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## Controlling Lean Manufacturing in Multidivisional Organisations

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Controlling lean manufacturing in multidivisional organisations: Highlighting local interests and constraints

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# Controlling lean manufacturing in multidivisional organisations

Controlling  
lean  
manufacturing

## Highlighting local interests and constraints

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### Abstract

**Purpose** – The purpose of this paper is to address the impact of a multidivisional structure on the implementation of lean manufacturing. It investigates how the controls employed by the corporate level impact the local implementation of lean manufacturing.

**Design/methodology/approach** – The paper reports on case studies in three subsidiaries in different multidivisional organisations.

**Findings** – The paper finds that lean manufacturing can be severely constrained by the accounting-based controls which are commonly in place in a multidivisional structure. Depending on the degree of centralisation, subsidiaries may be restricted to implementing lean tools in a fragmented way, rather than acting according to a coherent set of principles.

**Practical implications** – Companies may have to accept that being part of a multidivisional organisation can imply that their lean implementation is more gradual and piecemeal than they prefer. The paper proposes several ways to mitigate the constraints that may arise from incompatibilities between accounting-based controls and lean controls.

**Originality/value** – This study contributes to the literature about external constraints on production innovations, such as lean manufacturing. It highlights how the organisational context creates local conditions that may be detrimental to the implementation of lean manufacturing.

**Keywords** Lean, Management control, Lean manufacturing, Control system, Multidivisional structure

**Paper type** Research paper

### 1. Introduction

Since the 1990s, lean manufacturing has attracted the attention of western manufacturing companies as an approach to achieve superior performance (Hines *et al.*, 2004; Holweg, 2007). However, despite its positive effects on manufacturing performance (Cua *et al.*, 2001; McKone *et al.*, 2001; Shah and Ward, 2003), lean manufacturing has always had an uneasy relation with the systems through which organisations have traditionally controlled their performance. These traditional systems rely heavily on accounting-based controls. Already in the 1980s, researchers observed that such control systems are unable to support modern manufacturing practices (Kaplan, 1984, 1989; Brimson and Berliner, 1987). They argued that these systems produce inaccurate cost price information, and ignore many of the benefits that arise from excellent performance in the areas of quality, flexibility, throughput time and customer responsiveness. Consequently, they continued, the traditional control systems make it difficult for organisations to understand which actions are needed to improve manufacturing performance.

In lean environments, control systems should reward managers and employees for efforts which reduce waste and increase quality (cf. Fullerton and McWatters, 2002). These systems may be inconsistent with the extant accounting-based controls, which are predominantly financial in nature (Hansen *et al.*, 2003; Li *et al.*, 2012). These financial



controls may promote actions which improve financial performance, but which, for instance, decrease quality or lead to increased inventories. Because of the distortions created by accounting-based controls, various authors suggest that companies must adjust their control systems in order to fully reap the benefits of lean manufacturing (e.g. Åhlström and Karlsson, 1996; Bhasin, 2008; Hope and Fraser, 2003; Li *et al.*, 2012; Maskell *et al.*, 2012). These adjustments can lead to control systems which motivate behaviour that is more aligned with the principles of lean manufacturing (Bhamu and Sangwan, 2014). Empirical findings confirm that such adjustments are essential. For instance, Fullerton and Wempe (2009) find that utilising non-financial performance measures is a requirement for lean to be successful in financial terms. Various studies also show that companies which have implemented lean practices have adjusted their control systems; for example, by including more non-financial and bottom-up measures of performance (Baines and Langfield-Smith, 2003; Fullerton and McWatters, 2002).

However, previous studies have paid limited attention to the implications that a multidivisional structure may have for these adjustments of control systems. Most studies either investigate independent companies (e.g. Chiarini, 2012; Fullerton and Wempe, 2009; Powell *et al.*, 2013), or largely ignore the consequences of multidivisional structures for the control of manufacturing facilities (e.g. Kennedy and Widener, 2008; Fullerton and McWatters, 2002). This emphasis in previous studies may be a reflection of how companies regard lean implementations. Hines *et al.* (2004) find that companies pay much attention to localised shop-floor implementations of lean manufacturing, even to the extent that this has resulted in “island optimisations”, rather than a holistic organisation-wide perspective. Bhasin (2012) observes that mechanisms which hold organisational activities together, such as performance measurement and performance compensation systems, are often omitted from lean implementations. As a result, the initial gains of lean manufacturing often remain localised (Mohanty *et al.*, 2007). Such a lack of immediate impact on performance measures that are important to higher-level managers can be problematic, because it could result in the loss of support from higher levels for a company’s lean implementation (Li *et al.*, 2012).

Hence, the control of the production system does not take place in isolation. Rather, it is embedded in wider organisational controls, which are often based on accounting measures (Kennedy and Widener, 2008). This especially holds for multidivisional organisations. In these organisations, the corporate level controls the activities of the lower levels predominantly through accounting-based controls (Hansen *et al.*, 2003; Hope and Fraser, 2003; Østergren and Stensaker, 2011). Examples of such controls are budgets and financial performance indicators (e.g. net income, return on investment). The effects of the corporate level’s use of such controls on innovative manufacturing technologies have not received much attention in previous studies.

This study investigates how lean manufacturing in multidivisional organisations is affected by the extant infrastructure of accounting-based controls. It is based on case research in three production companies in the Netherlands. These companies implemented lean manufacturing, which significantly altered their production function. In these companies, several frictions were identified, which arose from incompatibilities between the controls employed at their corporate levels and the needs of lean manufacturing. Through the analysis of these frictions, the study demonstrates that demands from the corporate level can constrain subsidiaries in their attempts to follow the principles of lean. The study also proposes ways to mitigate these constraints.

The remainder of this paper is structured as follows. Section 2 discusses management control in a multidivisional setting, and the incompatibilities between the accounting-based and lean controls. Next, Section 3 describes the research method employed for this paper. Subsequently, Section 4 presents the findings from the case studies, and Section 5 discusses their implications. Finally, Section 6 presents the conclusions as well as some directions for future research.

