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Abstract

The literature suggests that important strategic initiatives can derive from employees within the organization as they respond to needs and opportunities observed in daily operations. This seems to indicate that employees have a good sense of the firm's operational capabilities observed through direct interactions with colleagues, customers and partners. Executives make their own judgments about the corporate capabilities from discussions with various managers, other executives and industry specialists. But, the information gathered by executives may be qualitatively different from the conditions sensed by the employees. So, we arranged a contest between operational capabilities assessed by employees and executives and the relationship to subsequent firm performance. Based on more than 400 individual data points collected from two medium-sized organizations over a period of eighteen months, advanced distributed lag time-series analyses show that the sensing of front-line employees (surprisingly) is a better medium-term predictor of organizational performance than executive judgments. These results have implications for the way organizations set up their management information and communication structure.

Keywords: dynamic capabilities, interactive management controls, operational capabilities, performance prediction, strategic response capabilities

INTRODUCTION

The literature describes how local operational knowledge held by individuals deep within the organization may inspire autonomous initiatives that can have significant strategic consequences for the firm (e.g., Burgelman, 1983, 1994; Burgelman & Grove, 1996; Mintzberg & Waters, 1985; Noda & Bower, 1996). Essential information about specific operational conditions is typically decentralized and held more economically among lower-level employees associated with the daily operations (Mintzberg, 1990). This is consistent with an information processing perspective suggesting that turbulent conditions require flexible organic forms where updated information is readily available to form adaptive responses to emerging changes (Galbraith, 1977; Thompson, 1967). The related autonomous decisions can assume a substantive in scale. Hence, it is found that up to half of all investments can be committed outside the strategic scope of executive management in the case of a large organization operating in a dynamic industry (Burgelman & Grove, 2007). In other words, the decentralized knowledge may represent unique insights at the forefront of emerging developments and it can be of strategic significance to the firm. Accordingly, Grove (1996: 22–23) argues that: "we need to expose ourselves to lower-level employees, who, when encouraged, will tell us a lot that we need to know … the leader is often the last of all to know". However, these somewhat appealing claims have never been formally tested and we do not really know whether employee insights on specific parameters in the operating environment are reliable and have potential predictive value. The interpretation of local conditions could be biased and of such a tacit nature that it is difficult to interpret meaningfully. Therefore, we present (to our knowledge) the first systematic field study conducted to ascertain the potential usefulness of operational knowledge held by employees as predictor of organizational performance.

We specifically examine the extent to which knowledge about operational conditions gathered from frontline employees directly involved with different stakeholders can generate accurate short- to medium-term performance predictions. Hence, both employees and executive managers of two medium-sized organizations in the dynamic hospitality industry submitted updated monthly assessments of essential operational parameters based on their intuitive judgment of prevailing conditions. The monthly data form a time series of indices reflecting individual judgments about the organization's operating capabilities. Using the lagged values of these indices as predictors in regressions against actual performance data shows that frontline employees provide significantly better predictions of medium-term performance than do the executive managers.

THEORETICAL BACKGROUND AND HYPOTHESES

The Importance of Locally Held Knowledge

It is argued that the detailed locally held knowledge is important to make innovative opportunistic decisions (Teece, 2007). This is supported by an economic logic as we "need decentralization because only thus can we insure that the knowledge of the particular circumstances of time and place will be promptly used" (Hayek, 1945: 84). That is, organizations need important local knowledge to make effective decisions. The strategy literature shows how locally held knowledge can inspire autonomous actions initiated by individuals deep within the organization that generate important strategic options for the firm (Burgelman, 1983, 1994; Mintzberg & Waters, 1985; Mintzberg, 1990). Hence, lower-level employees may have superior knowledge about essential business conditions of strategic interest where the specificity of such knowledge makes centralization difficult and costly (e.g., Mintzberg, 1990: 190).

The executive role is typically perceived as that of a centralized analytics-based strategic decision-maker (e.g., Boyd & Reunning-Elliott, 1998; Lorange, Norton, & Ghoshal, 1986; Schendel

& Hofer, 1979). Ongoing management reporting and predictions about expected outcomes is central to this executive role where management can take corrective measures and revise the planned actions (Goold & Quinn, 1990; Simons, 1991, 1994). This view ascribes to the ideals of rational decision-making (e.g., Ansoff, 1965; Drucker, 1967; Simon et al., 1987). The implied adaptive capacity of the firm is expressed in contemporary concepts like strategic renewal and dynamic managerial capabilities (e.g., Agarwal & Helfat, 2009; Helfat et al., 2007; Teece, 2007). Yet, there is little concrete advice about the type of information managers need to inform adaptive decisions and the potential importance of specific local operational knowledge. Based on ideas about dispersed decision power, autonomous initiatives, peripheral visioning and sensing (Bower, 1970; Burgelman, 1983; Day & Schoemaker, 2006; Mintzberg, 1978, 1994; Teece, 2007) we suggest that frontline employees can have valuable insights to inform the firm's adaptive moves.

The strategic decision-making process includes procedures to gather information and perform forecasts that allow timely revisions of short-term action plans (e.g., Boyd & Reuning-Elliott, 1998; Grant & King, 1982). For this purpose, Simons (1991, 1994) proposed that so-called interactive management control systems could guide responsive executive decisions. A control system is interactive when: (1) it is addressed regularly by the highest management level, (2) it receives regular attention from operating managers across the organization, (3) it informs face-to-face discussions between superiors and subordinates; and (4) it leads to continual debate (Simons, 1991). This way, top management is updated on operational experiences from lower-level employees as they deal with daily business challenges.

Hence, Burgelman (1996) describes strategy evolution as the managerial redirection of resources toward viable business opportunities that are (in)-formed by initiatives from autonomous individuals within the organization. As Grove (1996: 128) notes: "the process of adapting to change starts with the employees, who through their daily work, adjust to the new outside forces." In other

words, frontline employees respond to evolving business challenges and gain updated knowledge as they observe the effects of their actions. So, emerging environmental challenges and related incremental changes in conduct are initially observed by organizational actors that are close to the operational actions. As the frontline employees engage in business execution they gain detailed insights about changing conditions, stakeholder sentiments, and the quality of internal competencies in dealing with those changes. This can provide an intuitive understanding of emerging threats and opportunities that cannot be accessed elsewhere in the organization. From this it follows that decentralized organizations, where local operating actors have greater autonomy and are given some leeway to take responsive actions, are more observant and less likely to be blindsided to change (Teece, Pisano & Shuen, 1997).

The Sensing and Capture of Local Information

The observance of changes in business conditions is considered an important element of an organization's ability to orchestrate resources, reorganize, and adapt (Teece et al., 1997). Here observance is essentially conceived as environmental scanning (Peteraf & Bergen, 2003) and the sensing of employees (Teece, 2009). Hence, dynamic capabilities depend on scanning, interpreting, and learning from individual entrepreneurial responses and development activities (Teece, 2009: 9). Information and sense making about new technologies, customer needs, competitive moves, and so forth are important for organizational decision-makers (Teece, 2007). But, the new important insights residing at lower organizational levels might be unreliable, biased, tacit and intuitive. Hence, it poses a management challenge to convert individual sensing capabilities into useable organizational information for relevant decision-making.

