Information Culture and Information Use: An Exploratory Study of Three Organizations

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This research explores the link between information culture and information use in three organizations. We ask if there is a way to systematically identify information behaviors and values that can characterize the information culture of an organization, and whether this culture has an effect on information use outcomes. The primary method of data collection was a questionnaire survey that was applied to a national law firm, a public health agency, and an engineering company. Over 650 persons in the three organizations answered the survey. Data analysis suggests that the questionnaire instrument was able to elicit information behaviors and values that denote an organization's information culture. Moreover, the information behaviors and values of each organization were able to explain 30–50% of the variance in information use outcomes. We conclude that it is possible to identify behaviors and values that describe an organization's information culture, and that the sets of identified behaviors and values can account for significant proportions of the variance in information use outcomes.

Introduction

This research explores the link between information culture and information use in organizations that have recently undergone structural change. By information culture,

we mean the socially shared patterns of behaviors, norms, and values that define the significance and use of information. By information use, we are interested in the outcomes of applying and working with information as perceived and experienced by members of an organization. While we may expect information culture to form a vital component of an organization's information environment, the relationship between information culture and use has not been often examined. As an initial step to fill this gap, we pose these questions:

- Is there a way to systematically identify information behaviors and values that can describe the information culture of an organization?
- Are organizations differentiated by distinctive sets of information behaviors and values that reflect their characteristic information cultures?
- Assuming that we can describe and differentiate information cultures, do the observed information behaviors and values have a significant effect on information use "outcomes"?

The article is in five sections. Following this introduction, we review the literature and conceptual framework. The ensuing section discusses the research method. Data analysis and results are in the fourth section. The article closes with a summary and discussion. This research is a large, multi-site study of which other findings were reported in Bergeron et al. (2007), Choo et al. (2006), and Detlor et al. (2006a,b).

Literature Review and Conceptual Framework

Information Culture

In an early study on the subject, Ginman (1988) defined information culture as the culture in which "the transformation of intellectual resources is maintained alongside the transformation of material resources. The primary resources for this type of transformation are varying kinds of knowledge and information. The output achieved is a processed intellectual product which is necessary for the material activities to function and develop positively" (p. 93). Analyzing interviews with 39 CEOs, Ginman found a connection between CEO information culture, the company life cycle, and information interest and use. A highly developed information culture was positively associated with organizational practices that led to successful business performance. She concluded that information culture is a strategic goal and should be planned for as much as the transformation of physical resources. Ginman's work formed the impetus of a study, "Information Culture and Business Performance," supported by the British Library R&D Department (Grimshaw 1995). The study included a literature review of organizational culture and information culture by Abell and Winterman (1995). Ginman's research was also the stimulus of a study by Owens, Wilson, and Abell (1996) that investigated the relationship between effective information systems and business performance. Results showed the lack of a coherent information policy in many of the companies surveyed. The influence of information professionals was waning, and many firms emphasized internal information over external sources.

More recently, Curry and Moore (2003) define information culture as follows:

> A culture in which the value and utility of information in achieving operational and strategic success is recognised, where information forms the basis of organizational decision making and Information Technology is readily exploited as an enabler for effective Information Systems. (p. 94)

Information culture consists of these components: communication flows; cross-organizational partnerships; internal environment (cooperativeness, openness, and trust); information systems management; information management; and processes and procedures. Curry and Moore (2003) believe that the synthesis of information culture and organizational culture is an integral part of the process of becoming a knowledge-based organization:

> The organization first recognizes the need to adopt an information culture, then communicates the ethos and demonstrates commitment by restructuring to reflect the components of an information culture. The process is dynamic and continues until the philosophy and practice of an information culture become the norm. . . At this stage the information culture is no longer distinguishable from the organizational culture and the organization has evolved into one in which the availability and use of information are inherent in everyday activities. (pp. 95–96)

Oliver (2003), in her multiple case-study of organizational and information culture in distance-education institutions in Australia, Hong Kong, and Germany, argued that

> the values accorded to information, and attitudes towards it are indicators of "information culture" within organisational contexts . . . and that these values and attitudes are likely to be shaped by interactions within and across the various layers of organisational culture—national, occupational and corporate. (p. 288)

Orna (2005), drawing on three case studies of the UK Department of Trade and Industry, the British Galleries at the Victoria and Albert Museum, and a cooperative bank, concluded that "the information culture in organizations has a decisive influence on how information products [resources and services] are managed, and how effective they are" (p. 57).

For this study, we regard information culture as those elements of an organization's culture that influence its management and use of information. Thus, information culture is manifested in the organization's values, norms, and practices that have an impact on how information is perceived, created and used. *Values* are the deeply held beliefs about the role and contribution of information to the organization, as well as the principles that define how information ought to be created and used. *Norms* are rules or socially accepted standards that define what information behaviors are normal or to be expected in the organization. Norms may be explicit or implicit. Explicit norms are typically codified as guidelines and policies that specify information creation and use as part of organizational routines. Informal norms are not formally documented but are apparent in the day-to-day information activities of the group. By defining what behaviors are acceptable, informal norms are an important part of the socialization of the group. Norms may also be descriptive or injunctive: Descriptive norms describe what most others do in a situation, whereas injunctive norms are those behaviors of which most others approve or disapprove (Cialdini, Bator, & Guadagno, 1999). Thus, descriptive norms are concerned with actual behavior, while injunctive norms refer to attitudes or what people believe to be right based on values. Values and norms together mold the information *practices* of people and groups in an organization. Information practices are the observable, stable patterns of working and interrelating that link people, information, and technology in the social performance of organizational work. Insofar as information practices are enacted by a social structure of roles, rules, and warrants, they are a manifestation of cultural norms and values.

