A user-oriented model for global enterprise portal design

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Abstract: Enterprise portals collect and synthesise information from various systems to deliver personalised and highly relevant information to users. Enterprise portals' design and applications are widely discussed in the literature; however, the implications of portal design in a global networked environment have barely been explored. This paper aims to highlight the challenges of enterprise portals for international, transnational and multinational businesses, paying special attention to the influence of national culture on enterprise portal design. A user-oriented model for enterprise portal design is put forward emphasising the relevant cultural characteristics of the portal users influencing portal design. The incorporation of these characteristics to the portal design will support both portal contribution and portal benefits, ultimately leading to improved business processes.

Keywords: enterprise portal; global portal design; user oriented model; cultural influences; international e-business.

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1 Introduction

Via a Google search, Tatnall (2005) found 35.6 million entries for the word 'portal' in December 2003. Exactly five years later we found 710 million entries. This might appear to be a large increase, considering that both the words 'door' and 'window' have about 500 million entries and the concept appears to be used in a large variety of contexts. The

more precise 'enterprise portal' has about 1.8 million entries in Google and 2.330 entries in Google Scholar (542 in 2003, 62 in 2000, and very few before 2000; cf. for 'portal' Google Scholar provides 1.2 million entries in 2008, 77.900 in 2003, and 73.100 in 2000). Apparently, the development of portals and supporting applications has attracted wide attention in both the popular and scientific media.

Whereas portals provide great opportunities to e-business, *global* portals provide even larger opportunities owing not only to the larger scale, but also to the larger diversity of the information represented (Feng, 2006). An important yet under-represented area in research to date is culture, and specifically the influence of culture on enterprise portal design. Therefore, the purpose of this paper is to highlight the implications and the opportunities of enterprise portals for international, transnational and multinational business, paying special attention to the influence of culture on enterprise portal design in a global environment. Our study will show how culture influences several factors of the design and usage of enterprise portals in a global context. To deal with the cultural influences on enterprise portal application in a global environment, a user oriented model for enterprise portal design is provided subsequently. This study should be of benefit to managers, educators, and students involved in international business intelligence, information systems management, information resource management, and knowledge management.

The structure of the paper is as follows: first, we demarcate the enterprise portal concept. Next, we draw attention to the opportunities that enterprise portals provide to improve the daily information flows within and between enterprises. Then, we discuss the influence of culture on global enterprise portal design by means of five elementary points. Subsequently, we come up with a user-oriented model for culturally influenced enterprise portal designing. The final section then ends with key findings, practical recommendations and a future research agenda.

2   Demarcation of enterprise portals

In the introduction we demonstrated the ambiguous use of the term portal. We opted for the more specific term 'enterprise portal'. However, the relevant scientific literature has not yet reached consensus on the scope of the enterprise portal concept.

2.1   Solely an internal or also an external orientation?

A key point in defining the enterprise portal concept is the question of whether it includes or excludes a link to outside stakeholders. For instance, Tatnall (2005) and Hansen and Deimler (2001) solely focus on intranet applications. According to Tatnall (2005), enterprise information portals are used to manage the information and knowledge within an organisation and are primarily designed for business-to-employee processes. However, the most cited article on enterprise portals focuses both on internal and external functionality (Raol *et al*., 2002). Also, Ryu *et al*. (2005) do not exclude linkages between multiple companies in their definition of enterprise information portals. However, Mendoza *et al*. (2002, p.71) add to the ambiguity by using the term 'business portal' to describe "a central location that can easily be accessed by all the firm's employees, customers, partners, and suppliers".

First of all, "a portal aggregates information from […] all network-accessible resources […] and makes that information available to various users […by offering] centralized access to all relevant content and applications" (Tatnall, 2005, pp.3–4). More specifically, Ryu *et al.* (2005, p.246) define an enterprise (information) portal "as a knowledge portal whose main function is to assist its members in obtaining specialised knowledge through various learning processes [and] can be considered to be a knowledge community that is composed of employees in a single company or in multiple companies that have relationships with each other". Our main reason for following the broader enterprise portal definition, which from hereon includes enterprise *information* portals, is that the integration of information between companies in our contemporary networked world is almost inevitable. Yet, at least as, if not more important than providing a clear definition are the functionalities of enterprise portals.

