Assessing Business Transaction Standards and Their Adoption: A cross case analysis between the SETU and Vektis standards

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Abstract— Nowadays businesses increasingly want to be interoperable so that they can collaborate with other organizations. Interoperability can be achieved through the use of business transaction standards, by which the organizations that use the standards collectively form a value added network. However the effectivity of these standards is largely dependant on the number of organizations that have adopted it, and thus it is very important that the standard conforms to the conditions that organizations have towards adopting these standards. Building on recent literature describing technical standards [1], we have constructed a model through which standard aspects can be compared with the adoption conditions that organizations have. Subsequently cross case analysis methods were used to identify important aspects that influence the adoption of business transaction standards, as well as the identification of methods by which the aspects can be adapted by an Standard Development Organization (SDO) so that higher standard adoption is achieved. This evaluation can give managers and SDO's a higher understanding on standards itself and the domain it is supposed to function in. The cases demonstrated that early involvement of organizations with high market powers (preferably through a federation that represents these organizations) is important for adoption whereby the development and maintenance of the standard should preferably be funded by those organizations that have most to gain from broad standard adoption. Furthermore open characteristics, modularity and efficient business processes are perceived imperative for the adoption of business transaction standards.

Index Terms— Adoption, business transaction standards, case study, interoperability.

I. INTRODUCTION

Business transaction standards are used by Inter - Organizational information Systems (IOS) to increase the

level of interoperability amongst collaborating organizations. Collaborative business (C-business) describes the interlinked collaboration of all participants in a value added network [2] through which organizations agree to work together as a method for achieving their common goals. When collaborative business is strived after, the systems of every party involved must be able to interoperate. This interoperability can be achieved through a standard that is recognized by all involved parties. The advantages that can be derived from standard use is that documents and messages are delivered to the target organization in such manners that they can automatically be processed through their business processes, without necessarily owning and controlling the asset. "Through this unique combination of resources advantage over competing firms can be established. These unique interfirm linkages may be a source of relational rents and competitive advantage" [3]. Because standards enable interfirm linkages the relational view as described by Dyer [3] is applied who has identified several advantages (relation-specific assets, interfirm knowledge sharing routines, complementary resources / capabilities and effective governance) resulting from interconnecting resources. Existing standard research suggest that standard adoption is dependant on the aspects that that standard have [1], however most research describe technical standards (like the USB and IPv6 standards). Research describing business transaction standards is scarce [4]. Furthermore because of political, organizational, and economic complexies [5] business transaction standard development differ from technical standards and thus indicates that the aspects form technical standards are not necessarily the same as business transaction standards. The goal of this paper was to identify those aspects that are of importance for the adoption of business transaction standards, and search for methods through which these aspects can be adapted by an Standard Development Organization (SDO) so that higher standard adoption is achieved. In contrast to van de Kaa [1] who developed a framework showing technical standards aspects through which managers can make a well informed choice on which standard to use. We argue that an SDO can also use the aspects to alter the standard in order to achieve higher adoption degrees and subsequently achieve higher interoperability. This was achieved by constructing an adoption model consisting of adoption factors found in

existing literature. The model was validated by using cross case evaluation techniques, which was done by first constructing case descriptions of the two business transaction standards. Second using the case descriptions cross case analysis has been conducted that show similarities and differences between the two cases. And third using the cases a determination was made which aspects are of importance for business transaction standards as well as making adoption hypotheses.

II. STANDARD ADOPTION CONDITIONS

Organizations can have multiple factors that encourage or restrict them for adopting business transaction standards (i.e. adoption conditions), for the SDO it is important to know which adoption conditions are present so that the standard aspects can be altered in such manners that the standard complies to those conditions. In order to ascertain these conditions multiple organizational viewpoints were adopted whereby the organizational viewpoints are those organizational types involved in standards. Krechmer [6] identified end users, implementation organizations and SDO's as those organizational types that have different viewpoints towards adoption conditions. The end user organization will benefit from the business transaction standard because the application of IT and complementary organizational resources can improve business processes / enable new ones and may ultimately impact organizational performance. Zhu [7] identified two business drivers that are of key influence to the adoption of end user organizations: Network effects and switching costs. The implementation organization is the organization that makes software (in-house or outhouse) that is compliant to the standard which is developed by the SDO. The implementation organization ensures that the end user is able to use the software / standard. Since our goal is to assess the standard that is used by that specific software solution, a software supplier (portability) and maintainer (maintainability) view has been used and not a software developer view. The SDO usually is a non-profit organization that is comprised with members that have common goals, thus the goal of an SDO is the development and maintenance of a standard that service the common interests of it's members. Zhu [7] describes that for an SDO one measure is key for adoption and diffusion which is deployment. The deployment of the standard can subsequently be judged based upon three measures: Volume, Diversity and Breadth.

