The Role of Information Systems in Organizational Improvisation: A Perspective based on Two Complementary Theories

Research-in-Progress

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ABSTRACT

To remain competitive or to simply survive in today's highly dynamic environments, organizations often need to act rapidly. Top managers deal with urgent issues and must improvise. The role that information systems (IS) play in facilitating improvisation is critical to the organization's internal processes and market performance. This research-in-progress paper reviews the organizational improvisation literature and examines improvisation using the complementary lenses of organizational learning and dynamic capabilities. It places IS strategy, digital options and IS leveraging capability at the core of the discussion on improvisation. A research model and propositions are presented, as well as the study's methodology and expected contributions.

Keywords

Organizational improvisation, organizational learning, continuous innovation, dynamic capabilities, information systems, strategy, environmental turbulence.

INTRODUCTION

In today's fast changing and unpredictable environments, organizations are faced with unplanned opportunities to develop new products or services to penetrate new markets or maintain their position in current markets (Pavlou and El Sawy, 2010; Tanriverdi, Rai and Venkatraman, 2010). Organizations that react rapidly can take advantage of such opportunities and perform better than other, less flexible businesses (Tanriverdi et al., 2010). Indeed, organizations in many industries are expected to innovate at a much faster pace than before to simply survive (Crossan, Lane, White and Klus, 1996). This need for continuous change requires organizations to develop the ability to innovate in the present while keeping an eye on the future (Brown and Eisenhardt, 1997). However, continuous innovation demands put organizations under constant time pressures, which can also challenge internal routines (Miner, Bassoff and Moorman, 2001) and result in the need for improvisation.

Scholars have defined organizational improvisation as a time-constrained exercise that is spontaneous, creative and aims to produce change (e.g., Crossan, Cunha, Vera and Cunha, 2005; Crossan et al., 1996; Perry, 1991). Improvisation is neither good nor bad (Vera and Crossan, 2004, 2005), but it can generate positive outcomes, negative outcomes or no outcomes at all (Cunha, Cunha, and Kamoche, 1999; Miner, et al., 2001; Kamoche, Cunha and Cunha, 2003). Organizational improvisation has been studied in a number of research disciplines, including learning, strategy, and IS (Cunha et al., 1999). From an organizational learning perspective, improvisation can induce short and long-term changes in what the organization does or knows (i.e., organizational learning), and in what the organization retains once organizational learning has occurred (i.e., organizational memory; Miner et al., 2001). From a strategic perspective, improvisation blends planned and emergent strategies, formulation and implementation (Moorman and Miner, 1998a; Perry, 1991). In the IS literature, researchers have examined improvisation in decision support systems development (Mendonça, 2007), flexible software development (Harris, Collins and Hevner, 2009), technology adoption (Tjørnehøj and Mathiassen, 2010), and individual use and organizational change (Orlikowski, 1996, 2000). More recently, Pavlou and El Sawy (2010) empirically examined the impact of improvisational capabilities on other business capabilities and overall business performance. However, to date, IS scholars have not examined the impact that organizational IS strategy has on improvisation. For instance, we do not know how organizations in different contexts with different IS strategies handle improvisation and with what results. In brief, there is a need to study IS, strategy, improvisation, and organizational outcomes together.

The current research aims at studying the role of IS in facilitating (or hindering) organizational improvisation using two theoretical lenses, namely organizational learning and dynamic capabilities. There are examples of similar studies of a phenomenon with different theoretical lenses in the IS field (e.g., Webster and Trevino, 1995). Additionally, researchers have suggested that complex organizational phenomena, such as organizational agility, should be studied using different theoretical frameworks to gain richer insights (e.g., Sambamurthy, Bharadwaj and Grover, 2003). By so doing, we hope to better explain why organizational improvisation can have both negative (e.g., drained resources) and positive (e.g., new processes, increased performance) outcomes. Consequently, our research questions are the following: 1) How do IS and technology facilitate organizational improvisation and subsequent organizational outcomes? And 2) To what extent do dynamic capabilities and organizational learning theories inform our understanding?