2.2 Applications within enterprise portals

According to Raol *et al.* (2002), the core of any portal framework are the applications it claims to support. Hence, the strength of a portal is the degree to which it provides a gateway to manage, structure, and facilitate access to business information. Most contemporary organisations use portals to identify, capture, store, retrieve or distribute great amounts of information from multiple internal and external information sources (Feng, 2007).

Tatnall (2005) describes various sub-elements of enterprise portals such as business intelligence portals providing market and competitive information, and business area portals supporting specific business processes such as personnel and supply chain management, and also sales. In addition, Hansen and Deimler (2001) describe how an integrated enterprise portal can support:

- online business processes, such as interaction and coordination embedded in online procedures and software, online information repositories, and online tools to assist service representatives with customer service

- online people management, for instance, online benefits, administration and healthcare information, online training, and online career development

- online services, such as online employee marketplaces, online employee assistance, and rich online company-to-employee communication.

Externally, Raol *et al.* (2002) describe how enterprise portals can, for instance, incorporate external services from business partners such as travel reservations.

In sum, enterprise portals can be used to deliver information and applications to employees (Counsell, 2004; Daniel and Ward, 2003; Detlor, 2004), to provide staff with job- or task-related information and knowledge (Detlor, 2000; Terra and Gordon, 2003), and as a way to enable collaboration and interaction with the external network of business partners (Ben-Arieh and Pollatscheck, 2002; Collins, 2002; Dias, 2001). Now, knowing the possible applications within enterprise portals, what are exactly the business opportunities?

3   Business opportunities for enterprise portals

The alignment of business and IT is essential for the performance of contemporary organisations (Henderson and Venkatraman, 1993). Enterprise portals can be extremely helpful in the alignment of business and IT on a business process level by connecting and serving the needs of large numbers of users (see also Ehrenhard *et al.*, 2006).

3.1   Internal opportunities

For most knowledge workers, the enterprise portal is the most prominent gateway to their networked "virtual organisations" (see, Walker, 2006). This is not an easy task because the portal must integrate information from a large number of different functions, including purchasing, R&D, manufacturing and production, finance, sales and marketing, and the like. The enterprise portal delineates and explicates the internal collaborations and interoperability requirements among these various functions and collaborating groups.

Since an enterprise portal offers a single point of access and a single point of information interchange (Hazra, 2002), it can integrate business events across existing information systems and departmental boundaries, thus facilitating internal collaboration and promoting interoperability among the different departments within an organisation.

Furthermore, the enterprise portal can enhance employee productivity and business competitiveness. Those capabilities of an enterprise portal give employees a resourceful and promising role in the organisation because they can personalise information for decision making. As Hansen and Deimler (2001) pointed out, an integrated enterprise portal can be used to improve morale by delivering a comprehensive business-to-employees programme. Meanwhile, the personalised information allows employees to find high-quality information without having to spend copious amounts of time browsing. It also reduces massive quantities of information into customised sets. The effective information acquisition and utilisation make employees more productive in doing their jobs and thus make businesses more competitive.

3.2   External opportunities

In addition, an enterprise portal introduces business information management for enterprises with an extension to reach the customers, suppliers, and business partners in their network. In this way, an enterprise portal can support supply chain management and customer relationship management for both businesses and customers. In practice, business relationships evolve in multiple directions in which buyers, sellers, and brokers of goods and services come together to exchange information, obtain specific knowledge, and conduct transactions. An enterprise portal could therefore extend both to potential customers worldwide and suppliers by comparing offerings and prices instantly in a real-time manner.

Additionally, collaborative relationships with business partners is possible, such as collaboratively designing products, matching and responding to customer demands by the entire value chain players, *etc*. Accordingly, an enterprise portal can provide enterprises with a genuine capacity to enable real-time, interactive exchange of business transaction information and integration of business processes in a network; for example of trading partners, buyers, sellers, brokers or intermediaries, and business service providers.

3.3 Enterprise portals as a driver for global integration

Various applications of an enterprise portal strongly suggest that it can contribute to both internal and external integration of enterprise businesses. The internal integration includes the back-end processes required for complete fulfilment of customer requests, which may involve the major customer–client interactions (such as registration, marketing, payment, and so on) and management of customer transactions (for instance, accommodating requests from the website for products and services, or integration of the vast amounts of customer information). The external integration combines services from multiple providers (for example, partners of a supply chain) to support extended transaction management, information exchange, coordination, and collaboration along the entire business value chain. In addition, personalisation can help in providing more relevant information, as opposed to more information.

