Cultural, National, and Industry-Level Differences in B2B Web Site Design and Content

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ABSTRACT: Web sites are a major instrument for companies to transmit information to customers and conduct transactions in business markets. Differences in Web site design and content across companies can be explained by cultural factors (mainly high- or low-context communication, individualism, and power distance), characteristics of a company's home country, and corporate demographics. Based on a review of recent studies, mostly in B2C settings, this paper summarizes what is known about the impact of cultural dimensions on Web site design and content. Content analysis of 600 B2B Web sites in 57 countries confirms the interrelatedness of certain antecedent variables with Web site design and content. Some cultural orientations, especially high-context communication, may be detrimental to the design of Web sites, making them less clear, less attractive, and less interactive. Companies in countries characterized either by high-context communication, collectivism, or high power distance should strive for cultural adaptation of Web sites. Firm size and R&D intensity also have an impact on Web site design and content.

KEY WORDS AND PHRASES: Business-to-business, communication, content analysis, country of origin, culture, Web sites.

Culture, along with other factors, such as a company's country of origin and the industry the company is active in, has been shown to influence Web site design and content [7, 17, 22, 36, 109, 119, 120, 121, 125]. There is also evidence that Web sites require cultural adaptation when site designer and site user differ in terms of cultural background [7, 66, 116, 118, 127]. Cultural adaptation has been identified as a significant driver of on-line trust in global e-commerce [11]. More generally, significant variance in Web site design and content can be found on the cultural, national, and industrial levels.

So far, however, most studies have been conducted in the area of business-to-consumer (B2C) transactions, while studies examining the influence of culture and other variables on business-to-business (B2B) Web site design and content remain scarce [20, 34, 86]. The lack of attention to B2B Web site design and content is astounding given that corporate Web sites have become important media enabling industrial companies to relate with their professional target customers [85, 136]. Day and Montgomery observe that in a globalizing and increasingly interconnected world, "rapid developments in information technology and networks facilitate interactive communications and help tighten relationships" [32, p. 5]. And Samiee argues that the Internet plays a particularly strong role in international business-to-business marketing, as compared to national settings and consumer marketing [109].

B2B companies are often small and medium-sized businesses with a clearly identifiable home country and a distinctive national culture. They tend to design their Web site and its content according to their home country's cultural standards. This is especially true as concerns communication styles, which correspond to those of their culture of origin (as emitter) but not necessarily to the cultural norms of targeted customers (as receivers) (e.g., [31, 47, 107]). Empirical evidence suggests that B2B Web site design and content influence business buying and selling behavior, negotiation strategies, pricing practices, and performance in a B2B context [35, 68, 81]. But little is known about the factors determining B2B Web site design and content. This paper attempts to fill this gap.

The purpose of this paper is twofold. First, it offers a comprehensive review of the relationship between cultural dimensions and Web site design and content. Analyzing the results of approximately 30 empirical studies, it confirms the strong influence of high- and low-context communication styles on Web site design and content, through a specific operationalization of communication styles that is original vis-à-vis the existing literature. The review of the literature on culture and Web sites also provides evidence that, among the four classic cultural dimensions identified by Hofstede [59, 60<<OK?>>], only the influence of individualism-collectivism and power distance on Web site design and content can be considered to be fully backed by empirical research.

Second, based on an empirical study of about 600 B2B Web sites from industrial companies in 57 countries, the paper analyzes the determinants of supplier Web site design and content. More particularly, the focus is on three groups of potential determinants of Web site design and content. The first set of factors consists of cultural constructs (i.e., high- versus low-context communication [52, 53, 54], individualism vs. collectivism, power distance, uncertainty avoidance, and masculinity/femininity [60]). The second factor analyzed is whether a B2B company's home country is an older or a more recently industrialized nation, because there is evidence of marked differences between Web sites from firms in these two types of countries [36, 74, 104]. Finally, the third set of constructs comprises corporate demographics and industry-related variables (i.e., firm size, commodity vs. equipment, R&D intensity). Results of previous studies provide the rationale for expecting an impact of these variables on Web site design and content (e.g., [26, 91, 106]). Firm size has an impact on resources and capabilities in the field of communication and design. Commodity offerings require less explanation than specialized equipment during marketing processes. There is a link between R&D intensity and a firm's technology affinity, which, in turn, is expected to have an impact on the way a company uses its Web site in its marketing efforts.

This is the first study to use a large sample of 600 B2B Web sites in a wide array of geographically and culturally diverse countries. It shows that some cultural orientations, especially high-context communication, high power distance, and collectivism, may make Web sites, on average, less clear, less attractive, and less interactive. Therefore companies in emerging industrial countries (generally high context, collectivist, and high power distance) should strive for Web site cultural adaptation.

B2B Marketing and Web Site Design and Content<<AU: PLEASE CONFIRM HEADING LEVELS THROUGHOUT>>

Whereas there is a broad stream of research on the influence of Web site design and content on business-to-consumer markets, studies dedicated to the same topic in a business-to-business context remain strikingly scarce. In both types of markets, corporate Web sites have become important media enabling companies to relate with their target customers [85]. With respect to B2B markets, Sharma posits that "by utilizing the Internet, firms will better serve the needs of their customers" [111, p. 84]. He also predicts that "if business firms do not utilize the Internet, there is a high probability that value will migrate from the firm." Hence, an increasing number of companies are investing in the development and management of on-line resources directed at professional buyers (e.g., purchasing managers, supply chain managers). At the same time, the use of on-line services and information resources by professional buyers is increasing rapidly [40].

These trends can be interpreted in the light of the more fundamental characteristics of business-to-business marketing. Current research shows that B2B marketing more often relies on relational rather than transactional marketing practices [25, 26]. These empirical results are in line with the predictions several scholars made when the relationship marketing concept emerged in the 1990s (e.g., [112]). Relationships have been described as evolving in a sequence of awareness, exploration, expansion, and commitment [39]. In each of these phases, communication and transactions between actors play a paramount role. There are different ways of communicating in B2B markets, and they can be supported by different media [13]. B2B transactions can be organized in a variety of ways and range from simple, one-off exchanges of goods and money to complex and often long-term configurations of exchange. The Internet may play a specific role in each of the relationship phases described by Dwyer, Schurr, and Oh [39]. For example, in the awareness phase, the traditional way of reaching new customers is primarily through direct marketing activities and events. The Internet allows suppliers to get in touch with their customers more easily, quickly, and at less cost [124]. Yet, as Evans and King argue, "many experts feel business-to-business web marketing is not used effectively enough" [41, p. 344]. Numerous firms work with homepages that are not up-to-date, providing only poor information, and manifesting major technical shortcomings (e.g., [61]).

In a B2B context, the Internet can be used for a range of different purposes. Several authors have suggested classifications of these purposes (e.g., [5, 38, 104]). From these classifications, information and transaction emerge as key dimensions. With respect to transaction, it is possible to further distinguish between one-way transactions and two-way transactions. Information refers to content related to the design of the Web site, (e.g., Web site interface, logical structure, presence of a search engine) or informative content not related to any contract and unilaterally emitted by the supplier (e.g., references, contact information, FAQ). One-way transaction refers to content that is contract-related

but unilaterally emitted by the supplier (e.g., providing product prices, stock availability, choice assistance, product guarantee). Finally, two-way transaction refers to elements of interaction that are related to an interactive digital relationship between the supplier and the customer (e.g., possibility to buy on-line, to register on-line and have access to customized information, secured on-line transaction, on-line after-sales services). Subsequently, these categories are briefly described and linked to individual elements of Web site design and content. A list of design elements of Web pages was collected from studies published over the past 10 years for the purpose of the empirical study. An exhaustive presentation of this classification is provided in Table 2**<<if table 2 is to be cited here, table 2 will be placed here as table 1 and subsequent tables renumbered / tables will appear in order cited / please advise>>**.

The first category of Web site characteristics comprises elements of one-way information. In business markets, customer companies are typically motivated to obtain a sense of their suppliers' product portfolio, quality level, reliability, and commitment to meet delivery dates. This information can consist of both information stemming directly from the supplier and third-party information. Credibility of information is a major quality criterion for the customer. In general, B2B suppliers prefer to send messages that may affect their reputation only after carefully crafting the content and presentation of such messages (i.e., one-way information). Hence, there may be a conflict of interest between supplier and customer. For the purpose of this study, six aspects of one-way information are distinguished along which business-to-business Web site design and content may differ.

Information accessibility. In order for customers to reach potential suppliers, the suppliers have to be easily identifiable on the Web. Search engines like Google, databases, and on-line business directories such as Alibaba.com make it easier for customers to find potential suppliers [135]. Access to corporate Web sites is often based on a URL with the "companyname.com" syntax [86]. After having attracted potential buyers to their Web sites, companies need to communicate with them. As e-commerce language is assumed to be English [131], it is essential for all B2B suppliers to have at least an English version of their Web site. However, adding other language versions may be an important competitive advantage when targeting non-English-speaking foreign markets [133, 135].

Web site interface. The graphical quality and visual appearance of pages is paramount to making user perception as positive as possible. Interface, appropriate and coherent use of colors and texts, entertainment, and multimedia features influence user appreciation of Web sites [20, 131].

Web site navigation. To enhance the perceived usefulness of site content and technical features, Web sites have to be well organized, logically structured, and easy to navigate [20, 21, 29]. Web sites have to run correctly and quickly, with no broken links, no blank pages with "under-construction" status, and no problems in reaching pages after clicking on links. Well-designed and efficient search engines help customers quickly find what they are looking for [21, 29, 131].

Company information. Corporate information is another possible content of company Web sites. Sites can be used to describe organizations, their po-

sitioning vis-à-vis target audiences, as well as their financial status or their contributions to the community or to environmental development [63, 86]. Technical and industrial standards followed by companies, job offers, and quality labels or certifications obtained from official certification bodies can be displayed. Firms may also list references of successfully managed past projects or the names of corporate customers previously served, to reduce buyer transaction uncertainty [34, 51].

Contact information. Web sites may also be used to present the external distribution networks of a company, or internal contact information (e-mail, phone, fax, postal mail) [86]. They may also provide FAQ pages [63, 128, 131, 133].

Product cues. Listing and accurately describing products offered is a key element of content on most Web sites. Lord and Collins found that product presentation is the most important criterion for buyer purchasing decisions and that 91.3 percent of the suppliers they surveyed included product presentation on their Web sites [86]. Nevertheless simple product presentation may not suffice to persuade buyers. To reduce customer uncertainty, companies may provide downloadable databases containing information on product specifications and use [12, 51]. B2B Web sites may also present product quality assessment through scientific tests and certification, or information that customers consider valuable input from suppliers with which they can make the right purchasing decisions [20, 21, 29, 63, 86, 133].