## 2. Lean manufacturing and management control in multidivisional organisations

Although lean manufacturing systems can bring many benefits, there are various hurdles which may threaten the implementation and continuance of lean in organisations (Turesky and Connell, 2010; Taylor *et al.*, 2013). To overcome such hurdles, previous studies have generated a range of factors that have been shown to be critical to the success of lean manufacturing systems (e.g. see Achanga *et al.*, 2006; Bhasin and Burcher, 2006; Worley and Doolen, 2006). These studies may give rise to the idea that organisations are able to avoid lean failures by carefully attending to these success factors. For instance, Turesky and Connell (2010, p. 111) observe that: "Given that the approach to lean manufacturing initiatives is well-documented, it seems odd that consultants and their counterparts in leadership would fall victim to such threats to sustainability [of lean manufacturing]". However, lean implementations may also be subject to extraneous constraints, which cannot be directly influenced. Bamford *et al.* (2015) argue that partial implementation of lean is not always the result of deliberate organisational choice or a lack of a firm belief in lean. Instead, extraneous constraints may force an organisation to implement lean in a "more patchy, piecemeal and partial" way (p. 703).

Previous studies have considered constraints related to, for instance, seasonal patterns in the demand for products and supplier reliability (Bamford *et al.*, 2015) and dissimilar socio-economic and cultural conditions between countries (see Moyano-Fuentes and Sacristán-Díaz, 2012). This paper aims to add to this body of research by arguing that – from a subsidiary perspective – the multidivisional structure can also be a source of constraints which can be influenced only to a limited extent (see e.g. Maalouf and Gammelgaard, 2016).

The benefits of a multidivisional structure have been described at length (see Chandler, 1962), and these descriptions mostly highlight its ability to minimise transaction costs and thus to achieve an optimisation of organisational efficiency (Williamson, 1970, 1975, 1981). Accordingly, the so-called M-form hypothesis predicts that large multidivisional organisations produce superior outcomes in comparison to other organisational forms. These outcomes are mainly attributed to the high level of decentralisation and autonomy of decision making at the local level.

Yet, there is conflicting evidence about the benefits of decentralisation of decision rights and plant autonomy for implementing lean manufacturing. Lower degrees of decentralisation are found to be associated to better alignment of organisational goals, simpler decision making and better coordination (Puranam *et al.*, 2006). These factors facilitate the roll out of lean manufacturing. By contrast, recent findings suggest that higher degrees of decentralisation facilitate a sense of ownership of the lean implementation and greater plant management autonomy in decision making about lean manufacturing (Secchi and Camuffo, 2016). Secchi and Camuffo (2016) tentatively conclude that the benefits of a higher degree of managerial autonomy and localised decision making more than offset the advantages of tighter control by the corporate level. Therefore, one may expect that multidivisional organisations provide an appropriate context for implementing lean manufacturing.

However, although multidivisional organisations are typically associated with decentralisation, some degree of centralisation is needed to hold the different parts of the organisation together (Otley and Berry, 1980). To enable the corporate level to control its subsidiaries, multidivisional organisations use elaborate systems of accounting-based controls. Flamholtz (1996) observes that these systems permit corporate managers to delegate day-to-day operations to lower-level managers, while simultaneously assuring that these managers remain focused on the strategic goals of the organisation (see also Lowe, 1971; Otley, 1999). In addition, authors such as Hansen *et al.* (2003) and Otley and Berry (1980) indicate that accounting systems enable the corporate level to integrate the management control system with the needs of stakeholders such as shareholders and banks.

Accounting-based controls introduce new forms of centralisation, as organisation-wide “centres of calculation” are used to control all subsidiaries on similar criteria (Quattrone and Hopper, 2005). Hence, through their use of accounting-based controls, multidivisional organisations can establish varying levels of centralisation (Pellinen *et al.*, 2016). However, the use of accounting-based controls may be detrimental to the success of lean implementations for two reasons. First, as previously argued, the extensive use of accounting-based controls may result in a *de-facto* centralisation of decision-making authority. And second, accounting systems were originally developed for mass production systems, which were slow to change and inflexible by nature. Hence, accounting systems may not be appropriate to respond to new environmental demands, including those emanating from new technologies (Pirson and Turnbull, 2015; Hamel and Prahalad, 1983). Therefore, the use of accounting-based controls in multidivisional organisations may negate the aforementioned benefits of decentralisation.

Modern production technologies are not a mere set of tools and practices, such as total quality management, a Kanban system and cellular manufacturing (for an overview, see Shah and Ward, 2003). Instead, in order to be successful, these tools and practices should be tied together into a complete system (Womack and Jones, 1996). The backbone of such a system is a set of principles, which should guide all actions. In the context of lean, these principles include creating value from the perspective of the customer, and aiming at perfection (Womack and Jones, 1996). Following such principles is facilitated by a set of local controls, which include specific performance measures, standard operating procedures and other, more social, ways to control workers (Fullerton *et al.*, 2013; Kennedy and Widener, 2008; Kristensen and Israelsen, 2014). However, various authors have argued that the actions promoted by these local controls may not be consistent with accounting-based controls (e.g. Kaplan, 1984, 1989; Brimson and Berliner, 1987; Maskell *et al.*, 2012).

Hansen and Mouritsen (2007) draw on these authors to provide a systematic classification of these inconsistencies. They identify four incompatibilities between accounting-based controls and controls which support modern production technologies, including lean manufacturing. Table I uses this classification to structure the literature about the implications of using accounting-based controls in lean environments.

Table I shows that a misalignment between accounting-based and lean controls impedes the successful implementation of lean (see also Åhlström and Karlsson, 1996). As mentioned earlier, organisations often adjust their control systems to deal with the incompatibilities between accounting-based and lean controls. The control systems in lean companies usually rely more heavily on non-financial and bottom-up measures of performance (Baines and Langfield-Smith, 2003; Fullerton and McWatters, 2002), and they place more emphasis on behavioural and social controls, such as standard operating procedures, empowerment and training (Kennedy and Widener, 2008). In addition, the accounting systems in these companies are more simplified and streamlined, and they tend to focus on value streams (Fullerton *et al.*, 2013).

However, in a multidivisional organisation, subsidiaries are not commonly able to influence the control system used by the corporate level. Therefore, implementing lean manufacturing in a multidivisional organisation presents a specific set of challenges, which are related to the degree of centralisation and the use of accounting-based controls by the corporate level. The ways in which these challenges unfold are expected to affect the success of lean implementations. Hence, this paper problematizes the implementation of lean in multidivisional organisations. It confronts the merits of an autonomous local implementation and operational control with the varying degrees of centralisation brought about by the use of accounting-based controls. To this end, the following two research questions (RQs) are formulated:

- RQ1.* How does the corporate level’s use of accounting-based controls in multidivisional organisations constrain the local implementation of lean manufacturing in their subsidiaries?