The individual intuitive sensing makes it possible for a person to know more than he or she can immediately express in words. Much of the tacit insights come from individual observations

and experiential outcomes. In the words of Polanyi (1966: 16): "our body is the ultimate instrument of all our external knowledge, whether intellectual or practical." Hence, the ability to create new knowledge stems from conversions between tacit and explicit knowledge over time. As Nonaka and Takeuchi (1995: 60) explain: "knowledge of experience tends to be tacit, physical, and subjective … tacit knowledge is created 'here and now' in a specific, practical context." So, new insights are shaped through experimentation and hands-on learning where tacit knowledge is converted into explicit knowledge through articulation that can be communicated (Håkanson, 2007). That is, the sensing from day-to-day activities of frontline employees provides new experiential insights and knowledge that can be captured in explicit form. When employees perform assigned tasks they accumulate knowledge about factors that challenge the operating capabilities of the organization. These insights derive from observing the effects of attempted solutions and hands-on interactions with various stakeholders (Burke & Sadler-Smith, 2006). The resulting experiences reflect the application of embedded capabilities in dealing with the demands imposed by various counterparts. Hence, it provides essential information about the firm's response capabilities that may affect future performance outcomes. This can be expressed formally as:

$$Firm\ performance_t = \sum w_{i,\,t\text{-}n}\,(factors_{i,\,t\text{-}n}) \qquad (1)$$

That is, firm performance at time *t* is a function of the assessed qualitative level of essential operational factors as judged by frontline employees and executive managers at time *t-n* weighted by the relative importance of these factors (w_i). Hence, the factor weights can change over time and the individuals may be unable to perceive their importance.

The Importance of Sensing Operational Capabilities

Some scholars distinguish between operational and dynamic capabilities and observe that the latter govern the rate of change in operational capabilities and constitute a higher order construct of complex multidimensional meta-capabilities (Collis, 1994; Winter, 2003; Zahra & George, 2002; Zahra, Sapienza, & Davidsson, 2006). Operational capabilities have been conceived as "how you earn your living" (Zollo & Winter, 2002) and dynamic capabilities as "how you change your operational routines" (Helfat & Peteraf, 2003; Winter, 2003). However, the distinction between dynamic and operational capabilities is rather blurred and the aggregation of incremental changes in operational routines over time effectively amounts to a dynamic capability effect (Helfat & Winter, 2011). Therefore, sensing the ability to apply the operational capabilities against changing conditions and requirements can provide information about the organization's adaptive capacity. Hence, the sensing of the organization's ability to deal with new problems, foster innovative solutions, and create effective responses can give important indications about the capacity to apply operational capabilities in ongoing adaptive moves.

The ability to restructure resources and adapt organizational activities relies on the firm's operational capabilities and their effectiveness compared to close competitors in the industry. Hence, comparing to peers and appraising comparable firms can give important inputs when existing organizational capabilities are assessed (Protogerou, Caloghirou, & Lioukas, 2011). For example, employee sensing of good customer service can be compared against industry peers as it affects the perceived prestige and status of their job. Operational capabilities can also be related to effective coordination of cross-functional teams as market services and technological deliveries are transformed (Protogerou et al., 2011). The employee sensing of opportunities for advancement, job satisfaction, expectations of rewards, and the need to look for other employment say something about the relative effectiveness of the firm's operational capabilities. Hence, these variables can inform about different aspects of the firm's operational capabilities.

Conceptual Model and Hypotheses

We capture the theoretical considerations in a sequential model showing the link between employee sensing and firm performance through expectations about operational capabilities as predictors of future firm performance (Figure 1). The employees' sensing of operational capabilities forms intuitions about their ability to deal with ongoing challenges that in turn will affect the future business conduct of the firm. The assessment of the firm's operating environment is based on observations and experiential insights gained by individual members of the organization over time. As Weick (1979: 228) explains, "the environment is viewed … on the basis of enactments and interpretations people construct." As organizational members engage in everyday work activities, they perceive patterns in previous events to create meaning and use these cognitive abilities to focus on the future (Hurst, Rush & White, 1989). Hence, intuitive assessments about firm capabilities derive from tacit knowledge that is affected by past experiences (Hurst et al., 1989; Reber, 1989; Shirley & Langan-Fox, 1996).

- Insert Figure 1 about here -

The knowledge absorbed through environmental sensing by individuals located at different hierarchical levels in the organization is likely to differ. Top managers are in touch with other executives and professional communities related to the industry, as well as with a variety of stakeholders in the wider society. In contrast, frontline employees receive information and signals about the state of business through daily social interactions with diverse stakeholders including customers, suppliers, partners, managers, colleagues, and functional specialists. This enables lower-level employees to assess changes in different aspects of the operational capabilities that may predict future firm performance.

In addition to insights about needs, wishes, satisfaction, disappointments, etc. of external stakeholders, the employees also acquire local knowledge about the effectiveness of the firm's operational capabilities. Hence, the employees can, for example, assess the ability to innovate, finding good solutions to new problems, developing and implementing new services, systems, and processes that satisfy emerging requirements.

Hypothesis 1: *Frontline employees engage in environmental sensing that form expectations about (specific) operational capabilities that, in turn, affect future firm performance*.

Management thinkers and theorists have argued that dispersed local knowledge can be of supreme importance to central strategic decision-makers. In Hayek's (1945) words, such information is "knowledge about the particular circumstances of time and place." This type of fleeting, hard-to-codify insight acquired by those engaged in the midst of things may add important strategic insights not otherwise available to top management. Thus the environmental sensing of frontline employees can generate unique information about the qualitative developments in the firm's operational capabilities. However, the management literature often implies that senior managers, due to their intimate knowledge of the organization, are in a superior position to assess firm capabilities and the related performance effects (e.g., Dess & Robinson, 1984; Hambrick, Geletkanycz & Fredrickson, 1993; Powell, 1992). The management accounting literature likewise suggests that forecasts from internal financial models establish good predictions of firm performance. These relationships represent competing interpretations that we can try out empirically in a competitive contest to determine whether the environmental sensing of frontline employees is, in fact, anything more than a neat idea.

Hypothesis 2a: *The expectations about operational capabilities sensed by frontline employees are better predictors of future firm performance than the judgment of executive managers.*

Hypotheses 2b*: The expectations about operational capabilities sensed by frontline employees are better predictors of future firm performance than the financial forecasts.*

These hypotheses imply that knowledge gathered from localized "sensing" by frontline employees is useful and provides information above and beyond what is otherwise available to senior management. While we do have impressive case-based evidence (Burgelman, 1983, 1996, 2002, 2005; Burgelman & Grove, 2007) to demonstrate the importance of observations made by lower-level employees, we are not aware of attempts to systematically address the potential value of dispersed environmental sensing in a quantitative empirical study. There is little concrete evidence about the extent to which knowledge about key operational capabilities residing at lower levels in the organization is accurate and whether it can be meaningfully used in ongoing decision-making at higher management levels. For example, local sensing may be unarticulated and too difficult to meaningfully explicate. Therefore, the following presents an empirical study devised to establish the initial testing ground for the hypotheses.