4 Cultural impacts on enterprise portal design

From a technical point of view, extending an e-business to a global scale presents challenges, but none that cannot be overcome. But what of the users? A global portal also exposes companies to users with different languages, different lifestyles and different cultures, affecting perceptions and expectations. Different users may have completely different interpretations of a single message displayed on an enterprise portal. It is therefore relevant to identify the enterprise portal design factors that are influenced by culture, and the possible differing attitudes and behaviour of international portal-users. This is in line with Luna *et al.* (2002) who state that cultural congruity, being the congruity of a website with a visitor's culture and the manifestations of that culture, must be considered when designing a website. We highlight five factors that need to be considered when designing a global portal in order to achieve cultural congruity. Next to language differences, important roles are also played by colours, icons, symbols, and layout (see, *e.g.*, Choong and Salvendy, 1998; Del Galdo, 1990; Fang and Rau, 2003; Hazra, 2002; Marcus *et al*., 1999; Nielsen, 1999; Ossner, 1990; Rau *et al*., 2004; Russo and Boor, 1993; Spencer, 1988; Tractinsky, 2000).

4.1 Language

Language differences between countries are among the more obvious hurdles that global portals must overcome (see *e.g.*, Tractinksy, 2000). The differences require more than just translation of text, but call for consideration of the meaning and implications attached to words and phrases and how those meanings and implications vary across borders. As mentioned by Usunier and Lee (2005), the internet is far from immune to the language-based difficulties wrought by high- versus low-context cultures. Explicit choices for instance have to be made concerning the tone of the communication being formal or informal and the way in which a person is addressed. There are technical considerations as well, such as the difference between single- and double-byte characters for Western and Chinese text, respectively. Likewise, date representations (*e.g.*, the sequence of day, month and year, or use of the non-Western Gregorian calendar) and to a lesser extent, time conventions (*e.g.*, 12- or 24-hour clock), can differ from culture to culture (Del Galdo, 1990).

4.2   Colours

Colour is a useful and important consideration, as it both catches and holds the user's attention. It can also help to sustain, reinforce and enhance a positive experience during searching or browsing. However, in a global context, colours connote very different meanings. For instance, colours that are sacred differ between Judeo-Christian West (red blue, white, gold), Buddhist (saffron yellow) and Islamic (green) traditions. Based on Russo and Boor (1993), some significations of colours related to several countries are adopted, and presented below in Table 1.

As shown in Table 1, a single colour will have very different meanings from country to country; while similar meanings may be represented with completely different colours. For example, red means happiness, prosperity, and success in China, and is the most preferred colour for celebrations, such as weddings. It is also often used to decorate a festivals sites, important events, or to welcome very important persons. Nevertheless, red represents danger for Anglo-American, anger for Japanese, and death for Arabs. A similar example is white colour, which represents purity for Anglo-American and is commonly used for weddings, but represents death for Chinese and is normally used during funerals. Thus, in a global environment, differences in colour go deeper than just appearance, and the selection of colours can be a difficult and sensitive decision for designers of global enterprise portals.

Table 1   Colours related to some national cultures

Country	Red	Green	Yellow	White
Anglo-American	Danger	Success; safety	Coward	Purity
French	Aristocrat	Crime	Lucky; temporary	Neutral
Chinese	Happy; success	Life; hope	Wealthy; powerful	Death
Japanese	Anger; danger	Young; energetic	Grace; nobility	Death
Arab	Death	Fertile; strong	Happy; wealthy	Joy
Indian	Life	Wealth; fertile	Success	Death

Source: Adapted from Russo and Boor (1993)

4.3   Icons

Similar to colour, the meaning of icons also varies from one country to another. Icons that represent everyday objects or functions in one country may be perceived as obstacles by users in another country (Choong and Salvendy, 1998). Nielsen (1999) suggested that, in general, hands or feet as icons should be avoided. Additionally, animal icons may have subtly different meanings by country. For instance, an owl represents wisdom in many Western countries but implies something evil in some Eastern countries. To most Westerners, the dragon is a fearsome mythical animal, but to the Chinese, the dragon has a more positive and mythological connotation. Chinese people consider the dragon as a representative of wisdom and a source of blessings. Another example is that a dog can be a lovely image in some countries, but it is seen as the lowest form of life in some other countries. Some icons may convey meanings that are not only different, but contradictory (Marcus *et al.*, 1999).