Increased understanding is important for both research and practice. For research, organizational improvisation is still an under-researched phenomenon, especially in the IS field. In this study, we examine how IS facilitates the structured use of improvisation in organizations operating in turbulent environments. This research informs the organizational learning field by showing that IS can play a key role in facilitating improvisation through information flows and changes to organizational memory (Moorman and Miner, 1998b). In the dynamic capabilities literature, this research expands both the role of improvisation as a dynamic capability and of IS capabilities in the pursuit of competitive advantages by organizations. For practitioners, this research is of importance since improvisation has become a fact of life for top managers faced with the need for rapid and creative action.

This paper is organized as follows. First, the literature is reviewed. We discuss past research on organizational improvisation and the role of IS, and provide key definitions. Related studies on organizational learning and dynamic capabilities are presented. Second, our research model and methodology are described. Finally, study limitations and expected contributions are highlighted.

LITERATURE REVIEW AND THEORETICAL BACKGROUND

Organizational Improvisation

Improvisation has been studied in a number of research areas, including business management, innovation, learning, marketing, organizational theory, strategy, and IS (Cunha et al., 1999). Early research on the topic used the metaphor of jazz music to conceptualize organizational improvisation (e.g., Crossan et al., 1996; Perry, 1991). More recently, scholars have advocated 'breaking free' of the jazz metaphor to better understand the various forms of organizational improvisation (Cunha et al., 1999; Kamoche et al., 2003). In an attempt to bring improvisation under one unified definition, Cunha and his colleagues define organizational improvisation as "the conception of action as it unfolds, by an organization and/or its members, drawing on available material, cognitive, affective and social resources" (Cunha et al., 1999, p.302). Indeed, scholars have generally defined improvisation as a time-constrained exercise that is spontaneous, creative and aims to produce a desired outcome (e.g., Crossan et al., 2005; Crossan et al., 1996; Perry, 1991).

Figure 1 provides our research model, including expected antecedents and outcomes derived from organizational learning and dynamic capabilities theories. This model suggests that IS plays an important role in facilitating organizational improvisation. The model's constructs and propositions are further described below.

Three broad categories of antecedents have been identified in the literature on improvisation, organizational learning, dynamic capabilities and IS. They include the environmental context (environmental dynamism), organizational context (organizational maturity, structure, strategy and culture) and the knowledge and information management context (organizational memory, information and knowledge flows, digital options and IS strategy).

The environmental context is a key factor in the improvisation literature (e.g., Crossan et al., 2005; Davis, Eisenhardt and Bingham, 2009). Environmental dynamism, comprising levels of velocity, unpredictability, complexity and ambiguity, is considered both an antecedent (Davis et al., 2009) to improvisation as well as a moderator between improvisation and organizational outcomes (e.g., Pavlou and El Sawy, 2010).

The Role of IS in Improvisation from an Organizational Learning and Dynamic Capabilities Perspective

In general, there is a consensus that organizational structure and culture play a critical role in fostering effective improvisation. Brown and Eisenhardt (1997) studied a number of strategic business units in the highly turbulent, high-technology industry and found that "semistructures", or structures that strike a balance between rigid and loose structures, between order and disorder, are ideal for improvisation in the context of continuous product innovation (Brown and Eisenhardt, 1997; Eisenhardt and Tabrizi, 1995). More recently, Davis and colleagues (2009) studied the strategic impact of structure on improvisation, using simulation models, and examined the interplay of structure with organizational maturity. They found that the right amount of structure (modeled as rules) is dependent on whether the organization is new