DATA AND METHOD

Research Design

The study was designed as parallel survey observations that would generate monthly time-series data over an 18-month period in 2006-7. The study was initially conducted in three Scandinavian hotel units of international hotel chains (two four-star hotels in Norway and a five-star hotel in Denmark), but the final data sample was from two hotels[1] (one in Norway and one in Denmark) throughout the full period.

[1] Early in the data sampling period, the management team of one of the Norwegian hotels unexpectedly introduced a dynamic pricing model, which obscured estimates of the relative performance measure for this hotel. According to the dynamic pricing model, room rates reflect changes in market prices adjusted day to day or even hour to hour, based on automated RateView and Hotelligence quotes. For this reason, we omitted this hotel from our final analysis.

Since the hospitality sector is considered to be a dynamic industry that is exposed to international competition (Baum & Ingram, 1998; Ingram & Baum, 2001), it is an appropriate context for studying the predictability of strategic performance outcomes. The focus on a single industry and homogenous companies in terms of national (cultural) surroundings (Norway and Denmark) and organizational size reduces the potential for confounding effects that can be caused by varying industry contexts or differences in national regulatory, legal, and economic infrastructures.

The degree of information transmission between employees and management in hotels depends on their size (Mercader, Meroño Cerdán, & Sabater Sánchez, 2006) but four- and five-star hotels in Scandinavia operate under quite similar hierarchical structures compared to lower-scale hotels. The two hotels included in the sample have 120 and 125 (full- and part-time) employees, respectively, and are medium-sized business units according to the SME definition adopted by the European Commission. Thus, we believe that our sample is fairly balanced and provides a good basis for studying employee sensing effects of changes in operational capabilities.

Survey observations were obtained from frontline employees as well as executives, directors, and managers in two comparable surveys: the *Employee Strategic Sensing Survey* and the *Executive Employee Strategic Sensing Survey*. These surveys collect individual assessments on key indicators construed to capture employees' intuitive predictions about changes in operational capabilities with a 12-month forecasting horizon.

In constructing the survey measures (to be observed in time series), a literature review was conducted on reflective versus formative measures. In recent years, the management literature has facilitated a debate on the use of reflective versus formative measures. Formative measurements are increasingly considered a viable alternative to reflective measurement in theory development (e.g.,

Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Podsakoff, Shen, & Podsakoff, 2006). In a formative measurement approach, the numbers of indicators (independent variables) form a construct (an index) without any theoretical assumptions about the patterns of inter-correlations between the items. In reflective measurement models, causality flows from the latent construct to the independent variables, while the causality of formative measures flows in the opposite direction from the indicator to the construct (Diamantopoulos & Winklhofer, 2001; Edwards & Bagozzi, 2000). Formative measures typically assess one or more latent variables, as opposed to reflective indicators that are common in most organizational research (Bagozzi, 1994; MacCallum & Browne, 1993). Diamantopoulos (2011: 336) contends that the formative constructs themselves are not *inherently* formative versus reflective. The choice of formative versus reflective measures relates to the auxiliary theory (Bagozzi, 1982; Blalock, 1968; Costner, 1969). Bagozzi (1994) asserts that formative measures are particularly relevant for evaluating organizational and social constructs when the unit of analysis is a firm or group, or when converting measures into prediction indices (e.g., Johnston, 1988; Katona, 1951, 1960).

When choosing our measurement approach, we took into consideration the exploratory nature and purpose of this study, which was namely to test the performance of our survey items in a prediction index that aims to capture as much variation in firm performance as possible. Consequently, we decided to rely on formative measures to test the empirical model, but to perform a principal component analysis – holding the time constant – to determine the number of possible latent variables of the construct "employee sensing of operational capabilities."

The study examines the external validity[2] of employee predictions about the future in consecutive time series. We performed a prediction contest by comparing the Employee Strategic Sensing Index (ESSI) to (1) executives' expectations of comparable operational capability variables

[2] In the case of formative measures, external validity becomes the focal point (Bagozzi, 1994; Diamantopoulos & Siquaw, 2006; Diamantopoulos & Winklhofer, 2001).

using the Executive Strategic Sensing Index (EXESSI) and (2) management's financial forecasts based on historical reservation data and future market stipulations.

Participants and Procedures

The operational capability indicators of the *Employee Strategic Sensing Surveys* were monitored electronically from February 2006 to September 2007; they generated 33 monthly observations and 347 completed surveys from the two hotels. In order to take shifting work hours into account, we used a longer data-sampling period, between the 10th and the 16th of each month, to reach all frontline employees. Therefore, the pool of frontline employees changed somewhat between observations. Each month, a survey link was sent to department managers, who then forwarded the link to all frontline employees except newly hired staff. Frontline employees included all hospitality associates from all kinds of front office stations, restaurants, show kitchens, housekeeping, conference, banquet, and sales departments. The response rate each month varied over time and by hotel (within a range of 10-50%). This was partially influenced by the turnover rate among hospitality employees, the seasonality of the workload, occasional busy periods, and the relative ease of email access. However, the external validity of the results does not depend on the response rate, as all frontline employees in the sample are considered experts, even though a rate of high participation is desirable. The characteristics of the respondents and distribution of frontline employees by departments are reported in Tables 1 and 2.

- Insert Table 1 about here -

- Insert Table 2 about here -

A similar survey was devised for hotel executives, directors, and managers. This survey period started after the completion of a 6-month trial period for the frontline employees, thus there were fewer observations in the executive sample. The survey indicators from the two hotels were

monitored monthly from September 2006 to September 2007 and yielded a total of 19 monthly observations from 84 completed surveys. The sample included hotel chief executive officers; directors of human resources, operations, sales, and revenue strategy; restaurant managers and executive chefs; and guest service, front office, and housekeeping managers. The electronic data collection was obtained directly from the individuals' email accounts. A survey link was sent every month, although not to new (hired within the last month) executives and managers. The characteristics of the executives and managers are reported in Table 3.