III. STANDARD ASPECTS

Following the assumption that the aspects identified for technical standards are not the same as the aspects of influence for business transactions standards, we have identified the aspects that are of importance when dealing with business transaction standards. In order to establish a complete aspect overview that influence the adoption of business transaction standards, articles that discuss business transaction standard aspects have been examined. Starting point was the model by

van de Kaa [1] who has made a similar model describing factors for standard dominance specific for network (technical) standards. Additional aspects were identified through other literature sources. These articles were published in the top 25 CS/IS journals [8] and the top 25 International Business Journals [9]. Second articles discussing business transaction standard case studies were used to examine which aspects were mentioned relevant to adoption. This resulted in twenty six aspects that were subsequently subdivided into six distinct categories derived from Melville [10], the aspects are shown in Table 2. The importance of the Melville model is that it encompasses every domain (e.g. Focal firm, Competitive Environment and Macro environment) that Information Technology have influence upon. By embracing these categorizations it was possible to conclude that all aspects have been identified furthermore these categorizations ensured that generalizations and aspects pattern recognition can be used when applying case evaluation methods.

IV. CROSS CASE EVALUATION

In order to ascertain which standard aspects can best be influenced by SDO's so that higher adoption degrees are achieved, cross case analysis methods have been used. These cross case analysis methods have yielded qualitative results through which an in depth understanding was ascertained regarding the standard aspects that influence the organizational adoption conditions. The standards used for this analysis were the Vektis (http://www.vektis.nl) standard and the SETU (http://www.setu.nl) standard. Whereby the goal of this cross case analysis was to identify those aspects that are of importance of standard adoption, and to determine how these aspects relate to the adoption conditions. For both the SETU case and Vektis case a preliminary case description has been constructed using literature which has been provided by the SETU and Vektis organizations itself, internet (site) and Dutch articles. These sources provided a basis from which an understanding was formed regarding the dimensions that exist when using the standards. Because the general goal of this paper is to form hypotheses and to search for adoption patterns amongst standard aspects, the second data collection phase was conducted using separate data collection methods [11].

- The data used for the Vektis case study has been formed through a questionnaire that was sent to Vektis KEI members. These members represent both end user and implementation organizations and are involved with the standard build (43% response rate). This questionnaire consisted of open questions derived from literature, aspect categories and the adoption conditions.
- The data used for the SETU case study was formed through interviews with TNO employees, who are involved with the building and maintenance of the standard. As well as reviewing documentation provided by TNO.

The following two paragraphs will give short descriptions of the two standards.

A. Vektis case

Vektis is an organization that is funded by insurance organizations and ensures that appropriate information is available for health providers so they can perform their tasks in conjunction with their business (chain) partners. One of their activities is to provide standards for the declaration processes in the Dutch healthcare domain, by which standard users are insurers, health offices and health providers. The prime task of the standard is to provide mechanisms that show whether individuals are insured and to provide mechanisms that enable electronic health declarations. Whenever patients have used services provided by health providers a billing process is initiated towards the insurer. These declarations are transmitted electronically towards the insurance companies which in turn provide payment towards the health providers. The transmissions go through the VECOZO portal that ensures that the overall communication is conducted in a secure and safe manner. Vektis is also placed in the Dutch environment as an independent organization, by which it's partners, the Dutch health insurers, provide it's financial backing.

B. SETU case

The SETU (Foundation for electronic transactions in the staffing industry) was founded by the Dutch federation for the staffing industry (ABU). The SETU standards serve the process between staffing organizations and organizations that acquire personnel through the mediation of the staffing organizations. The general goal of the standard is to facilitate electronic transactions between the organizations within the Dutch staffing industry, to standardize the business process for compatibility reasons and to ensure continuity of the developed standards. The SETU standards are in existence since the beginning of 2007, since then the standards handle approximately 10 percent of all timecards. Recently the standard has been added to a Dutch government "Comply-or-Explain" list that includes open standards that are mandatory to be used for each (semi) government organisation for achieving interoperability [12].