(entrepreneurial) or established. Conceptually, experimental culture has also been identified as another key organizational enabler of effective improvisation (Crossan et al., 2005). Kamoche et al. (1999) suggest that a culture that allows for risk-taking and learning from failures is key to improvisation.
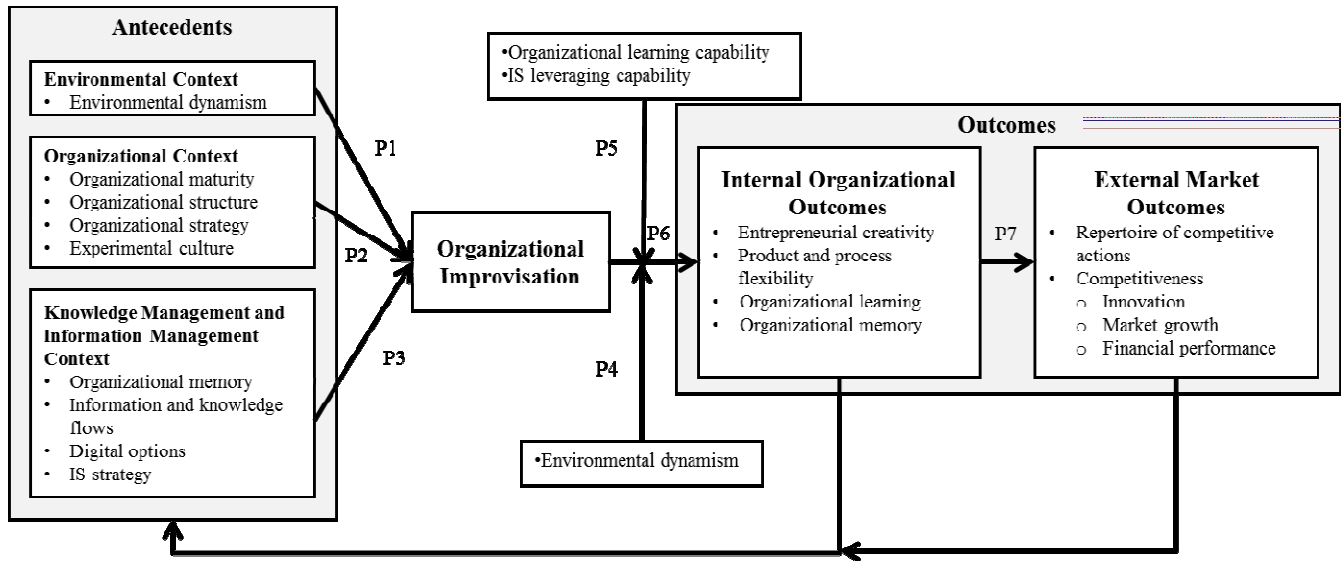

Figure 1. Research Model

From an information and knowledge management perspective, two main antecedents to improvisation have been identified (organizational memory and information and knowledge flows). We study two additional antecedents, based on our review of the literature, namely digital options and IS strategy.

Organizational learning occurs whenever the organization finds a new way to "view" or "do" something, and experiences a shift in assumptions, ideas or action patterns (Miner et al., 2001). Organizational improvisation has been described as one way to induce short-term as well as potentially long-term learning within the organization (Miner et al., 2001). Furthermore, what the organization retains, its organizational memory, plays an enabling role (Moorman and Miner, 1998a, 1998b) for, and may be affected by, organizational improvisation (Miner et al., 2001). In this stream of research, both organizational memory and information and knowledge flows have been suggested as potential antecedents to effective improvisation (e.g., Crossan et al., 2005; Moorman and Miner, 1998, 1998b). From an IS perspective, systems have been shown to both affect organizational memory (e.g., Stein and Zwass, 1995) and information and knowledge flows (Alavi and Leidner, 2001). Because slowness to learn can be considered to constitute an impediment to improvisation and related outcomes, we suggest that organizational learning capability may also be considered a moderator.

Dynamic capabilities allow organizations to identify and act swiftly on business opportunities, by giving them "the ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments" (Teece, Pisano and Shuen, 1997, p. 516). Sambamurthy and colleagues (2003) suggest that agility (i.e., the ability to detect opportunities for innovation), digital options (i.e., IT-enabled capabilities) and entrepreneurial alertness (i.e., the ability to detect areas of market ignorance) are dynamic capabilities that increase the number and complexity of competitive actions and financial performance. Digital options then facilitate organizational improvisation, which can also be regarded as a dynamic capability (Pavlou and El Sawy, 2010). IS leveraging capabilities (i.e., the effective use of information systems such as project and resource management systems) support organizational improvisational capabilities (Pavlou and El Sawy, 2010) and can be viewed as a moderator of the relationship between improvisation and organizational outcomes.

Lastly, we suggest a fourth antecedent to effective improvisation in the information and knowledge management context - the IS strategy implemented by the organization. The IS literature has suggested that organizations can be categorized as IS innovators (seeking to continuously innovate through IS), or IS conservatives (performing by exploiting existing IS) (Chen,

Mocker and Preston, 2010)[1]. We argue that the type of IS strategy adopted may impact improvisation. For instance, IS innovators may offer more flexible technologies to teams, and thus facilitate improvisation in terms of communication and information flows (Crossan et al., 2005).