- Insert Table 3 about here -

Measures

Performance. The common performance indicators in the hotel industry are the occupancy rate (share of rooms sold) (Berger, 1997; Jeffrey & Barden, 2000) and the revenue per available room (REVPAR) (Enz, Canina, & Walsh, 2001). REVPAR reflects the average revenue per available room (Wu, Hsaio, & Tsai, 2008) and is calculated as the product of the room occupancy rate and the average daily room rate. It increases when either the occupancy rates or the room rates increase, *ceteris paribus*. Because it standardizes earnings on a per-room basis, REVPAR makes it easy to compare hotel performance across competing operations in the industry. We use a comparative performance measure ($Pfm_{i,t}$) for hotel or firm i at time t, where the firm is benchmarked against the average performance of other firms in the industry. The measure is calculated by taking the difference between the hotel's return and the average return in the (local) hotel industry:

$$Pfm_{i,t} = \Delta\ln(R_{firm})_{i,t} - \Delta\ln(R_{industry})_{i,t} \qquad (1)$$

R_{firm} and $R_{industry}$ are the REVPAR for the hotel and the aggregate hotel industry, respectively. Change from period to period is represented by Δ, so that $\Delta\ln(R_{firm})_{i,t} = \ln(R_{firm})_{i,t} - \ln(R_{firm})_{i,t-1}$. Taking the first difference usually removes deterministic and stochastic trends from the

variable and transforms it into a stationary time series. Moreover, taking the first difference of the logarithm of a variable corresponds approximately to the percentage change of that variable from one period to the next. As a result, $\Delta\ln(R_{firm})_{i,t}$ and $\Delta\ln(R_{industry})_{i,t}$ can be viewed as the firm-specific and industry-wide returns expressed as percentages. REVPAR only accounts for revenues and not costs. However, since the hospitality or lodging business is characterized by large fixed costs and modest variable costs, most variations in returns are caused by variations in revenue. That is, $Pfm_{i,t}$ captures the excess hotel returns compared to the industry average.

The measure of $Pfm_{i,t}$ to a large degree filters out the effects of market developments in the hotel industry, such as aggregate room capacity changes, economic upturns or downturns, seasonality, and other common factors – so only hotel-specific variations in returns remain. As a result, the sensing of operational capabilities is used to predict whether a hotel is performing better or worse than the competition in the industry.

A strong correlation between a hotel and the competition obviously provides less variation to explain. The correlations between R_{firm} and $R_{industry}$ for hotels 1 and 2 in this study are 0.94 and 0.86, respectively, which means that there is comparatively less variation in $Pfm_{i,t}$ to predict in the case of hotel 1.

Predictors. We based the development of relevant sensing indicators for operational capabilities on conversations with leading hotel experts including hotel executives, frontline employees, and academics in Asia and Europe. We also conducted pre-tests on initial indicators with five hotel executives and ten frontline employees in Scandinavia. The refined indicators were presented and discussed with academics at conferences in Australia, Sweden, and Portugal and obtained further face validation through conversations with different hospitality experts. The operational capability indicators assembled from these efforts, regarding the daily work conditions that circumscribe the operating environment of frontline employees, are shown in Table 4.

- Insert Table 4 about here -

A principal component analysis (PCA) was performed using SPSS version 18 on the 18 months of data collected from the two hotels, keeping the time constant, to indicate any latent variables of the index. The PCA was conducted on the 13 ESSI items with varimax, which enhanced independency across factors. The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO = 0.86, which is "great" according to Field (2009), and all KMO values for individual items were above 0.82, thus exceeding the acceptable limit of 0.5 (Field, 2009). Barlett's test of sphericity, χ^2 (78) = 1265.064 ($p < 0.001$), indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues in accordance with Kaiser's criterion of above 1 (5.149; 1.421; 1.096) and in combination explained 59% of the variance. The scree plot was slightly ambiguous but showed inflexions that justified retaining components 1, 2, and 3. Therefore, we retained three operational capability components as latent constructs in the index. The indicator clusters suggest that component 1 represents "operational competencies" (OPCOMP) with four indicators, component 2 may be interpreted as "operational coordination" (OPCOOR) with five indicators, and component 3 represents "operational job attractiveness" (OPJOBAT) based on four indicators. See Appendix A for a complete list of the 13 ESSI indicators and related factor components.

A reliability test was performed on the three components. "Operational competencies" and "operational job attractiveness" had high reliabilities, with a Cronbach's α of 0.73 and 0.74, respectively. However, "operational coordination" had an unacceptable Cronbach's α of 0.46 due to a negative average covariance among items caused by the inverse scale on ESSI indicator 13. A test of the reliability of the construct that omitted indicator 13 yielded a Cronbach's α of 0.83.

The ESSI and EXESSI largely follow the structure and computation of the index of consumer sentiment (Curtin, Presser, & Singer, 2000; Katona, 1960). We first constructed a diffusion measure (X_{it}) for each of the 13 indicators. The X_{it} for item i at time period t was calculated as the difference between the number of positive and negative responses in each time period (month) divided by the total number of responses in that period (month), plus 100. When the positive responses outnumber the negative ones, the diffusion measure shows a number larger than 100, and in the opposite case, it is less than 100.

$$X_{it} = \frac{(\textit{No. of positive responses}_{it} - \textit{no. of negative responses}_{it})}{\textit{Total no. of responses}_{it}} + 100 \qquad (2)$$

The ESSI and EXESSI were then calculated by aggregating the 13 diffusion measures for each period and dividing by the sum of the base period:

$$ESSI_t = \frac{\sum_{i=1}^{13} X_{it}}{\sum_{i=1}^{13} X_{i0}} \times 100 \qquad (3)$$

Following convention, we multiplied by 100 to get the usual representation of an index, with the base period equal to 100. Using this computation, an ESSI value greater than 100 indicates that frontline employees are confident about the future of the hotel's operational capabilities, relative to the base period, while an ESSI value less than 100 indicates that employees are less confident about the future state of the business.

Validity and Reliability

The validity and reliability of formative time-series measures have received little attention compared to reflective measures that are derived from cross-sectional and longitudinal datasets. Formative time-series data typically involve non-personal variables – such as sales, advertising, and

expenditures – that are less subject to limitations of measurement (Didow & Franke, 1984). Although guidelines for constructing formative indicators are hard to find, Diamantopoulos and Winklhofer (2001) emphasize the importance of content specification and external validity based on an extensive literature review.

Content specification is concerned with capturing sources that tap into the forecasting task in fairly broad terms to reach all the important indicators. As argued by Nunnally and Bernstein (1994), "breadth of definition is extremely important to causal indicators," and failure to consider all aspects of the construct can lead to omitting relevant indicators. Our interviews with hotel industry experts sought to capture a broad range of central aspects concerning the frontline employees' perceptions of their daily work situation and operational performance. The specific indicators we developed for the study emerged from further extensive conversations with experienced hospitality researchers, who helped assure us that the indicators reflect important aspects of operational capabilities. The PCA indicated three diverse index constructs of employees' sensing of operational capabilities; thus we are satisfied that we have captured a sufficient level of diversity in the construct.

The external validity of formative measurement models is relevant for assessing the suitability of indicators. Bagozzi (1994) notes that the "best we can do … is to examine how well the index relates to measures of other variables." Hence, the ESSI was validated against EXESSI and REVPAR budget forecasts received from hotel management. The performance forecast ($Pfm^{forecast}$) is based on the hotel's own budget forecasts, provided by the revenue managers. Hence, we used EXESSI and the monthly REVPAR budgets for the two hotels to validate ESSI and assess employees' forecasting performance of changes in operational capabilities in a "prediction contest."

EMPIRICAL MODELS

We use single-equation distributed lag models to evaluate ESSI and EXESSI as performance predictors for each of the two time-series (hotels) using Granger causality tests. We test this individually for both hotels and compare the results to the predictive capacity of financial forecasts. Subsequently, we aggregate the two cases as unbalanced panel data to further assess whether the two indexes (ESSI and EXESSI) contain predictive information across the full sample.