Marchand, Kettinger, and Rollins (2001) surveyed over a thousand senior managers from nearly as many companies operating in 22 countries and 25 industries in an attempt to answer the following question: "How does the interaction of people, information and technology affect business performance?" Results of the study showed that three "information capabilities" constitute an organization's *Information Orientation* that predicts performance. An organization needs to be strong in all three capabilities in

order to realize superior results. The three information capabilities are as follows:

- *Information Technology Practices*: the capability to effectively manage IT applications and infrastructure to support operations, business processes, innovation, and managerial decision making.
- *Information Management Practices*: the capability to manage information effectively over the life cycle of information use, including sensing, collecting, organizing, processing, and maintaining information.
- *Information Behaviors and Values*: the capability to instill and promote behaviors and values in people for the effective use of information.

As part of our conceptual framework, we use the six information behaviors and values identified by Marchand et al. (2001) to characterize the information culture of an organization: information integrity, formality, control, sharing, transparency, and proactiveness. *Information integrity* is defined as the use of information in a trustful and principled manner at the individual and organizational level. It sets boundaries beyond which people may not go. It implies that there are ways of using information that are *not* appropriate and will be sanctioned (p. 121). *Information formality* is the willingness to use and trust institutionalized information over informal sources (p. 122). *Information control* is the extent to which information about performance is continuously presented to people to manage and monitor their performance. Managers use information to monitor and control operational activities and decisions to achieve intended strategy and improve business performance (p. 123). *Information transparency* is defined as openness in reporting and presentation of information on errors and failures, thus allowing members to learn from mistakes (p. 124). *Information sharing* is the willingness to provide others with information in an appropriate and collaborative fashion. This behavior was well recognized by senior managers, particularly as it relates to internal information sharing (p. 125). *Proactiveness* is the active concern to think about how to obtain and apply new information in order to respond quickly to business changes and to promote innovation in products and services (p. 126).

Information Use

Although information use is a fundamental concept, there are no definitional or methodological approaches that are broadly accepted or applied. The classic work of Taylor (1991, p. 230) identifies the following eight classes of information uses:

- *Enlightenment*. Information is used to develop a context or to make sense of a situation by answering questions such as, "Are there similar situations?" "What are they?" "What is our history and experience?"
- *Problem Understanding*. Information is used in a more specific way than enlightenment—it is used to develop a better comprehension of a particular problem.

- *Instrumental*. Information is used so that the individual knows what to do and how to do something.
- *Factual*. Information is used to determine the facts of a phenomenon or event, to describe reality.
- *Confirmational*. Information is used to verify another piece of information.
- *Projective*. Information is used to predict what is likely to happen in the future.
- *Motivational*. Information is used to initiate or sustain personal involvement in order to keep moving along on a particular course of action.
- *Personal or Political*. Information is used to develop relationships, enhance status, reputation, and personal fulfilment.

The categories are not mutually exclusive, so that information used in one class may also address the needs of other classes.

Todd (1999) discusses the trend in recent years to conceptualize information use as a multifaceted change process that

> makes the distinction between "utilization" as doing something with information and making a difference to the thoughts and actions of people; and "impact," seen as modifications in a program or policy; and "utility," referring to the relevance of the information . . . to an area of policy or program. (p. 853)

An important form of information use is instrumental utilization, which "describes the range of organizational outcomes, impacts, end-states and physical changes in practice and procedures which are a direct result of the applications of information" (p. 854).

Consistent with the approach of examining information use as outcomes, Kirk (2002) developed an outcome model that examines the different modes by which information use is "understood and experienced" in an organization. In her analysis, information use goes beyond the merely functional, the problem solving, or the performing of tasks. Information use includes the construction of new knowledge and new meanings, the transformative act of shaping decisions and influencing others, and the movement and exchange of information with colleagues.

Kirk's (2002) doctoral field study concluded that "managers understood and experienced information use in five different ways: as information packaging; as information flow; as developing new knowledge and insights; as shaping judgments and decisions; and as influencing others" (p. xii). "Information packaging" refers to information use as "repackaging existing information in a different form and format so that it is accessible to others" (p. 188), an activity that is often part of facilitating information flow. "Information flow" is information use as "enabling the flow of information by transmitting it to people or exchanging it with them" (p. 218). "Developing new knowledge and insights" concerns information use as a "forward-looking process" that creates new ideas and meanings (p. 236). Finally, "Shaping judgments" and "Influencing others" refer to the use of information to guide decision making and to influence the behavior of others.

