Organizational Agility – Testing, Validity, and Reliability of a Diagnostic Instrument

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The purpose of our research is to test the reliability and validity of a diagnostic instrument developed to evaluate multiple dimensions of organizational agility in a complex system comprised of culture, leadership, systems, and people. Data from survey responses from 1,162 participants from multiple departments in a city government in the Southeastern USA were gathered in 2014 and was then subjected to independent testing. Results of the statistical testing using factor analysis, principle component analysis (PCA), and Cronbach's alpha provide strong support for the diagnostic instrument as a valid and reliable tool to assess the perception of the components and dimensions of organizational agility.

INTRODUCTION

The rate of change powered by technology, globalization, and complexity has been increasing for decades (Salmador & Bueno, 2007; Sena, 2013). Business leaders throughout the globe are faced with continuously changing environments where threats and opportunities appear rapidly making the need for fast and effective adjustments critical for success. Without organizational agility which is commonly regarded as "the ability to remain flexible in the face of new developments, to continuously adjust the company's strategic direction, and to develop innovative ways to create value" (Weber & Tarba, 2014, p. 5) organizations lack a key resource for an adequate decision-making process in the 21st Century. In this regard, organizational agility should be seen as a core competency that generates a competitive advantage and is a strategic differentiator becoming imperative for survival rather than a business choice (Harraf et al. 2015).

Yet traditional organizational structures are not built for speed and are typically unable to make the adjustments needed to quickly adapt to changes. Typical organizational designs are essentially anti-

change burdened with rigid leadership hierarchies, organizational structures, information systems that are not aligned with current demands, and corporate cultures with an inertia that resists new ideas or processes (de Jager, 2004; Scott, 1981; Scott & Davis, 2003). The result is that identifying and implementing meaningful change in many, if not most organizations, is difficult if not virtually impossible. Executives increasingly recognize the critical need for change in the form of organizational agility when confronted with strong natural forces against change must find a way to overcome organizational the inertia to prosper in the 21st Century (de Jager, 2004; Hopkins, Mallette & Hopkins, 2013). Teece, Peteraf and Leih (2016) suggested that such a dynamic and fluid environment requires dynamic capabilities to navigate extreme uncertainty generated by innovation and dynamic competition. Agile organizations must develop dynamic capabilities to be successful in the 21st Century. Part of the typical problem in many organizations is that senior management at the top of the hierarchy takes too long to make effective decisions. Agility therefore requires implicit leadership that facilitates knowledge sharing, seeks consensus, trusts people, delegates more, and provides an environment for people to maximize inherent tacit knowledge (Nold, 2012).

The concept of agility originated in the context of designing flexible, manufacturing operations (Sherehiy, 2008). Steadily the agility concept was applied to other functional areas such as information technology (Kassim & Zain, 2004), supply chain (Lin, Chui & Chu, 2006), human resources (Dyer & Shafer, 1999; Breu, Hemingway, Strathern & Bridger, 2001). More global efforts to describe attributes of agile organizations as a whole have emerged in books primarily by consultants and a few researchers. Books on the subject of agility and change by Hamel (2012), Worley, Williams, and Lawler (2014) and others, while interesting reading, were often based on qualitative observations from case studies and have typically lacked empirical testing of the proposed models or methodologies. Research on the global construct of organizational agility typically lacks suggestions on how to convert theory to practice or offer practical measurement tools (Charbonnier-voirin, 2011; Sherehiy, 2008).

Grantham, Ware and Williamson (2007), Doz and Kosonen (2008), Harraf et al (2015) and Hamel (2012) are representative of the vast majority of authors on the topic of organizational agility who developed models using qualitative methods from case studies and interviews with key leaders. Sharehiy (2008), Verdú and Gómez-Gras (2009), and Charbonnier-voirin (2011) represent a very small number of researchers who introduced models for organizational agility, assessment tools, and offer empirical evidence supporting the model. Verdú and Gómez-Gras (2009) observed that "existing models [of organizational flexibility and agility] have not been sufficiently validated by means of quantitative surveys" (p. 682).

The objective of the study is to help bridge the gap between practice and academic theory by testing a practical model of organizational agility along with a diagnostic instrument to assess multiple dimensions of organizational agility. Responses to the assessment instrument from one organization were subjected to independent empirical testing to provide quantitative testing of the model's constructs and validity and reliability of the assessment tool. Our work contributes to the literature on organizational agility by evaluating the validity and reliability of a diagnostic survey instrument of organizational agility.