In addition to information, a B2B Web site can also allow for transactions between a professional supplier and its professional customers. Two forms of transaction can be distinguished, one-way and two-way transaction. In one-way transaction applications, companies use Web sites to initiate transactions, but they do not manage the complete transaction through their Web site.

Transaction cues. Suppliers may use Web sites to provide prices [63, 86, 128, 135]. Failing to provide a price could lead buyers to default to competitors, as this is an important purchase criterion for customers [86]. Internet development has made customers more savvy and more oriented to and capable of bargaining [135], which highlights the importance of presenting list prices, and possibly volume- or loyalty-related rebates. Choice-assistance devices, such as "Tip of the Week," on-line guides, Web bots, and intelligent agents, can be added to the Web site to facilitate comparative searching and make buyer choices easier [12, 63, 86, 128]. In addition, rapid technological improvements in Internet and information technologies enable sellers to provide detailed information about stock availability and delivery delays for each product [29, 103, 131]. Web sites constitute powerful tools for companies to reassure customers about their delivery capabilities [131]. The ability to effectively manage delivery-related information is a privileged avenue for developing collaborative relationships with customers [44]. Finally, suppliers may indicate whether, and to what extent, they provide guarantees.

The content comprised in the transaction cues category is often central to purchasing decisions in industrial markets. However, industrial suppliers can be legitimately concerned that disclosing too much information may backfire to their detriment. For instance, announcing large inventories or short delivery delays may be a signal that the supplier's order book is modest. One-way transactions require the unilateral disclosure of key cues for marketing negotia-

tions that will later be used by potential customers to assess supplier credibility and reliability. The example of price is striking: An industrial supplier that provides a price list on its Web site may have difficulty in selling the items at a price higher than the one displayed electronically. Furthermore, clients may browse and complain that they have been invoiced at a price higher than the one listed, even though this can be explained by smaller order size and other circumstances that may justify a higher price [104]. In the case of one-way transaction, customers' reactions, such as requests for proposals, invitations to reverse auctions, engaging in negotiations, or inviting a sales rep visit, do not take place on the corporate Web site.

In the case of two-way transaction, the company has made a strategic decision that Internet transactions should be enabled more broadly. Often the Web is understood as an automated device that significantly reduces transaction costs. Moreover, it allows managing several typical subprocesses of customer relationship management electronically. Making a B2B Web site more bilateral (e.g., by enabling the customer to make routine orders on-line) saves transaction costs. However, it requires a more sophisticated version of the Web site. It also bears the risk of weakening the relationships companies have with purchasing managers on the customer side by depersonalizing the interactions. In sum, the category of two-way transaction elements can be referred to as tools for the management of on-line relationships.

On-line relationship. Company Web pages may be tools for managing customer relationships through digital communication with customers or by creating virtual private networks to exchange information or goods [34, 63, 135]. As a whole, real-time and interactive communication helps firms to retain customers while being competitor focused, as well as to respond quickly to changes in the marketplace [128]. Moreover, it has been shown that the more interactive a Web site is, the more it is appreciated by visitors [49]. In addition to interaction/relationship features, companies may extend Web site functionality by providing on-line purchasing features [63, 86, 128, 133]. The on-line buying option facilitates and accelerates purchasing processes, and buyers may perceive less uncertainty concerning the order-handling process. Moreover, electronic transactions lead to less paperwork and huge reductions in transaction costs [34]. In addition, maintaining and enhancing newly established relationships are core activities for suppliers to consolidate their customer base [99]. To develop relationships, customization can help suppliers obtain further information about their customers and adjust offerings accordingly [128, 133, 135]. As a result, companies are better able to raise customer satisfaction and hence performance [128]. When it is easy to register and log in to a site, customers perceive high benefits in registering [131, 133]. In addition, suppliers can store customer profiles, allow buyers to adjust their profiles if necessary, and use profile information to guide customer ordering. Web sites can then be tailored based on explicit customer preferences by using a registration tool (i.e., user id and password) in conjunction with cookie technology [20]. However, transactions and payments need to be secured. As many buyers are still uncomfortable with purchasing on the Web, protection of customer privacy and corporate identity, credit and payment possibilities, and storage and transmission of transaction-related information are crucial

issues [10, 20, 63, 131, 135]. Finally, companies may provide on-line logistics services as well as on-line after-sales services [63, 133].

Summarizing, the extant literature identifies key elements of Web site design and content. They are classified in three main categories: one-way information, one-way transaction, and two-way transaction. The next section develops hypotheses about the impact of three types of potential antecedent variables (cultural dimensions, home country of a company, and industry demographics) on Web site design and content.

Cultural, National, and Industry Differences in B2B Web Site Design and Content

Cultural Differences

There are strong reasons to assume that national culture shapes the design and content of corporate Web sites in business-to-business markets. When companies have a definite home-country, with homogeneous employees in terms of nationality and culture, all of them speaking the same language which conveys cultural codes and particular communication patterns, Web site design and content are likely to be influenced by cultural norms. The domestic country's cultural bias is related to ethnocentrism, defined as the natural tendency to view one's own group as the center of the universe (i.e., the sociological concept defined by Sumner and expounded by Levine and Campbell [77, 126]). The leaning toward culture-centered Web site design and content relates to the spontaneous tendency of people to use their own frame of reference, the local knowledge found in their in-group, to make judgments about what is appropriate (i.e., the self-reference criterion in Lee [76]) and to act accordingly. Web site design reflects a "domestic country bias" in favor of one's own country and its associated cultural norms. Albers-Miller and Gelb find that there is a significant relationship between Hofstede's cultural dimensions and the use of particular communication strategies across eleven countries [2, 59, 60].

Approximately 30 research studies have shown that culture matters on the Web (e.g., [7, 15, 127]). Web site design characteristics affect customer evaluation of on-line channel service quality and risk [93]. Cultural characteristics may also affect the perceived value of Web sites [122]. The literature on culture and Web sites has investigated site design and content across cultures, intercultural communication on Web sites, consumer perception of whether Web sites are adapted or standardized, cultural preferences for certain Web site characteristics, cross-cultural Internet usage according to differences in perceived risk and innovativeness, and cross-cultural adoption patterns for e-commerce [30, 43, 98, 100, 113, 115, 116, 117, 129, 137].

Some studies have taken the source perspective, that is, investigated how and to what extent Web site design reflects the culture of origin of those who have developed the Web sites, especially as concerns high versus low context communication and Hofstede's culture dimensions [15, 22, 28, 36, 89, 114, 119, 125, 138].

The literature has also looked at Web site targets, that is, how site visitors react to Web sites designed in a different culture, even when they are translated but not culturally adapted [94]. As argued by Barber and Badre, cultural markers specific to a given culture (i.e., that of the Web site designer) may influence user performance when the user does not share a similar cultural background [9]. Such literature has studied interactions between site visitors and site content from a cultural perspective, how culture influences Web site acceptance and performance, site interactivity, and user behavior in terms of sticking to a particular Web site [8, 42, 79, 83, 87].

The distinction between source and target studies is somewhat artificial inasmuch as source-related studies have often also examined whether multinational corporations (MNCs) tend to localize or standardize their on-line communication strategies, whether site users prefer localized or standardized Web content, whether Web site cultural adaptation influences consumer perception of Web site effectiveness, and consequently to what extent companies should adapt their foreign Web sites to the target country's culture [7, 66, 96, 115, 118, 121].

Table 1 summarizes the literature for three types of culture and Web site research studies mentioned above: source, target, and interface/cultural adaptation studies. The literature on culture and Web sites is presented based on research studies that have examined the links between Hall's high/low context communication and Hofstede's four major dimensions of culture and Web site design and content, use, and cultural adaptation. As noted above, these categories correspond to studying the relationship between cultural dimensions and Web site design and content in three different ways: (1) looking at how Web sites reflect the source cultural values; (2) surveying Web site visitors from different national/cultural groups to assess how they react as communication targets to elements of Web site design and content; (3) studying the interface between sources and targets, in particular how site visitors (i.e., targets) react to culturally adapted versus standardized Web sites. Table 1 shows to what extent empirical findings converge in five key areas of cultural differences that are studied in an important part of the literature on culture and Web sites: high- and low-context communication, individualism, power distance, masculinity/femininity, and uncertainty avoidance [53, 60]. In what follows, the five cultural factors are examined successively.

High-Low Context Communication

The first relevant cultural difference is related to communication styles as described by Hall [52, 53, 54]. Hall explains that in high-context (HC) messages, little is in the coded, explicit part of the message, while most of the information is either in the physical and social context or internalized in the person. Conversely, in low-context (LC) communication, most information is found in the explicit code, which could be transformed into digits (e.g., Yes/No corresponds to 1/0). Western low-context Web sites also tend to have more interactivity functions than Eastern high-context Web sites [22, 27]. LC communication cultures favor explicit, context-free messages, which can be

Table 1. Research Studies Examining Relationships between Cultural Dimensions and Web Site Design (source), Use (target), and Adaptation (interface).<<NOTE THAT AXES WERE CHANGED TO MORE CLEANLY FIT THE PAGE (3 COLUMN VERSUS 5 COLUMN WIDTH>>

Source	Target	Interface/cultural adaptation
High/low context communication		
Cho & Cheon [22]	Evers & Day [42]	Okazaki & Rivas [96]
Cyr & Trevor-Smith [28]	Fink & Laupase [43]	**Singh, Fassott, Zhao, & Boughton [119]**
Hermeking [56]	**Liao, Proctor, & Salvendy [80]**	**Sinkovics et al. [120]**
Rosenbloom & Larsen [105]	**Nantel & Glaser [94]**	Tian & Emery [127]
Singh & Matsuo [114]	**Park & Jun [98]**	
Singh, Kumar, & Baack [116]	**Würtz [137]**	
Singh, Zhao, & Hu [117]		
Suh et al. [125]		
Masculinity/femininity		
Cyr & Trevor-Smith [28]	Simon [113]	**Baack & Singh [7]**
Marcus & Gould [89]	**Tsikriktis [129]**	Singh, Fassott, Chao, & Hoffmann [118]
Singh & Matsuo [114]		*Singh, Fassott, Zhao, & Boughton [119]*
Singh, Kumar, & Baack [116]		
Singh, Zhao, & Hu [117]		
Zahir, Dobing, & Hunter [138]		
Individualism/collectivism		
Cho & Cheon [22]	Evers & Day [42]	**Baack & Singh [7]**
Cyr [27]	**Liao, Proctor, & Salvendy [80]**	**Kang & Corbitt [66]**
Cyr & Trevor-Smith [28]	**Marcus & Alexander [88]**	**Okazaki & Rivas [96]**
Cyr et al. [30]	**Park & Jun [98]**	**Singh, Fassott, Chao, & Hoffmann [118]**
Marcus & Gould [89]	**Pavlou & Chai [100]**	**Singh, Fassott, Zhao, & Boughton [119]**
Singh & Matsuo [114]	Simon [113]	Sinkovics et al. [120]
Singh, Kumar, & Baack [116]	**Steenkamp & Geyskens, 2006**	
Singh, Zhao, & Hu [117]	*Tsikriktis [129]*	
Zahir, Dobing, & Hunter [138]		