Information Use Outcome Space	Manager in foreground	Organization in foreground
Level 3 Information as transformative force	Shaping judgments and decisions	Influencing others
Level 2 Information as construct	New knowledge and insights	
Level 1 Information as object	Packaging information	Information flow

FIG. 1.   Information use outcome space. (adapted from Kirk, 2002, p. 272, Figure 9).

Kirk (2002) locates these five modes in an "outcome space of the phenomenon of information use" (pp. 271–273) that is divided into three levels (Figure 1 above). At Level 1, information is seen as an object; and it is at this level that information packaging and information flow are experienced and understood. At Level 2, information is viewed as a construct that is used to create new knowledge and insights. Finally at Level 3, information is perceived as a transformative force that shapes judgments and influences others. We adopt this holistic model as the conceptual framework to analyze information use outcomes. Each level of information use is translated into questionnaire items in the survey, as described in the next section on data collection.

Research Method

Data Collection

The primary method of data collection is a questionnaire survey that was applied to three study organizations. A survey allowed us to reach a cross-section of the various groups of people (professionals, administrative and support staff, managers) whose work is information-intensive and to develop a general sense of their perceptions and beliefs about information in their organizations. The survey also included a number of open-ended qualitative questions that asked for more detailed commentary.

The questionnaire contains sections on information behaviors and values and information use outcomes. Most items are presented as statements that respondents indicate their agreement with on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*), with a sixth category for *do not know*.

Twenty-eight questions were adapted from the 23 items used by Marchand et al. (2001) in their survey on information orientation. (Since the IO study focused on managers, we broadened the phrasing of the questions to make them relevant to a broader section of organizational members.)

The items cover information integrity, formality, control, transparency, sharing, and proactiveness. These factors were discussed earlier in the article, and the questions are shown in the results section below. This research differs in scope and method from the information orientation (IO) study (Marchand et al.). The IO study examined the combined effect of capabilities in information management, information behaviors and values, and IT practices on business performance. Its respondents were senior managers who indicated their agreement with statements describing information behaviors and practices in their firms. In this research, we focus on the part of the IO construct that relates to information behaviors and values. We are interested in how these values can help us to systematically describe the information culture of an organization. We surveyed many groups in the organization: managers, professional staff, as well as administrative and support staff. Finally, the dependent variable in this study is information use outcomes.

Five new items were developed to collect data on information use outcome modes (see Figure 1). At the information as transformative force level, two questions refer to the influence and impact of information use on others and on the organization as a whole. At the information as construct level, two questions refer to the development and use of new knowledge and ideas. At the information as object level, there is one item on information flow as information sharing.

The questionnaire survey was implemented as Web pages hosted on a server in the Faculty of Information Studies, University of Toronto. Participants accessed the survey remotely via a Web address. They chose to answer either the English or French language versions of the survey. Each section of the survey contained built-in checks to ensure that it is completely answered before the next section is presented. Responses were entered automatically into a database. Each completed questionnaire formed a record in that database. The database was subsequently cleaned and imported into SPSS for statistical analysis.

Variables

The definitions of research variables are summarized in Table 1 below. Definitions of Information Behaviors and Values as the independent variables are based on Marchand et al. (2001). Definition of Information Use Outcome as the dependent variable is based on Kirk (2002). Example questionnaire items are also shown in the table.

Research Sites

Three Canadian organizations participated in the study. They are all knowledge-intensive organizations. All were in the process of developing or implementing an information management strategy, primarily as a response to recent major organizational changes. The study sites vary in size (large, medium, and small in number of employees) and in the sector in which they operate (private and public). The three organizations are a legal firm (L), a public health organization (H), and an engineering company (E). In each organization, invitations to participate in the Web-based survey were sent out to all employees, including professional, managerial, technical, and support staff.

Organization L is one of the largest Canadian-based national law firms employing about 1,700 staff. With offices in major cities across Canada, the firm's practice areas include corporate, tax, entertainment, intellectual property, international, immigration and health law. Recently, the firm went through a number of acquisitions and mergers to create a national firm that is capable of a diverse portfolio of offerings. In order to manage the knowledge of a diverse and geographically dispersed group of professionals, the firm introduced a firm-wide knowledge management strategy in order to encourage professionals to share their knowledge and collaborate. Central to this initiative is an intranet portal specifically designed for law professionals, which simplifies access to information and supports the exchange of knowledge. At organization L, 405 persons answered the survey, a response rate of 23%.

Organization H is a Québec-based public organization in the field of health science, with about 550 employees. Its role is to develop scientific knowledge in its realm of responsibility and transfer it for use in health policy, research, and training as well as to various sectors of society (local, national, and international levels). It is a relatively young organization, created less than 10 years ago as the result of the merger of various existing institutions with longer histories. The organization is dispersed geographically in various buildings and cities. The organization works

TABLE 1. Summary of research variables.