Incompatibility	Lean controls	Accounting-based controls	Implications of accounting-based controls for lean manufacturing
Financial vs non-financial	Measures of non-financial performance are used to control operating processes (Chiarini, 2013; Womack and Jones, 1996)	Measures of financial performance are used to control the organisation (Otley, 1999). Measures related to the efficiency of workers and the utilisation of machines and equipment play an important role. Periodic variance analyses are conducted to examine differences between standard (budgeted) costs and actual costs	Emphasis on financial performance measures may lead to decisions which are inconsistent with lean; e.g. building inventories, large batch sizes (Bamber and Dale, 2000; Maskell <i>et al.</i> , 2012)
Status quo vs improvement	Aim is to make continuous and fundamental changes to the organisation in order to eliminate waste and improve quality (Womack and Jones, 1996)	Mechanism of target setting applied is usually considered to be a reflection of a rather static approach to control (Hope and Fraser, 2003; Otley, 1994). Gains from lean initiatives are often not recognised (Kaplan, 1986, 1989; see also Chiarini, 2012)	Static approach to control does not encourage improvements. Lean initiatives, for instance, to increase flexibility or to reduce throughput time, may not receive management approval (Kaplan, 1986, 1989; see also Chiarini, 2012)
Hierarchical vs lateral	Lateral approach to control. All stages in the production process are supposed to cooperate in order to create value for the customer (Womack and Jones, 1996)	Vertical, hierarchical approach to control (Otley, 1994, 1999). Organisational goals are translated into subgoals, and individuals and units are held responsible for these subgoals (Flamholtz, 1996)	Reduced incentives for cooperation between departments (Flamholtz, 1996; Hansen <i>et al.</i> , 2003; Hope and Fraser, 2003). Accounting controls may be an obstacle to implementing a structure based on value streams (Hansen <i>et al.</i> , 2003)
Top-down vs empowerment	Much emphasis on empowering the lower levels (Forza, 1996). Reliance on localised performance measures, which are presented visually on the shop floor (Fullerton <i>et al.</i> , 2013; Maskell <i>et al.</i> , 2012). Controls are built into operating processes (Maskell <i>et al.</i> , 2012)	Top-down approach to control (Otley, 1994; Otley and Berry, 1980). It is assumed that the corporate level of the organisation has the authority and the responsibility to control the lower levels. The required information often comes from company-wide systems, which track and monitor various aspects of the business (Åhlström and Karlsson, 1996; Maskell <i>et al.</i> , 2012)	Information from company-wide systems may not be useful to operators (Wallander, 1999), and producing it may be considered as waste (Maskell <i>et al.</i> , 2012)

**Table I.**  
Incompatibilities  
between controls and  
implications for lean  
manufacturing

*RQ2.* How can variations in the level of centralisation explain differences in the success of lean implementations between subsidiaries of different multidivisional organisations?

The paper distinguishes between the four areas of incompatibility identified by Hansen and Mouritsen (2007), because these represent areas where local and corporate interests can collide. Hence, these areas are fundamental sources of constraints on lean manufacturing in multidivisional organisations. The aim of the study is to explore how companies, which are part of a multidivisional structure, can increase the success of their lean implementation.

### 3. Research method

An inductive case study (Barratt *et al.*, 2011) was conducted. This research method is particularly suitable to understand context and practitioner experiences (Fisher, 2007).



In general, such a case study approach fits well with the type of RQs as formulated in Section 2, which require a thorough understanding of the nature and complexity of the phenomenon under study (Voss *et al.*, 2002). The cases selected for this research were three Dutch production subsidiaries, which will be referred to as Midden, West and Zuid. Some of the features of these subsidiaries are listed in Table II.

These subsidiaries were selected because they were all part of multidivisional organisations which operated an elaborate accounting-based control system. The subsidiaries varied in the extent to which their corporate level, operationalised as headquarters (HQ), intervened in local strategy and operations. Hence, they varied in the level of centralisation. The case selection was thus based on a theoretical sampling strategy (Barratt *et al.*, 2011).

The empirical research was conducted in three stages. The first stage included an interview with a lean consultant and a discussion meeting with representatives of Midden and West[1]. During the discussion meeting, the representatives of the two companies gave an understanding of the problems related to the control of their lean operations. In the second stage of the study, two research assistants were enlisted to spend three months at each of these companies to explore the relationships between the introduction of lean manufacturing and the extant management controls. For this purpose, they interviewed and had informal talks with persons at all levels in their company and they collected internal documents. They conducted a total of 26 interviews of varying length. The third stage took place during the same timeframe, in which the researchers interviewed a total number of 12 managers, consultants and management accountants in Midden, West and Zuid. Some persons were interviewed on more than one occasion. The average length of the interviews was 1:55 hours. All interviews are listed in Table AI.

The interviews dealt with the implementation of lean manufacturing, the design and use of the management control system (including the accounting system) in the “new” lean manufacturing environment, and the relation with HQ. Additional interviews were added until theoretical saturation was reached; that is, when newly analysed data did not prompt

	Midden	West	Zuid
Industry	Home fixtures	Personal appliances	Lighters and tobacco
Total no. of employees	9,000	120,000	9,000
Global sales (Million EUR)	700	25,000	1,500
No. of production subsidiaries	16	118	8
No. of employees in subsidiary	170	1,500	100
Reason for implementing lean	Threat of closure; move of production to low-wage countries; need for more efficiency	Potential for higher quality and more efficient manufacturing	Need to better compete with high-volume, low cost suppliers in Asia. Need for more flexibility
Level at which initiative for lean was taken	Subsidiary	HQ and subsidiary	Subsidiary
Stage of lean implementation	Lean implemented in two main production lines	Lean implemented in one production line; a second planned to follow	Lean implemented throughout the local subsidiary
Level of centralisation	High	Medium	Low

**Table II.**  
Features of case sites

further changes to the theoretical understanding of the events in the companies (Karlsson *et al.*, 2010). This approach ensured comparability of the data, because more data were added until the three case studies could be compared on the four themes classified in Table I, their histories of implementing lean and the ways they were controlled by their corporate levels. Following some of these interviews, persons at the three companies invited the researchers for a site visit. These visits were helpful for obtaining an understanding of the operational implications of lean. The data collection process ended with a meeting with representatives of the case companies to discuss the initial findings of the study. Together with the interviews and the observations during the site visits, the discussion meetings also offered opportunities for triangulation of the data and corroboration of the conclusions (Barratt *et al.*, 2011; Voss *et al.*, 2002).

