

Top-down, bottom-up, or both? Toward an integrative perspective on operations strategy formation



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ABSTRACT

Operations strategy is formed via complex processes that transpire in multiple directions at multiple organizational levels. While most previous studies focus on the “macro-level” process of strategy formation from the dominant top-down perspective, this study investigates the “micro-level” process of strategy formation that governs interactions among competitive priorities, objectives, and action plans within operations. Using 111 (59 top-down and 52 bottom-up) action plans collected from six German manufacturing plants, we build on [Kim and Arnold's \(1996\)](#) framework and propose an integrated process model of operations strategy formation that encompasses both top-down planning and bottom-up learning. We also identify a contingency factor that affects their balance: centralized versus decentralized organizational structure. Finally, based on the analysis of their respective strategic content, we provide evidence concerning the complementary roles of top-down and bottom-up action plans in operations strategy.

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1. Introduction

How is operations strategy formed? The *process* of operations strategy is of considerable interest to many scholars but has received relatively less attention than has the *content* of operations strategy ([Boyer et al., 2005](#); [Swink and Way, 1995](#)).³ The process of operations strategy comprises the activities and dynamics of strategy formation and implementation ([Boyer et al., 2005](#); [Slack and Lewis, 2011](#); [Swink and Way, 1995](#)), whereas the content of operations strategy consists of the particular decisions regarding competitive priorities, objectives, and action plans that specify the operation's strategic direction.

Since [Skinner \(1969\)](#) first postulated that manufacturing tasks should support corporate objectives, operations strategy formation has been conceptualized as a top-down process of “formulation and implementation” within the guidelines of overall corporate

strategy. [Wheelwright's \(1984\)](#) well-known framework represents this high-level view of manufacturing strategy within an organizational hierarchy. He argues that a company's preferred positioning in the market should determine the competitive priorities of operations. Given its role in supporting corporate strategy, an operations strategy is perceived to make decisions about developing the structure, infrastructure, and capabilities to support those competitive priorities.

This top-down perspective has been widely accepted and dominated empirical studies on the process of operations strategy ([Maruchek et al., 1990](#); [Menda and Dilts, 1997](#); [Schroeder et al., 1986](#); [Swamidass, 1986](#); [Ward et al., 1996](#); [Ward and Duray, 2000](#)). However, a few case studies have documented an alternative process—of bottom-up operations strategy—that emerges in the absence, or lack, of a corporate (or strategic business unit) strategy ([Barnes, 2002](#); [Slack and Lewis, 2011](#); [Swamidass et al., 2001](#)). These scholars argue that, in practice, operations strategy is formed in a more complex process than the top-down “formulation and implementation”, and they identify the need to document more real-world processes. This is the starting point of our study.

Especially, most of previous studies have examined the process of operations strategy at the “macro-level” by focusing on hierarchical relationships and the external consistency between operations strategy and corporate and/or other functional strategies ([Barnes, 2002](#); [Maruchek et al., 1990](#); [Menda and Dilts, 1997](#); [Schroeder](#)

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³ [Boyer et al. \(2005\)](#) report that, of the 31 operations strategy articles published in the *Production and Operations Management Society* journal since its founding, only 8 are process related.

et al., 1986; Slack and Lewis, 2011; Swamidass, 1986; Swamidass et al., 2001; Ward et al., 1996; Ward and Duray, 2000). In contrast, Kim and Arnold (1996) ground the process of operations strategy at the “micro-level” by investigating the internal consistency among manufacturing’s competitive priorities, objectives, and action plans based on the top-down assumption. Yet because their study relied on survey data, the authors were unable to investigate the actual process by which competitive priorities are translated into action plans, and vice versa.

Hence, our study aims to fill this gap in the literature by exploring the internal process of operations strategy as actually practiced. Using information on six German manufacturing plants and their 111 strategic action plans, we build on Kim and Arnold’s (1996) top-down framework and propose an integrated process model of operations strategy formation that incorporates both top-down and bottom-up perspectives. We also explore organizational factors—such as competitive priorities, organizational structure, and size—that influence the extent to which action plans are stipulated top-down or emerge bottom-up. Furthermore, we delve into the strategic content of both types of action plans to explain their respective roles in operations strategy.

In this study, we posit that operations strategy is formed through an iterative process of integrating competitive priorities, objectives, and action plans that are partly induced by top-down planning and partly emerge from bottom-up learning. Top-down action plans tend to reflect top management’s strategic intentions with regard to the organization’s specified priorities while bottom-up action plans tend to arise in the areas of operational practices and processes—the domain of lower-level managers’ expertise. Thus, our findings suggest that top-down and bottom-up action plans serve complementary roles in the formation of operations strategy. Additionally, our results show that decentralized organizations adopt relatively more bottom-up actions than centralized organizations do.

Our study makes several contributions to the operations strategy literature. First, it fills a void in the literature of operations strategy by investigating the internal processes governing the interactions among competitive priorities, objectives, and action plans. Second, this study contributes to a mid-range extension of the theory on the operations strategy process by documenting the existence of bottom-up action plans with reference to Kim and Arnold’s (1996) top-down framework; we believe that our paper is the first attempt to integrate the top-down and bottom-up perspectives on the formation of operations strategy from competitive priorities to action plans. Third, this research enhances our understanding of top-down and bottom-up integration by identifying a contingency factor—namely, centralized versus decentralized organizational structure—that affects the balance between top-down planning and bottom-up learning. Finally, our study substantiates the roles of top-down and bottom-up action plans in operations strategy by examining the strategic content of those plans.

The rest of this paper is organized as follows. The literature is reviewed in Section 2, and the methodology is explained in Section 3. Within-case and cross-case analyses are presented in Sections 4 and 5, respectively. We discuss our findings and propositions in Section 6, and the paper’s limitations and contributions are summarized in Section 7.

2. Literature review

2.1. Process of operations strategy

Although there is no generally accepted definition of operations strategy, it is expected to specify competitive priorities and objectives for the operations function in alignment with the firm’s overall

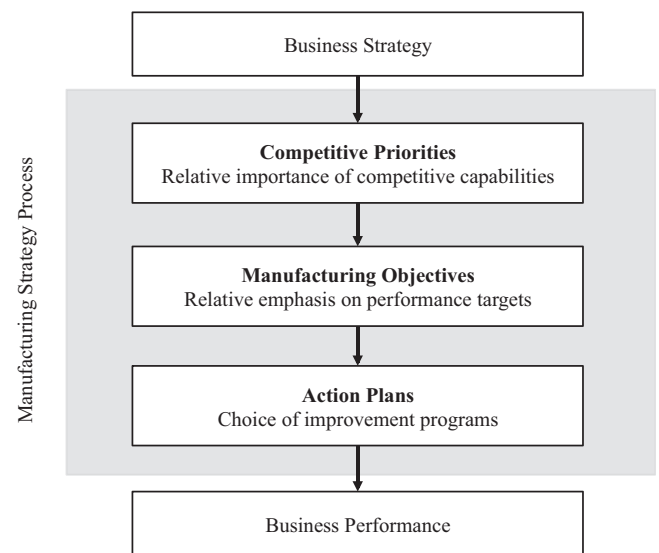


Fig. 1. A process model of manufacturing strategy
Adopted from Kim and Arnold (1996).

business strategy, and to pursue them through consistent patterns of actions (Skinner, 1969; Slack and Lewis, 2011; Wheelwright, 1984). Following the dominant top-down perspective, Kim and Arnold (1996) develop a hierarchical process model that delineates competitive priorities, manufacturing objectives, and action plans in the choice of improvement programs (see Fig. 1). In line with Wheelwright (1984), Kim and Arnold (1996) suggest that competitive priorities describe a company’s preferred dimensions of competitive advantage and largely determine the relative emphasis that the operations function places on such capabilities as cost, quality, dependability, and/or flexibility. Based on the firm’s competitive priorities, they argue that operations managers should articulate measurable performance objectives and generate action plans to implement. Since each action plan requires the allocation of scarce resources, managers should assess, prior to adopting one, its expected effect on specific performance objectives. Thus, Kim and Arnold’s model postulates top-down action plans that are carefully “formulated and implemented” in alignment with competitive priorities and objectives.