ORGANIZATIONAL AGILITY DEFINED

Multiple researchers and theorists have proposed definitions for the global construct of organizational agility. Teece, Pereraf and Leih (2016) referred to "agility as the capacity of an organization to efficiently and effectively redeploy/redirect its resources to value creating and value protecting, (and capturing) higher-yield activities as internal and external circumstances warrant" (p.17). Verdú and Gómez-Gras (2009) used the term organizational flexibility with subsets of internal and external strategic, structural, operational, and managerial flexibility.

Haneberg (2011) defined agility as the efficiency with which organizations respond to continuous change by consistently adapting. Charbonnier-voirin (2011) suggested that agility is demonstrated by organizations ability to sense and react quickly to change in the environment through anticipation, innovation, and learning. Sherehiy (2008) described agility as a strategic ability of the organization to

adapt and adjust rapidly to unanticipated and sudden changes in the market. Verdú and Gómez-Gras (2009) described the dynamic capabilities of an organization as a system consisting of multiple resources (technology, people, finances, knowledge, etc.), processes (operations, tasks, routines, etc.), and managerial functions (strategizing, organizing, planning, leading, etc.). Recurring themes from these and many other authors and researchers are the attributes of adaptation, speed, sensing, innovation, and learning (Dyer & Shafer, 2003; Kassim & Zain, 2004; Tsourveloudis & Valavanis, 2002).

Michel (2013) and Nold and Michel (2016) defined organizational agility as the ability to make countless small adaptations in response to nonstop change that result in changing the fundamental building blocks of the organization. The Michel (2013) model incorporates components suggested by multiple researchers. Similar to Verdú and Gómez-Gras (2009), Michel describes an organization as a dynamic and complex system consisting of organizational culture (underlying beliefs and values), systems (operations, processes, routines), and leadership (strategizing and leading) that is powered by people through collaboration, relationships, and shared purpose. Harraf et al. (2015) developed a framework for organizational agility with ten pillars including a culture of innovation, vision, communications, tolerance for ambiguity, and learning organization which are elements of the Michel model. Michel suggested that in today's business environment, companies must consciously develop dynamic capabilities to be agile and adaptable to respond rapidly in small increments to internal and external changes that ultimately change the leadership, systems, and culture allowing the firm to survive and be successful in a different environment which is consistent with numerous other theorists (Alzoubi, Al-otoum & Albatainh, 2011; Doz & Kosonen, 2008, Harraf at al., 2015). Accelerating the speed of change is essential for success in a VUCA (volatile, uncertain, complex, and ambiguous) environment therefore the development of a practical diagnostic instrument to assist executives quickly pinpoint unseen weaknesses is essential for rapid and effective action.

MODELS FOR ORGANIZATIONAL AGILITY

Grantham, Ware and Williamson (2007) suggested that success in the 21st Century volatile, uncertain, complex, and ambiguous (VUCA) environment depends on an organizations ability to continuously evaluate market conditions, reexamine and revise corporate strategies, and reallocate resources quickly. Continuous environmental change requires collaborative strategic management (CSM) that describes a dynamic decision-making process designed to engage key players at all levels of the organization.

Doz and Kosonen (2008) proposed an organizational model called fast strategy intended to create an organization with the ability to move quickly to adapt to continuous change and volatility. The objective of fast strategy is to provide an organizational framework that enables the company to maintain momentum while continuously redirecting and/or reinventing the core business. According to Doz and Kosonen (2008) in order to become agile in today's economic markets, enterprises must develop three key dimensions within their organizations. Strategic sensitivity, collective commitment, and resource fluidity are required to continuously adjust and adapt the strategic direction of the core business.

The Sharehiy (2008) model was developed by a thorough review of existing relevant literature and consists of three major constructs; agility strategy, workforce agility, and work organization with multiple sub-constructs or dimensions describing detailed behaviors or conditions for each major construct. Data was collected via a survey instrument administered to managers and workers of six small enterprises using a 7-point Likert-type scale and validated using Cronbach's alpha and factor analysis to test reliability along with other descriptive statistics. Results of the survey instrument provided positive evidence for many of the major and sub-constructs and the agile organizations outperformed organizations subscribing to lean methodologies.

