | | |
| 7-3 | Reduce recovery time when troubles happen at 3D02 machine | ... | C.<br>N. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 7-4 | Avoid tangling the material wire inside the stand of 3D02 machine | ... | N.<br>W. | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| **8 Promote multi-tasking operators** | | | | | | | | | | | | | |
| 8-1 | Increase the number of operators who can use 3S06 machine | Don't calculate | S.<br>N. | | | | | | | | | | |
| 8-2 | Standardize the method of inner layer connection | 11 | I.<br>W. | | | | | | | | | | |
| **9 Promote environmentally friendly activity** | | | | | | | | | | | | | |
| 9-1 | Use a recycled rubber band for fall prevention of material wire | 2 | K. | | | | | | | | | | |

*** ...: Text not included to avoid overloading the table*