IBV (Independent variables)	Definition	Example items
Information sharing	Willingness to provide others with information in an appropriate and collaborative manner	I often exchange information with the people with whom I work regularly. I often exchange information with citizens, customers, or clients outside my organization.
Information proactiveness	Active concern to obtain and apply new information to respond to changes and to promote innovation	I actively seek out relevant information on changes and trends going on outside my organization. I use information to respond to changes and developments going on outside my organization.
Information transparency	Openness in reporting information on errors and failures, thus allowing learning from mistakes	Managers and supervisors of my work unit encourage openness. The people I work with regularly share information on errors or failures openly.
Information integrity	Use of information in a trustful and principled manner at the individual and organizational level	Among the people I work with regularly, it is common to distribute information to justify decisions already made. Among the people I work with regularly, it is normal to leverage information for personal advantage.
Information informality	Willingness to use and trust informal sources over institutionalized information	I trust informal information sources (e.g., colleagues) more than I trust formal sources (e.g., memos, reports). I use informal information sources (e.g., colleagues) extensively even though formal sources (e.g., memos, reports) exist and are credible.
Information control	Information is presented to people to manage and monitor their performance	I receive information about the performance of my organization. My knowledge of organizational performance influences my work.
Information use outcome (dependent variable)	The construction of new knowledge and new meanings; the transformative act of shaping decisions and influencing others; and the movement and exchange of information with colleagues	I can quickly recognize the complexities in a situation and find a way of solving problems. I have influence over what happens within my work unit. Sharing information is critical to my being able to do my job.

at establishing a common culture. At the time of data collection, the organization was developing a formal information strategy. At organization H, 190 people answered the survey, a response rate of 34%.

Organization E is an engineering firm based in Ontario. With 150 employees, it specializes in the creation of aviation simulators for training pilots and technicians on a variety of jet aircraft and helicopters. Clients include the national air forces of Canada and Australia. Development projects are typically large, often multi-year commitments with cross-functional employee project teams of stable membership. A few years ago, E found itself on the verge of collapse, partly due to severe shocks to the entire aviation industry following the 9/11 terrorist attacks in the U.S. and partly owing to an array of management problems. A major private investor was found, and the firm began to improve its management of information and knowledge to better support its current customers and help win new ones. To this end, a Chief Knowledge Officer was hired and charged with this task. At organization E, 103 persons answered the survey, a response rate of 69%.

Data Analysis and Results

Our research goals, stated briefly, are to (a) develop a method to profile information culture, (b) compare information cultures across organizations, and (c) examine the effect of information culture on information use outcomes.

Factor Analysis

As this is an exploratory study, we use factor analysis to examine the questionnaire responses in each of the three sites. To address our first two research questions—Is there a way to systematically identify information behaviors and values, and are organizations differentiated by distinctive sets of information behaviors and values?—,we need to see if survey items loaded onto the same underlying factors across the organizations and if different combinations of factors emerged in each organization. To address the third question—Do the observed information behaviors and values have a significant effect on information use outcome?—,we use multiple regression to measure the collective and individual effects of information behaviors and values on information use outcome.

The reliability of the factors that emerge from factor analysis depends on the size of the sample. Gorsuch (1983) suggested that there should be at least five subjects per variable and not fewer than 100 subjects per analysis. In this study, we started with six IBV variables, and the number of participants in the three organizations were 400 (L), 102 (E), and 180 (H). Thus, the sample sizes met the criteria proposed by Gorsuch.

Tables 2–4 show the results of the factor analysis of the three organizations for the information behaviors and values (IBV) domain. The number of factors to be retained was decided using two tests. First, we followed Kaiser's (1960) criterion selecting factors which had an eigenvalue of greater than one. Second, we applied the scree plot test (Cattell 1966), which selected factors on the steep part of the eigenvalue plot.

Factors were extracted using a principal components analysis with varimax rotation. In Tables 2–4, the size of the factor loadings reflect the extent to which a questionnaire item is correlated with each factor. Conventionally, items that correlate less than 0.3 with a factor are omitted because they account for less than 9% of the variance. In addition, we set the cut-off as the correlation above which no item correlates highly with more than one factor (Bryman & Cramer, 1994). Using both these criteria, we adopt a threshold loading of .45 in our factor analysis. These factor loadings are shown in boldface.

The L organization analysis (Table 2) extracted five IBV factors that collectively account for 60% of the total variance. These factors are Integrity, Transparency, Sharing, Proactiveness, and Informality. Items that loaded on two factors for internal and external sharing were combined into Sharing, as suggested by theory. This was done for organization H and E as well. All Cronbach's α are above .70, except for one factor (Informality, $\alpha = .67$)

The H organization analysis (Table 3) extracted three IBV factors that accounted for 45% of the total variance. These factors are Transparency, Proactiveness, and Sharing. The factor with the smallest eigenvalue ("Integrity") was dropped because of low factor loadings and unacceptable α. For the remaining factors, Cronbach's α are above .70.

The E organization analysis (Table 4) extracted three of the six factors identified by the Information Orientation study and they collectively account for 60% of the total variance. These factors are Sharing, Integrity, and Proactiveness. The Cronbach's α are .75 and above.

We note that questionnaire items loaded onto the same factors in each of the three organizations, and that the Cronbach's α for the items lie in the respectable to very good range of .70 – .85 (DeVellis 2003, p. 95).