4.4   Symbols

Symbols are also commonly used for international communication, but similar to colours and icons, the meanings of symbols are country- and culture-specific. "Most symbols are not universal; they may be understood and used by a large part, but not all, of the world population" (Usunier and Lee, 2005). One example to consider is whether symbols such as the 'X' or check marks convey the correct distinctions as to 'selected' or 'de-selected. Looking again to China, an 'X' is most commonly used to cross out what is not desired rather than indicating what is to be selected, which is precisely the opposite in many Western countries (Feng, 2006).

4.5   Layout

Regarding the *layout of portals*, reading direction across the world can be generally divided into three types, the most popular being left-to-right, and row-by-row, from top to bottom. However, in some regions, people read from *right-to-left*, and row-by-row, from top to bottom. Moreover, a third way to read is from right-to-left and *column-by-column*, such as in traditional Chinese layout that is still very popular in Taiwan, Hong Kong and some locations in mainland China. Obviously, left-to-right sequencing may be inappropriate or confusing for use with right-to-left reading scripts or with icon layout. Studies have shown how pictorial information should be presented and organised for scanning on a display according to the direction the script flows naturally in the user's first language (Marcus *et al*., 1999). The early version of a website called Arabia.On.Line, for example, intended to be a place where Western readers could learn about Arab countries, mistakenly laid out its contents as though the text were written in Arabic, for Arabic readers. The result was an arrangement of icons that was misleading for the (Western) viewer's eye, and led them to directions inconsistent with that intended by the designers (Badre, 2000). As a final, somewhat humorous example, consider a billboard where a woman on the left is shown unhappy, next to a pile of dirty laundry, while the woman on the right of the billboard is shown smiling, next to clean laundry and holding a certain brand of washing powder. Now imagine how the message might change for viewers who are accustomed to reading from right to left!

5   A user-oriented model for global enterprise portal design

We stated before that not the technology, but the behaviour of the user is the central challenge in making global enterprise portals a success. Or, as Kim *et al*. (2002, p.61) state in relation to enterprise portals: "Information technology can play an essential role in knowledge management only when it is applied in a broader organisational context."

### 5.1   Linking users, portals and processes in a global environment

Ryu *et al*. (2005) found in their study that customising portals to make them understandable to as large a population as possible is important as higher knowledge receipt from other members leads to an optimal learning behaviour. Hence, to incorporate cultural influences into the design of global enterprise portals, it is important to set up efficient linkages between enterprise portal users and business processes via enterprise portals (see Figure 1).

Figure 1   A generic model of enterprise portal application in a global environment
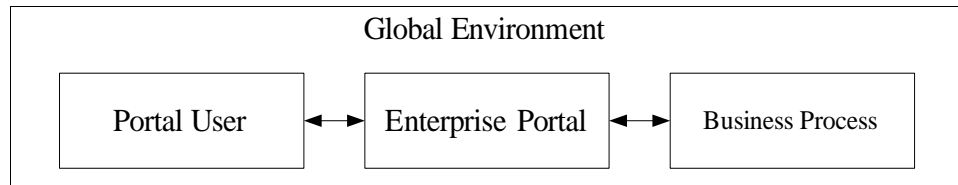
The meaning of the four entities in Figure 1 – a global environment, portal user, enterprise portal, and business process – as well as the relations among them can be briefly introduced as follows. The entity of a global environment represents the general situation for an implemented enterprise portal. The portal user entity represents not only internal employees, managers, but also external business partners, customers, and even suppliers. All of them have access to the enterprise portal for being involved in one or more business processes in one way or another, including both on local and international levels. When the enterprise portal entity is aligned with the business process entity, it can provide enterprise portal users with a genuine capacity to enable real-time, interactive exchange of business transaction information.