Estimation of Forecasting Models

We adopt parsimonious specified distributed lag (DL) models, in which the data are entered in first difference form as stationary time series. The DL estimated by OLS should yield unbiased coefficients, because ESSI is based on items that are unrelated to room and occupancy rates. Moreover, since monthly variation in REVPAR has been filtered out in the performance measure, *Pfm*, less variation should be required to account for the remaining variation. Therefore, there is less chance of omitted variable bias. The models are specified as follows:

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_{i,j} \Delta \ln ESSI_{i,t-j} + u_{i,t}, \quad (4)$$

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_{i,j} \Delta \ln EXESSI_{i,t-j} + u_{i,t} \quad (5)$$

$Pfm_{i,t}$ is the performance measure introduced in equation 1 for hotel i at time t. $ESSI_{it-j}$ is the ESSI index based on frontline personnel responses in period $t - j$, where j is the forecasting horizon; $\delta_{i,i}$ are parameters to be estimated and $u_{i,t}$ is a white-noise error term. We use a general to specific modeling strategy, where lag length is reduced until it reaches the highest significant lag.

The panel data models follow the formulation of equations 4 and 5 above. However, in the fixed-effects panel data model, the two hotel cases are estimated simultaneously and the parameter δ is constrained to be identical across the two equations. Thus, the subscript i that identifies the hotel cases is removed from δ in models 6 and 7:

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_j \Delta \ln ESSI_{i,t-j} + u_{i,t}, \quad (6)$$

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_j \Delta \ln EXESSI_{i,t-j} + u_{i,t} \quad (7)$$

We also tested the three latent variables (OPCOMP, OPCOOR, and OPJOBAT) in a prediction contest. They are constructed in the same way as ESSI, but consist of a subset of the 13 items used for ESSI as described in Appendix A.

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_j \Delta \ln OPCOMP_{i,t-j} + u_{i,t}, \quad (8)$$

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_j \Delta \ln OPCOORD_{i,t-j} + u_{i,t}, \quad (9)$$

$$Pfm_{i,t} = \sum_{j=1}^{q} \delta_j \Delta \ln OPJOBAT_{i,t-j} + u_{i,t} \quad (10)$$

These three latent variables helped validate the usefulness of the ESSI construct. In practice, they are sub-indices of ESSI and, consequently, if any of them outperforms ESSI that would indicate that the ESSI construct is sub-optimal – or worse – not relevant. We now turn to the empirical results for the two hotels in the sample.

RESULTS

Prediction Power of Employee Sensing of Changes in Operational Capabilities

We set out to examine the 13 ESSI items individually to assess their ability to predict future firm performance, and to assess employees' ability to predict specific operational capabilities that are relevant to firm performance. Table 5 shows the predictive effects for each of the 13 ESSI indictors; four items in particular demonstrate a significant forecasting ability with a two-period lag. These indicators reflect employees' sensing about the hotel's ability to develop new services,

systems, and processes over the next 12 months; to solve managerial and work related problems effectively; and to create prospects for higher employment positions. These indicators relate to the hotels' specific operational capabilities. This result provides support for Hypothesis 1: *Frontline employees engage in environmental sensing that can foresee changes in (specific) operational capabilities that, in turn, predict medium-term firm performance.*

- Insert Table 5 about here -

Prediction Contest Between ESSI, EXESSI and Financial Forecasts

We now turn to a prediction contest between ESSI and EXESSI. A correlation analysis of the coefficients between ESSI and EXESSI yields a correlation for hotel 1 of $r = 0.3144$ and for hotel 2 of $r = -0.3578$. This indicates that the responses of executives and frontline employees in almost identical surveys differ substantially, since employees and executives appear to display different – and, for case 2, directly opposing – assessments of internal conditions.

Table 6 shows the estimation of single-equation DL models for the two individual hotels. DL models are estimated using current and lagged values of ESSI and EXESSI, as predictors of company performance (*Pfm*). We use a general-to-specific modeling approach that starts with a generously specified model and then proceeds to more parsimonious model specifications based on the elimination of variables (or, more precisely, lagged values of variables) that are not significant. Whereas Table 6 only reports DL models with two lags, DL models with as many as six lags have been estimated. Since significant variable coefficients only start to appear from the second lag, we have not reported models with higher-level lags. The estimations for hotels 1 and 2 are statistically significant. These findings provide additional support that environmental sensing by frontline employees can predict medium-term firm performance.

- Insert Table 6 about here -

Table 7 has two purposes: (1) to validate the usefulness of ESSI by comparing its performance with the latent variables OPCOMP, OPCOOR, and OPJOBAT in predicting firm performance (*Pfm*); and (2) to pit the judgments of executives against those of frontline employees in a prediction contest of firm performance (*Pfm*), which is represented by a prediction contest between ESSI and EXESSI. With respect to the first purpose, the estimation results in Table 7 show that ESSI, OPCOMP, OPCOOR, and OPJOBAT all have a significant second lag. However, the parameter for the second lag is more significant in the model with ESSI than for the three latent variables. Moreover, R^2 is highest for the model with ESSI. This suggests that aggregating the 13 items as a formative measure improves ESSI's usefulness as an indicator variable, compared to the reflective measures represented by the factor components OPCOMP, OPCOOR, and OPJOBAT. Next follows the competition contest between executives and frontline employees.

The contest took place in two rounds. First, ESSI and EXESSI were used to predict performance similar to that in Table 6. The only difference was that a fixed-effect panel data model was used to estimate the two cases instead of estimating them separately as single equations. This change increases the degree of freedom available for estimation and presents one model for both hotels, thus leading to less ambiguous results. Second, we also tested how ESSI and EXESSI performed in relation to the hotels' existing forecasting systems. The hotels' revenue forecasts are typically generated using historical booking data that is modified by managerial judgments based on special knowledge about conferences, economic downturns, etc. We used these forecasts to construct a new variable for forecast error (FE), calculated as FE = $Pfm - Pfm^{forecast}$, which tested whether ESSI and EXESSI can predict variations in *Pfm* that are not accounted for by the firm's own management forecasts, $Pfm^{forecast}$.

- Insert Table 7 about here -

When predicting *Pfm*, each of the models with ESSI and EXESSI has significant second lags. The second lag of ESSI is significant at the 1% level, compared to EXESSI's, which is only significant at the 10% level. Thus, of the executive and employee indicator variables, ESSI appears to be the stronger predictor of *Pfm*. This provides support for Hypothesis 2a: *The changes in operational capabilities foreseen by frontline employees are stronger predictors of medium-term firm performance than the expectations of executive managers.* The results in Table 7 show that ESSI can predict the residual variation in the performance measure, whereas hotel management is unable to foresee FE. This finding suggests that ESSI captures unique information beyond the financial forecasts available to the hotel management, which can be strategically important to the enterprise. This provides support for Hypothesis 2b: *The changes in operational capabilities foreseen by frontline employees can predict unexplained errors in the financial forecasts on firm performance.* We now turn to a discussion of the empirical results.