However, proponents of continuous improvement argue for bottom-up action plans that emerge from lower-level organizational members working in day-to-day operations. For instance, operations-based managerial innovations, such as Just-In-Time (JIT)/lean manufacturing and Six Sigma/Total Quality Management, emphasize bottom-up organizational learning for continuous improvement through employee involvement, cross-functional communication, and feedback across all organizational layers (Deming, 1992; Womack et al., 1990). Although such improvement programs are often adopted and implemented by top management, the proponents of JIT and TQM emphasize linking top management’s strategic goals with the daily management of operations at lower levels via employee participation in devising action plans (e.g., *hoshin kanri*; Wichter and Butterworth, 2001). The essence of these initiatives is to create communication channels for new ideas and to involve lower-level organizational members in collaborative decision making and problem solving (Wichter and Butterworth, 2001).

Generally speaking, it is top management’s responsibility to establish the overall goals and objectives for an organization and to allocate resources, whereas the actions required to achieve those objectives are usually carried out by lower-level organizational members (Bower, 1974; Burgelman, 1983; Burgelman and Grove,

2007; Mintzberg, 1978; Mintzberg and Waters, 1985). The distance in the organizational hierarchy between top management and lower-level members creates a gap between managerial intentions and organizational actions that can lead to a discrepancy between “intended” and “realized” strategies (Mintzberg, 1978).

This discrepancy between managerial intentions and the actions of an organization's employees raises the issue of coordination and is a source of variation in the extent of planning and control when operations strategy is formed. In their study on deliberate and emergent strategies, Mintzberg and Waters (1985) argue that the coordination process can be guided by a plan as an intended strategy in which long-term goals and intentions are specified prior to actions, or emerge from patterns in action over time in the absence of, or despite, intentions. Similarly, Burgelman (1983; Burgelman and Grove, 2007) argues that some initiatives autonomously emerge from middle-level managers in search for new opportunities while the majority of strategic initiatives are induced by managerial intentions.

Thus, we conjecture that the process of coordinating managerial intentions (i.e., competitive priorities and objectives) and actions can be induced top-down as well as autonomously emerge from bottom-up in operations strategy formation.

2.2. Top-down versus bottom-up strategy formation

What are the main distinctions between top-down and bottom-up strategy formation? The top-down process can be described as the planned coordination of intentions and actions to achieve specific outcomes imposed by a central authority, as described by Kim and Arnold (1996). Top management specifies its long-term goals, intentions and means prior to actions in the form of a plan and elaborates the plan in as much detail as possible to translate it into collective actions with a minimum of discretion left (Bower, 1974; Burgelman, 1983; Burgelman and Grove, 2007; Mintzberg and Waters, 1985). Some strategies might not be carried out as intended whereas other strategies accurately reflect intentions, yet fail to achieve the desired outcomes—perhaps because of a turbulent environment (Mintzberg and Waters, 1985). Based on the initial outcomes, top management reinforces or modifies its plans as appropriate.

In contrast, a bottom-up strategy can emerge as an unplanned pattern of actions and may realize outcomes not initially intended by top management (Bower, 1974; Burgelman, 1983; Burgelman and Grove, 2007; Mintzberg and Waters, 1985). As remarked by Mintzberg and Waters (1985), no action transpires in the total absence of intention. Top management may offer some broad direction yet refrain from specifying detailed actions for every operational decision in the cascade of organizational hierarchy. In this context, middle managers can autonomously undertake strategic initiatives to identify specific actions that will serve their objectives in line with the firm's broad direction and/or to search for new opportunities that could advance their career prospects within the organization (Burgelman, 1983; Burgelman and Grove, 2007; Nonaka, 1988). Slack and Lewis (2011) describe the principle governing a bottom-up perspective of operations strategy as shaping “objectives and action, at least partly by the knowledge it gains from its day-to-day activities” (p. 13). In this study, we document how a manufacturer's operations objectives and action plans are shaped, at least in part, by autonomous initiatives that emerge in the absence of, or despite, top management's *prior* intentions.

In sum, a top-down strategy can be distinguished from a bottom-up strategy in terms of two characteristics: (i) the initiative's origin and (ii) the sequence of events among intentions, actions, and outcomes. Top-down strategy is triggered by top management's intentions and manifests in the performance outcomes of stipulated actions. Bottom-up strategy is initiated by lower managers'

actions representing their own interpretations of the company's directions, which may partially differ from top management's *prior* intentions. Based on these distinctions, we categorize the strategic action plans of six German manufacturing plants into two groups—top-down and bottom-up—and examine how the plans are formed, the organizational factors that affect their formation, and their strategic content. Our purpose is to map out the formation process of top-down and bottom-up operations strategy by investigating how action plans are formed in practice and how they interact with competitive priorities and objectives within operations.

3. Methodology and case descriptions

3.1. Case selection

Data were collected as a part of a research project addressing the operations and technology strategy implementation of European manufacturers. Six German manufacturing plants were selected from the finalists of INSEAD's Industrial Excellence Award (IEA) competition between 2005 and 2008. After obtaining the interviews and organization charts of all finalist firms from the IEA database, we chose our sample plants based on the following theoretical sampling (Yin, 2009). First, we selected plants operating within a single country (Germany) but in diverse industries; thus we minimized cultural differences in strategy processes while retaining some variation in manufacturing practices and processes. Second, we chose plants whose top management teams had more than four years of tenure as well as the autonomy to devise their own operations strategy. Third, since the organizational structure can affect the decision-making process (Siggelkow and Levinthal, 2003), we chose two plants with a centralized structure and two with a decentralized structure. This initial sampling scheme, however, resulted in a size disparity between centralized and decentralized plants: the latter had a greater number of employees. To reduce any sampling bias associated with size and to approach “theoretical saturation” (Eisenhardt, 1989), we augmented the initial sample by adding one larger plant with a centralized structure and one smaller plant with a decentralized structure (see Section 5.1 for details). All six manufacturers we contacted agreed to participate in the study. Hence, our final sample includes six German manufacturers featuring different organizational characteristics.

3.2. Data collection

The on-site visits and interviews for this research study were carried out in 2009. During the visits and interviews, we learned that each manufacturer had a set of high-priority action plans (called “strategic initiatives” or “strategic projects”, depending on the organization) that were being implemented, formally tracked, and officially budgeted by top management. In order to establish whether those plans were driven by top management or instead emerged from other members of organization without top management's *prior* intentions, we collected from each manufacturer the entire set of such action plans underway at the time of this study. Thus, we employed a multiple case study design with an embedded unit of analysis—that is, six manufacturers representing cases with embedded strategic initiatives (Yin, 2009, p. 46). For consistency with Kim and Arnold's (1996) terminology, we refer to both “strategic initiatives” and “strategic projects” as “action plans” hereafter.

We collected data by interviewing top management on-site and then using the interview responses to compile lists of action plans; this procedure enabled us to obtain, for each action plan, a content description and the names of the key personnel involved.

Table 1
Breakdown of informants by manufacturer and management level.