5.2   Closed-loop principle

In the literature study in Section 4, we demonstrated how users of an enterprise portal in a global environment might have different cultural backgrounds. Owing to cultural differences, they could have very different perceptions and expectations when they access an enterprise portal. To deal with the cultural influences, we propose to adopt the "closed-loop principle" (Bemelmans, 2000) for designing an enterprise portal in a global environment. This principle is rooted in an economic approach to information systems design (for a discussion, see Cordella, 2006). The principle is based on the concept that the development, use and maintenance of information systems will only be successful in cases where the stakeholders involved have (direct) incentives to perform their information systems management tasks in line with the goals of the company. The best way to obtain these goals is to provide stakeholders with 'benefits' in information systems management: *i.e.*, positive incentives for those contributing in line with company goals, and negative incentives for those not contributing in line with company goals. The 'closed-loop principle' is depicted in Figure 2.

**Figure 2**   The closed-loop model
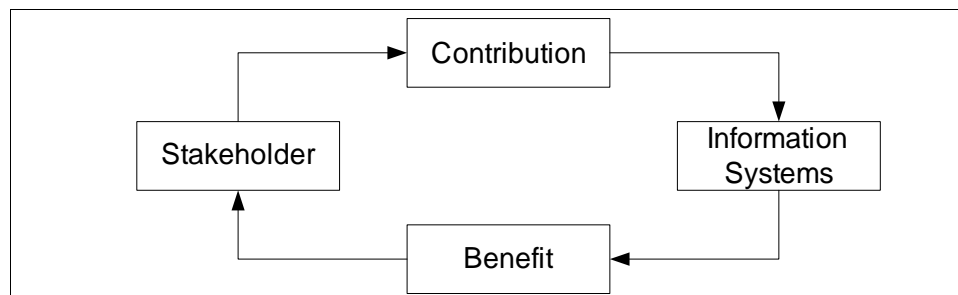
Source: Bemelmans (2000)

According to Bemelmans (2000), the relationship between information systems and their stakeholders can be classified into two parts: contributions and benefits. Stakeholders will contribute to relevant information systems if, and only if they will experience benefits from doing so. One of the best behavioural motivators is a direct positive benefit when doing information systems management tasks as intended by the designers of the system. Mainly, the closed-loop principle emphasises the importance of creating incentives for all stakeholders in an information systems management design.

5.3 User-oriented model for global enterprise portal design

Based on the aforementioned model, one of the key issues for designing an enterprise portal in a global environment is to set up effective linkages between enterprise portal users and the enterprise portal design itself. Additionally, effective linkages need to be created between the enterprise portal and the underlying business processes, thus supporting enterprise portal users in the execution of their tasks. By incorporating the 'closed-loop principle' in the design of the enterprise portal, the interests of enterprise portal users and the interests of the company providing the portal are aligned. The result is the model depicted in Figure 3, which we label as the user-oriented model for global enterprise portal design.

Figure 3 The user-oriented model for enterprise portal designing in a global environment
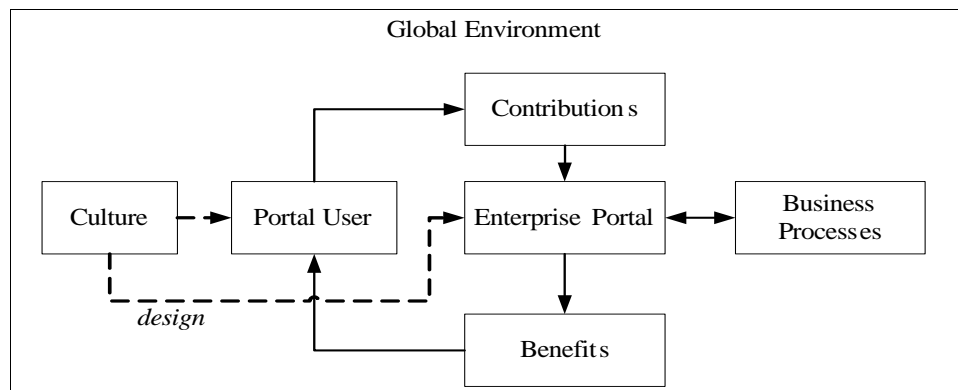
To further explicate a key aspect of the 'closed-loop principle' in our model, we turn to Ryu *et al.* (2005), who studied the individual user's investment strategy in enterprise portals. They focus on how the user attempts to obtain the optimal benefit from specialised knowledge in enterprise portals. Ryu *et al.* (2005) identify three activities for knowledge acquisition through enterprise information portals:

1   spending a certain amount of resources and time to search for new skills and techniques (learning by investment)

2   accumulate specialised knowledge by doing tasks in the enterprise information portal (learning by doing)

3   communicating with members to transfer knowledge (learning from others).