Past literature has identified interim, internal organizational outcomes, as well as external market outcomes of improvisation. Internal organization outcomes have been studied in the organizational learning literature and include organizational learning, organizational memory, product and process flexibility, and entrepreneurial creativity (e.g., Cunha et al., 1999; Crossan et al., 2005; Kamoche et al., 2003; Miner et al., 2001; Moorman and Miner, 1998a, 1998b). Furthermore, because processes such as learning and memory are both antecedents and outcomes of improvisation, we suggest a feedback loop (see Figure 1). Consequently, we expect that the more an organization develops the ability to perform structured improvisation, the more it will learn from this and the more this will facilitate its ability to improvise in the future.

We identify two main external market outcomes: the repertoire of competitive actions and overall competitiveness. Although past literature on organizational improvisation has not specifically studied competitive actions, it can be expected that the number and complexity of actions (Sambamurthy et al., 2003) will increase with effective organizational improvisation. Indeed, the number of opportunities that can be identified and acted upon should increase simply because improvisation allows for the reduction of time between identification of an issue and its resolution. Another major outcome of organizational improvisation is competitive, "improvised performance", which can take the form of commercialized innovation (Brown and Eisenhardt, 1997). Pavlou and El Sawy (2006) found that IT leveraging competence (i.e., "the ability to effectively use IT functionalities to support IT-related activities", p.199) indirectly helps create new product development (NPD) competitive advantage through NPD dynamic capabilities, and helps create opportunities for market growth. Kim, Shin, Kim and Lee (2011) also found that IT capabilities indirectly influence financial performance through process-oriented dynamic capabilities. In this way, we expect organizational improvisation, moderated by environmental dynamism, organizational learning capabilities and IS leveraging capabilities, to result in internal and external outcomes that enhance firm competitiveness.

Research Propositions

Using the organizational learning and dynamic capabilities theories, we present Figure 1 (above) and the following propositions:

Proposition 1 (P1): Organizations will conduct more effective organizational improvisation actions in industries with high environmental dynamism, especially high velocity.

Proposition 2 (P2): Organizations with certain characteristics will conduct more effective organizational improvisation actions. Specifically:

> P2a: Organizational maturity affects organizational improvisation as young organizations with flexible organizational structures will conduct more effective organizational improvisation actions.

> P2b: Organizations with an experimental culture will conduct more effective organizational improvisation actions.

> P2c: Organizations with limited formalized strategy, allowing for strategy to emerge, will conduct more effective organizational improvisation actions.

Proposition 3 (P3): Organizations that provide certain knowledge and information management contexts will conduct more effective organizational improvisation actions. Specifically:

> P3a: Organizations with enabling organizational memories will conduct more effective organizational improvisation actions.

> P3b: Organizations with rich information and knowledge flows will conduct more effective organizational improvisation actions.

> P3c: Organizations with digital options with a wide reach and range will conduct more effective organizational improvisation actions.

> P3d: Organizations with IS innovative strategies will conduct more effective organizational improvisation actions than organizations with IS conservative strategies.

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[1] The authors also suggest that some organizations may have no IS strategy at all.

Proposition 4 (P4): Environmental dynamism, especially high velocity environments, will moderate the extent to which effective organizational improvisation actions positively influence internal organizational outcomes.

Proposition 5 (P5): Organizational dynamic capabilities will moderate the extent to which effective organizational improvisation actions positively influence internal organizational outcomes. Specifically:

P5a: In organizations with high learning capabilities, the extent to which effective organizational improvisation actions positively influence internal organizational outcomes will be increased, while in organizations with limited learning capabilities, the extent to which effective organizational improvisation actions positively influence internal organizational outcomes will be reduced.

P5b: In organizations with high IS leveraging capabilities, the extent to which effective organizational improvisation actions positively influence internal organizational outcomes will be increased, while in organizations with limited IS leveraging capabilities, the extent to which effective organizational improvisation actions positively influence internal organizational outcomes will be reduced.

Proposition 6 (P6): Positive internal organizational outcomes will increase when effective organizational improvisation occurs. Specifically:

P6a: Entrepreneurial creativity will increase when effective organizational improvisation occurs.