Manufacturer	Top management informants	Middle management informants	Frontline management informants	Total
AUTO	4	4	7	15
CONTROLLERS	2	4	2	18
MEDICAL	2	6	4	12
DRIVES	2	3	3	8
GLASS	5	4	3	12
FITTINGS	1	3	2	6
Total	16	24	21	61

Semi-structured follow-up interviews were conducted with various organizational members at multiple levels of management: top, middle, and frontline (see [Appendix](#) for the condensed interview protocol). *Top* management includes the unit head (CEO in one case, division manager in two cases, and functional head in three cases) and immediate subordinates, and *frontline* management is the lowest level with staff responsibility; *middle* management refers to all managerial positions in between. We recruited one to seven informants at each level who were involved in action plans and were also willing to participate in the study (see the detailed breakdown of informants by management level and organization in [Table 1](#)). We first conducted individual interviews with each informant at the top management level and then performed group interviews—up to four interviewees—with informants at the middle or frontline management levels. Informants were grouped by the same rank to preclude self-censoring in the presence of superiors. Altogether, we conducted interviews with 61 informants and collected data on 111 action plans from the six manufacturing plants.

To ensure the validity of the data, we used multiple investigators for *investigator triangulation* (see [Patton, 2002](#)) and multiple informants for *data triangulation* (see [Yin, 2009](#), p. 116). First, two authors of the paper together conducted on-site visits and interviews while the other author examined the data from a third party perspective. This setup can help to mitigate a potential investigator bias. During the interviews, two investigators alternately asked questions and took notes for triangulation. To comply with the “24-hours rule” ([Eisenhardt and Bourgeois, 1988](#)), case study reports for each manufacturer were written based on the notes immediately after each visit. The case write-ups were later combined with the

action plan databases. For each manufacturer, we then created tables to structure the statements on the evolution of each action plan (columns) along the organizational actors and their hierarchical levels (rows). This exercise facilitated systematic tracking of the initiation and evolution of each action plan. In addition, the authors independently categorized the organizational structure of manufacturers as either centralized or decentralized, an exercise that yielded consentient categorizations.

Second, we validated the data by cross-examining the interview scripts from multiple informants on how specific action plans were initiated, developed and implemented, and by aligning the details of events across the varying perspectives of top, middle, and frontline management. Furthermore, we used organization charts with each informant's task description to triangulate our categorization of centralized versus decentralized organizations. Hence, our research design employed multiple sources (informants) across organizational ranks and so enabled us to identify and validate the hierarchy-spanning process of operations strategy formation.

4. Within-case analysis

The within-case analysis was designed to examine each case as a stand-alone entity ([Eisenhardt, 1989](#)) and to identify the organization-specific characteristics that might influence the process of operations strategy formation. Given the existence of an embedded unit of analysis (the action plans), we followed [Yin \(2009\)](#) and began by examining organization-level characteristics—here, the firm's size, competitive priorities, and organizational structure. In particular, the manufacturer's organizational structure was categorized as either *centralized* or *decentralized* based on the distribution of decision-making authority across organizational layers ([Siggelkow and Levinthal, 2003](#)). For example, we classified a manufacturing unit as “centralized” if decision-making authority was vested in the unit's top management team or as “decentralized” if significant decision-making authority devolved to its lower-level members or subunits. [Table 2](#) summarizes the examined characteristics.

The second step of the within-case analysis focused on action plans embedded within the case organizations. Because of geographical and time constraints, we collected cross-sectional data on ongoing action plans through face-to-face interviews during the visits rather than by following the progress of actions over time.

Table 2
Key characteristics of the case study manufacturing units.

	AUTO	CONTROLLERS	MEDICAL	DRIVES	GLASS	FITTINGS
Industry and process	Car components: axles, gearboxes, shaft drives Metalworking and assembly	Power controllers (electrical and electronics) for machine tools Engineering and assembly	SME, two manager-owners Medical kits for ambulances, home-care devices (breathing) Assembly	Pneumatic & electric drives for automated machine tools Extrusion, metal-working, assembly	Specialty glass tubes for industrial applications Glass smelting, extruding, and cutting	Brass faucets Forging, surface treatment, extrusion, and assembly
Competitive priorities	First, most innovative; second, most efficient supplier of power train systems	First, technology leadership; second, balanced growth in all business segments; third, total cost leadership	First, product innovation; second, internationalization (where the latter implies modularized customization)	Customer orientation with delivery speed and reliability as top priorities (priorities were shifted away from cost efficiency)	Technology leadership and delivery reliability, with cost as a constraint	High flexibility, time to market and the optimum balance between availability, inventory, costs, and quality to reinforce corporate goals and brand value
Organizational structure	Decentralized; matrix	Centralized; divisional	Decentralized; functional	Decentralized; divisional	Centralized; functional	Centralized; functional
Size (approx.)	2500 employees	700 employees	800 employees	2400 employees	1000 employees	530 employees

Table 3
Action plans.

	AUTO	CONTROLLERS	MEDICAL	DRIVES	GLASS	FITTINGS
Number of action plans underway	10	24	16	10	6	45
Number (percentage) of top-down action plans	4 (40%)	17 (71%)	3 (19%)	3 (30%)	5 (83%)	27 (60%)
Example of a top-down action plan	Develop lithium ion batteries as new business	Design controllers for airport conveyor systems	Increase product variety for foreign markets	Reposition between electrical and pneumatic drives	Implement new smelting reactor technology	Acquire dry-machining technology know-how
Number (percentage) of bottom-up action plans	6 (60%)	7 (29%)	13 (81%)	7 (70%)	1 (17%)	18 (40%)
Example of a bottom-up action plan	Integrate inbound and manufacturing logistics	Redesign testing and reclamation processes	Increase process flexibility	Segment plant into “fast” and “slow” processes	Reduce energy cost in smelting process	Implement logistics train for route-oriented parts supply

Thus, we used retrospective questions about how the actions originated and how they earned the support of top management. Since there were multiple informants, we were able to cross-reference the responses in order to weed out inconsistent reports and to sort action plans into two categories—top-down or bottom-up—based on who initiated the action and how it was initiated (Yin, 2009). For example, an action initiated by middle or frontline management, in the absence of top management’s *prior* intentions, was classified as bottom-up; if top management initiated or required the action, it was classified as top-down. Table 3 presents the breakdown of action plans for each organization in our case study.

AUTO is a production unit of a German premium car manufacturer and has about 2500 employees. AUTO manufactures key components of chassis and drivetrains; it is an internal systems supplier that competes against external competitors for production orders. The plant makes just-in-sequence deliveries of its systems to an assembly plant located on the other side of town. Top management states that the competitive priorities of AUTO are to be the “first most innovative and second most efficient supplier of power train systems”. Decision making in AUTO’s matrix organization is decentralized; as described by the unit head, “functions and processes in our matrix [organization] make and adjust as many decisions among themselves as possible, I only intervene if no consensus is reached.” Six out of ten ongoing action plans were formed bottom-up and focused mostly on improving material flows and manufacturing processes.

CONTROLLERS, with approximately 700 employees, manufactures highly customized power controllers and switching cabinets for industrial automation control. Located in East Germany, CONTROLLERS was bought by a German-based global electrical engineering conglomerate in 1990, after the fall of the Iron Curtain. Once purchased, CONTROLLERS had to reinvent itself and moved into the expanding niche of highly customized machine controllers and power units; it also offered peripheral services of all-in-one engineering and project management. The unit head of CONTROLLERS describes its competitive priorities as “first technology leadership, second balanced growth in all business segments, and third total cost leadership.” CONTROLLERS is organized in a matrix format, by product, and centralizes its decision-making authority with the top management team. According to the unit head: “The more strategic an issue is, the stronger my involvement in decision making. At the end of the day I make such decisions.” Of its 24 action plans, 17 were classified as top-down. The unit head seemed to take the most active role in formulating action plans, which emphasized product adaptations to new markets.