(continues)

Table 1. Continued

Source	Target	Interface/cultural adaptation
Power distance		
Burgmann, Kitchen, & Williams [15]	**Liao, Proctor, & Salvendy [80]**	**Baack & Singh [7]**
Cho & Cheon [22]	**Marcus & Alexander [88]**	Singh, Fassott, Chao, & Hoffmann [118]
Cyr & Trevor-Smith [28]	**Pavlou & Chai [100]**	**Singh, Fassott, Zhao, & Boughton [119]**
Marcus & Gould [89]	*Tsikriktis [129]*	*Sinkovics et al. [120]*
Singh & Matsuo [114]		
Singh, Kumar, & Baack [116]		
Singh, Zhao, & Hu [117]		
Zahir, Dobing, & Hunter [138]		
Uncertainty avoidance		
Burgmann, Kitchen, & Williams [15]	Evers & Day [42]	*Baack & Singh [7]*
Cyr [27]	*Liao, Proctor, & Salvendy [80]*	Singh, Fassott, Chao & Hoffmann [118]
Cyr & Trevor-Smith [28]	**Marcus & Alexander [88]**	*Singh, Fassott, Zhao, & Boughton [119]*
Marcus & Gould [89]	*Tsikriktis [129]*	*Sinkovics et al. [120]*
Singh & Matsuo [114]		
Singh, Kumar, & Baack [116]		
Singh, Zhao, & Hu [117]		
Suh et al. [125]		
Zahir, Dobing, & Hunter [138]		

Notes: References in bold support the influence of cultural dimensions (Hall and Hofstede) on Web site design, use, or adaptation. References in italics do not provide evidence for such influence. References in standard text either are not empirical studies (conceptual/or illustrative) or provide inconclusive findings.

more easily coded in the digital communication environment of Web sites than communication from HC cultures, where messages are implicit and need contextual knowledge to be decoded by the receiver. Thought patterns in LC cultures are linear and emphasize rationality and logic, while HC cultures communicate in a nonlinear way with less emphasis on rationality [67]. LC communication cultures are more information based and employ direct, textual, factual, and analytical argumentation in marketing communication use [80]. Conversely, in Japan, which is considered a high-context culture, additional information beyond a written format is preferred [28]. LC communication countries use more hard-sell communication with a lot of explicit information [56]. Furthermore Web sites from LC communication countries are more transparent, more logical, and have more content [137]. This is supported by empirical evidence. For instance, Suh, Taylor, and Lee find Web sites from low-context Australia to be more informative than those of high-context Korea [125]. This finding is supported by other research studies [114, 115, 119]. Therefore corporate B2B Web Sites from LC countries are expected to have more one-way information.

HC communication tends to be more indirect, ambiguous, and understated than LC communication, which is direct and precise, and expresses feelings and intentions rather openly [50]. Hermeking shows that HC communication cultures use soft-sell appeals (indirect approaches creating emotions and atmosphere by visuals and symbols) in contrast to the hard-sell appeals highlighting product features with explicit information that prevail in low-context cultures [56]. South Korea utilizes much more (high-context type) multimedia presentation (text, sound, or video) than the United States and the UK, where presentation is more often based only on (low-context type) text. Furthermore, as emphasized by Samiee: "high-context cultures revolve around personal contacts and, as the Internet is a relatively impersonal medium, attempts to automate processes and transactions are not likely to be well received" [109, p. 423]. Rosenbloom and Larsen examine the relationship between culture and channel communication in B2B marketing channels by comparing fax, phone, e-mail, and written communication between partners from high-context and low-context countries [105]. They find that e-mail communication is more common within low cultural distance countries/channel partners than between channel partners with high cultural distance, and that phone communication, on the other hand, is much more frequently used by partners with high cultural distance than by partners with low cultural distance. In a recent comparative study of Web sites from countries with high-context versus low-context communication, Cho and Cheon show that low-context cultures use more interactive functions than high-context cultures [22]. LC communication increases clarity, directness, explicit messages, and univocal content that does not require interpretation. This facilitates interaction in a digital context and makes two-way exchanges easier. Conversely, HC communication is less favorable for two-way digital exchange, as it requires more personalization, face-to-face, and nonverbal communication. Overall, Table 1 shows that empirical evidence is highly supportive of the influence of high- and low-context communication styles on Web site design and content in terms of both one-way information and one-way and two-way transaction. Hence:

H1a: *Web sites of companies in low-context communication countries score higher on the one-way information dimension than Web sites of companies in high-context communication countries.*

H1b: *Web sites of companies in low-context communication countries score higher on both the one-way and two-way transaction dimensions than Web sites of companies in high-context communication countries.*

Individualism/Collectivism

The influence of individualism on Web site design and content has been shown by Baack and Singh, by Burgmann, Kitchen, and Williams, by Steenkamp and Geyskens, and by Suh, Taylor, and Lee [7, 15, 122, 125]. Baack and Singh identify a Web site design factor related to individualism/collectivism comprising such elements as community themes and tradition themes [7].

Individualists have independent selves, primarily organized and made meaningful by reference to their own internal repertoire of thoughts, feelings, and actions, rather than by reference to the thoughts, feelings, and actions of others [1, 90]. Individualists are more short-term oriented, conduct business independently of personal relationships, and use a cost-benefit analysis (economic model) to evaluate the business exchange [60]. Conversely, in collectivist cultures, the self is defined as part of a group. One's group membership is an important statement of identity and achievement. People with interdependent selves (i.e., with collectivistic values) are usually more attentive and sensitive to others than those who have independent selves related to individualistic values [90]. Individualists feel more at ease with digital communication and are more prone to communicate without personal, face-to-face acquaintance [82]. Hence, they should engage more easily in one-way information and one-way transaction than collectivists.

Collectivists cannot easily deal with the rather depersonalized communication style found on the Internet. Empirical evidence for this is provided in a study where a strong correlation between individualism and e-commerce adoption was found in a B2C setting [82], but one would expect this relationship to hold true in a B2B context. Arguably, because of their need for personalized communication, collectivists have a greater need for face-to-face rather than digital interaction. This preference should prevent industrial companies in collectivist cultures from investing too strongly in Web site elements of two-way transaction. An influence of this cultural dimension on Web site design and content is evidenced by the empirical literature summarized in Table 1. Japanese Web sites show higher levels of collectivism features than U.S. Web sites, and the same holds for Chinese as compared with U.S. Web sites [114, 119]. Many studies show a significant influence of individualism on Web site design and content [22, 80, 96, 100, 118, 122]. Overall, 15 studies support the influence of individualism on Web site design and content, while only two provide contrary findings.

Based on the characteristics of individualistic/collectivistic cultures, as well as on previously published studies, this cultural dimension is expected to have

an identical impact on both information and transaction as elements of Web site content and design. Hence the following hypotheses are formulated:

> **H2a:** *Web sites of companies in individualistic countries score higher on the one-way information dimension than Web sites of companies in collectivistic countries.*

> **H2b:** *Web sites of companies in individualistic countries score higher on both the one-way and two-way transaction dimensions than Web sites of companies in collectivistic countries.*

Power Distance

Power distance is defined as "the extent to which less powerful members of organizations and institutions accept and expect that power is distributed unequally" [60, p. ix]. In large power distance cultures, it is considered legitimate that less powerful members will be dependent on more powerful members. As a consequence, privileges and status symbols for those in higher positions are both expected and popular. Communication is vertical in large power distance cultures, with the more powerful members expecting to be recognized and respected. Conversely, in small power distance cultures, inequalities are minimized, independence of the less powerful is valued and encouraged, and status and class symbols are frowned upon [58]. As a consequence, communication is understood as horizontal, between peers, and is relatively unaffected by status differentials.

The concept of power distance has its roots in the family structure and is pervasive in the institutions that socialize members of the culture (school, church, social organizations). In large power distance cultures, organizations are centralized, and there are big differences between those at the top and those at the bottom. In a high-context culture, communication is dependent on the hierarchical and group-centered relational context in which it occurs [132]. The genre of messages differs according to the degree of power differential, with indirectness preferred when the power distance is small, and directness preferred when superiors convey messages to subordinates [73]. Since B2B Web sites arguably present a rather egalitarian communication setting, more indirectness, less information content, and less clarity in B2B Web sites can be expected from high-context cultures. Information is power-related in high power distance societies because controlling information is a way to maintain or increase one's power. Key information is concentrated at the top and not easily available to lower-status members, and secrecy can be the rule rather than the exception [60]. This translates into a greater reluctance to deliver information.

Conversely, in small power distance cultures, organizations are decentralized, there is more consultation in decision-making, and individual differences are minimized. In line with this, Cho and Cheon explain that in small power distance cultures, "Web sites may tend to lessen the distance between consumers and marketers in an attempt to maintain and create more *horizontal*

relationships through two-way interaction" [22, p. 103 (emphasis added)]. In countries high on power distance, power is concentrated at higher levels in the hierarchy. Decision competence is hardly decentralized, and managerial initiatives come from higher hierarchical levels. Moreover, since information is a central aspect of power, it is oftentimes retained at higher managerial levels. In environments where top management controls many activities, there is little room for lower management and employees to take decisions on their own and actively implement innovative tools. Lower-level managers may even expect to be guided by higher-level managers. Since higher-level managers are more senior and probably have less experience with, and affinity for, the Internet,[1] they may not be aware of the opportunities it offers. Consequently, power distance is likely to result in a lack of initiative for designing more informative and interactive Web sites. Furthermore, as noted above, higher power distance societies display a larger gap between marketers and consumers and have been shown to be less likely to provide customers with further interactive messages [22].