The data analysis followed several of the suggestions made by Voss *et al.* (2002). All interview recordings were coded and then analysed according to the classification by Hansen and Mouritsen (2007). Each theme in this classification emphasises a specific set of constraints that the subsidiaries encountered due to the controls that were imposed by HQ. In order to understand the origins and consequences of these constraints as well as the conditions under which they could be mitigated, the researchers analysed their summaries and coded transcripts in detail and revisited the relevant parts of their recordings. Also the relationships between the three companies and their corporate levels were compared, to understand the context that had given rise to a particular level of centralisation.

#### 4. Empirical findings

This section presents the findings from the case studies. It is organised around the two RQs.

##### 4.1 *Impact of HQ controls on lean implementation*

One of the cornerstones of the multidivisional form is a set of accounting-based controls, which binds together the different units and levels of the organisation (Hansen *et al.*, 2003; Hope and Fraser, 2003; Østergren and Stensaker, 2011). As lean is often initially limited to production units, it deploys controls which are restricted to the local level (Hines *et al.*, 2004; Bhasin, 2012). This section will demonstrate how each of the four incompatibilities between both types of controls affected the implementation of lean.

*Financial vs non-financial performance measures.* In the case companies, performance measures did not cascade down the organisational hierarchy. The companies combined the use of lean-oriented performance measures at the lowest level with the use of a traditional budgeting system by HQ. This traditional budgeting system was largely financial in nature, and put much emphasis on standard cost variances; for instance, related to the utilisation of machines. It was considered a benefit that the financial measures brought in a shareholder perspective. For example, when asked which performance measures receive most attention, a controller in West said:

O yes, that's an easy one! From headquarters? Conversion cost [variances], I believe. Yes, and that is because, in the end, also from their perspective, if they are evaluated, conversion costs are of primary importance. That is not to say that [other performance measures] are irrelevant, but I believe that in this respect our company is financially driven. Whether you like it or not.

The financial measures were not always consistent with the lean-oriented performance measures used by the subsidiaries, which were more operational in nature, and which led to a heightened focus on the customer. A former senior manager of Zuid suggested that frictions between different sets of performance measures are typical of multidivisional companies. He argued:

[In a multidivisional organisation], I am very restricted in the accounting measures I can use. The emphasis on contribution is at the expense of a focus on the customer. If you have a machine,

its costs need to be recovered; however, lean does not look at contribution, but at sales to the end customer. [...] It leads to massive conflicts when you state that you are not really interested in contribution.

When attempting to implement lean in a [multidivisional] organisation, many aspects are not really open for discussion. One of these is attempts to improve [the format of] monthly reports. But if these reports are not changed, you will not have discussions about customer value and the benefits of investments in lean, so you cannot show important things.

In Midden and West, lean was successful in operational terms, but not in financial terms. In these companies accounting had lost its role as an “integrative device” into which all the activities of the organisation can be “drawn together” (cf. Otley and Berry, 1980, p. 234). One explanation for the lack of a positive impact of lean on financial performance in Midden and West was that improvements in financial performance were postponed by re-investing the savings that resulted from lean. However, this strategy was considered risky, because it could lower HQ’s support for lean.

Particularly in Midden, inconsistencies between the two types of performance measures constrained the implementation of lean (cf. Bamber and Dale, 2000). The company had an increasing number of conflicts with the managers at HQ due to the different understandings about performance and how to measure it. There were various instances where the traditional variance metrics were adversely affected by decisions which were beneficial from a lean perspective. For example, the demand for the company’s products decreased sharply as a result of the recent recession in Europe. This reduction in demand prompted a manager at the subsidiary level to call for a reduction of the output of the subsidiary. However, such a reduction in output would lead to a sharp increase in unfavourable variances. The lower production volume would immediately be translated into losses, as the fixed costs of the expensive capital goods could not be fully absorbed by the units actually produced. This was not acceptable for the managers at HQ, who did not see the need for lower production volumes. They asked the subsidiary to maintain production levels, and to store the surplus output temporarily in their warehouse. Therefore, there was an incentive to maintain or increase production, even when there was no demand. A respondent explained:

By increasing production we can easily perform better than the budget. The result is that you end up with stock, but it looks very favorable on the cost calculations. When there is pressure for better results it is very tempting to say: we will increase production.

Hence, HQ’s requirement to meet financial targets forced Midden to give up some of the lean principles.

*Status quo vs improvement.* Lean manufacturing promoted innovation in the three companies. Lean initiatives fundamentally changed the nature of production processes, which led to lower lead times, less waste and higher quality. However, the decision-making tools favoured by HQ induced a more conservative behaviour. By focussing on absorption costs, relevant costs and revenues, and incremental cash flows, these tools were often in favour of investments in existing production technologies. A former senior manager in Midden noted:

It is not in the nature of lean to account for its benefits in the way that HQ likes to see. The whole point is to cease the wasteful collection of data. We know there are many benefits to working smarter; this is purely logical. However, to put a number on those is difficult. Moreover, the gains we obtain from lean operations will be used for further improvements in our processes, there may therefore not be a direct financial gain, but certainly many benefits in the quality of our processes and products.

Following the lean principles, many interviewees took the view that it was important for their company to reduce lead and change-over times, to improve product and process quality, and to empower employees. They were convinced that such initiatives would have

positive financial consequences, but neither before nor after their implementation, they were able to quantify these consequences. Zuid did not consider major investments at the time, but in Midden and West, people expressed their frustration that they could not convince HQ of the benefits of investing in lean. According to an industrial cost engineer in West:

An issue which does generate discussion is, for example, this project I am working on [using a high labour intensity to increase flexibility]. At some point we had to invest a sum of money. [...] What you see then is that it is obviously a problem. "Come on, this is not China", and so on. Their viewpoint regarding this issue is perhaps a bit old school, so to say. You try to explain to them the importance of following the market, being flexible, being able to changeover quickly etc. However, the benefits of such an approach don't mean much compared to other things, it seems. Perhaps that is the problem; that you have to convince people. You may wish you already passed that stage. It is simply a matter of difference in mind-set.

