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Harnessing the frontline employee sensing of capabilities for decision support☆

Carina Antonia Hallin [a,*], Torben Juul Andersen [a], Sigbjørn Tveterås [b]

[a] Copenhagen Business School, Department of International Economics and Management, Porcelænshaven 24A, 3rd floor, 2000 Frederiksberg, Denmark
[b] University of Stavanger, Department of Industrial Economics, Risk and Planning, 4036 Stavanger, Norway

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ABSTRACT

The ability to sense developments in operational (steady-state) and dynamic (growth) capabilities provides early signals about how the firm adapts its operations to ongoing changes in the environment. Frontline employees engage in the daily transactions and sense the firm's operating conditions and ability to deal with the environment that eventually will affect performance and strategic outcomes. The environmental sensing is a central cognitive feature and constitutes an information source for operations strategy decisions. Drawing on aggregated judgmental time-series forecasting techniques, this article develops a sensing instrument an *employee-sensed operational conduct* (ESOC) index for updated information as an essential decision support mechanism. This sensing capacity is firm-specific and difficult to replicate once in place and thus can provide a basis for sustainable competitive advantage.

1. Introduction

The management literature acknowledges that environmental scanning is important to inform decision makers about the changing context in which the firm operates (e.g., [2,3,5,10]). Sensing is an important cognitive element of dynamic capabilities [49,63,64] and efforts to scan emergent risks and opportunities before they fully evolve is important information for strategic decisions [7,11,18]. While strategy scholars engage to conceptualize the sensing construct (e.g., [31,34,63]) the empirical foundations and its relationship to firm performance have received little attention.

Operations strategy has considered how operating practices affect strategy [58] and how operational capabilities can explain competitive advantage [28,29]. Operational capabilities execute existing procedures to generate a profit where search routines of dynamic capabilities change existing routines or develop new ones [47]. Similar distinctions are made between steady-state capabilities and growth capabilities [61]. Hence, management scholars suggest different ways to categorize those capabilities typically distinguishing between operational and dynamic capabilities [30,32,69,70]. An operational capability enables the firm to perform specific activities drawing on existing techniques in support of current products and services [32,69]. In contrast, a dynamic capability enables a firm to change how it conducts its business [65]. Thus, the sensing of changes in operational and dynamic capabilities can provide essential information for strategic decisions where a method to collect and analyze this data can become an effective decision support system alongside other collective intelligence approaches [9,15].

Dynamic (manufacturing) capabilities are generally recognized as important sources of sustainable competitive advantage [29,61,65] because they develop in unique ways and are hard to imitate [32,59,72]. Despite this realization there has been little effort devoted to measure operational conduct as a function of supportive capabilities. To our awareness there are no prior attempts to develop an indicator of sensed adaptation in capabilities used to obtain early signals that can inform strategic decisions.

Developing new operations management (OM) practices is a way to adapt capabilities and achieve a better fit with the changing conditions [48] and a stream of research has examined the performance effect of these practices [68]. This study uses such insights to construe an index reflecting the effectiveness of operational and dynamic capabilities, which when fully operationalized is a low cost decision support system providing first-hand accurate information about a firm's operational conduct and performance.

Frontline employees involved in the daily operations are the first to note changes in operating practices, as they see directly what goes on in the organization and how the firm interacts with customers, suppliers, and other important stakeholders. Hence, this paper develops an index to evaluate firm capabilities and their adaptation to environmental change based on sensing information collected from frontline employees. It demonstrates how frontline sensing can be collected

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* Corresponding author.
E-mail address: cah.int@cbs.dk (C.A. Hallin).

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systematically to form an *employee-sensed operational conduct* (ESOC) index based on aggregated judgmental time-series forecasting as reliable predictive information for strategic decisions.

2. Theory and hypotheses

2.1. Capabilities and strategic adaptation

The operations management literature suggests that integration and best practices matter to business success [55] although manufacturing firms arguably suffer from an oversimplified view of the practice-performance link [58]. It calls for a more comprehensive view of the link between capabilities and strategic fit with the environment but there is surprisingly little empirical evidence specifying the effect of operating practices on performance [62]. The theoretical underpinnings of integration is rarely addressed directly [54] but rather highlight certain integration-related operations practices [16,20,24,54]. Hence, the decision support literature can gain further insights into how changes in firm capabilities will adapt operational practices and link to performance.

Adaptive organizational actions derive from interpretation of environmental information [17]. However, once action is taken, the environment is already changed again, thereby triggering ongoing cycles of information gathering, interpretation, and adaptation. In the microfoundations of dynamic capabilities these actions are framed by three sequential capacities for change: sensing, seizing, and reconfiguring [63]. Strategic reference point theory suggests that organizations able to adapt their resource deployment to obtain a better fit with the changing environment will outperform [3,23,37]. The implied adaptation process is a function of observance and understanding that informs the formation of effective responses by modifying and reconfiguring resources and capabilities [30].