Table 1 shows that the literature strongly supports the influence of power distance on Web site design and content. Using factor analysis, Baack and Singh empirically identify a Web site design factor related to power distance [7]. It is constituted of such elements as pictures of important company representatives, information on organizational structure, and use of proper titles. In line with actual cultural differences, there is evidence of more power distance related features on Indian, Chinese, and Japanese Web sites than on U.S. Web sites [119]. Web sites from the three Asian countries depicted significantly higher levels of status appeals, referent power, and hierarchy. This result was confirmed for Japanese versus U.S. Web sites [114]. Furthermore, cultural adaptation is needed for Web sites designed in high power distance countries for lower power distance targets, resulting in more favorable visitor attitudes, more presentable and easier to navigate Web sites, and higher purchase intentions [115]. Out of 13 empirical studies dealing with power distance and Web site design and content, 10 support the influence of power distance on Web site design, while only three provide contrary findings.

Based on the characteristics of the power distance concept as well as on previously published studies, one would expect an identical impact of this cultural dimension on both information and transaction as elements of Web site content and design. Hence the following hypotheses:

> **H3a:** *Web sites of companies in low power distance countries score higher on the one-way information dimension than Web sites of companies in high power distance countries*

> **H3b:** *Web sites of companies in low power distance countries score higher on both the one-way and the two-way transaction dimensions than Web sites of companies in high power distance countries.*

Influence of Masculinity/Femininity and Uncertainty Avoidance

As shown by Table 1, research studies are much less conclusive for the influence of uncertainty avoidance and masculinity vs. femininity on Web sites. Furthermore, there were no clear rationales for the direction of uncertainty avoidance and masculinity vs. femininity influence in the case of B2B Web sites.

There is support for the influence of the masculinity/femininity dimension on Web site design and content, with six empirical studies supporting it against two that disconfirm it (*see Table 1*). For instance, there is evidence of more masculinity-oriented features in Web sites from more masculine countries (e.g., Japan in [114]; the United States in [119]). However, in a B2B context, the masculinity vs. femininity cultural dimension is less present than in B2C, where Web sites feature gendered characters, female celebrity endorsers, sex roles, gender-related content, and so on.

Although frequently studied, empirical evidence for the influence of uncertainty avoidance on Web site design and content is predominantly unsupportive, with eight empirical studies disconfirming its influence on Web site design and content against five supporting it. In Baack and Singh's study, uncertainty avoidance does not emerge as a factor in Web site design and content [7].

However, based on the data, these cultural dimensions warrant exploratory investigation. Consequently, although uncertainty avoidance and masculinity vs. femininity are not included in the formal hypotheses, the discussion indicates whether the data support their influence or not.

Country of Origin

The Internet is a global medium by definition [72]. It represents a network of interlinked computers operating on a standard protocol. There is no geographic limitation to Internet access, and suppliers in almost any country can create Web sites containing information and dialogue content. The Internet allows supplier companies in all countries to relate with customer companies in distant country markets. The Internet enables companies to accelerate their internationalization process, as compared to companies internationalizing mainly through traditional brick-and-mortar, to the extent that some new businesses may be considered "born globals" [84].

Leading international development agencies and organizations have identified commercial applications of information technology that offer tremendous potential for accelerating economic growth in new industrial countries [136]. The background of this appreciation is that important variations still exist in the degree of economic development between countries. While some countries, referred to as older industrial countries, have achieved high levels of wealth for many years, new industrial countries are currently in the process of increasing their level of economic wealth and thus bridging the gap with older industrial countries [36]. Older and new industrial countries differ on a variety of dimensions. Research and development capabilities and, as a consequence, access to timely technology are among the major differences

between the two groups of countries. Companies in new industrial nations are, on average, younger, and therefore less experienced. They have not been in business for as long, and their technological level is, on average, slightly lower than that of companies in older industrial nations. They are legitimately less self-confident, and therefore more concerned to control information and less prone to enter into more interactive on-line exchanges.

Researchers in the field of electronic commerce have conducted various studies examining the size of the gap [36, 48, 74]. Recently, Pels, Brodie, and Johnston benchmarked business-to-business marketing practices of firms in older and new industrial countries [101]. Their results show that firms in new industrial countries tend to have lower use of information technology in marketing and stronger emphasis on direct face-to-face and personal interaction with customers. B2B companies in older industrial nations better understand the necessity to manage customer uncertainties in business markets (need uncertainty, transaction uncertainty, market uncertainty) through a number of influence tactics that may start with an appropriately designed B2B Web site [36]. They have been more exposed than companies in new industrial nations to the body of knowledge concerning B2B interactions and the ways and means to manage relationships in industrial markets (i.e., the academic literature on business markets, see [44, 45]). Gaur and Waheed's research shows that the primary reason that companies in a new industrial country use the Internet is to sell their core product to existing customers [48]. Establishing an interactive channel of communication and providing information about their company are also important. More "sophisticated" functions and features of the Internet are seen as less important.

Based on these insights, one may argue that B2B companies in older industrial nations are more likely to be aware of the advantages offered by one-way information and by one-way as well as two-way transaction. Based on empirical findings documented in the literature as well as on the rationales developed above, the general hypothesis is that companies in new industrial countries deliver less information and make less use of the opportunities for interactive marketing offered by the Web. Hence, the following hypotheses are formulated:

> **H4a:** *Web sites of companies in older industrial nations score significantly higher on the one-way information dimension than Web sites of companies in new industrial nations.*

> **H4b:** *Web sites of companies in older industrial nations score significantly higher on both the one-way and two-way transaction dimensions than Web sites of companies in new industrial nations.*

Firm Demographics and Industry-Related Variables

Factors other than country and cultural variables are alternative explanations for some of the differences described above, mainly corporate demographics and industry-related variables. Such factors are likely to account for differences

in B2B Web site design and content, especially demographic factors related to company size (e.g., number of employees, sales figures), type of product a company or business unit is mainly selling (commodity vs. more specific equipment), or R&D intensity.

The first alternative variable in the study is firm size. Based on the extant literature, two opposite rationales may be formulated. The first argues that larger companies are better able than smaller ones to invest in attractive B2B Web sites. Being larger, more established, and therefore more self-confident, they may also be more prone to disclose corporate information. Case-based evidence supports this rationale [80, 91]. On the other hand, it could be argued that despite these aspects, large firms are less inclined to do on-line business than smaller companies, which have stronger incentives to move toward using the Internet in their marketing activities. For example, Quelch and Klein argue that small and medium-sized companies can enter new markets more quickly as well as develop a better and more permanent presence. They also have higher gains in efficiency, given their limited reach in terms of distribution outlets [104]. Thus:

> **H5a:** *Web sites of large companies score higher on the one-way information dimension than Web sites of smaller firms.*

> **H5b:** *Web sites of large companies score lower on both the one-way and two-way transaction dimensions than Web sites of smaller firms.*

Dou, Nielsen, and Tan hypothesize that customized products require negotiations and communication in order to draft detailed contracts [36, p. 109]. Parts of this process can be supported and anticipated when a supplier provides elements of one-way and two-way transaction on its Web site. Particularly for new customers, one-way information can facilitate the information-collection process. As concerns industry contingency, the assumption is, therefore, that B2B companies producing equipment will need more interaction with customers for tailoring offers and customizing products than B2B companies turning out standardized industrial commodities. Hence:

> **H6a:** *Web sites of companies manufacturing industrial equipment score higher on the one-way information dimension than Web sites of companies producing industrial commodities.*

> **H6b:** *Web sites of companies manufacturing industrial equipment score higher on both the one-way and two-way transaction dimensions than Web sites of companies producing industrial commodities.*

Finally, the degree of R&D intensity is likely to have an influence on the design and content of B2B Web sites. R&D intensity has been shown to have a direct impact on export performance and financial performance (e.g., [33, 57]). The rationale is that innovative firms develop stronger managerial dynamism and have a general openness to new fields of activity, export markets, and information technologies. High-tech industries may be expected to be more
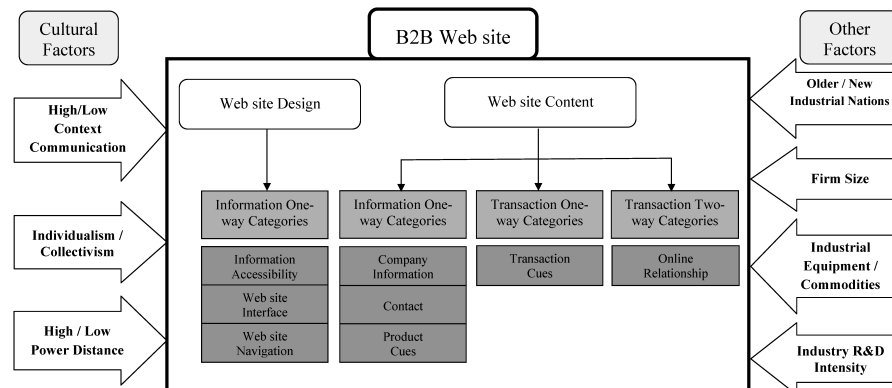
Figure 1. Research Model

sophisticated in Web site design and content, and more prone to promote one-way information as well as both one- and two-way transaction features on their Web sites. In line with Hanson's classification of the degree of Web site sophistication as "simple publishing," "interactive," or "personalized" (i.e., Web pages customized to unique needs) [55], high-tech industries are expected to develop more sophisticated Web sites. Hence:

> *H7a: Web sites of firms in high R&D intensity industries score higher on the one-way information dimension than Web sites of firms in low R&D intensity industries.*

> *H7b: Web sites of firms in high R&D intensity industries score higher on both the one-way and two-way transaction dimensions than Web sites of firms in low R&D intensity industries.*

Figure 1 summarizes the relationships between the constructs tested in the empirical study.

Empirical Setting

The research hypotheses was investigated by means of a content analytic approach using a research instrument that describes Web site information content, graphic design, and interactive features [69, 131]. The survey instrument was based on the above review on B2B Web sites, the coding procedures, the sampling procedure and the resulting corporate sample, and the operationalization of culture- and industry-related independent variables.

Survey Instrument Development

Content analysis is a widely used data-collection technique in the electronic commerce literature [7, 15, 22, 119, 122]. It is the only data-collection technique

that enables researchers to generate objective measures on multiple aspects of Web sites. The coding instrument is based on the corporate Web site literature, with special focus on B2B companies [20, 34, 36, 86, 131]. The coding instrument is presented in Table 2, which displays the coding categories derived from the literature review in the first section of this paper. Major dimensions of Web site design and content are subdivided into coding categories. These coding categories are further related to individual coding criteria derived from sources mentioned in Table 2. Table 2 also presents how individual coding criteria were rated and provides the level of intercoder reliability.