MEDICAL is a family-owned firm—a “small or medium-sized enterprise” (SME)—that develops and manufactures medical devices for ambulances and homes; it has a total of some 800 employees. The heads of manufacturing and technology and of sales are members of the owner family, who identify MEDICAL’s

competitive priorities as “first product innovation and second internationalization, where the latter should be reached by modularized customization.” MEDICAL has a functional structure characterized by decentralized decision making, wherein substantial autonomy is given to lower-level managers. The head of manufacturing explained that frontline production managers are “entitled to develop and decide on their own key performance indicator systems within their production teams.” Of the 16 action plans at MEDICAL, 13 are classified as bottom-up; they concentrated on improving the configuration of the firm’s modular manufacturing operations.

DRIVES is a manufacturing unit of a German industrial control and automation company with nearly 2400 employees. The plant manufactures pneumatic and electric drives for factory automation applications in various industries. The top management of DRIVES describes the unit’s strategic focus as “customer orientation with delivery speed and reliability as top priorities.” DRIVES has a divisional structure and grants considerable autonomy to lower-level managers. The unit head explained: “All decisions should be made at the most operational level as possible. I will not interfere with these decisions; I will only ensure that the decision-making processes follow our principles and standards.” Seven out of ten action plans at DRIVES were initiated bottom-up and focused on changing the configuration of intrafirm material logistics and manufacturing processes.

GLASS is the division of a German glass manufacturer that develops, manufactures, and sells specialty glass tubes for applications in pharmaceutical, electronics, and environmental technologies worldwide. GLASS has about 1000 employees and a functional structure of organization. Its competitive priorities are “on technology leadership and delivery reliability, with cost being a constraint.” According to top management at GLASS, which consists of the division manager and the heads of various functions, “[we] make all key decisions” and delegate decisions only to the subunits that have “earned our trust by a consistent track record of performance.” Five of the division’s six action plans were top-down and focused on developing new smelting technology and improving smelting process control.

FITTINGS is a manufacturing unit of a German sanitary fittings company; it competes globally in the medium and premium price segment of brass faucets. The unit is a leading high-technology plant with 530 employees, and it is the only unit that incorporates all key processes of the company’s global production network. The competitive priorities at FITTINGS are “high flexibility, time to market, and the optimum balance between availability, inventory, costs, and quality to reinforce corporate goals and brand value.” FITTINGS is organized by functions with a centralized decision-making system. The unit head boasted: “All key decisions are made centrally by us [top management], and ... execution is tightly monitored with the help of our NATO-inspired manufacturing

dashboard in our executive control room.” Of the unit’s 45 action plans, 27 were classified as top-down and 18 as bottom-up. Most of the action plans involved new materials and metal founding technologies or making improvements in the flow of materials among manufacturing operations.

5. Cross-case analysis

The cross-case analysis is performed in three steps. First, we compare top-down and bottom-up action plans across organizations and investigate the factors that might affect the *extent* to which actions are stipulated by top management or emerged from lower-level managers. The second step of cross-case analysis focuses on the *process* of how action plans are formed in practice and interact with competitive priorities and objectives with reference to the top-down process framework articulated by Kim and Arnold (1996). In the last step, we take a closer look at the *content* of action plans by comparing top-down and bottom-up ones.

5.1. Organizational factors and top-down versus bottom-up action plans

The within-case analysis showed that all six case organizations, which operate in diverse markets with different processes, adopted both top-down and bottom-up action plans. However, the proportion of these plans that are formed top-down or bottom-up varies across organizations. As shown in Table 3, 70% (i.e., 7 of 10) of the action plans adopted by DRIVES originated with middle and frontline managers; only 30% (3 of 10) were formulated by top management. In the case of CONTROLLERS, 29% (7 of 24) of its action plans emerged bottom-up and 71% (17 of 24) were induced top-down.

In order to explain these differences across organizations, we examine the manufacturers’ competitive priorities, organizational structure, and size (i.e., number of employees) as factors that could influence the process of formulating operations strategy.

5.1.1. Competitive priorities

Despite differences in their products and processes, our case plants had similar emphases with regard to competitive priorities in their respective markets. Four plants (AUTO, CONTROLLERS, MEDICAL, and GLASS) identified their first priority as innovation in products or technology and their second as cost leadership. However, these organizations exhibited varying degrees of adopting top-down (respectively 40%, 71%, 19%, and 83%) versus bottom-up (60%, 29%, 81%, and 17%) action plans. The remaining two organizations are similarly inconsistent on this score. Both DRIVES and FITTINGS identified their first priority as customer service (e.g., flexibility and response time) yet adopted top-down (respectively 30% and 60%) and bottom-up (70% and 40%) action plans to different degrees. In short, competitive priorities do not explain the extent to which top-down versus bottom-up action plans were adopted across organizations.

5.1.2. Organizational structure

We used centralized versus decentralized organizational structure as a sampling criterion because a decentralized (centralized) structure tends to involve a wide (narrow) range of organizational members in decision making (Siggelkow and Levinthal, 2003) and thereby facilitates (hinders) employee-led action plans. Our cross-case comparison of bottom-up action plans supports this conjecture. The three decentralized organizations in our sample—namely, AUTO, MEDICAL, and DRIVES—adopted more (respectively 60%, 81%, and 70%) action plans from middle or frontline managers than did the three centralized organizations—CONTROLLERS, GLASS, and FITTINGS (29%, 17%, and 40%).

In decentralized organizations, top management tends to provide fairly broad objectives while delegating significant decision-making authority to lower-level managers. Within guidelines, middle and frontline managers undertake initiatives to identify their own actions. This is reflected in a comment by DRIVES’ unit head: “Content authority should be as much delegated as possible, but this is coupled with everyone’s obligation to bring up ideas and initiatives that we can use to develop our unit.”

In contrast, top management in centralized organizations tends to specify goals and actions in as much detail as possible and only occasionally adopts action plans that emerge from middle and frontline managers. According to the top manager at FITTINGS, “to ensure consistency with our line of attack, it is us [the unit’s top management] who trigger and develop the strategic projects. You cannot expect this from lower-level managers. They have to do their job, and to them we have mapped out pretty clearly what decisions their jobs include. However, if a somewhat good idea bubbles up, [then] we of course use that.” Lower-level managers at FITTINGS also confirmed this point when asked about strategic actions: “[it is] top management’s responsibility to determine the strategic initiatives to fill in the strategic dashboard.”

Thus, decentralized organizations tend to encourage employee-led action plans whereas centralized organizations exercise tight control of actions in daily operations.

5.1.3. Size

Organizational size (in terms of the number of employees) became a sampling criterion because there was a size disparity in our initial sample between plants that were decentralized (AUTO with 2500 employees and DRIVES with 2400 employees) and those that were centralized (CONTROLLERS with 700 employees and FITTINGS with 530 employees). Without additional cases, the effects of organizational structure and size would be conflated. In order to separate the effect of size from that of organizational structure, we added a smaller-sized decentralized organization (MEDICAL with 800 employees) and a larger-sized centralized organization (GLASS with 1000 employees). Our final sample thus includes three large plants (at least 1000 employees) and three small plants (fewer than 1000 employees), where centralized and decentralized structures were represented by one or two plants of each size (see Table 2).

That being said, the proportion of bottom-up action plans varied among plants with similar headcounts. For example, the three largest plants (AUTO, DRIVES, and GLASS) in our sample had (respectively) 10, 10, and 6 action plans at the time of this study; of these plans, 60%, 70%, and 17% (respectively) originated with middle and frontline managers. The three smallest plants (CONTROLLERS, MEDICAL, and FITTINGS) had 24, 16, and 45 action plans underway at the time of this study; of these plans, 29%, 81%, and 40% emerged bottom-up. Thus, a plant’s number of employees does not seem to affect the adoption patterns of bottom-up and top-down action plans across organizations.