DISCUSSION AND CONCLUSION

The importance of devising mechanisms that can aggregate locally held knowledge for the purposes of decision-making and adaptive planning has long been stressed in social science (e.g., Hayek, 1945; Teece, 2007). A major finding in this paper is that employee sensing of changes in important aspects of operational capabilities, as aggregated by ESSI, has a significant short- to medium-term predictive power on firm performance. The main findings of the paper thus point to ESSI as a potential new mechanism for capturing employees' locally held knowledge, which can be of strategic value for managerial decision-making purposes. We believe these findings provide strong and consistent support for our theoretical expectations. The consistency of the ESSI results across two different organizations (data time-series) illustrates the robustness of the methodology.

The Important Role of Employees' Environmental Scanning of Operational Capabilities

Surprisingly, the findings also reveal that the environmental sensing of frontline employees makes better and more accurate predictions than the sensing performed by the executive managers and the financial models adopted by top management. Furthermore, we discern a unique ability among frontline employees to predict the performance effect of particular aspects of the organization's internal operational capabilities. That is, frontline employees that have contact with essential corporate stakeholders – customers, suppliers, partners, and society at large – have significantly stronger predictive powers for key strategic performance variables compared to the middle-, line- and top managers in the two sampled organizations.

In fact, we demonstrate a relationship between employees' accumulated knowledge of changes in operational capabilities and reliable predictions of future firm performance. So, management should be able to elicit this information and ascertain insights about the current effectiveness of specific operational capabilities and their relative importance for future performance outcomes. This is expressed by the relative weight of factor i (w_{it}) in equation (1), which expresses overall firm performance at time t. Consequently, employee sensing can provide a basis for evaluating the effectiveness of key operational capabilities through accurate predictions about firm performance. The ability to make predictions should allow for more timely interventions to take corrective actions and circumvent adverse predictive performance relationships of specific operational capabilities. Therefore, employee sensing of operational capabilities can become a highly relevant input to update strategic action plans as a basis for making adjusted management decisions.

Our PCA results provide indications of theoretical constructs of operational capabilities across the sampled observations. Our findings seem to be in line with suggestions that different types of operational capabilities are at play (Dosi et al., 2002; Helfat & Raubitschek, 2000; Protogerou et al.,

2011; Teece, 2007). Furthermore, the identified components of OPCOOR are consistent with the importance ascribed to team-working and managerial capabilities in sharing knowledge across departments to enhance the development of new products, services, and technologies (e.g., Dosi et. al., 2002; Protogerou et al., 2011). We also found that OPCOMP included expectations about innovation, competitiveness, and competitive benchmarking (Teece, 2007). Hence, the reported findings support the importance ascribed to the scanning of renewal opportunities and the sensing of the environment in assessing performance effectiveness (Teece, 2007). Particularly, we found that some ESSI indicators related to job rotation and job commitment are included in OPJOBAT. The attractive employment characteristics expressed as "job opportunities" and "job rotation" indicate the extent to which complementary knowledge and experiences are absorbed within the firm (Cohen & Levinthal, 1990).

Limitations

While the data analyses reveal some striking relationships between employee sensing and performance, the reported findings have some obvious limitations. First of all, the time-series data was gathered from two Scandinavian hotels, and even though due care was taken to collect a large number of representative observations, we cannot claim that such data will reflect similar outcomes in all other industries and national contexts. However, the external validity in this initial study is deemed acceptable, as the correlation coefficients between the indices performed as expected. Given the preliminary nature of this longitudinal empirical study, there is a need for future replications and extended studies to further consider the nature of the underlying employee sensing phenomenon and to find more precise indicators for essential operational sensing parameters. More organizations and comparable business sectors should be included in the samples of future studies, and follow-up examinations in other industries should be developed to increase the generalizability

of the results. Future replication studies may consider the potential confounding effects of dynamic pricing schemes and assess whether there are systematic differences in the predictive capabilities of frontline employees across different geographical regions and cultural spheres.

Employee Sensing, Accuracy in Predications, and Job Commitment

One may question whether employee sensing of changes in operational capabilities from their perceptual "now" also affects their commitment to the job in relation to how interesting they find task assignments and their perceived opportunities for job rotation and career advancement. Poor operational assessments by employees may, for example, lead to low commitment, which in turn could cause below par operational execution and lead to poor performance outcomes as a "self-fulfilling prophecy" (Henshel, 1993). Hence, it would be relevant to examine whether "current" assessment of job commitment can predict firm performance, or if it is indeed related primarily or exclusively to the *intuitive judgments* of employees on a mix of different operational capabilities. Therefore, we performed a robustness check to see if job commitment measured by the classical organizational commitment scale (Mowday, Steers, & Porter, 1979) has any predictive power on firm performance (Figure 2). However, we found no evidence that the employees' assessments of their current commitment to the job were related to future changes in firm performance. From this we deduce that the true predictors of medium-term performance outcomes relate to the actual status of the firm's operational capabilities as assessed by the sensing of frontline employees and not by employee job commitment.

- Insert Figure 2 about here -

Hence, it appears that top management can gain superior information from lower-level employees, as these interpret day-to-day operational activities and their expected effects on firm performance. This means that informative inputs gathered from frontline employees can be used in

interactive management control systems, in which face-to-face discussions and ongoing debate may indicate that strategic action plans need to be revised (Simons, 1991, 1994). That is, strategic information residing at lower organizational levels can be transferred to key decision-makers and used to decide on corrective strategic actions. This is consistent with claims that lower-level employees are able to sense the need for strategic adjustments in view of changing conditions, since they are among the first to observe environmental changes (Burgelman, 1996; Grove, 1996).

Frontline employees can gain detailed insights about subtle market changes and operating shortcomings, which constitute valuable knowledge that is not otherwise accessible to top management. This conforms to the notion that the sensing abilities of lower-level employees are important elements of the micro-foundations of dynamic capabilities (Teece, 2007). Similarly, it resonates with a strategic responsiveness construct that builds on organizational capabilities to assess environmental changes with sufficient accuracy (Andersen, Denrell, & Bettis, 2007). Indeed, this ability to sense the firm's changing strategic requirements is considered a necessary prerequisite for formulating appropriate responses and reconfiguring internal resources to adjust action plans. The results are also consistent with empirical evidence showing the importance of strategic flexibility that allows the firm to engage in ongoing strategic adjustments as updated environmental information becomes available (Brews & Hunt, 1999). It further resonates with findings that decentralized experiential insights can drive effective responses and adaptive strategic actions (Andersen & Nielsen, 2009). That is, the ability to gather experientially derived information from the operational activities of lower-level employees can facilitate a firm's capacity to adjust its strategic course.