Coding Procedure

The coders were 50 business students in management at a West European university. They were asked to participate in the data collection as part of class assignments during an elective industrial marketing course and received credit for participation. A pilot test of the instrument on 100 Web sites was performed before data collection.[2] Product/industry categories were assigned to coders who participated in the selection of sampled companies and collected corporate demographics (i.e., company country of origin, annual sales, number of employees). They had to rate coding criteria either by checking whether a Web site feature was present or absent or by rating Web site features on 5- or 7-point semantic differentials.[3] For instance, "Newsletter registration" was coded as "Present" or "Absent," but the coding criterion "References" ranged from 1, that is, "No reference," to 7, that is, "complete and detailed reference list with the possibility to get in contact with buyers."[4]

Web sites were independently coded by two coders who later met to compare their coding outcomes. Discrepancies were resolved by each pair of coders after discussion and on the basis of arbitration by one of the researchers in the very rare case of persistent disagreement. Intercoder reliability was assessed by using a per-criterion-agreement method [46]. Intercoder reliability (IR) for coding criteria is reported in Table 2: In most cases, intercoder reliability ranged between 95 percent and 100 percent (for 31 of 42 coding criteria). For perceptual coding categories such as Web site graphics, intercoder reliability was slightly lower, but always above 0.85 (6 of 42 coding criteria). This resulted in an average intercoder reliability of 0.96 across all coding criteria. Generally, coders differed only in neighboring rating points, and further data analysis showed a high level of statistical reliability after disagreement resolution.

Sample

The base population was based on English-version Web sites of industrial suppliers worldwide. For consistency in terms of home country and culture, B2B companies that had only one Web site (i.e., a single Web site design reflecting their home country and culture, possibly with different language versions) were selected, thereby eliminating multinational companies with many different country and divisional Web sites. Thus all Web sites were coded based on their English version.[5] The sample of B2B Web sites cannot be probabilistic

Table 2. Coding Categories Operationalization.

Coding category		Operationalization (coding category criteria)		Source
Website design				
Information one-way				
Information accessibility	Accessibility	Ease of access to Web site with search engine	5-point***	[86, 135]
		Access to company site with "companyname.com"	Yes/No***	[131, 133,135]
	Language	Number of languages other than native available	7-point***	[20, 131]
Web site interface	Graphics and multimedia	Web site is exciting	7-point*	
		Web site is entertaining	7-point*	
		Web site looks appealing	7-point**	
Web site navigation	Search engine	Presence and efficacy of Web site search engine	5-point**	[20, 29, 131]
	Web site works well	Web site broken links and loading time based on ADSL connection	5-point*	[131]
	Web site update	Quality and recency of Web site update	5-point*	[21, 131]
	Logical structure	Web site is logically structured	5-point***	[20, 29, 131]
		Web site is easily readable	7-point***	[20, 21, 131]
		Guiding visitors step-by-step in Web site	Yes/No**	[12, 21]
Website content				
Information one-way				
Company information	Company information	Corporate information about supplier	5-point*	[12, 63, 86]
	Supplier financial status	Information provided by supplier about its financial situation	5-point***	[63, 86]
	Standards and certification	Number of ISO standards for which supplier is certified	5-point***	86
	References	Information about relevant/exemplary deals	7-point***	[34]
	Community activities	Information pages about supplier's CSR actions	5-point***	[86]
	Job opportunities	Details about job opportunities offered by supplier	5-point***	[63, 86]
	Newsletter	Newsletter registration available	Yes/No***	[86]
Contact	Distribution	Information about distributors and their location	5-point***	[86, 128]
	Contact	Four dichotomous criteria on possibility of reaching supplier by (1) e-mail, (2) phone, (3) fax, and (4) postal mail	Yes/No***	[86, 131]

			Scale	References
Product cues	FAQ	Presence/quality of frequently-asked questions	5-point***	[63, 86, 133]
	Links	Number/organization of links to other Web sites for information or comparison purposes	5-point**	[63, 86, 133]
	Product information	Amount and accuracy of product information	7-point***	[12, 20, 21, 29, 86, 131]
Transaction one-way				
Transaction cues	Price availability	Degree of price information available online	5-point***	[63, 86, 128, 135]
	Choice assistance	Tips for product use	Yes/No***	[12]
		Tips for right product choice	Yes/No***	[63]
		Tips about product end-uses and applications	Yes/No***	[86]
		Software for assessing customer needs and guiding choice	Yes/No***	[128]
	Stock and availability	Level of information about stocks and product availability	5-point*	[30, 103, 131]
	Guarantee	Product quality guaranteed?	Yes/No***	[131]
Transaction two-way				
On-line relationship	Interaction/relation	Possibility to have on-line interaction/relationship with supplier	5-point***	[34, 63, 135]
	On-line buying	Possibilities offered to order and pay on-line	5-point***	[63, 86, 128, 131]
	Customization	Possibilities offered to register online and have access to customized information after login	5-point***	[20, 34, 63, 128, 131, 133, 135]
	Secure transaction	Degree of customer privacy and security when performing transactions online	5-point ***	[10, 20, 131, 135]
		Information about secure transaction available only after login	Yes/No**	
	Logistics	Logistics services offered by supplier	5-point***	[63, 131]
		Information about logistics available only after login	Yes/No***	
	After-sale services	On-line services offered by supplier after purchase	5-point***	[63, 131]

Notes: Intercoder reliability (IR): * 0.85 < IR < 0.90. ** 0.90 < IR < 0.95. *** IR > 0.95. <<ADVISE IF ANY ALIGNMENT OF THE LINES NEEDS TO BE CHANGED>>

since there was no information about the base population. The project was to generate country and industry representativeness by using large on-line B2B directories, diversified in terms both of national/cultural origin and of industry type. The companies were selected from two on-line business directories: www.alibaba.com for the first half of the sample, and www.europages.com for the second half. Twenty different product categories with large numbers of suppliers were selected. To randomly select companies, one out of every five or 10 companies in the directory was selected, depending on category size. The usable sample contained 597 B2B Web sites from 57 countries.[6] The sample included firms from China (14.7%), India (8.2%), the United States (5.7%), the UK (8.9%), France (9%), Italy (11.2%), and Germany (6.7%). Companies were mostly small and medium-size enterprises (SMEs): 54.1 percent had fewer than 50 employees, and 4.5 percent more than 1,000. Moreover, 14.9 percent of the companies had sales below $1 million, and 9.2 percent above $50 million. Detailed sample composition is provided in Table 3.

Operationalization of Culture and Industry-Related Variables

Each observation (i.e., a B2B Web site from a particular country) was assigned Hofstede country scores for individualism, power distance, uncertainty avoidance, and masculinity vs. femininity (e.g., all Chinese Web sites were assigned the China score of 80 for power distance). Similarly each Web site observation was associated with the level of context in communication corresponding to its country of origin (from 1—low to 5—high). The high-/low-context communication construct was operationalized by classifying the 57 countries in five categories in terms of level of context in communication (low, low-medium, medium, medium-high, high). This was based on Hall's work [47, 48, 49] as well as several studies that classified countries in respect to high- versus low-context communication [3, 6, 18, 19, 37, 70, 95, 108, 137]. The classification was discussed by the three authors and validated with two colleagues specialized in international/cross-cultural managerial issues.

Country cultural scores for individualism/collectivism, power distance, uncertainty avoidance, and masculinity vs. femininity were taken from Exhibits A.1 to A.3 in Hofstede [60, pp. 500–502]. Countries were categorized as "older industrial" or "new industrial" based on different published sources.[7] Supplier company size was measured based on payroll and yearly sales figures, both being coded on a 7-point measure. Categories for the number of employees were "less than 5 employees," "5 to 10," "11 to 50," "51 to 100," "101 to 500," "501 to 1000," and "more than 1,000 employees." Annual sales brackets were "less than 1M USD," "1 to 2.5M," "2.5 to 5M," "5 to 10M," "10 to 50M," "50 to 100M," and "more than 100M USD." As concerns industry contingency, the sample was divided into two subsamples representing, respectively, industrial commodities and industrial equipment.[8] R&D intensity for each firm was measured using the percentage of sales spent on R&D by their industry, based on estimates from the 2006 Scoreboard using 1,250 global companies from the British Department for Business Innovation and Skills (www.innovation.gov.uk/rd_scoreboard).

Table 3. Corporate B2B Web Site Sample Demographics.

	Number of Web sites	%	% using 2-way transaction
Region/country of origin			
Asia			
China	88	14.72	37.5
India	49	8.19	12.2
Taiwan	16	2.68	6.7
Japan	2	0.33	100.0
Malaysia	14	2.34	21.4
Thailand	7	1.17	25.0
Hong Kong	1	0.17	100.0
Korea	9	1.51	22.2
Other Asia	23	3.85	17.4
North America			
USA	34	5.69	38.2
Canada	6	1.00	16.7
Europe			
UK	53	8.86	26.4
France	54	9.03	24.1
Spain	18	3.01	16.7
Italy	67	11.20	25.4
Germany	40	6.69	22.5
Turkey	17	2.84	25.0
Czech Republic	8	1.34	12.5
Scandinavian	15	2.51	33.3
Belgium	12	2.01	16.7
Other Europe	38	6.35	13.5
Others			
Rest of World	27	4.52	33.3
Number of employees			
< 5	22	3.75	28.6
5–10	87	14.85	26.7
11–50	208	35.49	18.2
51–100	93	15.87	22.6
101–500	123	20.99	24.2
501–1000	27	4.61	25.9
> 1000	26	4.44	30.8
Product (equipment)			
Equipment			
Fire fighting	50	8.33	22.0
Industrial lighting	50	8.33	15.8
Printing machinery	40	6.67	30.0
Paper machinery	40	6.67	25.0
TV and radio broadcasting	40	6.67	22.5
Intercoms	31	5.17	20.0
Diamond cutting tools	30	5.00	43.3
Auto heating and air-conditioning	22	3.67	22.7

(continues)

Table 3. Continued.

	Number of Web sites	%	% using 2-way transaction
Elevators and lifts	20	3.33	26.3
Sensors and temperature sensing devices	10	1.67	40.0
Storage carts and trolleys	10	1.67	5.0
Commodities			
Coatings	50	8.33	10.0
Plastic pipes	40	6.67	30.0
Agricultural fertilizers	40	6.67	40.0
Inks, solvents, and pigments	28	4.67	28.6
Computer keyboards	20	3.33	40.0
Iron bars	20	3.33	10.5
Bicycle parts	20	3.33	19.5
Integrated circuits	20	3.33	20.0
Shock absorbers	19	3.17	30.0

Data Analysis and Findings

Data analysis was based on a three-pronged strategy: (1) exploratory and confirmatory factor analysis to derive a measurement instrument for assessing the communication features of B2B Web sites, both one-way and two-way; (2) assessment of measurement invariance across groups for the B2B Web site measurement instrument [17, 121] and use of latent mean analysis to generate confirmatory empirical evidence for Hypotheses H4a and H4b as well as H6a and H6b [16]. In these two sets of hypotheses, group means were compared for two groups (either "older industrial" versus "new industrial" countries for H4 and "commodity" versus "equipment" suppliers for H6; and (3) correlation between the design and content features of each individual Web site and the high-/low-context communication score (H1a and H1b), the individualism (H2a and H2b) and power distance scores (H3a and H3b), of its country of origin as well as company size (H5a and H5b) and its R&D intensity (H7a and H7b). Additionally, descriptives were provided of some Web site design and content aspects that were left out by the EFA/CFA process and exploratory findings as concerns uncertainty avoidance and masculinity/femininity influence on Web site design and content based on the data.