5.2. The integrated process of operations strategy: top-down and bottom-up

Our cross-case analysis has so far focused on identifying factors that affect the extent to which organizations adopt top-down versus bottom-up action plans. Here, we discuss the actual process of how action plans are formed and interact with the plant’s competitive priorities and objectives. Our goal is not to document the idiosyncrasies of each organization’s operation strategy process but rather to delineate those processes that are common to all the sample organizations. Because the existence of bottom-up action plans clearly constitutes a deviation from the Kim and Arnold’s (1996) top-down framework (hereafter the “KA framework”) shown in Fig. 1, we compare and contrast the formation

processes of top-down and bottom-up action plans with reference to that framework.

5.2.1. Competitive priorities and objectives

All six manufacturing plants were consistent in describing the hierarchical planning process for formulating competitive priorities and performance objectives under the umbrella of corporate strategy. That process consisted of first defining the manufacturing unit's competitive priorities (e.g., innovation, delivery, quality, flexibility, cost) in accordance with the preferred competitive dimensions of corporate strategy. In a second step, manufacturing objectives were developed to translate those abstract competitive priorities into more concrete and measurable performance targets that reflected the relative emphasis placed on each dimension of the competitive priorities. It was commonly described as top management's responsibility to establish the relevant priorities and objectives. As summarized in Table 2, each plant typically had a top priority (plus a few secondary priorities) and maintained the same priorities for about four years. The lone exception was DRIVES, whose top management had recently changed its top priority from cost efficiency to delivery and redefined its objectives accordingly—in particular, reducing the throughput time from customer order to delivery and increasing the number of on-time deliveries. We conclude that, in accordance with the KA framework, competitive priorities and performance objectives are in large part formulated and implemented by top management.

5.2.2. Action plans

The formation process of action plans is where practice is most divergent from the KA framework. We have documented that each plant in our sample had both top-down and bottom-up action plans—a coexistence that is in stark contrast to the KA framework, which postulates only top-down action plans. More specifically, that framework presumes that action plans are formed by management based on how nearly those plans are expected to satisfy specific objectives and thus to support the organization's competitive priorities.

The KA framework's top-down perspective is partly supported by our observations. It is top management that selects “strategic initiatives” or “strategic projects” among various initiatives and allocates resources to the selected action plans. In this regard, the “strategic initiatives” or “strategic projects” of six plants represent the action plans that convey top management's strategic intentions. However, not all action plans were formed by top management or in accordance with its stated intentions. Some action plans emerged from middle or frontline managers in the absence of, or despite, top management's *prior* intentions but were *later* integrated into its strategic direction.

5.2.3. Bottom-up action plans

Bottom-up action plans usually begin as autonomous initiatives of lower-level managers. Given the limited power of these managers to secure resources, their autonomous initiatives usually start small and are scaled up by earning top management's support. From the many autonomous initiatives that are launched, top management selects only a few as “strategic initiatives” or “strategic projects.” For an initiative to earn the status of a high-priority action plan, lower-level managers must demonstrate its value-generating potential through early successes.

Since numerous initiatives were autonomously started and ended by lower-level managers, the organizations did not have any record of how many autonomous initiatives were underway or of how many never rose to the level of an action plan. It is nonetheless evident that, of many autonomous initiatives that emerged from lower management in the absence of top management's *prior*

intentions, only a few are able to demonstrate value-generating potential and so become one of top management's action plans.

For example, two line managers at DRIVES initiated a physical segmentation of the plant. “[We] basically did it overnight without informing higher-level management because ‘fast response’ is too expensive to pursue on regular production lines.” These managers physically divided their production area into two subplants that relied on different process designs, configuring one subplant for high-volume products (to maximize cost efficiency with large batch sizes) and the other for low-volume products (to achieve shorter lead times, and more flexibility, with small batch sizes). As a result of this autonomous initiative, DRIVES was able to shorten its delivery time for small-volume, nonstandard orders and could charge a premium for faster delivery to customers. The early success of this initiative garnered the attention and support of top management and became one of its strategic action plans. The segmented production lines, initially implemented for a single product type, became the plant's default design and was applied to the entire manufacturing area.

5.2.4. Top-down action plans

The formation of top-down action plans closely follows the “formulation and implementation” process spelled out by the KA framework. In the similar process of translating competitive priorities into performance objectives, top management establishes action plans based on specific objectives derived from its desired outcomes, and stipulates those plans in detail to lower-level managers. For instance, the top management of GLASS initiated the building of a new glass-smelting reactor that enabled the plant to produce specialized solar-thermal glass tubes. Top management planned this project down to the smallest detail and led it from inception to completion.

5.2.5. Action plans and competitive priorities

Top-down action plans are formed in “deliberate” conformance with the manufacturing plant's competitive priorities and objectives to realize top management's strategic intentions. In contrast, bottom-up action plans can emerge irrespective of the specified competitive priorities because lower-level managers often undertake autonomous initiatives to serve their objectives in line with the organization's overall directions or to pursue new opportunities that can advance their career prospects within the organization. To explore this possibility, we assessed how many top-down and bottom-up action plans were directly linked to a plant's first priority—which can be assumed to represent top management's strongest strategic intention. Fig. 2 compares each manufacturer's entire set of top-down and bottom-up action plans with those that are directly linked to its first priority.

For each organization, the figure's left bar depicts the top-down and bottom-up proportions of all action plans while the right bar does likewise for those action plans that are directly linked to the organization's first priority. A visual inspection of these bar graphs reveals that, for each organization, top-down dynamics account for more of the “priority” action plans than for the overall action plans (i.e., the top-down proportion is greater for the right than for the left bar). The only exception is DRIVES, for which the two proportions are roughly equal. By and large, an action plan linked to the organization's first priority is more likely to be formed top-down than bottom-up. This finding indicates that bottom-up action plans tend to emerge outside formally specified priorities whereas top-down action plans are more likely formulated in line with them.

5.2.6. Integrating top-down and bottom-up processes

The process of forming operations strategy at our case organizations exhibits both similarities to and differences from the KA framework. To reconcile our findings with that framework