Practical Implications

The practical implications of the findings derive from the fact that information gathered from frontline employees can predict the medium-term performance effects of specific operational

competencies. Since the predictive power of employee sensing exceeds that of top managers, it may be used to inform managerial decisions and generate updated strategic responses. Hence, unique knowledge and strategically relevant information above and beyond what is otherwise accessible to top management resides among frontline employees and can be gathered as useful input for ongoing decision-making. The study points to the potential for a new fruitful research area on how environmental sensing and strategic control processes can help firms become more responsive to dynamic environmental conditions by utilizing the subtle insights of the organization's frontline employees. To further examine the value of employee sensing for managerial strategic decision-making (dynamic capabilities), it might be relevant to consider the employees' qualitative assessments of their predictions in future studies. As the results of this paper demonstrate, the strategic value of frontline employees' knowledge (ESSI) is that it can provide solid information for adaptive managerial initiatives that may be further enhanced through ongoing qualitative feedback processes. It will also be relevant to further observe how top management can implement and exploit aggregated, locally held employee knowledge when experimenting with such information feedback loops in the future.

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FIGURE 1

Conceptual Model: Employee Sensing of Operational Capabilities and Firm Performance

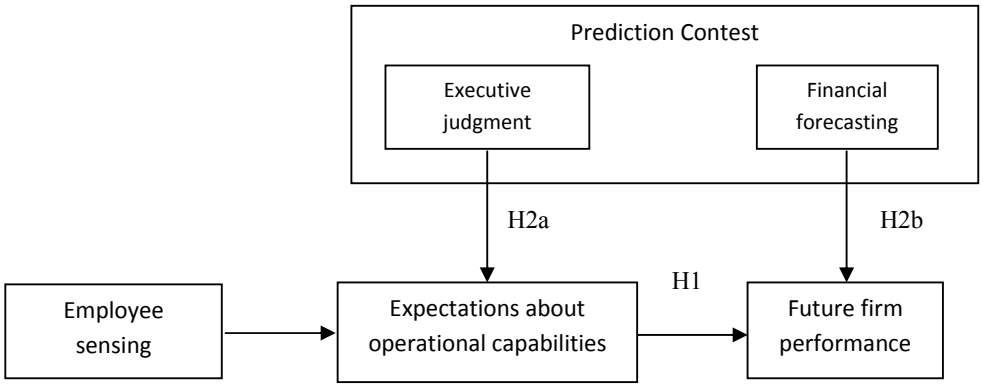

FIGURE 2
Conceptual Model: Performance Effect of a Self-Fulfilling Prophecies Behavior

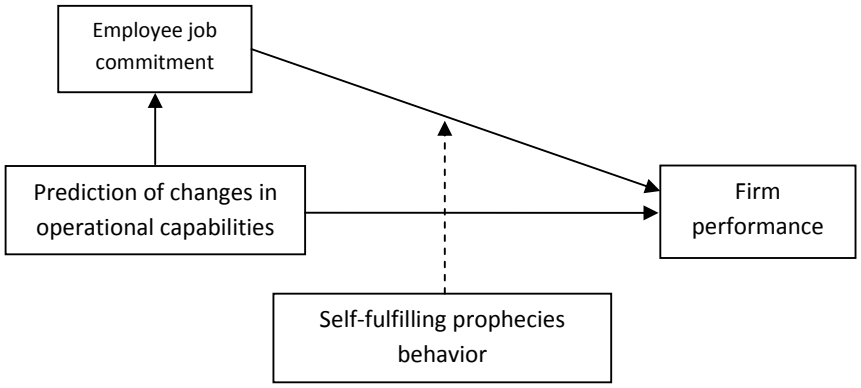

TABLE 1

Characteristics of Frontline Employees

Control variables	Hotel 1 (N=208)	Hotel 2 (N=139)
Gender	Female=51%	Female=65%
Years in the chain	M = 2.27	M=10.63
	SD=1.72	SD= 7.59
Years in the industry	M=5.60	M=13.32
	SD=3.68	SD= 6.47

TABLE 2

Distribution of Frontline Employees by Hotel Department[a]

Hotel department	Hotel 1 N=208	Hotel 2 N=139
Front office	35.6	23
Banquet/bar/meeting/events	4.8	28.1
Guest services	17.8	
Housekeeping	20.2	6.5
Restaurant	11.5	2.2
Kitchen	9.6	4.3
Sales department		26.6
Others (not indicated departments)	0.5	9.3

[a]*Distribution in percentage.*

TABLE 3

Characteristics of Executives, Directors, and Managers

Control variables	Hotel 1 (N=44)	Hotel 2 (N=40)
Gender	Female=18%	Female=60%
Years in the chain	M=6.82	M=3.68
	SD=6.36	SD=3.50
Years in the	M=11.93	M=8.67
industry	SD=6.53	SD=5.85

TABLE 4

Frontline Employees' Sensing of Operational Performance

Questions addressed to hotel experts	**Operational capabilities areas**
Which significant groups of people do frontline employees interact with?	Co-workers in own and other departments, guests, managers, colleagues of other hotels in the local area.
What do they perceive in their daily work?	Their own job, coordination in own department, coordination between departments in the hotel, how guests enjoy services, how managers solve challenging issues, the hotel in relation to its competitors.
What kind of operational performance issues do frontline employees build anticipations about?	The future of their own jobs, future salaries, how problems are solved, how coordination works, how satisfied the customers seem to be, how the hotel develops its services, the hotel in relation to the competition, reputation of the hotel.

TABLE 5

Prediction Contest of *Pfm* Between Individual *ESSI* variables 1-13 Using Fixed Effects Panel Data Model[a]

	Respect	Innovation	Competi-tion	Guest exp	Dept Manager	Hotel Manager	Teamwork	Corp Department	Job assign	Interest Higher Pos	Chance Higher Pos	Earnings	Another Employer
	ESSI1	ESSI2	ESSI3	ESSI4	ESSI5	ESSI6	ESSI7	ESSI8	ESSI9	ESSI10	ESSI11	ESSI12	ESSI13
ΔlnXt	-.0120	-.0743	-.0058	-.2294	.2257	-.1734	.0461	-.1578	-.0738	**.3120***	-.0183	.2882	.1621
	(.955)	(.689)	(.982)	(.342)	(.131)	(.246)	(.809)	(.507)	(.752)	**(.079)**	(.888)	(.290)	(.379)
ΔlnXt-1	-.1049	-.1657	.1015	-.1252	.2286	-.0187	.1356	-.0827	-.0525	.2558	-.1124	.4416	.0593
	(.689)	(.381)	(.733)	(.678)	(.155)	(.903)	(.535)	(.737)	(.848)	(.171)	(.629)	(.189)	(.767)
ΔlnXt-2	.1039	**.4893****	.2883	.2038	**.3742*****	**.3990****	.0599	.1226	.3814	.0588	**.7709*****	.3142	-.0891
	(.662)	**(.021)**	(.337)	(.484)	**(.010)**	**(.013)**	(.805)	(.614)	(.122)	(.749)	**(0.000)**	(.258)	(.631)
Constant	-.0105	-.0125	-.005	-.0184	-.0092	-.0166	-.014	-.0124	-.0094	-.0061	-.0059	-.0163	-.0124
	(.741)	(.643)	(.883)	(.561)	(.732)	(.511)	(.661)	(.696)	(.751)	(.836)	(.806)	(.591)	(.693)
Observations	28	28	28	28	28	28	28	28	28	28	28	28	28
R-squared	0.036	0.312	0.04	0.077	0.309	0.387	0.017	0.031	0.158	0.156	0.466	0.11	0.056
Number of cases	2	2	2	2	2	2	2	2	2	2	2	2	2