The operations management literature pinpoints the importance of operating practices as a source of dynamic capabilities that allow the organization to respond to ongoing changes and adapt (e.g., [45,62,72]). The dynamic capabilities framework in strategic management [65] is consistent with the concept of core dynamic manufacturing capabilities in the operations management literature [72]. Like core dynamic manufacturing capabilities, dynamic capabilities embrace the firm's capacity to change the ecosystem it occupies, develop new products and processes, and modify existing business models [63]. Helfat and Winter [32] argue that dynamic capabilities enable a firm to change how it makes its living, whereas operational capabilities are routines for the status quo. However, they also argue that it is hard to distinguish between the two because many incremental changes in operating routines over time can add to a substantial dynamic change [32].

The operations management literature identifies operating practices [38,57,61] that affect operational conduct and adaptation. The capability framework proposed by Swink and Hegarty [61] incorporates growth capabilities that change the company and steady-state capabilities that represent current operational routines. Swink and Hegarty [61] refer to seven core capabilities of relevance to adaptive change: improvement, innovation, integration, acuity, control, agility, and responsiveness – all capabilities linked to firm performance. To exemplify the NUMMI plant, a joint venture between General Motors and Toyota, had excellent improvement capabilities as a result of worker motivation, learning, problem solving, waste reduction, and standardization [1]. Acuity refers to insights managers gain from operations and transactions that translate customer needs into better manufacturing specifications. Allegheny Ludlum Corporation, a specialty steel manufacturer, exemplifies superior acuity [39] developed through remodeling and experimentation. Processing data on productivity, utilization, yields, rejects, and variances coupled with an understanding of customer needs provided a basis for effective strategic responses that gave the company a clear advantage [61]. It is argued that a focus on common traits that identify specific capabilities should guide the development of proper measures [21]. So, characteristic artefacts can be collected from respondents to capture good self-reported capability measures.

2.2. The sensing of frontline employees

The sensing capacities of individuals are associated with updating of their mental schemas [6,31,34] as the environment changes. Sensing constitutes an important cognitive element of dynamic capabilities [49,63,64] and dynamic managerial capabilities [31]. Teece [63] argues that "while certain individuals in the enterprise may have the necessary cognitive and creative skills, the more desirable approach is to embed scanning, interpretative, and creative processes inside the enterprise itself." Pavlou and El Sawy [45] refer to these surveillance activities as the firm's sensing capacity, conceived as the ability to spot, interpret, and pursue opportunities that adapt the operational capabilities to accommodate changes in the environment.

A part of the strategic management literature indicates that employees below the top-management level have insights of strategic importance due to their interactions with relevant stakeholders (e.g., [12,67]). Particularly, frontline employees gain intimate knowledge about operational performance through the reactions observed among multiple stakeholders. Frontline employees are closest to serving the customers and hold an unfiltered view of stakeholder interaction [66]. They are important boundary spanning individuals with updated insights about changing conditions, stakeholder sentiments, and the quality of internal competencies (e.g., [67]). These insights provide an intuitive understanding of internal strengths and weaknesses and the ability to handle emergent risks and opportunities that cannot be accessed elsewhere in the organization.

Capabilities are shaped by firm-specific skills and processes used to manage operations and solve emerging issues by configuring resources in line with customer preferences as a source of competitive advantage [72]. They are developed through complex interactions within the firm's social structure, where the relevant knowledge is held collectively among many different individuals [72]. Hence, the cognitive interpretation among many organizational members constitutes a sensing capability of potential strategic significance [42,45]. Since frontline employees are involved in the daily operations, they sense the effectiveness of the firm's capabilities from personal hands-on experiences. The direct actions in operations and engagement with external and internal stakeholders make frontline employees the first to observe subtle changes that will affect how the firm operates and performs. Hence, we suggest that:

Hypothesis 1. Frontline employees can sense developments in operational and dynamic capabilities that are linked with future firm performance.

Winter [69] and Helfat et al. [30] argue that dynamic capabilities enable a firm to change existing routines and adapt organizational processes whereas operational capabilities retain and optimize existing routines. According to Helfat and Winter [32], "a dynamic capability is one that enables a firm to alter how it currently makes its living". Dynamic capabilities are constituted by resources and operational routines that transform existing processes into new configurations of resources and operational routines [14,65] that can provide better strategic fit. Hence, it can be argued that frontline sensing of dynamic capabilities, i.e., the firm's ability to adapt organizational processes to a changing environment, is a stronger predictor of firm performance compared to operational capabilities. This leads to the suggestion that:

Hypothesis 2.1. The sensing among frontline employees of developments in dynamic capabilities is a stronger predictor of firm performance than the sensing of developments in operational capabilities.

However, Helfat and Winter [32] also point out that it is difficult to distinguish between operational and dynamic capabilities, because

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