Table 5 below summarizes the results of the factor analysis across the three study sites. As expected, different sets of information behaviours and values (IBVs) were found for each organization. Two IBVs, Sharing and Proactiveness, appeared in all three profiles. Two other IBVs, Transparency and Integrity, showed up in two profiles. Of the six IBVs identified in the Information Orientation study (Marchand et al., 2001), one was not extracted in our factor analysis—Control. While Control may be perceived as a key factor by senior managers who were the subjects of the Marchand study, it may be less important to the non-managerial respondents included in this study.

Overall, the data analysis suggests that the questionnaire items are able to elicit information behaviors and values that describe the information culture of an organization. Moreover, the three organizations each has its own profile of information behaviors and values. The descriptive statistics of the item responses pertaining to each IBV are discussed in the next section.

Descriptive Statistics

Table 6 shows the mean scores of respondents' degree of agreement with given statements about their information behaviors and values on a scale from (1) *Strongly Disagree* to (5) *Strongly Agree*. The scores indicate strong agreement

TABLE 2.   L organization—IBV factor analysis.

	1	2	3	4	5	6
Integrity (α = .72; reverse coded)						
Employees know what to do but not the ultimate goal of their activity.	**.632**	.111	−.068	.055	.006	−.007
Among the people I work with regularly, it is common to distribute information to justify decisions already made.	**.513**	−.104	.05	.003	−.005	.125
Among the people I work with regularly, it is normal for individuals to keep information to themselves.	**.676**	.449	.163	.099	−.082	−.058
Among the people I work with regularly, it is normal to leverage information for personal advantage.	**.611**	.285	.206	−.119	−.152	−.148
Transparency (α = .80)						
Managers and supervisors of my work unit encourage openness.	.284	**.487**	.339	.064	.051	.134
The people I work with regularly share information on errors or failures openly.	.194	**.782**	.095	.036	−.042	−.042
The people I work with regularly use information on failures or errors to address problems constructively.	.179	**.828**	.140	.053	.011	.096
Sharing–internal (α = .66)						
I often exchange information with the people with whom I work regularly.	.161	.245	**.620**	.167	.071	.146
I often exchange information with people outside of my regular work unit but within my organization.	.164	−.093	**.550**	.134	−.037	.346
In my work unit, I am a person that people come to often for information.	−.002	.049	**.562**	.074	.047	.129
Proactiveness (α = .78)						
I actively seek out relevant information on changes and trends going on outside my organization.	−.006	.033	.333	**.686**	.057	.144
I use information to respond to changes and developments going on outside my organization.	.093	.049	.193	**.957**	.023	.183
I use information to create or enhance my organization's products, services, and processes.	.023	.156	.440	**.478**	.063	.214
Informality (α = .67)						
I trust informal information sources (e.g., colleagues) more than I trust formal sources (e.g., memos, reports).	−.109	−.021	.022	−.037	**.617**	.017
I use informal information sources (e.g., colleagues) extensively even though formal sources (e.g., memos, reports) exist and are credible.	.041	.001	−.036	.049	**.854**	−.009
I use informal information sources (e.g., colleagues) to verify and improve the quality of formal information sources (e.g., memos, reports).	−.011	.066	.152	.091	**.528**	.093
Sharing–external (α = .76);–internal and external (α = .74)						
I often exchange information with citizens, customers, or clients outside my organization.	.059	.008	.157	.213	.070	**.705**
I often exchange information with partner organizations.	.062	.083	.206	.089	.049	**.763**
Eigenvalues	5.058	2.880	1.830	1.645	1.263	1.137
Cumulative percentage of variance	21.99	34.51	42.47	49.62	55.11	60.06

with most items on Sharing, Proactiveness, and Transparency. While there was strong to very strong agreement with statements relating to internal sharing, the response was much lower (below the scale midpoint) for items on external sharing with customers, clients, and groups outside the firm. There was also strong agreement with statements on Proactiveness, with respondents indicating that they used information to enhance their work, and that they actively sought information on external changes and responded to them (items 6–8). Mean responses for the Transparency items showed strong agreement with statements that managers and supervisors encourage openness, and that information on failures or errors was acknowledged and addressed (items 9–11). It is interesting to note the low mean scores for the Integrity factor in organization E.

Information Use Outcome

As a check on the five items used to measure Information Use Outcome, a factor analysis was also conducted. In each organization, principal component analysis extracted only one factor using the Kaiser criterion and scree plot test, and this factor accounted for 45.1% (L), 43.3% (H), and 65.8% (E) of the total variance. The Cronbach's α are .67 (L), .66 (H), .86 (E). Thus, the five items appear to measure the latent variable of information use outcome.

Table 7 shows the mean scores of respondents' agreement with items about information use outcomes on a scale from (1) *Strongly Disagree* to (5) *Strongly Agree*. The scores indicate very strong agreement (means > 4.0) with the two statements on the work benefiting the organization and sharing information. In organization L and H, the item on "I have

TABLE 3. H organization—IBV factor analysis.