[a] p values in parentheses

*** p<0.01, ** p<0.05, * p<0.10

TABLE 6

Prediction Contest Between ESSI and EXESSI[a]

Dep. var.	Hotel 1 *Pfm*		Hotel 2 *Pfm*	
Expl. var.	ESSI	EXESSI	ESSI	EXESSI
$\Delta \ln X_t$	-0.1789	-0.255	-0.198	-0.059
	(0.494)	(0.290)	(0.752)	(0.867)
$\Delta \ln X_{t-1}$	-0.327	-0.027	0.264	1.087
	(0.284)	(0.927)	(0.763)	(0.104)
$\Delta \ln X_{t-2}$	**0.5129***	0.2424	**2.0841*****	**1.2825***
	(0.100)	(0.473)	**(0.010)**	**(0.056)**
Constant	-0.006	-0.014	-0.014	0.028
	(0.764)	(0.757)	(0.771)	(0.410)
Observations	14	7	14	6
R-squared	0.36	0.42	0.50	0.95

[a] p values in parentheses

*** p<0.01, ** p<0.05, * p<0.10

TABLE 7

Prediction Contest between ESSI and EXESSI (Fixed Effects Models)[a]

Dep. var	Performance (*Pfm*)					Forecast error ($Pfm - Pfm^{forecast}$)	
Expl. var	ESSI	OPCOMP	OPCOOR	OPJOBAT	EXESSI	ESSI	EXESSI
$\Delta \ln X_t$	-0.183	-0.450	-0.164	0.241	-0.298	-0.105	-0.006
	(0.595)	(0.201)	(0.500)	(0.366)	(0.147)	(0.639)	(0.943)
$\Delta \ln X_{t-1}$	-0.089	-0.301	0.103	0.237	0.150	0.018	0.093
	(0.838)	(414)	(0.708)	(0.494)	(0.577)	(0.950)	(0.402)
$\Delta \ln X_{t-2}$	**1.342*** **	**0.749-** **	**0.623** **	**0.684** **	**0.517***	**0.574** **	0.136
	(0.002)	**(0.037)**	**(0.016)**	**(0.035)**	**(0.073)**	**(0.028)**	(0.220)
Constant	-0.006	-0.015	-0.010	-0.007	0.023	0.001	0.018
	(0.822)	(0.611)	(0.712)	(0.799)	(0.432)	(0.936)	(0.161)
Observations	28	28	28	28	13	28	13
R-squared	0.36	0.28	0.25	0.20	0.51	0.19	0.28

[a] p values in parentheses

*** p<0.01, ** p<0.05, * p<0.10

[1] Unlike the other variables that are transformed as $\Delta \ln X_t$, $Pfm^{forecast}$ is transformed according to Equation 1

APPENDIX A
ESSI Indicators and Related Factor Components[a]

Indicators	Principal components	Factor loadings
ESSI 1 EXPECTATION		
Please think about the level of respect that associates of other competing hotels show you because you work for Hotel X. How do you think their level of respect will be for you in the next 12 months versus now?	Operational competencies	0.678
ESSI 2 EXPECTATION		
How do you think the ability of Hotel X to develop new and creative services, systems, and processes will be in the next 12 months compared with now?	Operational competencies	0.728
ESSI 3 EXPECTATION		
How do you think the ability of Hotel X to compete in the hotel industry will be in the next 12 months compared with now?	Operational competencies	0.767
ESSI 4 EXPECTATION		
Please think about the guests who have recently visited or stayed in Hotel X. How do you think they will talk about their experiences at the hotel to others during the next 12 months?	Operational competencies	0.590
ESSI 5 EXPECTATION		
How do you think your department manager will solve problems successfully in your department during the next 12 months compared with now?	Operational coordination	0.722
ESSI 6 EXPECTATION		
How do you think that the management of Hotel X will solve problems successfully in the hotel during the next 12 months compared with now?	Operational coordination	0.749
ESSI 7 EXPECTATION		
In the department where you work, how do you think the teamwork will be during the next 12 months versus now?	Operational coordination	0.517
ESSI 8 EXPECTATION		
How do you think the cooperation between departments will be during the next 12 months compared with now?	Operational coordination	0.533
ESSI 9 EXPECTATION		
How interesting do you think your job assignments will be in the next 12 months versus now?	Operational job attractiveness	0.610

Indicators	Principal Components	Factor Loadings
ESSI 10 EXPECTATION		
In the next 12 months, do you think you will be less or more interested in entering a higher position at the hotel versus now?	Operational job attractiveness	0.801
ESSI 11 EXPECTATION		
In the next 12 months, do you think your chances for being offered a higher position at the hotel will be worse or better compared with now?	Operational job attractiveness	0.709
ESSI 12 EXPECTATION		
In the next 12 months, do you think your earnings (including bonuses and tips) at the hotel will be worse or better compared with now?	Operational job attractiveness	0.632
ESSI 13 EXPECTATION		
In the next 12 months, do you think you will be less or more interested in getting a job with another employer compared with now?	Operational coordination	-0.667

[a] Response scales:

Decrease ……..……. Increase
Worse …….. Better
Unpleasantly ……. Pleasantly
Unsuccessfully ….. Successfully
Uninterested ……..… Interested

Measured on [1–5] Likert scales

APPENDIX B

Index of Consumer Sentiment (ICS)

The monthly national American Survey of Consumer Sentiment has been administered and maintained by the University of Michigan's Survey Research Center since its development in the late 1940s by George Katona. In 1952 it was converted to a quarterly survey and in 1978 to a monthly survey. The data, collected from approximately 500 telephone interviews, is received from adults living in households in the United States. A rotating panel design ensures that one survey is made up of 60% new respondents and 40% repeat respondents (Surveys of Consumers, 2007). The ICS consists of two dimensions: the Index of Current Economic Conditions, made up of two items that assess consumers' present financial situation, and the Index of Consumer Expectations, which has three items that measure consumer expectations from a 12-month and five-year perspective. The three ICS questions address pocketbook concerns such as personal well-being and security of the household level and the collective interest associated with long-term expectations of the national economy. The ICS is derived by calculating the results of these two dimensions (Bechtel, 1997) and uses 1996 as its benchmark with a value of 100 (Ludvigson, 2004). Responses are ranked using a three-point scale ranging from one (a pessimistic attitude towards current/future situations) to three (a positive attitude towards current/future situations). Point two on the scale indicates no change in comparison to the current/future situation. The ICS and CCI, described below, are included in the current study as validation indices to control for their diverse forecasting performance in relation to ESSI and EXESSI. With our performance measurement "excess return," we opt to capture employee and executive sentiments towards the future about internal firm conditions, and thus concentrate on scanning out external influences.

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