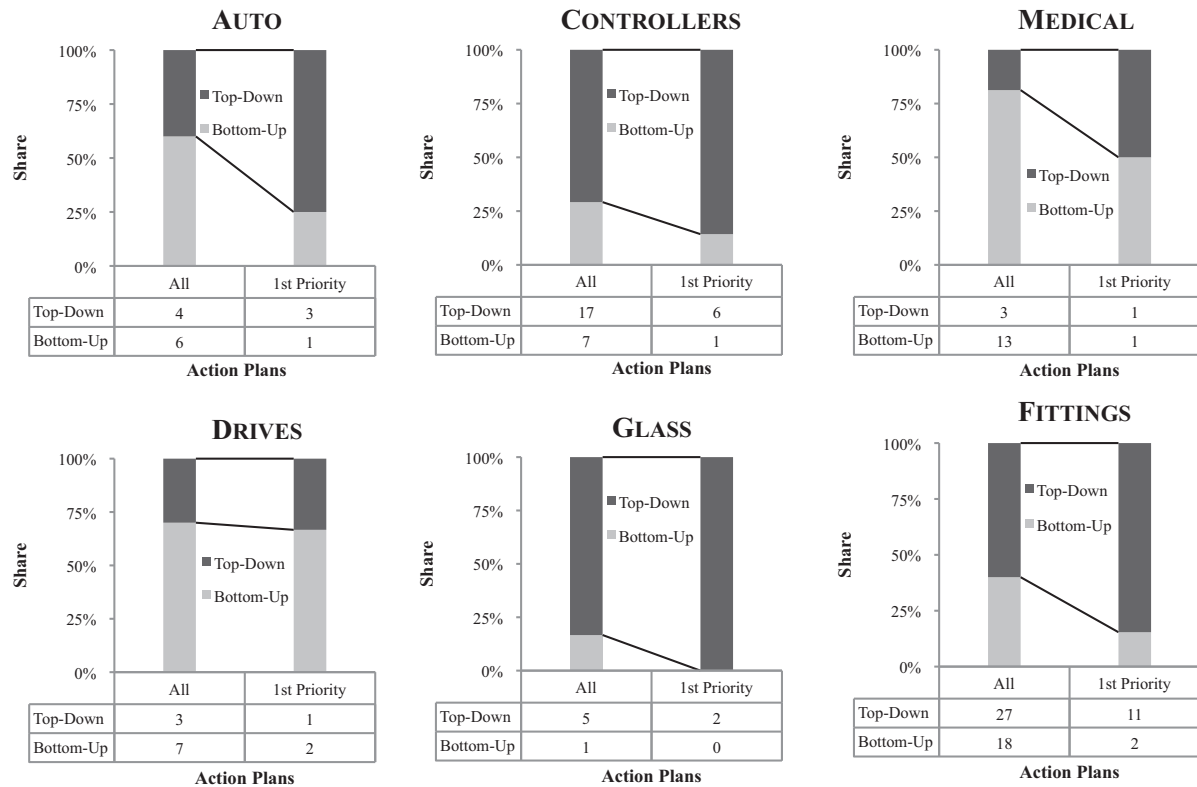


Fig. 2. Comparison of top-down and bottom-up strategic action plans vis-à-vis first priority.

and to refine the conceptual model of forming operations strategy, we propose an integrated process of strategy formation that encompasses both top-down and bottom-up action plans; see Fig. 3.

As mentioned, the hierarchical process of planning competitive priorities, performance objectives, and top-down action plans is similar to the KA framework's "formulation and implementation" procedure. The major departure from that framework is the

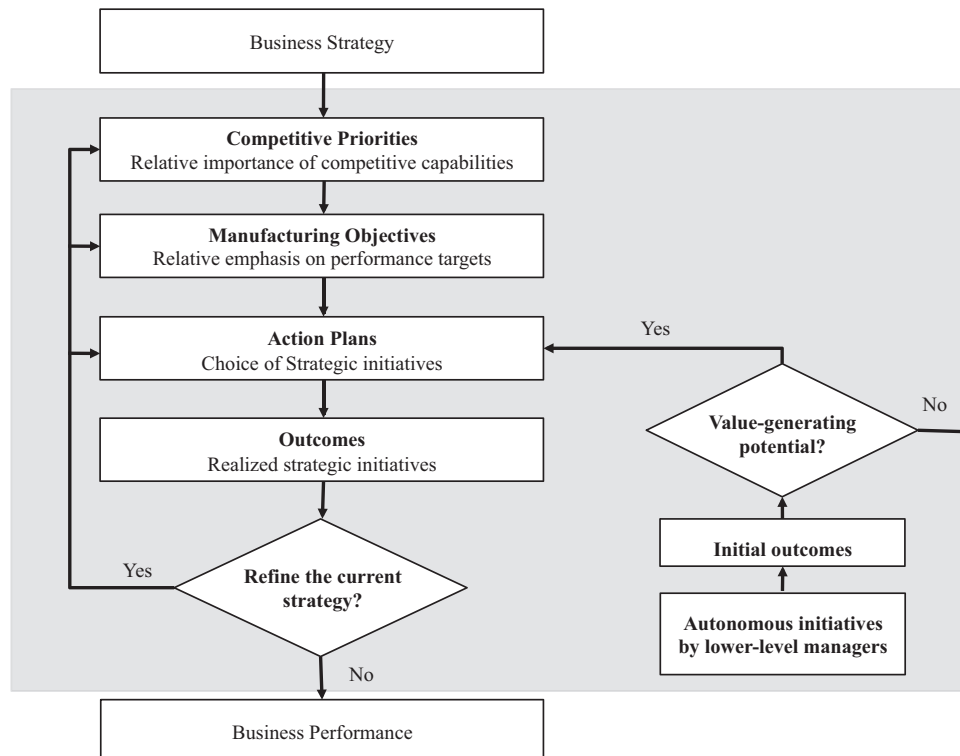


Fig. 3. An integrated model of the operations strategy formation process.

Table 4

Top-down and bottom-up action plans—breakdown by content category.

	Content	AUTO	CONTROLLERS	MEDICAL	DRIVES	GLASS	FITTINGS	Average (%)
Top-down	New products and technology	2	9	1	0	3	3	35
	Organization and coordination	1	4	1	2	0	6	28
	Methods and routines	1	0	0	1	0	3	12
	Mfg. and supply chain process	0	4	1	0	2	15	25
	Total	4	17	3	3	5	27	100
Bottom-up	New products and technology	1	1	5	1	0	0	17
	Organization and coordination	1	0	0	0	0	0	3
	Methods and routines	1	0	1	2	0	6	11
	Mfg. and supply chain process	3	6	7	4	1	12	69
	Total	6	7	13	7	1	18	100

process of bottom-up action plans that emerge from lower-level management. Middle and frontline managers undertake numerous autonomous initiatives on a small scale regardless of top management's *prior* intentions. Of these, only a few initiatives exhibit the potential to generate value and are elevated to a high-priority action plan by top management's support. Thus from here on, autonomous initiatives by lower-level managers become integrated into top management's strategic intentions.

No matter how they originate, all action plans are evaluated in terms of their contribution to the organization's goals and objectives. Some action plans may deliver the desired outcomes and can fit into the current strategic direction while others may require certain adjustments. Based on the respective outcomes, top management reevaluates the action plans as well as the plant's objectives and competitive priorities, and reaffirms or modifies the organization's strategic direction.

Given the unplanned nature of a bottom-up action plan, which typically emerges outside pre-specified priorities, its outcome—if successful—can alter top management's intentions and reshape the organization's competitive priorities. A case in point is DRIVE's plant segmentation: it was initiated by two line managers for a single product type yet was later, with the support of top management, scaled up to be applied to the entire manufacturing area. This action plan improved not only the plant's delivery performance but also its profitability (through price premiums for low-volume, nonstandard products). These successful outcomes led DRIVE's top management to shift its first priority to timeliness of delivery and away from cost efficiency, the priority formerly dictated by corporate headquarters. This example supports our contention that operations strategy formation is an iterative process of integrating competitive priorities, objectives, and action plans and that it incorporates both top-down planning and bottom-up learning because top management's strategic intentions is shaped, at least in part, by lessons from daily operations.

5.3. Content of top-down and bottom-up action plans

In this section, we explore the content of action plans to gain further insight into the areas in which bottom-up or top-down action plans are formed. Our previous mapping of action plans to a plant's first priority suggests that bottom-up action plans pursue improvement opportunities outside specified priorities whereas top-down action plans are formulated with those priorities in mind. To learn more about the specific content of top-down and bottom-up action plans, we pooled them by type across organizations and then grouped them into similar content categories. This sorting process was iterated until we obtained the fewest number of internally consistent categories, which resulted in action plans being categorized as follows: (1) new product and/or technologies, (2) organization and coordination, (3) methods and routines, or (4) manufacturing and supply chain process. Action plans in the first category are associated with the introduction of new products or

technologies; those in the second category focus on the organization's overarching governance and coordination structure. Action plans in the third category consist of advancing methods and routines in problem solving that could eventually contribute to process improvement, and those in the fourth category address changes in process improvement. The construct validity of this classification was confirmed by representatives from top management (cf. Yin, 2009) and is summarized in Table 4.

Our sample manufacturers had varying numbers of action plans underway at the time of the study and thus exhibit different proportions of action plans by content category (note the many zeros in Table 4). To compare the strategic content of top-down and bottom-up action plans, we aggregated plans across organizations by averaging the proportions of each content category, as shown in the rightmost column of Table 4. Using the aggregated proportions—instead of pooling action plans across organizations and then calculating the proportions—allows us to preclude bias that could arise from the different sample sizes. Fig. 4 compares the aggregated proportions of contents between top-down and bottom-up action plans.