Hamel (2012) suggested that innovation is at the core of agile organizations. Enabling adaptability in organizations requires a modification in aspirations, behaviors, and management systems. Organizations should be built around people to leverage critical thinking, innovation, and problem solving abilities. Adaptable organizations are characterized by decentralization, emphasis on community, transparency in

decision-making, leadership accountability, rewards systems aligned to contributions, peer reviews, and enlarged self-determination (Hamel, 2012).

Harraf et al. (2015) contributed to the literature on organizational agility by proposing a theoretical framework consisting of ten pillars. The ten pillars are: a culture of innovation, empowerment, tolerance for ambiguity, vision, change management, organizational communication, market analysis and response, operations management, structural fluidity and a learning organization. The authors conclude that understanding the degree to which an organization subscribes to the ten pillars may help executives guide organization through turbulent times but do not offer a way to measure the strength or the pillars.

Verdú and Gómez-Gras (2009) evaluated responses from 417 CEO's at companies in the European Union. Participants were asked to evaluate their perception of their company in relation to similar companies relative to where the company is today and where it should be now and in two years using a 7-point Likert type instrument. The suggestion is that identifying the perceived gap between where a company is and where it needs to be to remain competitive by executives is a first step to help executives develop actions to improve organizational flexibility. Beginning with 28 items Verdú and Gómez-Gras ultimately concluded that 11 items effectively evaluate internal and external structural and strategic flexibility which can be useful to business leaders.

The Charbonnier-voirin (2011) model emerged after a lengthy literature review and a qualitative study carried out with 22 human resources directors and managers. The objective of the study was to begin development of a useful diagnostic tool to predict organizational agility and help identify potential areas of strength and weakness. The emergent model consisted of four practices that were identified in the qualitative part of the study to be drivers of agility; practices directed toward mastering change, practices valuing human resources, cooperative practices, and practices of value creation for customers each with numerous sub-constructs and practices. The 7-point Likert type survey instrument that was developed based on the model was administered to a control group of 102 managers and a final sample of 135 managers at French companies representing multiple industries. Exploratory and confirmatory factor analyses were used to test for reliability and validity. Results of factor analyses suggest that the survey instrument developed by Charbonnier-voirin contained a highly satisfactory level of reliability and validity.

Recurring as an underlying, but critical, theme throughout the literature is the need for clearly defined and effectively communicated mission, vision, and values of the organization. Shared purpose and commitment to organizational mission, vision, and values becomes critical components for any change effort (Charbonnier-voirin, 2011; Hertz, 2006; Longenecker & Ariss, 2009). Doz and Kosonen (2008) and Sherehiy (2008) proposed strategic sensitivity and collective commitment as essential conditions for effective change. Hugos (2009) suggested the need for increased coordination across complex organizations while decreasing central control. Nold (2012) identified knowledge sharing and trust as key components to access tacit knowledge reservoirs while Charbonnier-voirin (2011) and Hamel (2012) suggested that adaptable organizations are characterized by decentralization, emphasis on community, and enlarged self-determination among other attributes. Critical to effectively adopting any change program is the need for the people to share in the goal and believe in the higher purpose.

The need for rapid and effective decision-making, use of knowledge embedded in the minds and experience of people, and innovation are also recurring themes throughout the literature on corporate agility, adaptability, and change (Doz & Kosonen, 2008; Grantham, Ware & Williamson, 2007; Hamel, 2012; Hugos, 2009; Sherehiy, 2008). Every innovation regardless of the type requires thorough evaluation, approval, and dedication of resources to be implemented. People are at the heart of identifying potential innovations and navigating the decision-making process. Clearly, determining what must be done, how to do it, and making it happen quickly demands that organizational leaders maximize all available assets, the most important of which is the reservoir of knowledge that resides within the minds and experience of diverse people scattered throughout the organization (Hamel, 2012; Nold, 2013; Nonaka & Toyama, 2005). Coordinating all of these moving parts in a fast-paced, complex, and volatile environment and doing so quickly are the essential elements of the agile organization. The speed and effectiveness of the decision-making process either enables or inhibits organizations ability to reconfigure

as needed to take advantage of new value opportunities as windows of opportunity open (Maitland & Sammartino, 2012).