Instrument Development: A Measurement Instrument for B2B Web Site Design and Content

As is recommended when building measurement instruments [23, 24], the study began with EFA (exploratory factor analysis), followed by CFA (confirmatory factor analysis). The final sample being large enough with about 600 observations, EFA was undertaken based on only one half of the total sample, while CFA was performed on the total sample. Web site criteria were used as a

starting base for exploratory factor analysis. The half sample was used in the first step to assess the factorial structure. Criteria with smaller communalities were deleted, as were criteria that cross-loaded, and factors based on only one or two criteria whose meaning consistency was not obvious. A six-factor solution emerged from the exploratory factor analysis accounting for 67.2 percent of total variance and highlighting key factors for B2B Web sites (attractiveness, clarity, contact, personalization, on-line-business, corporate information), each factor being based on three criteria. Factor 1, related to Web site graphics, emphasized Web site attractiveness with criteria displaying satisfactory loadings: "Web site is appealing" (0.90), "Web site is entertaining" (0.89), and "Web site is exciting" (0.92). Factor 2 highlighted contact with potential customers with criteria related to phone (0.84), fax (0.86), and postal contact (0.80). Factor 3 related to facilitating on-line business with criteria "Prices" (0.77), "On-line Buying" (0.82), and "Secured Transaction" (0.80). Factor 4 dealt with site personalization; it was based on criteria "Customization" (0.72), "Login for logistics" (0.83), and "Login for transaction" (0.83). Factor 5 was related to Web site clarity with criteria "Customer guided step-by-step" (0.78), "Web site is readable" (0.53), and "Web site is logically organized" (0.81). Factor 6 highlighted the Web site's disclosure of "Corporate Information" with three criteria, "Financial status" (0.81), "Distribution information" (0.61), and "Job opportunities" (0.76).

Confirmatory factor analysis based on AMOS6 led to a measurement model with satisfactory fit indices (GFI = 0.957; AGFI = 0.939; CFI = 0.966, TLI = 0.956, RMSEA = 0.049 [low: 0.041, high: 0.049]).[9] It also showed good levels of reliability for most individual measurement instruments (*see Table 4*). All coding criteria were significantly related to their constructs, supporting the assumed relationships between constructs and their indicators. Three dimensions of the measurement instrument reached a good level of internal reliability (recommended threshold: 0.70) as well as convergent validity (recommended threshold: around 0.50 and above). Two dimensions (i.e., "site clarity" and "on-line business") were below but near the threshold. "Corporate Information' was below the threshold (*see Table 4*). Convergent validity of individual constructs in the model was confirmed, since the mean of squared factor loadings was slightly below or above 0.5 for all latent variables (rho of convergent validity; *see Table 4*), except for the "corporate information" dimension. Discriminant validity can be assessed on the basis that covariance between any two constructs was lower than the variance shared by the constructs with their measurement indicators (see [44, p. 46]). Discriminant validity was met, again except for the "corporate information" dimension. Therefore the corporate information construct was not used for hypothesis testing. The "Contact" dimension was not used because most companies (more than 95%) indicated phone, fax, and postal address, resulting in very little variance. Individual coding categories not retained after EFA and CFA were used later for providing additional support.

Before comparing latent means for particular latent constructs (i.e., dimensions of B2B Web site design) across groups, cross-national measurement invariance must be assessed [121, 130]. Variation in the validity and reliability of research instruments across groups may be a threat to comparability.

Table 4. Confirmatory Factor Analysis Results.

Construct	Coding criteria	Standard loading	p-level	Jöreskog Rhô	Average variance extracted
Contact	Postal	0.660	0.000	0.841	0.641
	Fax	0.817	–		
	Phone	0.906	0.000		
Clarity	Logical Web site	0.628	0.000	0.719	0.460
	Readable Web site	0.702	0.000		
	Step-by-Step Web site	0.703	–		
Attractiveness	Exciting Web site	0.914	0.000	0.945	0.851
	Entertaining Web site	0.929	0.000		
	Appealing Web site	0.825	–		
Corporate information	Job opportunities	0.584	–	0.548	0.249
	Distribution information	0.529	0.000		
	Financial status	0.495	0.000		
Personalization	Login-transaction	0.776	–	0.783	0.550
	Login-logistics	0.830	0.000		
	Customization	0.600	0.000		
On-line business	Secured transaction	0.673	0.000	0.679	0.415
	On-line buying	0.660	0.000		
	Price availability	0.596	–		

Measurement invariance should be addressed at the three-level search for configural, metric, and scalar invariance in multigroup research. Assessing the invariance for the research instrument with six subdimensions was done through multigroup confirmatory factor analysis for the older industrial country group of B2B companies and the new industrial countries group [16, 17]. Suppliers were coded as new or older industrial based on their countries of origin. Japan, Australia, West European (e.g., France, Germany, Italy, the UK), and North American (United States and Canada) countries were coded as "older industrial countries." Other East European, Asian, African, and South American countries were coded as "new industrial countries." Configural invariance (criteria exhibit the same basic pattern of salient and nonsalient loadings for the two groups), metric invariance (loadings were nonsignificantly different), and scalar invariance (intercepts were identical in the two groups) are shown.[10] Then the study proceeded by latent mean analysis (see [17, chap. 9]). Since dimensions of Web site design and content are latent, unobservable constructs (observed through their measurement indicators, i.e., Web site criteria), their means cannot be directly compared. Latent mean analysis proceeds by constraining the mean score of the baseline group to zero, and by computing the latent mean difference for the other group as well as its statistical significance.

Findings

The first observation deals with whether B2B Web sites are designed merely as unilateral communication tools (for saving marketing communication costs by substituting Web sites for advertising and direct marketing expenses) or also for initiating transactions (in order to save transaction costs by substituting face-to-face by digital communication). There is clearly a strong dominance of one-way information and a striking underdevelopment of interactive, two-way transaction features through B2B Web sites. On a 0 to 10 adjusted measure,[11] unilateral communication is massively privileged, with factors displaying high scores, whereas the scores for one-way and two-way transaction related factors are all lower than 1 on the 10-point measure. The mean score for the Web site design and content dimensions constantly decreased when evolving from information to transaction aspects (*see Figure 1 and Table 2*), with 6.73 for "Clarity" and 4.44 for "Attractiveness" (information dimensions), and 0.62 for "Personalization" and 0.44 for "Online Business" (transaction dimensions). Descriptive statistics from the 600 B2B Web site database displayed very low scores for login variables that are the main avenue for digital interaction (6.48% for Logistics-Login and 4.91% for Transaction-Login). Very few B2B Web sites offer interactive possibilities through logins. B2B companies are extremely reluctant to disclose information on their stocks and availabilities (0.19 on a 0 to 10 measure), on delivery dates (0.60 on a 0 to 10 measure), and on prices (0.55 on a 0 to 10 measure).

H1a and H1b deal with the influence of low- versus high-context communication. High-context communication was negatively correlated with site attractiveness (-0.087, $p < 0.05$),[12] with site clarity (-0.125, $p < 0.01$), with per-

sonalization (–0.096, $p < 0.05$), and with on-line business (–0.080, $p < 0.05$). This is strong evidence of the negative influence of high-context communication on both informative and interactive aspects of Web site design and content.

H2a and H2b deal with cultural differences between industrial suppliers' Web sites in terms of how individualism versus collectivism influences Web site design and content. Individualism was not significantly related to site attractiveness but was positively correlated with site clarity (0.131, $p < 0.001$), personalization (0.081, $p < 0.05$), and on-line business (0.137, $p < 0.001$). H3a and H3b deal with cultural differences between industrial supplier Web sites from high versus low power distance countries as possible drivers of Web site design and content.[13] Power distance was negatively correlated with site attractiveness (–0.066, $p < 0.1$), site clarity (–0.140, $p < 0.001$), and on-line business (–0.112, $p < 0.01$). Power distance was also negatively correlated with personalization, but not significantly (–0.58, $p < 0.158$). It seems, therefore, that companies in countries scoring high on individualism and low on power distance tend to have more informative and more interactive Web sites.

Additional supportive evidence for the influence of cultural dimensions is given by the correlation between cultural dimensions and other coding categories not included in EFA and CFA (*see Table 5*). High-context communication was negatively correlated, individualism positively, and power distance negatively in all cases for both information- and transaction-related Web site features. In a similar vein, high-context communication was negatively correlated, individualism positively, and power distance negatively with two overall measures of Web site quality, "Web site works well" (i.e., no broken links, short loading time) and "Web site is updated."

The influence of masculinity on B2B was limited to a positive influence on on-line business (0.102, $p < 0.01$) and almost inexistent if one judges by the lack of any significant relationship in Table 5 for 13 categories. The influence of uncertainty avoidance seems more significant, with a positive influence on site attractiveness (0.099, $p < 0.05$), a marginally significant negative relationship with on-line business (–0.072, $p < 0.1$), significant positive relationships to a number of information-related features of B2B Web site design and content (tips about product use, newsletter availability, references, distribution information, and job opportunities; *see Table 5*), and a positive influence on "Web site works well."

H4 stated that industrial companies in older industrial nations are more communicative, scoring significantly higher than companies from new industrial countries (NIC) on information (H4a) and both one- and two-way transaction (H4b). Based on summative measurement instruments for both subsamples, with adjusted scores from 0 to 10, it appears that scores for the older industrial nations group were systematically higher than for the new industrial nations group. To take measurement error into account, and given that there is measurement invariance across the two groups, latent mean analysis was performed by constraining the mean of the assumed lower group (NIC) to zero and calculating the mean difference for the group of older industrial countries as well as its level of significance. There was no significant difference for "Attractiveness" ($p < 0.137$), but B2B Web sites from older industrial countries scored higher for the "Clarity" (0.202, $p < 0.044$), "Personalization"

Table 5. Correlation between Cultural Dimensions and Coding Categories.