Our qualitative analysis of the strategic content of top-down and the bottom-up action plans yields some interesting observations, as the two types of plans tend to address different strategic foci. Top-down action plans primarily involve new products and technologies (35%) or organization and coordination (28%); these trends are summarized by the left bar in Fig. 4. In contrast, bottom-up action plans predominantly focus on manufacturing and supply chain processes (69%) and, to a lesser extent, on new products and technologies (17%); see the right bar in Fig. 4.

The strategic emphases of top-down action plans on the development of new products and technology and on organization and coordination is consistent with the sample firms' competitive priorities. Innovation in products or technology was the top priority in four plants (AUTO, CONTROLLERS, MEDICAL, and GLASS), and cost leadership was their second priority. From the interviews, we learned that the unit head of CONTROLLERS formulated all action plans for new products and technologies himself while delegating to lower-level managers all issues related to changes in the manufacturing process. When this unit head launched a new airport conveyor business, he was directly involved with the development of new engineering capabilities and led the coordination efforts with external partners. When asked about the process-related initiatives, he replied: "I realized that for manufacturing issues you should rely on the experts who are *in* the processes." Similarly, the top management of AUTO is directly involved in all new product/technology-related action plans to "drive the [corporate] business strategy into our manufacturing organization."

At the same time, the selective focus of bottom-up action plans on improvements in manufacturing and supply chain processes can be explained by lower-level managers' tacit knowledge in this area. For instance, the development of new products or technologies requires extensive expertise not only on manufacturing

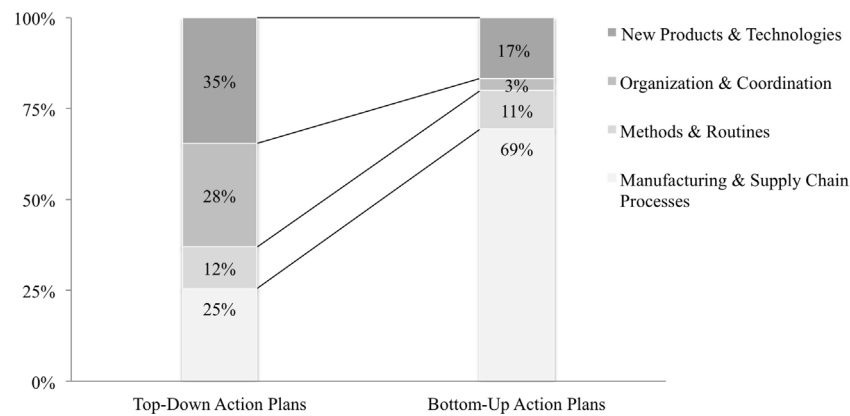


Fig. 4. The contents of top-down and bottom-up strategic action plans.

processes but also on market trends, customers, and competitors. Since their power to secure resources is relatively limited, lower-level managers eventually require top management's support for the success of any autonomous initiatives in the area of new product or technology development. In contrast, middle and even frontline managers can readily—and are often encouraged to—initiate process improvements that are based on their own tacit knowledge. Autonomous initiatives are undertaken by lower-level managers in part to advance their career prospects; hence they evaluate such initiatives in terms of the likelihood of success and thus tend to remain within their own areas of expertise. In turn, top management is more confident about betting on bottom-up action plans in those areas of operational practices and processes that are “owned” by lower-level managers. The top management of Auto elaborated on this point as follows: “[We] can only survive when we incorporate and implement all valuable ideas, and many outstanding ideas simply come from deep inside the plant, benefiting from the expertise that resides in our operational processes.” At Auto, such expertise helped solve the plant's long-standing problem of maintaining productivity and quality levels with an aging workforce. In particular, a quality control manager decided to experiment with various compositions of staff ages on an existing production line as a test of the productivity and quality performance of older workers. Relying on this manager's expertise, the unit head signed off on the experiment and provided resources that enabled its implementation as a high-priority initiative. This bottom-up action plan was instrumental in reaching the production line's quality goal (namely, no more than ten defective items per million produced) within three months, to achieve zero defects within a year, and to improve productivity by 7%. The top management of Auto then integrated the knowledge gained from this action plan into its guiding production principles and implemented the plan throughout its globally applied production system (Loch et al., 2010).

We can therefore summarize these results by stating that top-down and bottom-up action plans complement, rather than compete with, each other with regard to their strategic content. Top-down action plans are formulated to support top management's strategic intentions, and bottom-up action plans pursue diverse opportunities for improvement in the areas of operational practices and processes—which are important to top management but in the hindsight of its strategic focus.

6. Discussion

This study investigates the formation of operations strategy in practice and proposes an integrated process—encompassing both top-down and bottom-up procedures—based on analysis of the 111 (59 top-down and 52 bottom-up) action plans of six German

manufacturing plants. A bottom-up action plan is defined as an initiative by middle or frontline management irrespective of top management's *prior* intentions; a top-down action plan is one that is initiated or stipulated by top management. Investigating how these two types of action plans are formed in practice, and also how they interact with competitive priorities and objectives, allows us to augment Kim and Arnold's (1996) top-down framework by documenting action plans that emerge bottom-up.

As summarized in Table 2, our within-case analysis establishes that all six case organizations have, albeit in varying degrees, both top-down and bottom-up action plans. Top-down action plans are formulated and implemented to achieve specific objectives in a hierarchical planning process by which the operation's competitive priorities are defined in accordance with corporate strategy and then translated into performance targets. In contrast, bottom-up action plans emerge from autonomous initiatives in the exploratory process of lower-level managers' search for new opportunities. Of numerous initiatives, only those few with some value-generating potential are selected as high-priority action plans and subsequently integrated into top management's strategic intentions. Yet regardless of their origins, all action plans are evaluated based on their contributions to the organization's goals and objectives. Depending on the outcomes, top management may either reinforce or modify elements of its strategy, including objectives and competitive priorities. Operations strategy is thus formed through an iterative process of integrating competitive priorities, objectives, and action plans that are partly induced by top-down planning and partly emerge from bottom-up learning. This integrated process of operations strategy formation, as illustrated in Fig. 3, is summarized in the following proposition.

Proposition 1. Operations strategy formation is an iterative process of integrating competitive priorities, objectives, and action plans and encompasses top-down planning as well as bottom-up learning—of which the latter shapes, at least in part, top management's strategic intentions.

Although all six sample organizations incorporate both types of action plans, they showed varying proportions of top-down versus bottom-up plans. In order to identify the factors that led to these observed differences, we examined competitive priorities, organizational structure, and firm size (as measured by number of employees). The cross-case analysis indicated no systematic patterns in the proportions of top-down and bottom-up action plans with regard to competitive priorities and size, but it did indicate a notable difference between centralized and decentralized organizations: the latter adopted relatively more bottom-up plans than did the former. Our interviews with organization members at all three management levels (top, middle, and frontline) revealed that,

in decentralized firms, top management provides broad objectives but tends to delegate to lower-level managers a significant amount of decision making with respect to their actions. In centralized organizations, however, top management tends to specify goals and actions in as much detail as possible, leaving little discretion to lower-level managers. As a result, bottom-up action plans are more likely to arise within a decentralized organizational structure—where decision-making authority is distributed across organizational layers—than in a centralized structure characterized by concentrated decision-making authority. We state this result formally in our next proposition.

Proposition 2. A decentralized organizational structure encourages bottom-up action plans to a greater extent than does a centralized organizational structure.