THE MICHEL MODEL

Structure and Dimensions of the Michel Model

The Michel model incorporates many elements of prior models and expands on others elements needed to promote corporate agility (Michel, 2013; Nold & Michel, 2016). As shown in Figure 1, the model is composed of three primary components: systems, leadership, and culture. At the heart of the model are people who power the complex and interrelated system by contributing unique experience, expertise, and skills through collaboration, purpose, and relationships. Each component has multiple observable dimensions. The model provides a framework with dynamic capabilities as the measures of success in the new era.

FIGURE 1
THE MICHEL MODEL

Culture

Culture of the organization creates shared context, enables or inhibits knowledge exchange, and defines invisible the boundaries of collaboration. A vibrant culture establishes shared context as the common ground with a shared agenda, language, mental models, purpose, and, relationships (von Krogh, Ichijo & Nonaka, 2000). Shared context describes a shared mindset and the behavior of individuals based on shared norms, beliefs, values, and assumptions. The organizational culture becomes the invisible force that, like gravity, shapes all interactions within the universe that the organization exists.

Organizational culture either enables knowledge sharing or is a barrier to sharing even simple pieces of information (Nold, 2012). Becarra-Fernandez, Gonzalez, and Sabherwal (2004) suggested that 80% of the total amount of knowledge in an organization exists in the minds of people, not in databases, operating procedures, work instructions or any other explicit form. More recently, Suppiah and Sandhu (2011) found that 90% of organizational knowledge is tacit in nature. Any condition that inhibits the free flow of knowledge between people throughout the organization acts like an infection that diminishes the ability of the organization to use that knowledge. An infected culture is one of the main roadblocks to knowledge transfer in an organization (Ruggles, 1998). Similar to a virus infecting living organism, organizational traits like autocratic leadership styles, silos, or lack of trust and respect throughout the organization effectively block knowledge sharing. Unseen or unnoticed virus' make culture an

organizational bottle-neck that constrain the amount and quality of knowledge sharing limiting the creativity of people, the ability to act, and disrupting flow.

Collective thoughts, decisions, behaviors, and actions require direction, alignment, and coordination. Knowledge that is not shared, exchanged, and transferred has no value to an organization. Similarly, knowledge for the sake of knowledge has little value, which is why collaboration, the base of the Michel model in Figure 1, is critically important. The challenge for any executive is to create a culture that facilitates people working together on tasks that add value to the organization. Effective collaboration requires a shared problem and commitment with people working together with shared way of doing things. Furthermore, Brannen and Doz (2012) stressed the importance and challenges of a shared corporate language as enablers of strategic agility.

The dimensions for culture within the Michel model are:

- Understanding – Do people share an understanding of where the organization is and where it is going or attempting to go?
- Intent – Do people share a common intent of how to move the organization forward to meet goals and objectives?
- Agenda – Do people share a common agenda on what needs to be done to move the organization toward meeting goals and objectives?
- Aspirations – Do people share a common sense of purpose to meet goals and objectives?
- Norms – Do people share a common set of norms of behavior needed to get ahead within the organization?

Leadership

Leadership is a key component of the Michel model. Effective leaders in agile organizations interact with people on a personal level, relate to others to facilitate meaningful collaboration, and establish a supportive work environment based on trust (LaRue, Childs & Larson, 2006). Leadership, in the broadest sense, is characterized by effective communication and interaction with others at all levels throughout the organization. Successful leadership varies by organization and situation. A leadership style that is successful in one organization in a specific situation many not necessarily be effective if applied in a different organization or situation. However, the need for effective communication skills and interaction with followers are recurring themes in the literature (Haneberg, 2011; Hugos, 2009; Ulrich & Smallwood, 2003). It becomes essential for effective leaders in an agile organization to develop effective communication and interaction skills that are natural and unique to the leader and organization. Ultimately, what is important is that the individuals in the organization adopt shared vision, collaborate in a culture of trust, and engage multiple personalities, while leaders' champion creativity and experimentation. Specific communication and interaction strategies will vary from organization to organization and leader to leader but the overriding, primary, objectives are for shared vision, collaboration, and positive relationships to become integrated into the culture of the organization.