Coding category		High context	Individualism	Power distance	Uncertainty avoidance	Masculinity
Website design						
Information one-way						
Information accessibility	Access with search engine	-0.236**	0.220**	-0.188**	0.093*	-0.163**
	Companyname.com	-0.080*	0.116**	-0.083*	NS	NS
	Language	-0.151**	NS	NS	0.230**	NS
Web site Interface	Web site is exciting	-0.105*	NS	NS	0.098*	NS
	Web site is entertaining	-0.091*	NS	NS	0.101*	NS
	Web site looks appealing	NS	NS	NS	NS	NS
Web site navigation	Search engine	NS	NS	NS	NS	NS
	Web site works well	-0.273**	0.318**	-0.249**	0.187**	NS
	Web site update	-0.162**	0.130**	-0.115**	NS	NS
	Web site is logically structured	NS	NS	NS	NS	NS
	Web site is easily readable	-0.159**	0.152**	-0.171**	NS	NS
	Guiding visitors step-by-step	NS	0.082*	-0.124**	NS	NS
Website content						
Information one-way						
Company information	Company information	NS	NS	NS	NS	NS
	Supplier financial status	-0.093*	NS	NS	0.145**	-0.163**
	Standards and certification	NS	NS	NS	0.081*	NS
	References	-0.147**	0.099*	-0.106**	0.138**	NS
	Community activities	-0.142**	0.154**	0.112**	NS	NS
	Job opportunities	-0.164**	0.120**	-0.084*	0.093*	NS
	Newsletter	-0.170**	0.130**	-0.096*	0.117**	NS

(continues)

Table 5. Continued.

Coding category		High context	Individualism	Power distance	Uncertainty avoidance	Masculinity
Contact	Distribution	-0.178**	0.175**	0.128**	0.140**	NS
	E-mail	NS	NS	NS	-0.089*	NS
	Phone	NS	NS	NS	NS	NS
	Fax	NS	NS	NS	NS	NS
	Postal mail	NS	NS	NS	NS	NS
	FAQ	NS	NS	NS	NS	NS
Product cues	Links	-0.090*	NS	NS	NS	NS
	Product information	-0.092*	0.111**	-0.170**	NS	NS
Transaction one-way						
Transaction cues	Price availability	-0.101*	0.157**	-0.135**	NS	NS
	Tips for product use	-0.099**	0.123**	-0.094*	0.099*	NS
	Tips for right product choice	NS	NS	NS	NS	NS
	Tips about product end-uses	-0.125**	0.157**	NS	0.134**	NS
	Product software	-0.125**	NS	-0.092*	0.133**	NS
	Stock and availability	-0.090*	0.103*	-0.110**	NS	0.116**
	Guarantee	-0.143**	0.132**	-0.115**	NS	NS
Transaction two-way						
Online relationship	Interaction/relation	-0.168**	0.150**	-0.136**	NS	NS
	On-line buying	NS	NS	NS	NS	NS
	Customization	-0.101*	0.102*	-0.086*	-0.133**	0.130**
	Secure transaction	NS	0.132**	-0.111**	NS	NS
	Login secured transaction	NS	NS	NS	NS	NS
	Logistics	-0.162**	0.183**	-0.135**	NS	NS
	Login logistics	NS	NS	NS	NS	NS
	After-sale services	NS	0.101*	-0.104*	NS	NS

*p < 0.05. **p < 0.01. NS = not significant.

(0.078, $p < 0.023$), and "On-line Business" (0.109, $p < 0.011$) Web site dimensions. Findings partially supported H4a that companies from older industrial nations score significantly higher on information and strongly supported H4b concerning one- and two-way transaction.

Firm size appeared in the data as positively correlated with site "Attractiveness" and negatively with "On-line Business." Number of employees (0.184, $p < 0.01$) and sales figures (0.135, $p < 0.01$) were both positively correlated with Web site "Attractiveness." Number of employees (–0.093, $p < 0.05$) and sales figures (0.105, $p < 0.05$) were both negatively correlated with the disposition to do "On-line Business." Other latent mean differences were not significant. Therefore H5a received partial support, while H5b was not supported.

Assessment of group invariance for the research instrument between the industrial commodities and the industrial equipment group was performed through multigroup confirmatory factor analysis for the "equipment" group of B2B companies and the "commodities" group. Full invariance was shown, that is, even mean values for the latent constructs did not differ between the "equipment" and the "commodity" groups. Findings did not support the view that "equipment" companies score significantly higher on either one-way information or both one-way and two-way transaction than the "commodity" group. Therefore both H6a and H6b were not supported by latent mean analysis despite measurement invariance between groups.

Industry R&D expenditures were positively correlated with B2B Web site "Clarity" (0.127, $p < 0.01$) and the propensity to design the Web site to facilitate "On-line Business" (0.093, $p < 0.05$). Other correlation coefficients were not significant. This gives partial support to the fact that Web sites from suppliers in more high-tech industries scored higher on information (H7a) and both one and two-way transaction (H7b) than suppliers in less R&D intensive industries. Table 6 summarizes the empirical findings.

Discussion

As observed from the preceding discussion, information is strongly dominant. This finding is in line with comments certain scholars have made in recent years (e.g., [71]). One possible explanation could be an implicit assumption that disclosing information could enable potential or current customers to make inferences (e.g., on quality), compare (prices or delivery dates), or complain (about how they are actually being treated). There are, however, alternative explanations. For example, the overwhelming importance of direct personal relationships on B2B markets may constitute a strong barrier to the transfer of transaction processes from the traditional setting to the Internet. More generally, established habits of companies and their management, which have not changed and have not been questioned for years, may lead to passivity or inertia. Finally, e-marketplaces may constitute a much more important context of exchange for companies than individual company Web sites. Overall, the role of the Internet remains limited to customer acquisition and relationship-initiation functions. Corporate Web pages oftentimes only provide a brief overview of what a supplier may offer the customer.

Table 6. Summary of Empirical Findings.

Hypothesis	Information		Transaction		Outcome	
	Clarity	**Attractiveness**	**Personalization**	**Online Business**	**CFA-Latent Means**	**Table 5**
H1a Web sites from companies in low-context communication countries score higher on information dimension than Web sites from companies in high-context communication countries	-0.125**	-0.087*			Support	Support
H1b Web sites from companies in low-context communication countries score higher on transaction dimension than Web sites from companies in high-context communication countries			-0.096*	-0.080*	Support	Support
H2a Web sites from companies in individualistic countries score higher on information dimension than Web sites from companies in collectivistic countries.	0.131***	NS			Partial support	Support
H2b Web sites from companies in individualistic countries score higher on transaction dimension than Web Sites from companies in collectivistic countries.			0.081*	0.137***	Support	Support
H3a Web sites from companies in low power distance countries score higher on the information dimension than Web sites from companies in high power distance countries	-0.140***	-0.068†			Support	Support
H3b Web sites from companies in low power-distance countries score higher on transaction dimension than Web sites from companies in high power-distance countries.			NS	-0.112**	Partial support	Support

	Description					
H4a	Web sites from companies in older industrial nations score significantly higher on information dimension than Web sites from companies in new industrial nations.	0.202*	NS			Partial support
H4b	Web sites from companies in older industrial nations score significantly higher on the transaction dimension than Web Sites from companies in new industrial nations.			0.078*	0.109**	Support
H5a	Web sites from large companies score higher on information dimension than Web sites from smaller firms.	NS	0.184**			Partial support
H5b	Web sites from large companies score lower on transaction dimension than Web sites from smaller firms.			NS	-0.093*	Partial support
H6a	Web sites from companies manufacturing industrial equipment score higher on information dimension than Web sites from companies producing industrial commodities.	NS	NS			No support
H6b	Web sites from companies manufacturing industrial equipment score higher on transaction dimension than Web sites from companies producing industrial commodities.			NS	NS	No support
H7a	Web sites of firms in high R&D intensity industries score higher on information dimension than Web sites of firms in low R&D intensity industries.	0.127**	NS			Partial support
H7b	Web sites of firms in high R&D intensity industries score higher on transaction dimension than Web sites of firms in low R&D intensity industries.			NS	0.093*	Partial support

Notes: For H4a, H4b, H6a, and H6b, figures are latent mean differences; otherwise, they are correlation coefficients. †$p < 0.1$. *$p > 0.05$. **$p < 0.01$. ***$p < 0.001$. NS = not significant.

The influence of cultural factors (e.g., power distance and individualism, high- vs. low-context communication style) on B2B Web site design and content was the central research question. In line with the literature on culture and Web sites (*see Table 1*), this study confirms the strong influence of high- versus low-context communication on Web site design and content as concerns both information and transaction features. Larger power distance leads to lower site attractiveness, site clarity, and on-line business, and higher individualism leads to higher site clarity, personalization, and on-line business. Even though the influence of individualism and power distance is largely, if not fully, supported, it is reinforced by the correlation of coding categories not included in the CFA instrument with individualism and power distance (*see Table 5*). There is clear convergence with the existing literature on culture and Web site design and content for high- versus low-context communication, individualism, and power distance. The study, therefore, supports the need for Web site cultural adaptation emphasized by previous research [7, 15, 66, 115, 116, 127]. Concerning the influence of masculinity versus femininity, the only significant relationship is that companies in masculine countries are more prone to include on-line interaction in their Web sites. Contrary to the previous literature (*see Table 1*), which dealt mostly with B2C Web sites, the influence of masculinity versus femininity on B2B Web site design and content seems rather limited, especially when one looks at the correlation of coding categories not included in the CFA instrument with masculinity scores (*see Table 5*). It is necessary, however, to acknowledge that the situation is different concerning the influence of uncertainty avoidance on B2B Web site design and content. The data partially support this influence, especially as concerns information (see the significant correlation for information-related coding categories in Table 5) and a significant positive relationship with site attractiveness, this being further reflected in a positive influence on a general indicator of Web site efficiency (i.e., site works well, no broken links, short loading time). However, a high country score for uncertainty avoidance significantly reduces the adoption of on-line business by its B2B suppliers.

The empirical findings as concerns older versus new industrial countries are in line with the views of Quelch and Klein [104]. They are also in line with the empirical findings of Dou et al., who find strong support for their hypothesis that exporters from older industrial countries are more likely to employ transaction-related features in their Web sites than exporters from new industrial countries [36]. Companies in older industrial countries scored higher on one- and two-way interaction (higher clarity, better corporate information, more personalization, higher availability of on-line business). On the other hand, given the geographical, economic, and other barriers faced by companies in new industrial countries when approaching potential customers, the Internet offers tremendous opportunities to overcome classical barriers. Hence, it is at least partially counterintuitive that companies in new industrial countries would not seize the opportunities the Internet offers. It is likely that they have either not realized the scope of the opportunities or lack the know-how to use Web sites in B2B relationships. Future research could provide insights into the factors preventing companies in new industrial countries from using the Internet's full potential.