P6b: Product and process flexibility will increase when effective organizational improvisation occurs.

P6c: Organization learning will result when effective organizational improvisation occurs.

P6d: Organizational memory will increase when effective organizational improvisation occurs.

Proposition 7 (P7): Positive external market outcomes will result from positive internal organizational outcomes. Specifically:

P7a: The number and complexity of competitive actions will increase as a result of positive internal organizational outcomes.

P7b: The level of competitiveness, in terms of innovation, market growth and financial performance, will increase as a result of positive internal organizational outcomes.

Proposition 8 (P8): There will be a feedback loop between internal organizational outcomes and organizational antecedents, such that internal organizational outcomes will influence the organizational, and knowledge and information management, contexts.

Proposition 9 (P9): There will be a feedback loop between external market outcomes and the antecedents, such that the repertoire of competitive actions and the organization's competitiveness will influence the environmental, organizational, and knowledge and information management contexts.

METHODOLOGY

To test the propositions, we employ three research phases. First, we will conduct explanatory case studies to refine the constructs and relationships presented in Figure 1. Second, we will carry out a survey to test the research model quantitatively using a large sample of organizations. Last, we will use a limited number of telephone and face-to-face interviews to gather additional qualitative data to help explain our survey findings.

Explanatory Case Studies (Summer 2013)

We will first conduct a set of in-depth case studies. The objective is the investigation of a "contemporary phenomenon within its real-life context" (Yin, 1994, p.13). Organizational improvisation has been studied from a qualitative perspective on a number of occasions, including from strategic, organizational learning and IS perspectives (e.g., Brown and Eisenhardt, 1997; Moorman and Miner, 1998b). Therefore, we will take an explanatory approach rather than an exploratory one (Yin, 1994), since our objective is to refine our research model.

The organizations will be recruited from the Canadian software industry. The software industry, as part of the computer services industry, is a complex and competitive industry that requires creative decision-making and continuous innovation (Council of Canadian Academies, 2009, p.205). As such, we can expect the software industry to be well-suited for the study of organizational improvisation. Organizations will be recruited from the Dun & Bradstreet Million Dollar Database. Further details on the recruitment process are provided in the survey section below.

The primary means for data collection will be semi-structured interviews of approximately 45-60 minutes each. Interviews will aim to retrospectively discuss improvisational actions and events within the top management team, as well as the role of IT and impact on competitiveness, and organizational learning and memory. In preparing our interview protocol, we will exercise caution in ensuring that organizational learning and dynamic capabilities perspectives are equally represented. We expect to interview several members of the top management teams for each organization. Additional sources of evidence, such as documents and observations, will be collected to facilitate data triangulation and strengthen the research findings (Dubé and Paré, 2003, Yin, 2009).

We will follow a three-step methodology to analyze the qualitative data, namely systematic coding using a qualitative analysis software package (e.g., NVivo 10, www.qsrinternational.com), the use of multiple coders to increase reliability, and an extensive analysis of the coded findings. The proposed constructs and relationships depicted in Figure 1 will be refined.

Survey (Fall 2013)

A web-based survey will be developed and distributed to top management teams in organizations in the Canadian software industry. As specified above, the organizations will be selected using the Dun & Bradstreet directory. The Standard Industrial Classification (SIC) codes to be used to identify appropriate organizations range from 7370-7375[2]. Online surveys offer several advantages for researchers because they are easier to deliver and are more cost and time efficient than paper-based surveys. Additionally, past research has shown that the use of different survey presentation formats (e.g., paper-based or online surveys) does not alter result quality (Gosling, Vazire and Srivastava, 2004).

Items for each construct, originally derived from the literature, will be refined as needed, following the case studies. The potential development of new constructs identified during the case studies, as well as the refinement and contextualization of existing construct measures, will be done by following the steps suggested by Lewis, Templeton and Byrd (2005). First, findings from the case studies will help to refine the definitions of constructs and the pool of questionnaire items. Additionally, face validity will be evaluated during a pre-test phase where research experts will assess the proposed items on their construct representativeness, and an item-sorting exercise will be conducted (Moore and Benbasat, 1991). The final stages advocated by Lewis and colleagues (2005) pertain to the evaluation of convergent and divergent validity, as well as reliability, and can be addressed by analyzing preliminary data, using statistical procedures such as exploratory and confirmatory factor analyses.