The dimensions for leadership in the Michel model are:

- Sense making - Do leaders have the capability to sense changes in internal and external environments and interpret meaning?
- Strategy conversion – Do leaders have an understanding of why the organization has established strategic goals and are goals founded on lessons from the past?
- Performance conversion – Do leaders have a clear understanding of whether the organization is on track, what needs to be done to remain on track, and what needs to be done to achieve superior performance?
- Contribution dialogue – Do leaders have a clear understanding of what they can do to contribute toward moving the organization forward? Do leaders clearly understand their role?
- Risk dialogue – Do leaders have a clear understanding of the potential risks and the level of risk that the organization can tolerate?

Systems

In the Michel model, systems represent the institutional framework with rules, routines, and tools that set the stage for rigorous and disciplined leadership. Technology based information systems accumulate, store, process, and provide access to information and facilitate immediate feedback. Human systems in the form of rules, routines, and guidelines of many types provide frameworks that give technology structure and relevance. The roles of systems is to create meaning while balancing top down direction with bottom up creativity. Systems support implementation with the right balance between freedom and constraints to maintain control. To support collaboration among people, systems make information available to assist people to find purpose and support formation of beliefs and decisions. In addition, systems set boundaries balancing entrepreneurship with efficiency.

The dimensions for systems in the Michel model are:

- Information – Do decision makers at all levels have access to timely and relevant information to know what is going on inside and outside the organization to make informed decisions?
- Strategy – Do leaders and followers clearly understand the rules of the game and what is needed to achieve strategic and operational objectives?
- Implementation – Do decision makers throughout the organization clearly understand what actions are needed to be successful?
- Beliefs – Do decision makers throughout the organization have a shared ambition to support organizational objectives?
- Boundaries – Do decision makers throughout the organization have a firm understanding of boundaries or limits to their decisions or authority?

People

Individuals perform at their highest potential by winning their "inner game" and overcoming self-doubt, fear, bias, limiting concepts or assumptions that distort perceptions, decisions, behaviors, actions and stress that interfere with, and diminish, performance (Galwey, 2000; Whitmore & Galwey, 2010). Awareness about what is going on around them, choice to choose the best solution, and trust in others help people to focus attention on tasks and problems. Reaching a state of flow, the state where performance and creativity are at a peak, must be a primary objective at all levels of an agile organization (Csikszentmihalyi, 1997).

Control systems are needed to manage both evolutionary and revolutionary change by formalizing beliefs, setting boundaries on acceptable strategic behavior, defining and monitoring performance variables, encouraging debate, and discussion about uncertainties, communicating new strategies, establishing targets, and securing attention to new strategic initiatives (Simons, 1994). Unfortunately, most traditional management systems or processes do more to interfere with people and their ability to perform than to enhance performance (Drucker, 1957). Interactive leadership and diagnostic systems play an important role in creating a work environment where people succeed in 'playing the inner game'.

The dimensions for people in the Michel model are:

- Focus – Are people allowed to focus attention and energy on tasks? Are interferences preventing people from focusing their abilities to complete tasks?
- Awareness – Are people aware of forces that influence actions and decisions?
- Trust – Do people trust co-workers and management to be treated fairly and with respect? Is management credible?
- Choice - Are people allowed the freedom to use their own creative ability to solve problems, respond to customers, or to be innovative?

Collaboration, Purpose, and Relationships

The result of a high-energy work environment results an intense collaboration, a high sense of purpose and trusting relationships. These features have a stabilizing effect on organizations known as resilience or 'robustness' (Beinhocker, 1999; Deevy, 1995). Organizations reach higher levels of

resilience through collaboration (Doz & Baburoglu, 2000), purpose, and relationships (Alpaslan & Mirtroff, 2004) as cooperative strategies (Dyer & Singh, 1998). Companies are able to reinvent themselves and find new business models while the preserving core competencies (Coutu, 2002; Hamel & Valikangas, 2003).

The dimensions for the sides of the Michel model are:

- Relationships – Do co-workers and management have and maintain healthy, trusting, relationships?
- Purpose – Do people share a common higher purpose for the organization and organizational objectives?
- Collaboration – Do people collaborate effectively by sharing knowledge to achieve common goals and objectives?