	1	2	3	4
Transparency (α = .73)				
Managers and supervisors of my work unit encourage openness.	**.567**	.143	.133	−.020
The people I work with regularly share information on errors or failures openly.	**.773**	.037	.103	.114
The people I work with regularly use information on failures or errors to address problems constructively.	**.894**	.090	.024	.143
Proactiveness (α = .73)				
I actively seek out relevant information on changes and trends going on outside my organization.	−.198	**.595**	.205	.032
I use information to respond to changes and developments going on outside my organization.	−.023	**.969**	.133	.204
I use information to create or enhance my organization's products, services, and processes.	.178	**.458**	.028	.284
Sharing – internal (α = .64)				
I often exchange information with the people with whom I work regularly.	.232	.110	**.692**	.125
I often exchange information with people outside of my regular work unit but within my organization.	−.021	.205	**.451**	.330
In my work unit, I am a person that people come to often for information.	.266	.071	**.716**	.061
Sharing – external (α = .76); – internal and external (α = .71)				
I often exchange information with citizens, customers, or clients outside my organization.	.130	.174	.228	**.948**
I often exchange information with partner organizations.	.187	.246	.217	**.606**
Eigenvalues	4.452	2.544	1.822	1.574
Cumulative percentage of variance	19.36	30.42	38.34	45.18

TABLE 4. E organization—IBV factor analysis.

	1	2	3	4
Sharing – internal (α = .75)				
I often exchange information with the people with whom I work regularly.	**.846**	.286	.119	.192
I often exchange information with people outside of my regular work unit but within my organization.	**.664**	−.097	.162	.414
The people I work with regularly share information on errors or failures openly.	**.601**	.414	.201	.087
In my organization, information is essential to organizational performance.	**.576**	.045	.194	.177
Integrity (α = .83; reverse coded)				
Among the people I work with regularly, it is common to knowingly pass on inaccurate information.	.130	**.632**	.260	.042
Among the people I work with regularly, it is common to distribute information to justify decisions already made.	.058	**.683**	.152	.077
Among the people I work with regularly, it is normal for individuals to keep information to themselves.	.014	**.841**	.07f2	.115
Among the people I work with regularly, it is normal to leverage information for personal advantage.	.122	**.867**	.056	−.085
Proactiveness (α = .85)				
I actively seek out relevant information on changes and trends going on outside my organization.	.239	.071	**.819**	.173
I use information to respond to changes and developments going on outside my organization.	.149	.120	**.918**	.246
I use information to create or enhance my organization's products, services, and processes.	.284	.309	**.608**	.184
Sharing – external (α = .92); – internal and external (α = .78)				
I often exchange information with citizens, customers, or clients outside my organization.	.180	.044	.167	**.835**
I often exchange information with partner organizations.	.118	.020	.094	**.954**
Eigenvalues	7.495	2.894	1.847	1.642
Cumulative percentage of variance	32.59	45.18	53.21	60.35

TABLE 5. Information culture profiles.

		IBVs Extracted
L Organization	Sharing	Willingness to provide others with information in an appropriate and collaborative manner
	Proactiveness	Active concern to obtain and apply new information to respond to changes and to promote innovation
	Transparency	Openness in reporting information on errors and failures, thus allowing learning from mistakes
	Integrity	Use of information in a trustful and principled manner at the individual and organizational level
	Informality	Willingness to use and trust informal sources over institutionalized information
H Organization	Sharing	Willingness to provide others with information in an appropriate and collaborative manner
	Proactiveness	Active concern to obtain and apply new information to respond to changes and to promote innovation
	Transparency	Openness in reporting information on errors and failures, thus allowing learning from mistakes
E Organization	Sharing	Willingness to provide others with information in an appropriate and collaborative manner
	Proactiveness	Active concern to obtain and apply new information to respond to changes and to promote innovation
	Integrity	Use of information in a trustful and principled manner at the individual and organizational level

TABLE 6. IBV descriptive statistics.

	L Means	H Means	E Means
Sharing	**3.52**	**3.74**	**3.27**
1 I often exchange information with the people with whom I work regularly.	4.49	4.56	4.23
2 I often exchange information with people outside of my regular work unit but within my organization.	3.61	3.36	3.36
3 In my work unit, I am a person that people come to often for information.	3.97	4.21	3.97
4 I often exchange information with citizens, customers, or clients outside my organization.	2.96	3.24	2.60
5 I often exchange information with partner organizations.	2.59	3.33	2.20
Proactiveness	**3.68**	**3.73**	**3.35**
6 I actively seek out relevant information on changes and trends going on outside my organization.	3.51	3.46	3.21
7 I use information to respond to changes and developments going on outside my organization.	3.54	3.57	3.07
8 I use information to create or enhance my organization's products, services, and processes.	3.98	4.17	3.76
Transparency	**3.54**	**3.79**	**–**
9 Managers and supervisors of my work unit encourage openness.	3.82	3.87	–
10 The people I work with regularly share information on errors or failures openly.	3.30	3.71	–
11 The people I work with regularly use information on failures or errors to address problems constructively.	3.50	3.79	–
Integrity (reverse-coded)	**3.33**	**–**	**2.57**
12 Among the people I work with regularly, it is common to knowingly pass on inaccurate information.	3.12	–	1.86
13 Among the people I work with regularly, it is common to distribute information to justify decisions already made.	3.13	–	3.08
14 Among the people I work with regularly, it is normal for individuals to keep information to themselves.	3.29	–	2.80
15 Among the people I work with regularly, it is normal to leverage information for personal advantage.	3.77	–	2.54
Informality	**3.07**		
16 I trust informal information sources (e.g., colleagues) more than I trust formal sources (e.g., memos, reports).	2.68	–	–
17 I use informal information sources (e.g., colleagues) extensively even though formal sources (e.g., memos, reports) exist and are credible.	2.95	–	–
18 I use informal information sources (e.g., colleagues) to verify and improve the quality of formal information sources (e.g., memos, reports).	3.58	–	–