Both Midden and Zuid started implementing lean manufacturing without informing their HQ. In this way, they attempted to avoid discussions about their inability to quantify the benefits of lean manufacturing. In Midden, lean initiatives were initially treated as a series of small changes in the production process. A former manager explained:

In the first year, HQ did not know that we were implementing lean. We undertook everything in small steps so there were not many costs involved. The costs that we had, we reported them as quality costs to our parent.

However, as the lean implementation grew and started to encompass both of the production lines, the management team of the subsidiary informed HQ about their efforts. The managers at HQ were mostly indifferent to these efforts. They were very keen on the efficiency gains that lean would yield, but they were opposing any up-front investment in the process improvement technologies of lean, as there was no business case which financially justified lean manufacturing. As a result of the limited resources available, the subsidiary continued with a low-key rollout of lean. Hence, the subsidiary was restricted to smaller-scale lean initiatives, which did not require HQ approval. Consistent with Boyer (1996), the low level of support for lean by HQ put a constraint on the resources available to invest in lean initiatives.

*Hierarchical vs lateral relationships.* At all companies under investigation, HQ exercised control over the lower levels largely based on accounting information about individual organisational units. These hierarchical controls enabled HQ to act at a distance (cf. Quattrone and Hopper, 2005). However, based on the lean principles, the subsidiaries had introduced lateral controls, i.e. controls based on value streams rather than organisational units. These lateral controls could not easily be reconciled with the existing hierarchical controls. In West, for instance, interviewees explained that when they invested in a reduction of lead times or change-over times, this would increase the investment base of the organisational units. This would have a negative impact on the return on investment, for which the managers of these units were held accountable.

In Midden in particular, the combination of different control orientations proved to be problematic. During a major reorganisation in 2006, HQ had imposed a matrix structure on this subsidiary. This structure induced departments to work independently. As a team leader illustrated:

Engineering does a lot by themselves and excludes other departments in their operations.

This matrix structure also meant that various departments, including the logistics and the procurement departments, were managed from abroad. According to a former manager who was interviewed, this matrix structure led to isolated "vertical pillars" running through the organisation, and the emergence of "islands" which strongly reduced cohesion in the facility.

This invoked discussions about the rationality of particular decisions. Decisions which were optimal from the perspective of a functional area destroyed value from the perspective of a value stream. For example, the former manager explained that they received large shipments of parts which were cheaper to procure in bulk from China. The manager had not enough space to store these parts locally and he lost the flexibility brought about by having low inventories. As a result, he was placed in a position which violated various of the principles of lean.

The geographical distance between the managers at HQ and the production operations was regarded as a real problem in the context of the lean philosophy employed in Midden. HQ attempted to benefit from their overview of similar operations across different subsidiaries, but they were hindered by a lack of knowledge about interdependencies within a single unit. On those occasions, Midden had to accept that it was constrained in its attempts to eliminate waste from its value streams (cf. Hansen *et al.*, 2003). The subsidiary's use of controls was rather unbalanced, as there was always an implicit choice for either lateral or hierarchical controls.

*Top-down control vs empowerment.* The events in the case companies expose a fundamental contradiction between trust in company-wide systems and trust in localised solutions. Whereas the traditional control systems operated by their HQs were mostly top-down and supposed to traverse geographical distances, the lean philosophy of the case companies dictated that control was localised and contextualised. To facilitate this localised type of control, the case companies had hung up screens in the production halls which displayed scores on key performance measures, and they had implemented a Kanban system which created visual controls on the work flows. Control was exercised by local managers, in particular those in charge of production. Moreover, since the introduction of lean manufacturing, notions such as shared goals and trust in the expertise and motivation of team leaders and workers, all had become more important in the case companies. A senior manager of Zuid observed:

It's all very well, building a [company-wide] system and putting someone – who believes that he has the required knowledge too – in charge a mile away to operate it. But it is the people on the floor who really know what's going on. They recognize the bottlenecks. If these people can be motivated, then you're making progress. If you believe you must build a sophisticated control instrument around them, to force them with a gun, it will take you nowhere in the end.

The case companies believed that accounting information was useless to control their operations, and more and more they considered the activities needed to produce this information as waste (cf. Wallander, 1999; Maskell *et al.*, 2012). However, HQ in all three companies continued to rely on the accounting system for controlling the lower levels. To keep this system up-to-date, Midden kept tracking its inventories of raw materials, work in progress and finished goods. By contrast, in West and Zuid, a Kanban system had replaced their planning for, and recording of, the production of individual components in the company-wide system. However, similar to the accounting function in the company studied by Åhlström and Karlsson (1996), management accountants and auditors in both West and Zuid resisted these attempts to eliminate waste. They were responsible for safeguarding the quality of the data needed to prepare reliable reports for HQ. In their view, this required a detailed tracking of internal transactions. According to a manager in West:

So regarding [the elimination of waste from our company-wide information system], every time we try to launch an idea [by saying:] “this is what we want to do”, well, [the management accountants] start calling the head office claiming that the new manager has lost her mind, that she is doing crazy things. So it is a very sensitive issue, because knowledge gives people power. They think: as long as I know what this item costs, I can ... But it is a false sense of security that we have built.

West continued to use weekly inventory counts for its work-in-progress inventories to prepare the periodic financial statements required by HQ. By contrast, Zuid had decided to replace the regular inventory counts with a new type of internal controls. These controls relied on an orderly flow of products through the factory combined with visual controls on this flow. The internal auditors, however, did not accept this type of controls. According to a senior financial manager:

As long as you are able to print out lists from your [company-wide information] system, it is all right [according to auditors]. So auditors are simply confident that existing systems function properly. It is my experience that, although the system may function properly, its information is not really useful. However, it provides the auditor with a more solid basis, for it is a system which has been designed by an IT-consultant, who also arranged for its certification. So anything the system spits out is regarded as reliable, no matter what inputs were used. [Our approach] is based on the work of man, which means that mistakes can be made. But of course also the system depends on the input of people!

Hence, both West and Zuid were hindered in their attempts to eliminate “wasteful” activities, as these attempts were experienced as a threat to HQ’s ability to control the company.