Finally, the study investigated the relationship between corporate demographics, product type, and R&D intensity of industrial companies and Web site design and content. Larger companies were found to have more attractive Web sites. However, fewer possibilities for on-line business were available on their Web sites. These results may be based on three factors. First, large companies have larger resources available for the implementation and ongoing management of their Web sites. Second, they have large quantities of information to publish and more experience with this, since many of them are obliged to do so in annual business reports and comparable documents. Finally, many large firms have existing distribution channels and within these channels often have solid negotiating power. Hence, they depend less on the Internet to access their market than their smaller or more recently established competitors. Alternatively, they may not wish to compromise relationships with existing distributors by implementing direct Web sale solutions that would lead to a situation of competition with channel members.

With respect to the influence of product types, the findings differ from those of Dou et al., who found marginal support for companies selling standardized products employing more transaction features than companies selling customized products [36]. The findings also differ from those of Boyle, who found marginal support for commodity-like products differing from customized products in terms of Web site design and content [13]. Focusing only on B2B Web sites, rather than both B2B and B2C Web sites as did Dou et al., the study finds no support for such a difference. This may be due to the overwhelming importance of personal contact in B2B markets, whether for standardized or customized products. Jackson, Keith, and Burdick compared the use of various promotional elements (personal selling, trade shows, sales promotions, direct mail, technical literature, trade advertising) for five different product categories in industrial markets covering both standardized and customized products [64]. They showed that salespeople working mostly on the basis of personal contact are by far the most important promotional element in all product categories.

R&D intensity was observed to have a positive influence on Web site clarity, attractiveness, and on-line business. One may assume that in R&D intensive companies, technological affinity and expertise are higher, and that these skills also enable companies to use all dimensions of the Internet. This may be a type of halo effect: R&D intensive companies may be technology intensive in all domains.

Limitations and Implications

The limitations of the study are threefold. First, while it involved companies from a large number of countries (i.e., 57) and national cultures, some countries were represented by only one Web site (i.e., 17). This reflects country relative size as well as relative share in global industrial supply. Nonetheless, the sample includes companies in many economically relevant countries (i.e., 22 countries with five or more Web sites). These countries account for an important proportion of international trade. As a consequence, the findings may not be

representative for all types of countries and, in particular, for smaller countries that are not well integrated into the world economy. Future research could extend this study to additional countries. Second, the sample of companies only represents selected industries. These industries cover different product types and R&D intensities. Nevertheless, they are not fully representative of all existing B2B sectors. In particular, B2B services (e.g., consulting, training, banking, market research) were not studied. Again, this limitation represents an avenue for future research. Finally, the hypotheses focus on only three dimensions along which cultures may be described (power distance, individualism, communication style). Other dimensions from the Hofstede framework and other cultural concepts exist that establish a closer conceptual linkage between cultures and technologies [75]. The empirical literature is divided on the influence of uncertainty avoidance on Web site design and content (*see Table 1*). The research suggests that that uncertainty avoidance may influence B2B Web sites positively for information-related features and negatively for transaction-related features. Further research is needed to better understand the influence of uncertainty avoidance on Web site design and content, especially at the conceptual level.

Some of the constructs derived from confirmatory factor analysis did not reach the recommended 0.5 threshold for convergent validity. In fact, factor analysis of observation data (based on content analysis) is different from factor analysis of individual respondent self-reported behaviors and attitudes in survey research. Due to high individual response consistency in questionnaires, multiple items in psychometric scales tend to share more common variance than coding criteria in content analysis. Overconsistency of individual respondents is what artificially feeds convergent validity to the extent that it may often result in common method bias [102]. In the present case, the factor analysis was not based on respondents' data but on observed Web site data that were content analyzed. There is less consistency because data collection was driven by observations rather than by respondents. It is therefore understandable that some constructs did not reach the recommended threshold, which was based on self-reported opinion data. It is believed, therefore, that the constructs "Web Site Clarity" and "On-line Business" are acceptable. However, the construct labeled "Corporate Information" was not used because its AVE was very low and it did not meet discriminant validity. Similarly "Contact" was not used because of its lack of variance.

Despite these limitations, this study has several important theoretical and managerial implications. The influence of cultural dimensions on Web site design and content may turn out to be a more substantial phenomenon than initially anticipated. The "collective programming of the mind," although not absolutely static, changes less quickly than certain countries' levels of economic development. For interactions between companies in high-context and low-context communication, individualist and collectivist, large and small power distance countries communication through the Internet for B2B supplies remains a challenge. There are strong disparities between Web site design and content in companies from different countries. In the light of the increasing homogenization of many industrial companies' core offerings, factors allowing competitive differentiation are required in order to build

and maintain long-term competitive advantage. The Internet is one avenue for companies to achieve differentiation by providing customers advanced opportunities for interaction. Firms in older industrial countries appear to have realized this potential more quickly—and maybe more fully—than competitors in new industrial countries. It is possible that, at least currently, cost advantages in new industrial countries are still sufficient to protect competitive positions and, hence, discourage investment in differentiation through Web pages. However, as increasing wages and commodity prices reduce the cost advantages of producers in many new industrial countries, Internet-based differentiation may become a more relevant strategic concept for firms in such contexts. A replication of this study in the future may lead to a less important gap between countries.

As observed in the study, a large majority of firms do not currently use the full potential that B2B Web sites offer in the context of customer management. Many companies mainly exploit the one-way information possibilities of the Internet but refrain from interactive applications. This result is surprising in light of the predictions made in the early literature [104, 109]. On the other hand, depersonalized B2B Web sites may not be able to replace face-to-face relationship development as a customer-management approach in all sectors. There may be a tacit agreement that personal relationships characterized by trust, flexibility, and confidentiality are the basis for transactions, particularly in industries in which complex systems or projects representing important amounts of turnover are managed between supplier and customer.

Conclusion

This study investigated hypotheses related to the influence of cultural, national, and corporate characteristics on B2B supplier Web site design and content, utilizing a content analysis of 600 B2B Web sites diversified in geographical, cultural, and industrial terms. It adds to the extant body of studies focusing on culture and Web site design and content by showing how cultural differences affect Web site design and content, and by comparing the way different types of companies design Web sites to interact with business customers. High-context communication, high power distance, and collectivism are cultural factors that impede the proper design of Web sites in terms of making them clear, attractive, and interactive. Therefore companies in emerging industrial countries (often high context, collectivist, and high power distance) should strive for Web site cultural adaptation. Hypotheses relating firm characteristics to Web site design and content were only partially supported by empirical findings. Future studies will develop additional insights into why B2B companies tend to make strikingly little use of interactive features on their Web sites.

NOTES

1. For example, Papacharissi and Rubin found that individuals who receive more attention from their environment when talking have less Internet affinity than

people who receive little attention [97]. Arguably, higher-level managers will receive more attention from their environment constituted of subordinates than lower-level managers, particularly in high power distance cultures. In addition, Selwyn et al. show that older people have significantly lower Internet affinity than younger people [110]. Given that senior management is usually older in high power distance cultures because the seniority principle plays a key role in promotions, they can be expected to have less Internet affinity.

2. The coding instrument was presented to coders during an industrial marketing class. Coding categories, coding criteria (*see Table 2*), and the content analysis instrument were explained. Rating systems for criteria were described. Then each coder received the instrument in an electronic version. Coders had one week to look at the instrument, test it with two Web sites, and send comments or improvement suggestions to the authors. The final version was then sent back to the coders with final comments on how to proceed with the coding. Fifty coders had to pretest the instrument with two Web sites, resulting in a pretest performed on 100 Web sites.

3. Product categories were assigned to coders organized in groups of three to five. Groups were asked to select 30 to 50 company Web sites (depending on group size) from business directories, choosing one company out of five or 10 (depending on the number of companies in the category). A limitation was introduced regarding Chinese Web sites to about 15 percent of the total Web sites analyzed. Web sites were validated by the authors before the coders were allowed to content analyze them based on the coding instrument.

4. The full B2B content analytic research instrument is available from the authors on request.

5. Coders were instructed to select only Web sites that had an English version. Other languages were only checked to inform the coding category related to language versions.

6. Fifty coders analyzed Web sites, each coder being assigned 24 Web sites. Since each Web site was coded by two independent coders, $(50 \times 24)/2 = 600$ Web sites were analyzed (597 Web sites after eliminating three companies with missing data).

7. The *CIA World Factbook* (www.cia.gov/library/publications/the-world-factbook/appendix/appendix-b.html), the International Monetary Fund's *World Economic Outlook* (www.imf.org/external/pubs/ft/weo/2007/02), the World Bank Country Classification (http://web.worldbank.org/WBSITE/EXTERNAL/DATA STATISTICS/0,,contentMDK:2042045 . . . <<**link doesn't work**>>), and the list of newly industrialized countries (NICs) (www.ilo.org/public/english/bureau/inst/papers/1999/dp112/index.htm). <<**CIA and ILO web addresses have changed, new ones needed**>>

8. Companies were included in the "commodity" group when their products were bulk industrial inputs and in the "equipment" group when they sold investment goods. For instance, agricultural fertilizers and coating manufacturers were coded as "commodity," whereas elevators and paper machinery manufacturers were coded as "equipment."

9. The goodness-of-fit index (GFI) is analogous to a squared multiple correlation [65]. The adjusted goodness-of-fit index (AGFI) is a parsimony-weighted measure of model fit [65]. The study also uses the comparative fix index (CFI), with a conventional cutoff point at 0.95, because it has been shown to be robust to sample size and a number of measurement indicators and variables [4, 64]. The root mean square error of approximation (RMSEA) is also a parsimony-weighted measure of model fit [14, 123]. Browne and Cudeck suggest that RMSEA should ideally be below 0.05, acceptably below 0.08 [14].

10. Detailed statistical computations are available from the authors on request.

11. In order to generate a common metric, easier to understand and compare, scores for coding criteria (S) have been changed to $S' = [(S - 1)/n] \cdot 10$, n being the number of measurement points (5 or 7). For binary answers, S' is the percentage of positive answers divided by 10. The Web site design subdimensions can be used in

an additive manner, given their internal reliability. Redressed scores S' for each Web site dimension are the arithmetic mean of the three coding criteria S's.

12. All tests are two-tailed significance tests.

13. As concerns high- vs. low-context communication, there is no measurement possibility at the country or organization level. They can be measured only at the individual level. As a consequence, high-context communication is associated with low individualism and large power distance, while low-context communication is associated with high individualism and small power distance.

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