Note. –: IBV not extracted in factor analysis. Bold-faced means are IBV overall means.

TABLE 7. Information use outcome descriptive statistics.

Information use outcome space	Items	L Means	H Means	E Means
Information as transformative (shaping and influencing)	My work benefits my organization.	4.49	4.24	4.33
	I have influence over what happens within my work unit.	3.39	3.92	3.82
Information as construct (new knowledge & insights)	I can quickly recognize the complexities in a situation and find a way of solving problems.	4.22	4.01	3.92
	My work tasks demand new, creative ideas and solutions.	3.84	4.04	3.72
Information as object (information flow & sharing)	Sharing information is critical to my being able to do my job.	4.39	4.56	4.16
	Overall mean	**4.12**	**4.22**	**4.02**

influence over what happens within my work unit" had the lowest scores. In organization E, the item on "my work demands new creative ideas and solutions" had the lowest mean.

Multivariate Analysis

To create an aggregate score for information use outcome, item scores pertaining to the information use outcome factor (Table 7) were summed. To create aggregate scores for each of the five information behaviors and values (Integrity, Transparency, Sharing, Proactiveness, and Informality), item scores pertaining to each factor were summed.

Table 8 shows the correlations between these variables. Information Use Outcome is significantly correlated with each of the five Information Behavior and Values. All correlations are in the expected direction (positive).

In order to examine the effect of each variable while controlling for the effect of the others, multiple regression of Information Use Outcome on the Information Behavior and Values was performed. Table 10 shows the results. The regression equations of all three organizations are significant: In each case, the set of IBV variables explains a significant amount of variation in IUO variable. The models' adjusted R^2 are .38 (L), .29 (H), and .54 (E), and the F values for the model R^2 are all significant at $p < .01$. The standardized regression coefficients of IBVs are significant at $p < .05$ or better, with one exception (the Integrity coefficient is not significant in L, Table 9, top table).

The regression analysis suggests that the set of information behaviors and values of each organization has a significant influence on information use outcome as the dependent variable. Collectively, the IBVs were able to explain between

TABLE 8. Correlations between information use outcome and information behaviors and values.

	Use outcome	Sharing	Transparency	Proactiveness	Informality	Integrity
L organization						
Use outcome	1	.471**	.292**	.463**	.157**	.194**
Sharing	.471**	1	.271**	.483**	.176**	.136*
Transparency	.292**	.271**	1	.157**	.064	.407**
Proactiveness	.463**	.483**	.157**	1	.124*	.066
Informality	.157**	.176**	.064	.124*	1	−.125*
Integrity	.194**	.136*	.407**	.066	−.125*	1
H organization						
Use outcome	1	.461**	.364**	.331**		
Sharing	.461**	1	.300**	.356**		
Transparency	.364**	.300**	1	.049		
Proactiveness	.331**	.356**	.049	1		
E organization						
Use outcome	1	.468**		.685**		.420**
Sharing	.468**	1		.489**		.176
Transparency	.420**	.176		.246*		1
Proactiveness	.685**	.489**		1		.246*

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

TABLE 9. Information use outcome regression models.

Dependent variable Info use outcome	Independent variables	Std β	Sig.	Model adj.R^2	F	Sig.
L organization	Sharing	.312	.000	.378	32.1	.000
	Transparency	.130	.023			
	Proactiveness	.311	.000			
	Informality	.124	.014			
	Integrity	.040	.472			
H organization	Sharing	.314	.000	.292	25.5	.000
	Transparency	.260	.000			
	Proactiveness	.199	.004			
E organization	Sharing	.156	.045	.542	41.2	.000
	Integrity	.259	.000			
	Proactiveness	.545	.000			

30–54% of the variance in IUO. Inspecting the standardized β in each organization, different IBVs were more important in affecting IUO: Sharing and Proactiveness were most important in organization L, Sharing in H, and Proactiveness in E.

Summary and Discussion of Results

We summarize and discuss our findings by returning to our research questions: Is there a way to identify information behaviors and values that denote and differentiate an organization's information culture? Does information culture have an impact on information use outcomes?

Applying the same questionnaire survey to three study organizations, and with responses from nearly 700 participants, our analysis found that respondents consistently associated questionnaire items with latent constructs relating to the proposed set of information behaviors and values. This suggests that with further testing and refinement, these items can form the basis of a systematic method to identify information behaviors and values that can describe the information culture of an organization.