To answer *RQ1*, Table III gives an overview of the frictions between accounting-based and lean controls experienced by the case companies at the time of the research. The table shows that, in these companies, HQ put much emphasis on financial performance. For this reason, measures of both financial performance and internal controls which had to ensure the reliability of financial information were key elements of the system through which HQ controlled the subsidiaries. In addition, Table III reveals that HQ’s reliance on these types of controls constrained the subsidiaries in their attempts to follow the lean principles. On various occasions, these subsidiaries were forced to apply “old-fashioned

Incompatibility	Company	Origin	Consequence
Financial vs non-financial	Midden	HQ focuses almost exclusively on financial performance; adverse standard cost variances are not accepted	Subsidiary is prevented from fully applying operational controls according to lean principles
Status quo vs improvement	Midden	HQ only gives approval for investments if improvements in financial performance can be expected. Subsidiary is not able to calculate the effects of lean initiatives on financial performance	Up front investments in lean initiatives do not get approval from HQ. Subsidiary can only take small-scale lean initiatives
	West	When assessing business cases, HQ puts much emphasis on improvements in financial performance. Subsidiary is not able to capture benefits from lean initiatives in traditional decision-making tools applied by HQ	Subsidiary finds it very difficult to convince HQ of the advantages of lean-oriented investments as compared to mass-production alternatives
Hierarchical vs lateral	Midden	To maximise financial performance across different subsidiaries, HQ intervenes in subsidiary’s operations	Subsidiary is forced to ignore interdependencies within value streams; subsidiary is not fully able to focus on optimising value streams
Top-down vs empowerment	West	HQ requires reliable information at any point in time	Subsidiary’s attempts to eliminate “wasteful” accounting tasks were opposed by HQ
	Zuid	HQ requires the deployment of traditional internal controls	Subsidiary’s attempts to eliminate “wasteful” accounting tasks were opposed by HQ

**Table III.**  
Summary of origins and consequences of HQ’s use of controls

'efficiency' thinking" (cf. Womack and Jones, 1996, p. 18), while they would have preferred to create value for the customer, by offering more product variations and removing waste from operating and administrative processes. The controls applied by HQ resulted in larger batches and larger inventories, lower flexibility, and more resources devoted to keeping the company-wide information system up-to-date, than the subsidiaries deemed necessary and desirable. Table III also shows that there is a variation between the case companies in terms of the types of constraints experienced. Section 4.2 will explore how this variation is related to the degree of centralisation in each of the companies.

#### *4.2 Variations in the level of centralisation and lean implementations*

Of the three companies, Zuid was most unaffected by the incompatibilities listed in Table III. Although HQ was not particularly interested in lean, Zuid had been able to carve out local spaces for implementing lean. It had implemented lean without the permission of its HQ, but this implementation had positive effects on its financial performance. Especially the increased flexibility of manufacturing enabled it to compete with larger plants in Asia and sell its products at a premium. As a result, the company was able to meet the financial targets set by its HQ. A consequence was that HQ had no incentive to invoke additional accounting-based controls. Hence, Zuid operated as a highly decentralised unit, which had much decision autonomy on operational and strategic matters. This autonomy had enabled Zuid to expand and refine its lean operations to the extent that the plant not only operated a wide variety of lean tools (such as a Kanban system, regular 5S activities and value stream mapping), but also that it acted in line with the underlying principles of lean (e.g. by interrupting production when problems were detected).

In West, HQ supported the implementation of lean. Since HQ had decided to embrace lean manufacturing, the subsidiary experienced that there was no need to continuously renegotiate the relative importance of traditional performance measures and lean-oriented measures. HQ's support for lean had translated into a willingness to relax some financial controls and consent to the use of some non-financial measures of performance. Respondents also indicated that in recent years it had become easier to focus on value streams. In this company, lean was not limited to a set of tools. Managers increasingly asked each other which actions were most appropriate in light of the lean principles. They acknowledged that HQ's support for lean enabled them to bring up lean principles as a valid set of concerns at all levels of the organisation. However, it must be noted that there were occasional conflicts with higher levels, because West could not quantify the benefits of lean. Especially the central and local accountants could not be convinced that the accounting-based controls needed to be relaxed, if only temporarily.

Table III shows that Midden experienced the most frictions due to incompatibilities between lean and accounting-based controls. HQ of Midden had no interest in lean and it had imposed a large set of accounting-based controls, which reduced much of the autonomy of the subsidiary. Hence, despite being part of a multidivisional organisation, Midden was controlled in a highly centralised fashion and, as a result, it had limited decision authority. Midden was restricted to using isolated lean tools, rather than an integrated approach. For example, Midden mapped value streams, but it could not initiate process improvements based on those maps. Such improvements had short-term cost implications and were thus rejected by HQ. In general, the implementation of lean tools in Midden had not resulted in an adoption of the lean principles. Instead, it had used its limited decision space to implement lean in a fragmented fashion.

These exploratory findings provide insight into RQ2. All case companies had been able to implement various lean tools, such as value streams and particular 5S techniques. However, the principles of lean (such as a focus on perfection and the elimination of waste) were more difficult to implement and maintain in companies that were more strictly

controlled through accounting-based controls. Hence, the difficulties associated to lean implementations were not related to the use of lean tools, but rather to the incompatibilities between the principles of lean and centralised accounting-based controls. In this vein, one may tentatively conclude that accounting-based controls can displace the introduction of lean principles, leaving only a set of relatively incoherent lean tools. In general, multidivisional organisations may not offer the conditions which are beneficial for lean implementations, if they impose highly restrictive central controls.

## 5. Discussion

The findings of this study can be used to explore how companies can increase the success of their lean implementation, by diminishing the constraints which arise from the corporate level's use of controls. This section presents the outcomes of those explorations. It distinguishes between suggestions for lean implementation strategies aimed at reducing the degree of centralisation, and a suggestion for an alternative organisational form which avoids the degree of centralisation usually associated with the multidivisional form.

### 5.1 *Lean implementation strategies*

The variations observed among the three case companies suggest ways to reduce the degree of *de-facto* centralisation, and thus mitigate the constraints which result from the accounting-based controls applied by HQ.