Finally, we investigated the strategic content of top-down and bottom-up action plans and the extent to which they are consistent with the organization's competitive priorities. We first assessed how many top-down and bottom-up action plans were directly linked to a plant's first priority, or top management's strongest strategic intention. As shown in Fig. 2, more top-down than bottom-up action plans addressed the organization's first priority. When action plans were grouped into similar content categories, a noteworthy difference was evident in the strategic emphases of top-down versus bottom-up action plans: as shown in Fig. 4, top-down action plans focus mainly on new products and technology (35%) and somewhat less so on organization and coordination (28%). The result is in line with the first and the second priorities specified by our case organizations. Innovation in products or technology was the top priority of four plants (Auto, CONTROLLERS, MEDICAL, and GLASS), for which cost leadership was the second priority (see Table 2). This finding confirms that top-down action plans are formulated via a hierarchical planning process and reflect top management's strategic intentions with regard to the organization's competitive priorities.

In contrast, bottom-up action plans address manufacturing and supply chain processes (69%) much more than they do new products or technologies (17%). This selective focus of bottom-up action plans on process improvement can be explained by the tacit knowledge of lower-level managers in this area. The interviews indicated that such managers are frequently encouraged to undertake autonomous initiatives involving process improvements; however, they will likely face organizational constraints when seeking to initiate the development of new products or technologies without top management's support. Because the value-generating potential of their initiatives must be demonstrated by early successes, lower-level managers tend to propose action plans that lie within their domains of expertise. In this vein, top management relies on the operational expertise of middle and frontline managers and therefore tends to adopt bottom-up action plans in the areas of operational practices and processes. Thus, top-down and bottom-up action plans serve complementary roles in operations strategy. Whereas top-down plans are more likely formulated in line with top management's specified priorities and strategic intentions, bottom-up action plans tend to pursue diverse opportunities for improvement in operational practices and processes that are outside the main strategic focus of top management. These considerations lead to our final proposition as follows.

Proposition 3. Top-down action plans are more likely formulated to support the specified priorities, whereas bottom-up action plans tend to pursue diverse improvement opportunities in operational practices and processes beyond top management's current strategic focus.

7. Contributions and limitations

This study makes several contributions to the operations strategy literature. First, it fills a void in the research on operations strategy by investigating the formation process that governs interactions among competitive priorities, performance objectives, and action plans. This “micro-level” process of operations strategy formation has received scant attention whereas the “macro-level” formation process within an organizational hierarchy has been investigated by numerous studies (Barnes, 2002; Maruchek et al., 1990; Menda and Dilts, 1997; Schroeder et al., 1986; Skinner, 1969; Swamidass, 1986; Swamidass et al., 2001; Ward et al., 1996; Ward and Duray, 2000; Wheelwright, 1984). An important exception is the work of Kim and Arnold (1996), which grounds the process of operations strategy at the micro level and investigates the internal consistency of priorities, objectives, and action plans. However, that paper presupposes the dominant, top-down view of “formulation and implementation” in operations strategy and largely neglects bottom-up initiatives.

Our second contribution is thus to substantiate the bottom-up aspect of operations strategy formation by documenting and examining action plans that emerge via the autonomous initiatives of lower-level managers. Building on Kim and Arnold's top-down framework, we develop an integrated process model of operations strategy formation and thereby contribute to a mid-range extension of that theory. To the best of our knowledge, this study is the first attempt to integrate the top-down and bottom-up perspectives in the internal process of operations strategy formation.

Third, this research enhances the field's understanding of top-down and bottom-up processes by identifying a contingency factor—centralized versus decentralized organizational structure—that affects the relative extent of top-down planning and bottom-up learning within an organization. Finally, in this paper we investigate the strategic content of top-down and bottom-up action plans and develop novel insights into their complementary roles in operations strategy.

Our research also offers several managerial implications. First, our case studies demonstrate how bottom-up initiatives embody opportunities for improvement as well as for refining a plant's competitive priorities. Such opportunities would be omitted in a pure top-down formation process of operations strategy. For example, Drives' reprioritization of goals would not have happened without the unsolicited inputs from two line managers, and it offered a competitive advantage (speed) that the original strategy had not foreseen. Similarly, Auto's quality and productivity goals would have hardly been achieved by its aging workforce if the quality control manager's experiment would have been disapproved by top management. This value, once understood, can motivate senior managers to risk a perceived loss of control by opening up the strategy process to ideas from the bottom. Moreover, our results also suggest where the typical domains of bottom-up proposals may lie—practices and processes in operations and supply chain management.

Second, our results emphasize the importance of organizational structures that can facilitate or hinder “autonomous initiatives”. Employee-led initiatives do not happen in a vacuum, but rather in an environment where diverse ideas are valued and shared among organizational members. Thus, top managers should establish an organizational environment that encourages employees to try new ideas with regard to improving their work and that provides communication channels to share ideas with other members in the organization as well as across organizational hierarchy.

As is the case with most studies, ours also has limitations. The most obvious is that our sample, though heterogeneous in terms of industries and manufacturing processes, consists only of German plants. Generalizing the proposed model requires research that

compares and contrasts the related practices observed in various manufacturing organizations located in other countries. Moreover, even though our examining sets of current action plans has yielded useful insights into strategy formation by manufacturing organizations, the case studies we employ rely on cross-sectional data collected at a single point in time—a limitation due to the geographical and time constraints on our research. If the progress of autonomous initiatives were observed over time and from their inception, we could additionally collect information on the initiatives that were *not* selected as action plans and thus derive insights concerning why different initiatives become relatively more (or less) integrated into top management's strategic intentions. For these reasons, our study is suited more to building theory about the bottom-up process of operations strategy formation than to providing normative guidance regarding the relative effectiveness of various autonomous initiatives. Future studies would thus benefit from a longitudinal approach that follows the progress of strategic initiatives over time.

Appendix. Condensed interview protocol

A. Questions to top management

A.1 Operations strategy and competitive priorities

1. How would you summarize the strategy of your plant?
2. What are the competitive priorities of your plant and how do you rank them?
3. How was the strategy of your plant formed?
4. How would you characterize the plant's role in the corporate manufacturing network?
5. How is your plant's strategy related to corporate strategy?
6. How did the operations strategy evolve over time, and if so, why did it change?
7. How do you implement the operations strategy in the plant?

A.2 Strategic projects

1. What are the “strategic projects” [need to figure out company terminology] that are currently being implanted in the plant with top management support?
2. What are the goals of these strategic projects?
3. Who initiated the strategic projects and who is involved in developing these projects?
4. What is the content of the strategic project and how did that evolve?
5. How did these projects become “strategic projects”?
6. How did or will these strategic projects affect the plant's capabilities and strategy?

A.3 Centralization versus decentralization

1. What are your main decision areas?
2. What decision authorities have been delegated to middle and frontline management?
3. To what extent do you decide on the formulation of operations strategy and on the implementation of strategic projects?
4. To what extent do you empower lower level employees to pursue their own initiatives?

B. Questions to middle and frontline management

B.1 Operations strategy and competitive priorities

1. How would you summarize the strategy of your plant?
2. What are the competitive priorities of your plant and how would you rank them?

3. How does the operations strategy affect your organizational unit?
4. How would you characterize your organizational unit's role and function within the plant?
5. How does your organizational unit contribute to the plant's strategy?

B.2 Strategic projects

1. What are the “strategic projects” your organizational unit is currently involved with?
2. What are the goals of these strategic projects?
3. Who initiated these strategic projects and who is involved in developing these projects?
4. In which other strategic project were you involved? [Discuss remaining list of strategic projects.]
5. What is the content of the strategic projects and how did that evolve?
6. How did these projects become “strategic projects”?

B.3 Centralization versus decentralization

1. What are your main decision areas?
2. What decision authorities have been centralized at higher level management?
3. What decision authorities have been delegated to lower level management?
4. To what extent are you empowered to decide on the implementation of strategic projects?

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