The analysis also extracted different sets of IBVs for each organization, thus implying that organizations are differentiated by their own information cultures. As noted earlier, the information culture of L organization is characterized by Integrity, Transparency, Sharing, Proactiveness, and Informality. The information culture of E is indicated by Sharing, Integrity, and Proactiveness, while that of H is denoted by Transparency, Proactiveness, and Sharing.

We recognize that the information culture of an organization is determined by a large number of variables such as its mission, history, leadership, employee traits, industry, national culture, and so on. In addition, information culture would also be shaped by the cognitive and epistemic expectations embedded in the way that tasks are performed and decisions are made. For example, work-related requirements about evidential support, information quality, search thoroughness, evaluation of information, and deliberation and advocacy practices could affect the information behaviors and values of an organization.

Given our intuitions about factors impacting information culture, we offer tentative explanations of the observed differences across the three organizations. When it comes to sharing information with people and groups *outside* the organization, both L (law firm) and E (engineering company) had much lower mean scores than H (public health agency), as shown in items 4 and 5 of Table 7. One might assume that this reflects the mandate of H to transfer its knowledge to its external partners and stakeholders. H also showed the highest means for the Transparency factor, with an emphasis on encouraging openness. In contrast, Transparency was not extracted at all in E, perhaps an indication of the strong commercial impetus that is driving this company. Informality (the use of informal sources) as an IBV was only found in L, and it is tempting to conjecture that this may have something to do with the particular importance of personal networks in the legal profession. The lowest means were for the Integrity factor in organization E, with scores below the midpoint of the scale (items 12–15, Table 7). Low Integrity scores suggest that it is common for people in the organization to pass on inaccurate information, withhold information, or leverage information for personal advantage. The management of E might be interested in the diagnostic value of this finding.

Information culture may also be a function of the maturity or stage of development of an organization. For example, Ginman (1988) found a link between information culture and an organization's life cycle stage. Miller and Friesen's (1983) classic review of organizational life cycles suggests that organizations tend to move through five phases of development: Birth, Growth, Maturity, Revival, and Decline. Movement through theses phases is marked by increasing levels of information processing (in terms of environmental scanning, control, and communications) and decision making (in terms of analysis, multiplicity, and integration). Thus, we may expect an organization's information culture to vary according to its phase of development. Although our study did not collect data on life cycle stages,

two organizations (L and E) may be considered to be in the Revival phase, which Miller and Friesen (1983) predict would show an intense interest in information and be engaged in external scanning, risk-taking, and complex decision making.

As an aside, one might well ask whether life cycle models based on a unitary, cumulative sequence of change adequately describes organizational growth in today's volatile and divisive environments. Van de Ven and Poole (1995) have argued for a more complex theory of development that is based on the interplay between life-cycle, teleological, dialectical, and evolutionary models of change. Quite apart from change models, we have already noted that information culture may be affected by factors such as industry sector, organizational size, physical dispersion, professional norms, use of information technology, and so on. Much remains to be learned about the forces shaping information culture.

If we were to focus on the development of information management strategies, and suppose that organizations also evolve such strategies according to a life cycle sequence (Koenig 1992), then all three study organizations would be in the early phases of formalizing policies, incentives, and tools to encourage information sharing and use. We may assume that these policies and incentives, following a period of implementation and assimilation, would exercise a significant effect on information behaviors.

Having found consistent as well as distinctive profiles of IBVs in each of the three sites, our regression analysis also showed that the sets of IBVs that emerged in each organization were able to account for significant proportions of the variance in information use outcomes. Thus, the observed IBVs explained between 30–50% of the variance in information use outcomes. This is a moderate to large effect and suggests that further research focusing on information culture as a discrete component of organizational culture might be a worthwhile exercise.

The study's main finding is that information culture significantly affects information use outcomes. While it may be too early to consider implications for practice, this result suggests that managers might wish to consider taking the information pulse of their organizations, as it were, in order to have a sense of the information attitudes and values that are important in their organizations. During our conversations with managers of the study sites, we discovered that gaining this understanding was an important motivation for their taking part in the study.

It is necessary to point out the limitations of the present research. We studied only three organizations, and it is not clear to what extent the findings may be generalized. Another limitation is that the survey asked employees to report their perceptions of information behaviors and practices. Reported perceptions may not be the same as actual behaviors. Nevertheless, the pattern of survey responses appeared to be consistent with the data from interviews, site visits, and answers to open-ended questions that were also part of the research study. These additional findings will be reported in future articles.

To conclude, this study extends the work of Taylor (1991), Marchand et al. (2001), Kirk (2002), and others in analyzing the aspects of organizational culture that influence information use and behaviors. While organizational culture affects behavior in general, we suggest that a part of culture that deals specifically with information—the perceptions, values, and norms that people have about creating, sharing, and applying information—has a significant effect on information use outcomes. This concept of "information culture" is largely missing from current research. The present study has found that it is possible to systematically identify behaviors and values that describe an organization's information culture. Moreover, we found that the sets of identified behaviors and values were able to account for significant proportions of the variance in information use outcomes in the organizations we studied.

Acknowledgement

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