*Smooth the impact on financial performance.* The lack of particular constraints in Zuid suggests that subsidiaries can reduce the number of HQ interventions in local decisions by producing financial results which are satisfactory to HQ. In order to achieve this, a subsidiary may need to compromise on the degree of reinvestment of savings from lean. In this way, the benefits of lean in financial terms should become visible to HQ in an earlier stage. In addition, the subsidiary could stabilise production volumes in periods of temporarily low demand by producing units of a regularly demanded product for stock. This will avoid excessive drops in financial performance. Although these strategies are inconsistent with the principles of lean, the findings in Zuid, which applied both strategies, suggest that these strategies can help the company over time to implement lean further. Consequently, this study provides further support for Bamford *et al.*'s (2015) argument that a stepwise implementation of lean cannot always be avoided, and may bring benefits to the organisation similar to a full-scale implementation. As long as HQ is exercising strict control based on accounting information, subsidiaries will be constrained to lean initiatives which do not require the approval from HQ, as was demonstrated by the findings in Midden and – in an earlier stage – Zuid. Such smaller-scale initiatives can produce the first pieces of evidence of the success of lean, particularly when some financial savings can be reported. In this way, smaller initiatives can pave the way for a larger scale rollout. This argument is supported by the findings of Åhlström and Karlsson (1996), who showed that lean initiatives have to produce positive results in financial terms before changes in the control system are conceivable. Ultimately, the initiatives may lead to a manufacturing system which is more flexible and involves lower fixed costs. With such a system, financial performance is less sensitive to fluctuations in production volumes. Consequently, using accounting-based controls is less problematic.

*Gradually adjust the control system.* Many papers claim that top management support is important, because top management provides the financial resources needed for implementing at the lower level (e.g. Worley and Doolen, 2006; Moyano-Fuentes, Sacristán-Díaz, 2012; Scherrer-Rathje *et al.*, 2009). However, in the case of West, HQ support brought about a lower emphasis on accounting-based controls, which represented a *de-facto* decentralisation of decision autonomy (cf. Boyer, 1996). Decentralisation offers leeway for a more beneficial mix of controls for lean. To deal with the limited measurability of the effects of lean initiatives, the



assessment of investment proposals could gradually shift from a focus on the outcomes of traditional decision-making tools, to an approach which increasingly considers the expected, but difficult to quantify, improvements in operating processes. In the post-implementation phase, the effects of the initiatives on the subsidiary's performance could be assessed using a combination of financial and operational performance measures, where the emphasis on operational performance may grow over time. Both strategies were applied in West, although the lean proponents in this company felt that the emphasis of HQ was still too much on traditional tools and measures. The findings in West also suggest that multidivisional organisations can learn how to deal with the incompatibilities identified between accounting-based and lean controls (e.g. Maskell *et al.*, 2012; Chiarini, 2012; Hansen *et al.*, 2003), provided that the corporate level and the subsidiary recognise the value of each other's standpoint.

*Combine different control orientations.* If both satisfactory financial results and HQ support for lean are lacking, hierarchical forms of control are likely to be dominant. In the case of Midden, HQ exerted hierarchical power on many lower-level decisions, which hindered the optimisation of local value streams. Subsidiaries may then strive for a more balanced application of hierarchical and lateral controls to mitigate the constraints on implementing lean initiatives. Such an application of controls would imply that HQ keeps using its accounting-based controls, but acknowledges that financial results can sometimes be improved by considering lateral relationships. This can be achieved in two ways. First, HQ could involve subsidiaries in its decisions regarding interventions in particular functional areas. The subsidiaries can provide HQ with information about the consequences of particular interventions for their value streams, which should lead to more balanced decisions. Second, HQ could stimulate the expansion of lateral controls beyond its subsidiaries. For example, benchmarking could be used to share information about best practices and stimulate cooperation in improvement trajectories. Hence, where Kristensen and Israelsen (2014) showed that a balanced use of lean controls has a complementary effect on performance, the outcomes of this study suggest that there should also be a balance between these lean controls and the accounting-based controls that are important to HQ.

*Find alternative ways to safeguard the reliability of accounting information.* Irrespective of the subsidiary's financial results and HQ's degree of support for lean, keeping the company-wide information system up-to-date is likely to remain an important issue in multidivisional organisations. In all companies under study, HQ prevented a full erosion of its ability to control its subsidiaries. Hence, although there was considerable variation in the degree of centralised control, each multidivisional organisation under study retained a basic level of centralised control. In this vein, West's and Zuid's efforts to eliminate "wasteful" accounting activities created control problems for their HQ. To overcome such a deadlock, the accounting function and the operations domain together could search for combinations of internal controls which safeguard the quality of information without overly constraining the efforts to reduce "waste". The outcome is likely to be a combination of accounting-based controls and controls built into operating processes. At the time of the study, Zuid followed this route. However, the company experienced that it was not easy to convince persons outside the operations domain of the effectiveness of operational controls. Researchers, such as Kennedy and Widener (2008) and Fullerton *et al.* (2013), observed that the implementation of lean manufacturing is associated with an elimination of activities needed to track internal transactions. The findings of this study reveal a need to examine more critically the impact of eliminating such activities on higher management levels' abilities to control the lower levels. Developing internal controls which fit the lean principles seems feasible (see Maskell *et al.*, 2012), but convincing accountants and auditors of their reliability might be challenging. Accountants and auditors have to become familiar with ideas about control

which exist outside their field of expertise, and they may be afraid of losing control (Åhlström and Karlsson, 1996). More generally, the challenges faced by the case companies link back to Chenhall's (2003) call for research into the ways in which large, decentralised organisations combine controls to achieve sufficient degrees of diversification (i.e. fitting the local context) and integration (i.e. meeting central level demands).

### 5.2 *An alternative organisational form*

The mismatch between lean and the multidivisional structure may point to a need to consider alternative organisational forms which rely on controls that have a better fit with the operational emphasis of lean. We tentatively suggest that the so-called N-form, or network form, provides this better fit. Although often associated with collaborations between companies (e.g. Pekkola and Ukko, 2016), the network form also refers to specific ways of organising in a single organisation. It emphasises the combining of knowledge rather than the division of technologies and has the following characteristics (Hedlund, 1994). It entails temporary constellations of people, which provide operational flexibility. The network form highlights the importance of personnel at lower, operational levels and it promotes lateral communication. It promotes a catalytic and architectural role for top management, which is enabling rather than restrictive, and it emphasises focus, rather than economies of scale, as a competitive strategy. Finally, the network form recognises that a traditional hierarchy may be too restrictive, and thus different ways of ordering organisational activities may be deployed. Networked organisations combine various non-accounting-based controls which hold the organisation together, with a high level of local decision autonomy (Ruggero *et al.*, 2016).