Learning by investment and learning by doing primarily focus on users' contributions to the enterprise portal, while learning from others mostly focuses on the benefits that can be obtained by the user from an enterprise portal. Culture will influence the contributing part of the loop because differences in language and the interpretation of icons, colours, symbols, and layout affect the degree to which users effectively and efficiently execute tasks and search for new skills and techniques. The danger of intercultural conflict, however, gets exacerbated when looking at the barriers to learning from others; in other words, the benefits part of the loop. Potentially, up to three conflicting cultures might come into play: the original reference culture of the enterprise portal (the dominant corporate culture of the portal owner), the culture of the user who wants to learn from another user, and the culture of the user that is sharing his or her knowledge. Moreover, "what is learned from other members of an organisation is always critical in terms of its impact on the knowledge acquisition of individual members as well as on the organisation" (Ryu *et al*., 2005). Interestingly, learning from others has not been well studied as a key subject in the information systems area (Ryu *et al*., 2005).

To further improve the benefits of learning from others by stakeholders, we zoom in on what influences knowledge acquisition by learning from others. Ryu *et al*. (2005) propose two factors influencing the level of knowledge that each enterprise portal member can receive through learning from others. However, in a global environment we propose that sensitivity to cultural differences constitutes an important *third* factor, next to the level of communication adopted and others' willingness to provide information.

Finally, a key role in relation to this proposed third factor is fulfilled by "knowledge translators" as defined by Kim *et al*. (2002). Knowledge translators can interpret the specialised knowledge accumulated in a community into another community's perspective. The translator is sufficiently knowledgeable about the task of both communities to be able to translate (Kim *et al*., 2002). Naturally, the knowledge in this global context constitutes not only domain knowledge, but particularly cross-culture knowledge on language, icons, colours, symbols, and layout.

5.4   Benefits for global enterprise portal design

The user-oriented model above indicates a number of expected improvements for enterprise portal design in a global environment. First, this model serves as a useful communication channel to capture users' preferences that may relate to cultural differences when the portal users access an enterprise portal in a global environment. In this way, it can be helpful to design the profile of an enterprise portal for an international business because this design is directly associated with the user's contribution.

Second, by using this model, enterprise portal designers can try to ensure that the enterprise portal delivers what both the user and the portal owner want. When designers align interests with portal owners, enterprise portal users will benefit and will be satisfied with having access to enterprise portals that are equally useful for them as for the portal owner.

Third, based on the continuous updating contributions from enterprise portal users, this model can be an instrument for adapting an enterprise portal designed in one local situation to another situation in a global environment. Moreover, this model can form an approach to help a company extend their business to anywhere in the world as the enterprise portal could get adapted to match a specific cultural background. From time to time, the enterprise portal could bridge e-business users and e-business both locally

and internationally, which will greatly contribute not only to the enterprise portal profile, but also to e-business in the global environment. Accordingly, we believe that the user-oriented model provides a sound management mechanism by linking the portal users to enterprise portal design.

6 Discussion and conclusion

It is important to have enterprise portals that are designed technically sound. However, technically sound enterprise portals may not be effectively and efficiently used globally if cultural differences are ignored. Here we provide our key findings, practical implications and future research agenda.

6.1 Key findings

The contributions of this paper are fourfold. First, we demarcated what we exactly mean by the concept enterprise portal. In our definition, enterprise portals include both an internal and an external orientation, as in our contemporary networked-world, integration of information between partner companies is almost inevitable. In sum, enterprise portals can provide users with access to applications, knowledge and job- and task-related information, and can enable collaboration with the external network of business partners. In that sense, enterprise portals can be drivers of global integration, both internally for a company and externally for the companies' business network.

Second, based on previous research, we delineated specific cultural factors that need to be considered in the design of global enterprise portals. These cultural factors are: language, colours, icons, symbols, and layout. Whereas language differences are a rather obvious influence on user behaviour, differences in colours, icons and symbols can strongly affect the subconscious experience of an enterprise portal. For instance, the colour white represents purity in most Western countries, but death in China. Finally, layout especially in the form of reading direction can lead to quite ambiguous messages, particularly when combined with icons.

