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Strategic Issue Identification for Crowd Predictions

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1. INTRODUCTION

Successful decision making depends on the ability to identify relevant strategic environmental issues available to decision makers [Eisenhardt 1989, March and Olsen 1976, Vroom and Yetton 1973]. Crowd predictions are widely recognized for producing accurate predictions about the future [Hallin 2015, Hill 1982, Hong and Page 2004, Surowiecki 2004, Thompson 2012]. Strategic foresight and updated information about the future to support strategic decisions can be achieved by tapping into the collective wisdom of crowds [Berg and Rietz 2003, Mannes, Soll and Larrick 2014, O'Leary 2011, Wolfers and Zitzewitz 2004].

This paper introduces two empirical case studies on the identification of strategic issues for crowd predictions performed in large international organizations, Copenhagen Airports and Maersk Training. The methods include interviews with key decision makers and crowd testing in order to identify relevant environmental, industrial, and firm uncertainties that are expected to affect the future financial performance of the firm over the next year.

Malone, Laubacher, and Dellarocas [2009] have developed an overall framework for understanding the underlying genomes of collective intelligence systems by asking two pairs of related questions: “*Who* is performing the task? *Why* are they doing it?” and “*What* is being accomplished? *How* is it being done?” The *Who* relates to the staffing of the crowd that is undertaking the activity, while the *Why* concerns the various incentives that lead people to participate in collective intelligence systems. The third genome to be determined is the goal of the activity, which relates to the *What*. Lastly, the *How* concerns the choice of collective intelligence system put in place to undertake the activity [Malone et al. 2009].

The purpose of this paper is to present an approach to identifying the *What*. This new perspective focuses on identifying strategic issues of relevance for future financial firm performance of the individual firm. That is, it is an assessment of *What* the crowd should predict within a given time frame to provide updated strategic information for dynamic decision making.

Strategic issue identification and diagnosis are widely researched [Anderson and Paine 1975, Ansoff 1980, Daft and Weick 1984, Dutton and Duncan 1987, King 1982, Milliken 1990, Thomas and McDaniel 1990] and concern stakeholder perceptions of environmental changes as early routines in strategic decision making [Mintzberg et al. 1976]. In the strategic management literature, strategic issues are perceived as “developments or trends that emerge from an organization’s internal or external environments; they are perceived to have the potential to affect an organization’s performance” [Dutton and Ottensmeyer 1987 p. 355]. However, to our knowledge the strategic management literature falls short of effective dynamic procedures for identifying strategic issues for crowd predictions.

The paper offers: i) an integrated strategic issue framework (ISIF) for effective identification of both general environmental, industry, and firm emerging uncertainties for crowd predictions and ii) a systematic approach to identifying the most critical strategic issues that generate uncertainties for firm performance. We extend existing theory about assessment of the *What* in collective intelligence systems, employing a combination of interviews and crowd forecasting to identify specific strategic issues for crowd predictions for further validation in time-series prediction research in the firm cases.

2. INTEGRATED STRATEGIC ISSUE FRAMEWORK

We have developed an Integrated Strategic Issue Framework (ISIF) to assess emergent strategic issues based on adopted frameworks in various research disciplines such as strategic management [Hallin, Andersen and Tveterås 2012, 2013; Teece 1997], risk management [Miller 1992], operations management [Swink and Hegarty 1998], and project management [Jafaari 2001]. Miller [1992 p. 312] argues that “uncertainty about the environment and organizational variables reduce the predictability of corporate performance.” Uncertainties can arise from both exogenous shocks and internal events such as behavioral choices,

or a combination of the two. Inspired by Miller’s [1992] multidimensional approach to uncertainty, we propose an extended framework. General environmental uncertainties include political, macroeconomic, social, and demographic uncertainties. Industry uncertainties affect industry dynamics such as the input market, consumer tastes, new entrants, etc. Firm variables include operating, project management, safety, behavioral uncertainties, etc.

To further develop the existing framework by Miller [1992], we integrate an operational capabilities framework by Swink and Hegarty [1998]. They identify core manufacturing capabilities and their links to product differentiation and manufacturing outcomes, which can be viewed as uncertainties in respect to efficiency of firm operations. Recognizing main uncertainties that revolve around major and minor project implementations in firms, we draw on the uncertainty variables of Jafaari [2001] and incorporate them as firm uncertainty. Teece [2007] analyzes dynamic capabilities deriving from technological, organizational, and managerial processes that we include in our integrated variable framework to assess the level of uncertainty of the firm’s dynamic capabilities. Hallin et al. [2012, 2013] propose specific validated behavioral strategic issues tested in time-series prediction studies that we use as an integrated part of firm uncertainties. Table 1 shows an overview of the different theoretical contributions to the three levels of uncertainty.