QUANTITATIVE ANALYSIS OF THE MICHEL DIAGNOSTIC INSTRUMENT

Making a precise and relevant evaluation of the agile capability of an organization is inherently difficult because of the vagueness, multidimensional, and complexity of the phenomenon (Lin, Chiu & Chu, 2006; Tsourveloudis & Valavanis, 2002). The Michel model emerged over 10 years from information gathered from case studies and analysis of survey data from 102 organizations in different industries throughout the world between 2004 and 2014. The current form of the resulting diagnostic instrument represents a synthesis of both qualitative and quantitative analysis throughout the 10-year period. Sherehiy (2007) and Verdú and Gómez-Gras (2009) observed that tools developed to evaluate organizational agility have rarely been supported by empirical testing. Part of the reason for the lack of empirical testing is that relevant factor analysis requires data from a large sample, typically over 500 participants, during the same time period. All of the cases used to develop the Michel model and diagnostic instrument had less than 500 participants, except one. However, application of the diagnostic instrument with a large organization in 2014 provided a unique opportunity for independent statistical testing conducted by faculty at a major university in Germany.

The Sample

The sample consists of employees of a mid-size city government in the southeastern United States. A series of highly publicized scandals in the city resulted in the recommendation by a select committee of citizens for a survey of the culture and morale of the all city employees. The Michel diagnostic tool was selected after comparison to multiple "morale survey's" because the model provided greater depth and insight into the organization as a system and contributors to "morale" as well as the high degree of perception for change. 1,162 employees participated out of a total employee population of 2,400 (48.4% participation rate). Participants were asked to identify the department in which they work and whether they were a top executive (department or assistant department head), supervisor (anyone below department head with supervisory responsibility), and employees (anyone with no supervisory responsibility). Figure 2 shows the distribution of all participants horizontally by management level and vertically by department. Departments with less than ten employees were grouped into "Other" to protect the confidentiality of individual respondents.

FIGURE 2
DISTRIBUTION OF SAMPLE PARTICIPANTS

	Total	Electric Utility	Finance	Police	Airport	Community Dvpt.	Parks & Recreation	Information Technology	Water Utility	The Lakeland Center	Fire	Public Works	Other
Executives	38	8	2	2	1	1	2	1	1	2	2	2	14
Supervisors	421	86	15	39	5	17	74	17	47	21	29	50	20
Employees	703	162	23	94	6	34	103	37	75	12	47	65	45
Total	**1162**	**256**	**40**	**135**	**12**	**52**	**179**	**55**	**123**	**35**	**78**	**117**	**79**

Design of the Diagnostic Instrument and Data Gathering

The diagnostic instrument consists of 55 statements worded to provide insight into the strength of perception by employees to answer the questions represented by the dimensions of the Michel model discussed in section 4. Participants were asked to rate perceptions on a 9-point Likert type scale ranging from very strongly disagree (1) to very strongly agree (9). Questions were worded such that senior executives were asked to evaluate the strength of the dimension within the departments in their area of responsibility. All other participants were asked to evaluate perceptions within their work group or department. This approach provided visibility into gaps between what executive and employees perceive on the same construct.

Due to the size and diversity of the sample, responses were collected in multiple ways. Responses were made electronically, transmitted through the internet, and stored on a secured server for analysis and interpretation. With full cooperation of the information technology department, links to the diagnostic instrument were transmitted to executives via email while all other participants were allowed access to the instrument on computers at their work stations. Kiosks were set up and made available to all employees who did not have a permanent work station. All participants were given time while on the job to participate and several videos were created and transmitted to all participants explaining the reason for the project, how the process works, and to provide assurance of confidentiality. Employees had ten days in May 2014 to participate. At the conclusion of the data gathering window, raw data was transmitted to the independent research team in Germany for analysis.

Test Methodology

Similar to Charbonnier-voirin (2011) exploratory factor analysis was performed to assess the validity of the individual dimensions of agility in the Michel model with Cronbach's alpha to determine internal reliability of the primary constructs. The factor structure and psychometric qualities of the model were successfully analyzed using SPSS 23.0. Principle Component Analysis (PCA) with varimax rotation with Kaiser normalization was employed in order to test the dimensionality of the construct. PCA is often used in the development phase of a questionnaire (Roussel, 1996). The purpose of PCA is to retain enough items to characterize the phenomenon. Similar to Roussel (2005), items with factor loadings below 0.5 were eliminated from the PCA analysis.