Third, we iteratively developed a model that can help in improving global enterprise portal design by considering how the aforementioned elements of users' cultural background might constrain effective and efficient enterprise portal usage. For this purpose, we first described the key elements for global enterprise portals: portal users, enterprise portals, business processes, and the global environment. Next, we applied the closed-loop principle for information systems management design to our model of a global enterprise portal. Hence, by means of the closed-loop principle we focus attention on the contributions and benefits portal users obtain by executing tasks in the enterprise portal. However, we draw particular attention to the relation between enterprise portals and users' culture. In other words, enterprise portals that incorporate users' cultures improve the contributions of the user to, and the benefits received by the user from, the portal.

Fourth and final, we explored how portal users reap benefits from enterprise portals through learning by investing, learning by doing, and learning from others. Learning by investment and learning by doing emphasise the contribution of the user to the portal. However, learning from others emphasises mostly the benefit side when applying the

closed-loop principle to enterprise portals. Here we propose that an important third factor, incorporating user culture, will improve the benefits received from an enterprise portal. Cross-cultural knowledge translators could help in further improving and constantly updating the sensitivity of the enterprise portal to cultural differences.

6.2   Implications for practice

Our study provides a number of implications for practice. Our key message is that cultural differences need to be considered in the design of enterprise portals. We provided five factors that can be interpreted in multiple ways in a cross-cultural context. This list provides the tip of the iceberg when it comes to incorporating cultural differences in enterprise portal design. Nonetheless, practitioners can ask themselves to what extent their enterprise portals consider these cultural differences. Therefore, we hope this paper will raise awareness on this important issue.

Additionally, we provided basic guidelines on designing an enterprise portal by means of the closed-loop principle. Designers need to consider what kind of contributions they expect from portal users and link these to the benefits that users would expect from such an enterprise portal. Only when contributions and benefits are aligned can enterprise portals be a success. Of course, the alignment between business processes and enterprise portal should also not be left out of the picture.

Furthermore, we demarcated the enterprise portal concept. The term portal is used in a variety of ways, which is not shared by scholars, making our recommendations less clear to practitioners. We demonstrated which applications can be found within enterprise portals, and stressed how portals can integrate internal and external processes. This way, we highlighted how enterprise portals can provide opportunities to make businesses more efficient and effective. Hopefully our user-oriented model can be used to improve, promote, and adapt enterprise portals in one specific cultural environment to the other cross-cultural environment, which will contribute to international business profoundly.

6.3   Future research

To design enterprise portals successfully in a global environment, more research efforts are needed. First of all, other theoretical perspective – rooted, for instance, not only in sociology or psychology, but also in the humanities – could be employed to study enterprise portal usage among different cultures. From a more practical perspective, future research might concentrate on practical cases or 'best of breed' practices of user-oriented enterprise portal design by reviewing the enterprise portal software on the market. In addition, we believe that research findings of in-depth cases including both experiences and lessons will greatly contribute to enterprise portal design research.

Methodologically, an elementary experimental study comparing how Western and Chinese or Arab portal users interpret different colours, icons, symbols, and layout could easily provide more insights into these three cultural differences. In addition, non-participant observations on how users from different culture use an enterprise portal could contribute to basic insights into this field. Naturally, enterprise portal users from different cultures could be interviewed or surveyed to explore their experiences and the types of contributions and benefits they provide and receive from their enterprise portals.

By means of in-depth semi-structured interviews, specific recommendations might be obtained, whereas survey could provide more insights into the current state of the enterprise portal field in relation to cross-cultural work.

A final recommendation would be to focus on the development of tools for user-oriented global enterprise portal design. First of all, tools could gather data on usage of portals, provide users with opportunities for customisation, or help portal designers and developers to further improve the culture sensitivity of their portals – hence, partly automate the cross-cultural knowledge translator role. However, by conducting design research that aims at developing specific tools that support cross-cultural collaboration could be developed as a prototype, based on findings from other data sources, and then tested for the effectiveness and efficiency improvements they provide in practice. These tools will not only promote the progress of enterprise portal implementation and application in the global environment, but will also further e-business internationally.

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