Our target organizations are of medium and large sizes. Service organizations between 50 and 499 are categorized as medium-sized organizations, while large organizations count 500 employees or more (Industry Canada, 2012). An initial review of the target software industry organizations provides a sample of about 500. Based on prior IS research involving multiple respondents from top management teams (e.g., Chan, Huff, Barclay and Copeland, 1997), and following common reminder procedures, we expect a return rate of about 20%, which will provide us with a usable sample of about 100 organizations with matched top management team respondents. Data will be provided by two vice presidents or their designates - one who can describe the organization's environment, strategy and competitive actions, and a second who can describe organizational processes and the roles played by information systems and technology.

Following data collection, data analysis will be conducted using structural equation modeling (SEM). Specifically, Partial Least Squares (PLS) will be used because it allows for the modeling of latent constructs, the testing of exploratory relationships by relaxing the normal distribution assumptions, and the use of smaller samples (Gefen, Straub and Boudreau, 2000). SEM tools such as PLS allow for simultaneous testing of the structural and measurement properties of research models (Gefen et al., 2000). The measurement properties (reliability, convergent validity, and discriminant validity) of the final versions of the survey research instruments will be assessed, and the strength and significance of the proposed relationships between constructs reported.

Follow-up Interviews (Winter 2014)

Following the analysis of quantitative data, a small subset of organizations will be selected from the list of companies participating in the survey[3]. Follow-up interviews will be conducted by phone or in person with top management team representatives to better understand the survey results. The objective will be to obtain additional insights into surprising or non-significant findings. Rather than being left to conjecture why there are unexpected results, we hope to receive practical

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[2] SIC7370-Computer and data processing services; 7371-Computer programming services; 7372-Prepackaged software; 7373-Computer integrated systems design; 7374-Data processing and preparation; 7375-Information retrieval services

[3] Questionnaire respondents will be asked to indicate whether they are willing to participate in follow-up interviews.

explanations directly from the field. Consequently, interview protocols will be semi-structured and will include specific questions related to survey results that require additional insight and understanding.

LIMITATIONS AND EXPECTED CONTRIBUTIONS

Limitations

We foresee at least two study limitations. First, improvisation is a multilevel phenomenon (Crossan et al., 2005; Miner et al., 2001) that exists at the individual, team and organizational levels with different enablers and consequences. Although our research examines the organizational level, we recommend that future research addresses improvisation at lower levels of analysis, to complement our study. Second, we rely on perceptual, subjective data gathered from key informants. Recommendations outlined in Podsakoff, MacKenzie, Lee and Podsakoff (2003) will be followed to increase the validity of the subjective data gathered. Specifically, every effort will be made to address issues related to item characteristics (such as social desirability) or item context (such as priming) by carefully wording, and structuring, interview and survey questions. Common method bias can also be an issue when respondents answer questions both on independent and dependent variables. However, we will use matched respondents. We will also design the research instruments to mitigate common method bias. Additionally, statistical tools will be used to evaluate whether common method bias affects our survey findings, and to assess construct validity.

Expected Contributions

Studying the role of IS within organizations to facilitate improvisation in turbulent environments has both theoretical and practical merit. As we described, many enablers of improvisation, such as organizational structure, memory and information flows, are closely linked to information systems. This study aims to examine how IS, by permeating the organization and supporting employees in many different ways (e.g., through the use of knowledge management systems, organizational memory systems, and social network systems), can facilitate structured improvisation and indirectly contribute to organizational performance. This research also benefits from two theoretical lenses, that is, organizational learning and dynamic capabilities. By comparing and combining these two perspectives, we hope to demonstrate that IS, through improvisation, can lead to internal improvements, e.g., in organizational learning and memory, and externally, to increased competitiveness. The research findings should enhance our understanding of the role of improvisation as a dynamic capability, and of how IS capabilities are used in the pursuit of competitive advantages.

In organizations dealing with highly turbulent environments such as those in the software industry, improvisation is part of the daily activities of many managers who are constantly required to evaluate opportunities that impact survival and growth. This research hopes to provide managers with practical details on how IS strategy can facilitate structured organizational improvisation that builds on existing routines, processes and capabilities while allowing for fast and creative marketplace action.

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