For the PCA the seven primary constructs of the Michel model were clustered into three groupings. Effective leadership is strongly influenced by systems that provide timely and relevant information to key decision makers. Conversely, leadership styles strongly influence the design and implementation of

systems. Therefore, leadership and systems are grouped into cluster 1. Culture, representing unseen values, beliefs, and shared assumptions represents a very strong influence on the behavior of people, leaders, and systems is cluster 2. The entire system is powered by people through relationships, collaboration, purpose and focus therefore the people-centric constructs are aggregated into cluster 3.

RESULTS

As seen in Table 1, results of exploratory factor analysis on the specific dimensions of the Michel model are all greater than 0.5 with 13 of 20 (65%) factor loadings above 0.70. Factor loadings for dimensions of leadership are particularly high with 4 of 5 above 0.80. The results suggest that the statements used to evaluate the dimensions comprising the Michel model have high levels of validity with those that evaluate dimensions of leadership particularly strong. Since all of the dimensional items have factor loadings greater than 0.5, all were included in the subsequent PCA analysis.

Cronbach's alpha for the major constructs of culture, leadership and people were all above 0.80 demonstrating good internal validity. Cronbach's alpha for systems and the connectors of the model indicate questionable internal validity. Low alphas for systems and the connectors may partially be due to the few number of items. Cronbach's alpha for all three clusters is above .81 suggesting strong internal validity.

The correlations matrix is shown in Appendix A indicates strong correlations among the various elements and all are statistically significant.

TABLE 1
CONSTRUCT RELIABILITY, DESCRIPTIVE STATISICS, FACTOR ANALYSIS, AND PCA DATA

		Instrument Tests				Principal Component Analysis (PCA)		
						Cluster 1	Cluster 2	Cluster 3
Michel Model Component	Dimension	Chronbach's Alpha	Mean	SD	Factor Loading	Leadership & Systems	Culture	People Relationships Purpose Collaboration
		α →				0.83	0.81	0.81
Culture		0.81						
Culture	Understanding		7.22	1.94	0.60	0.37	0.59	0.25
Culture	Intent		6.40	2.33	0.73	0.37	0.75	0.26
Culture	Agenda		6.25	2.39	0.68	0.25	0.87	0.22
Culture	Aspirations		6.10	2.36	0.72	0.29	0.85	0.29
Culture	Norms		6.05	2.35	0.75	0.32	0.83	0.29
Leadership		0.83						
Leadership	Sense Making		6.58	2.38	0.83	0.80	0.35	0.24
Leadership	Strategy Conversation		6.40	2.44	0.79	0.78	0.30	0.28
Leadership	Performance Dialogue		6.48	2.34	0.82	0.84	0.32	0.20
Leadership	Contribution Dialogue		6.52	2.37	0.80	0.84	0.30	0.19
Leadership	Risk Dialogue		6.36	2.56	0.82	0.81	0.27	0.29
Systems		0.58						
Systems	Rules		5.93	2.30	0.69	0.56	0.31	0.33
Systems	Routines		6.34	2.24	0.73	0.53	0.36	0.42
Systems	Tools		6.57	2.18	0.74	0.61	0.61	0.42
Connectors		0.67						
Connectors	Collaboration		6.96	2.21	0.62	0.20	0.20	0.81
Connectors	Relationships		7.23	1.96	0.62	0.22	0.22	0.84
Connectors	Purpose		6.48	2.29	0.74	0.53	0.53	0.59
People		0.81						
People	Focus		5.90	2.25	0.66	0.45	0.19	0.53
People	Awareness		6.10	2.18	0.77	0.65	0.21	0.50
People	Trust		6.77	2.08	0.62	0.27	0.32	0.71
People	Choice		6.06	2.33	0.68	0.52	0.23	0.56

Results from the PCA analysis shown in Table 1 shows a clear factor structure supporting the major constructs of the model. After six iterations three distinct factors emerged for each of the three clusters. The results reveal that 19 of the 20 the dimensions have factors greater than 0.5 suggesting that the diagnostic is a good fit with the model.

Because of the tight interrelationship leadership with systems, the dimensions comprising leadership and systems in the model were grouped into cluster 1. All of the factors are above 0.5 in cluster 1 however leadership and systems are commonly separated in the literature. Further work is advisable to analyze each attribute separately. One possible approach might be to simplify some of items to provide a greater distinction between leadership and systems. Interestingly, three dimensions associated with people in cluster 3 (purpose, awareness, choice) also have factor weightings above 0.5 indicating a possible strong association with leadership and systems.