Secchi and Camuffo (2016) suggested that the implementation of lean manufacturing systems is positively associated with plant autonomy and that such implementation involves processes of experimentation and trial and error. They also highlight how knowledge sharing facilitates the effective implementation of lean. The findings in this paper extend these results by illustrating how the multidivisional form may not create the organisational conditions for the effective sharing of knowledge and local experimentation. The analysis demonstrates that the accounting-based controls in multidivisional organisations can be applied in a highly restrictive manner, discouraging the behaviours which are positively associated to lean implementation success. By contrast, the network form of organisations creates conditions that facilitate knowledge sharing and local autonomy. It supports information sharing as multiple relatively independent production units seek frequent collaboration with their peers to obtain best practices across the organisation. In addition, the network form can be controlled through mostly non-financial efficiency and quality measures and improvement actions can be initiated through instruments, such as benchmarking and value streams. The adoption of a network form may be only one tentative suggestion to avoid the detrimental effects of a strict use of accounting-based controls. In a more general sense, the findings of this paper suggest that researchers and managers may attend more to the ways the corporate level affects the local conditions, which, in turn, facilitate or impede the implementation of lean manufacturing systems. In this study, the focus was on accounting-based controls as influence on these local conditions, but it is likely that various other variables also impinge on these conditions.

## 6. Conclusion

Despite various innovations, both in accounting and in production, traditional accounting-based control systems are still in use in many organisations. In the multidivisional organisations included in this study, HQ persisted in using traditional accounting information to control the subsidiaries, partly because external stakeholders held them accountable based

on this information. Lean manufacturing provided a competing set of controls, which sometimes conflicted with the more traditional ones. The interferences of HQ based on information which was not consistent with lean manufacturing, constrained the subsidiaries in their efforts to follow the lean principles. In addition to constraints such as market characteristics and geographical context (Bamford *et al.*, 2015; Moyano-Fuentes, Sacristán-Díaz, 2012), this study demonstrates that the multidivisional structure of many organisations may also introduce constraints on lean implementations; especially related to their use of centralised controls. This study provides further contributions by suggesting four different strategies to mitigate these constraints. Through these strategies, the case companies tried to adjust the system through which they were controlled, but this could only be done cautiously, to avoid any disturbances in their relationship with HQ. As such, the multidivisional setting adds extra complexities to lean manufacturing. A more radical, longer-term strategy may therefore be to introduce changes in the organisational structure.

The findings of this paper give rise to a more fundamental question related to the effect of extraneous conditions on the implementation of lean manufacturing. More specifically, there is a need for a richer understanding about the ways in which these conditions encourage or restrict the implementation of lean manufacturing. This paper highlighted the impact of the relation between different organisational levels. Yet, other conditions may be considered, including institutional factors, such as the requirements of providers of financing and external auditors, and labour laws which constrain the use of a flexible workforce. The variety of other constraints (see Bamford *et al.*, 2015) emphasises the need for a coherent research programme that aims to understand and eliminate these constraints.

In this vein, this paper represents a call for further contributions to a broader understanding of the control of lean operations. We believe that it is important to appreciate the intricacies of control in lean companies, given the sometimes conflicting demands and frictions they experience. The effectiveness of lean manufacturing is rooted in a wide array of contextual issues, which this paper has only just begun to uncover.

#### Note

1. During this interview, it was pointed out that Zuid had implemented lean in a highly effective manner. Therefore, it was added to the study in a subsequent stage.

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Function	Company	Duration
Lean consultant	Ynova (consulting firm)	2:00
Lean consultant, industrial cost engineer West, industrial cost engineer no. 2	Ynova, West,	
West, lean consultant/former interim plant manager Midden, senior financial manager Midden, assistant financial manager Midden	Midden	2:00
Lean consultant/former interim plant manager Midden	Midden	2:30
Industrial cost engineer, industrial cost engineer no. 2, manager	West	2:30
Senior financial manager	Midden	2:00
Assistant financial manager	Midden	1:30
Former senior manager	Zuid	1:52
Senior manager	Zuid	2:39
Black belt lean manager	Zuid	1:47
Senior financial manager	Zuid	2:13
Senior manager, Black belt lean manager, senior financial manager	Zuid	0:45
Lean consultant/former interim plant manager Midden <sup>a</sup>	Midden	1:15
Senior financial manager, assistant financial manager <sup>a</sup>	Midden	1:15
Senior financial manager, assistant financial manager <sup>a</sup>	Midden	1:50
Production manager no. 1 <sup>a</sup>	Midden	1:30
Production manager no. 2 <sup>a</sup>	Midden	1:00
Lean manager/Manager quality control <sup>a</sup>	Midden	0:55
Supply chain manager <sup>a</sup>	Midden	0:30
Technical project manager <sup>a</sup>	Midden	0:17
Divisional procurement manager <sup>a</sup>	Midden	0:35
Plant manager <sup>a</sup>	Midden	1:45
Senior financial manager, assistant financial manager <sup>a</sup>	Midden	1:47
Team leader production department <sup>a</sup>	Midden	0:27
Manager product engineering <sup>a</sup>	Midden	1:18
Lean consultant/former interim plant manager Midden <sup>a</sup>	Midden	1:10
Assistant financial manager <sup>a</sup>	Midden	0:42
Industrial cost engineer no. 3 <sup>a</sup>	West	0:30
Green belt programme manager <sup>a</sup>	West	1:00
Maintenance employee <sup>a</sup>	West	0:45
Employee technical support group line 2 <sup>a</sup>	West	0:45
Production manager hall 4 <sup>a</sup>	West	1:30
Lean coach <sup>a</sup>	West	3:00
Quality inspector hall 2 <sup>a</sup>	West	0:45
Shift leader assembly line 2 <sup>a</sup>	West	0:30
Industrial cost engineer no. 1	West	1:40
Financial controller	West	1:31
Logistics capacity planner <sup>a</sup>	West	1:00
Management team member supply <sup>a</sup>	West	1:00
Employee logistics department <sup>a</sup>	West	0:45
Meeting about the challenges of accounting and control in a lean environment. Attended by most interviewees	West, Midden, Zuid	4:00

**Table AI.**  
Overview of  
interviews

**Note:** <sup>a</sup>Indicates interviews conducted by the research assistants

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