Table 1. Integrated Strategic Issue Framework (ISIF)

Level of uncertainty	Category	Sources
General environmental uncertainties	Political uncertainties	Miller [1992]
	Government policies	
	Macroeconomic uncertainties	
	Social and demographic uncertainties	
	Natural uncertainties	
Industry uncertainties	Input market uncertainties	Hallin et al. [2012, 2013], Jaafari [2001]
	Product market uncertainties	Miller [1992], Swink and Hegarty [1998],
	Competitive uncertainties	Teece [1997]
Firm uncertainties	Operating uncertainties	Hallin et al. [2012, 2013], Jaafari [2001]
	Liability uncertainties	Miller [1992], Swink and Hegarty [1998],
	R&D uncertainties	Teece [1997]
	Credit uncertainties	
	Behavioral uncertainties	
	Safety uncertainties	
	Financial uncertainties	

3. METHOD: IDENTIFYING THE *WHAT* TO PREDICT

The two international organizations in this case study are Copenhagen Airports and Maersk Training. Copenhagen Airports operates the largest airport in Denmark with many international routes, and has been rated as the most efficient airport in Europe several times by Air Transport Research Society. There are more than 2,400 employees working to serve the airport’s more than 20 million yearly passengers. However, more than 20,000 are employed at the airport when counting the personnel that work for the more than 500 firms that operate at the Copenhagen Airports.

Maersk Training, an independent business unit of Maersk Group, is one of the world’s leading providers of advanced immersive simulator training to the wind, oil and gas, and maritime industries. The firm is present in major energy hubs including Aberdeen, Houston, and Rio de Janeiro. The organization employs more than 400 employees that serve some of the world’s largest offshore firms.

The first research phase of identifying strategic issues (the *What*) for crowd predictions included structured interviews with executives in both firms about the influence of strategic issues on financial firm performance. Thus, the interview guide is highly standardized, and the main purpose of the structured interview is to gather relevant and quantifiable data on the drivers of financial firm performance. We interviewed respectively eight key decision makers in Copenhagen Airportsⁱ and two in Maersk Training about their expectations about emergent uncertainty variables that will impact financial firm performance over the next year. We asked executives to rate 115 variables in the ISIF on a scale from 1-5, with 1 being the least impact and 5 the largest impact on financial firm performance within a year. Additionally, we asked the interviewees to explain why they rated as they did and encouraged them to add new firm-specific variables to the framework. Consequently, we could assess specific variables that were predicted to be of strategic importance. That is, we retained variables ranked 3 or higher on average while omitting variables below 3 for further analysis.

The subsequent research phase involved survey testing of the remaining uncertainty variables with a test crowd of employees. The purpose is to reduce the list of uncertainty for monthly predictions during a year with the full crowd of selected employees across Copenhagen Airports. The test crowd consisted of white-collar workers from different departments such as HR services, airport sales, business control, capacity projects, commercial finance, commercial legal, compliance and risk management, construction projects, and e-commerce. First, we asked them to rate the variables on a scale from 1-5, with 1 being the least impact and 5 the largest impact on financial firm performance within a year. Then we asked the employee crowd to virtually invest 100 points across factors rated 4 and 5 on the scale, otherwise the respondents were asked to invest 0 points.

At Maersk Training the remaining variables were tested in crowd predictions during two months with a diverse crowd of 349 employees from business administration, training coordination, training instruction, and engineering in Maersk Training's offices in Aberdeen, Newcastle, Esbjerg, Svendborg, Stavanger, Dubai, Houston, Rio de Janeiro, and Chennai.

4. RESULTS

We find both major differences and similarities in what constitute the *What* in the two case studies. In both organizations, key decision makers expect fluctuations in firm-specific KPIs to be the root cause of perceived uncertainty in future financial firm performance. That concerns strategic issues for which executives need more accurate predictive forecasts. As expected, the cases differ significantly on average ratings of general environmental and industry uncertainties due to the organizations' different industrial contexts. Decision makers at Copenhagen Airports allocate high ratings to variables included in categories such as natural, financial, and operating uncertainties. Executives in Maersk Training allocate high ratings to policy and macroeconomic uncertainties. The crowd testing of variables in the two organizations will be completed by March 2016.

5. CONCLUSION

In this study we construct the Integrated Strategic Issue Framework (ISIF) for effective identification of both general environmental, industry, and firm strategic issues for crowd predictions. Additionally, we offer a systematic approach to identify the variables that have an impact on the major fluctuations in future financial firm performance. As the decision-making structure in both organizations is highly centralized, we argue that both executives and the employee crowd play an important role in fostering diversity in identifying strategic issues. Consequently, the approach includes interviews with executives to identify strategic issues and accordingly testing these issues with employee crowds. We conclude that variables for crowd predictions are indeed very context-specific in both case studies. Therefore, the *What* to be predicted by the employee crowds must be tailor-made to reflect the firm-specific context. This ensures that relevant variables are included in crowd predictions, and thus can impact the bottom-line of the studied organizations.

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