Cluster 2 is made up of dimensions of culture in the model. All of the factor weightings are greater than 0.5 suggesting that the model is consistent with the literature dedicated to culture. Three (agenda, aspirations, and norms) having factors greater than 0.8 suggesting a particularly strong association or influencing component of organizational culture. Interesting, two items (tools and purpose) outside of the culture cluster have factor weighting greater than 0.5 suggesting possible relationships with culture.

Cluster 3 aggregates the group of dimensions corresponding to intra- and inner-people-centric dimensions of the model. The only item below 0.5 is awareness, however, 0.495 is only .005 away from the 0.5 threshold therefore awareness is also included and considered relevant. The results are consistent with the literature dedicated to human performance. Interestingly, the people dimension of purpose yields factor weightings above 0.5 in all three clusters suggesting that people in organizations who share a common purpose can have a significant influence in all aspects of the organization and are instrumental in an agile organization.

The overall results offer strong evidence that the components of Michel model for organizational agility; culture, leadership, systems, and people when aligned contribute to agile organizations and that the diagnostic instrument has a good level of validity and reliability.

DISCUSSION AND IMPLICATIONS

Theoretical Contributions

Despite a growing volume of literature on attributes of organizational agility by researchers and practitioners, much of the existing work has been theoretical in nature lacking empirical testing (Charbonnier-voirin, 2011; Sherehiy, 2007). Much of the literature has focused on proposing theoretical models with few attempts to develop a valid and reliable diagnostic instrument to evaluate the construct as a whole. We tested a multi-dimensional construct for organizational agility as a whole and subject survey results from one organizational subject to independent statistical testing by an independent team from a major university. Factor loadings and Cronbach's alpha show that the diagnostic instrument offers a satisfactory level of reliability and validity. Results from the PCA indicate indicate strong relationships among the components for each cluster of dimenstions; leadership and systems, organizational culture, and people. The model and diagnostic tool contributes to the current body of literature on organizational agility and offers a methodology for future theoretical and empirical research of the construct as a whole.

The results demonstrate that a dynamic interrelated system of culture, leadership and systems that is powered by people through collaboration, relationships, and purpose represent key capabilities needed for agile organizations. PCA results for purpose are strong across all three clusters. Developing a workforce of people who share a common purpose appears to be particularly essential for agility. For future development of the model, Figure 1 should be updated, placing leadership and systems into one angle of the triangle with culture and people on the other angles.

Because the study was limited to responses from one organization we were limited in the statistical methods that were available. The sample organization was a governmental entity so further research is needed with for-profit companies in different industry sectors or varying size and national origin. Additional research using responses from a control organization is needed to test for reliability and other

key attributes. The diagnostic tool advances investigation into organizational agility by providing insight into key dimensions necessary for agile organizations and provides a baseline for continued research.

Practical Implications

Practitioners may be interested in the results because the model and diagnostic instrument offer practical insight into key unseen characteristics of an organization that have a strong influence on the organizations agile capabilities. The diagnostic instrument provides useful data for executives on key attributes of agility to focus efforts to change the current status. Synthesizing the results from diagnostic helps identify unseen gaps in the organization that are essential capabilities for an agile organization. The diagnostic tool also offers the ability to provide insight into different entities or departments or work teams to allow managers at all levels to convert the results to focused action.

Clearly, leadership, culture, systems, and people are not the only elements needed for agile organizations. Solutions to practical constraints on agility like fixed costs of corporate real estate (Grantham et al., 2007), resource fluidity (Doz & Kosonen, 2008), market analysis, operations management, and structural fluidity must (Harraf et al., 2015) confront executives. Based on our findings we suggest that executives who develop organizations to get the right knowledge to the right people at the right time in an environment where people share a common purpose and trust may access the vast resevour of tacit knowledge to find innovative solutions to practical constraints more effectively than competitors. Doing so could be a significant strategic advantage. Barrand (2006) stated that "a company is agile if its decision-making process is agile and if the principles of agility are widely accepted and shared. This must crystallize into agile behaviors" (pp. 130-131). The results of the study suggest that the Michel model and diagnostic instrument have the potential to inform leaders whether the dimensions of agility are widely accepted and shared in the organization and help provide a practical roadmap to develop a more agile decision-making process. The road toward developing agile capabilities in organizations is worth being followed both from academic and practitioner perspectives.

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