TABLE 1
FIELD CASE RESULTS

	Vektis	Setu
IT Resources	The standards are relatively open, whereby the insurance organizations pay contributions. Standards modules are built for specific occupational groups, resulting in high recognition, and increases the adoption amongst those groups. Furthermore the standards are built using ASCII and it is not compatible with other standards, however this has no influence on the adoption. The standards are also considered easy to use by which Vektis actively encourages the testing of the standards which is considered important for it gives a sense of confidence.	Although the standards are open they are not as widely used that software vendors have solutions ready "on the shelf" which are SETU compliant, this stresses the switching costs and portability. However many organizations / software solutions are already compliant to HR-XML which ensures that lower switching costs and portability is mediated and also linkages can be made to international organizations, The standards are built out of four complementary standards by which organizations can choose to implement one or multiple standards.
Compl. Org. Resources	Broad adoption of the standards can mainly be attributed to cost savings organizations within the healthcare domain can make significant cost savings through the standards. The fact that Vektis and Vecozo is funded by insurance organizations does not affect the adoption of the standards. However the presence of the KEI within Vektis encourages good will and reduces misinterpretations and thus has positive effects on adoption.	The development of the standards is conducted in such a manner that organizations can participate in the development. This creates good will and reduces misinterpretations amongst industry players. Furthermore organizations within the staffing domain can make significant cost savings through the usage of the standards (economies of scale do apply).
Business processes	The standard ensures that the declaration process is conducted on an unambiguous manner which makes the adoption of the standard attractive because it can be used to enhance business processes. Furthermore insurance organizations also offer to collect money that is not covered by the insurance, which creates good will and simplifies the process.	The standards ensure that no paper documents (e.g. hour specifications) will have to be sent towards other organizations that have converted to the standards. This will yield burden reliefs through increased processes which can attract organizations to adopt the standards.
Industry characteristics	The healthcare declaration processes is highly regulated within the market which results in high adoption. By which health insurance organizations do not compete by means of an effective communication process between chain partners, they do compete through lower insurance fees and by having superior customer contacts etc. This means that the health insurance organizations can collectively endorse / develop the standards.	When adopting the SETU standards staffing customer organizations have the possibility of reaching more staffing companies, and thus giving them more flexibility. This can have positive effects on the adoption of the standards. However the staffing industry is one where there is lots of competition (i.e. the market is not consolidated) and thus organizations can choose not to convert in order to be flexible to market changes.
Trading partners	Insurance organizations collectively have such powers that they can obligate (by means of contractual agreements) the usage of the standards, and thus health providers will have to implement the standards. High standard adoption has ensured that the programs (that are compliant to the standards) are relatively cheap and thus lowers switching costs.	At this point in time the installed base of the standard is not of such levels that other organizations automatically feel the need to adopt, there are several important organizations (e.g. Randstad) within the market that are actively working for higher adoption of the standards, however they cannot make the standard use compulsory towards their partners.
Macro Env.	The standards are not obligated by law, however the healthcare domain is strongly regulated which is one of the reasons why the insurance organizations have such powers in the market. Furthermore respondents stated that when the government would have obligated standard use adoption would have gone quicker.	The SETU standards have been added to the comply-or-explain regime of the Dutch government which pressures (semi) governmental organizations to convert to the SETU standards, furthermore expectations are that this regime will encourage other organizations to follow.

C.　Cross case Vektis and SETU

Using the data collected from the SETU and Vektis standards, a cross case analysis has been conducted whereby aspects that are important for the adoption of business transaction standards have been identified. Table 1 shows the similarities and differences between the two cases. These differences between the two cases can mainly be related to the competitive environment and the macro environment the main differences are:

- The staff lending domain is not consolidated resulting on more emphasis on the IT resource dimension e.g. making the standard more compatible with other standards.

- Legislation ensures that health insurance organizations have high domain powers, as a result the Vektis standards are purely built to serve the declaration process towards the insurance organizations, making the characteristics of the standard less important.

Table 2 shows the aspects that were deemed important (after assessing the SETU and Vektis cross case analysis) per organizational adoption condition.

TABLE 2
ASPECTS VERSUS ORGANIZATIONAL CONDITIONS

Standard aspects	*End user organization*		*Implementation organization*		*SDO*		
Focal Firm - IT Resources	1	2	3	4	5	6	7
1.1 Technological superiority	L	L		L			
1.2 Compatibility of standard	L & F	F	L & F	L & F	L		L
1.3 Open standard	L & F	L & F	L	F	L & F		
1.4 Complete set of functionalities	L & F		F	L & F	L & F	F	L
1.5 Customization capabilities	L	L		L		F	
1.6 Ease of use				L & F	L & F	L	
1.7 Deployment strategy	L			L & F	L		L
Focal Firm - Complementary Organizational Resources							
2.1 Financial strength	L & F				L & F		L
2.2 Complementary goods and reputation	F				F		
2.4 Participation in standard consortia	L & F				L & F		L
2.5 Pricing strategy that attracts customers		L					
2.6 Customer expectations					L		
2.8 Management support	L			L			
Focal Firm - Business processes (performance)							
3.1 Process management is increased	L & F				L & F	F	L
3.2 Business model is extended	L & F				L		L
Competitive Environment - Industry characteristics							
4.1 Vertical integration	L & F				L		L & F
4.3 Market is ready	L & F				L & F		
Competitive Environment - Trading partners							
5.1 Network externalities	L	F			L & F		L
5.3 Big Fish	L & F				L & F	F	
5.4 Stakeholders in standard build	L & F						L
Macro Environment							
6.1 Legislation that encourages standard usage	F				L & F	F	F

(1 = Network effects, 2 = Switch costs, 3 = Maintainability, 4 = Portability, 5 = Volume, 6 = Diversity, 7 = Breadth)

(F= Aspect found in field case (this paper), L = Aspect described in literature cases (earlier work))

V.　CONCLUSIONS

The goal of this paper was to identify those aspects that are of importance for the adoption of business transaction standards, and search for methods through which the aspects can be adapted by an SDO so that higher standard adoption is achieved. During the cross case analysis it has become apparent that the main reason for organizations to adopt business transaction standards is highly dependant on the powers that exist in the specific domain. When there are large power differences amongst organizations, then the SDO should focus on those aspects that reside in the competitive environment category (Table 2). Whenever there are low differences then the focus should be towards the IT resource category (table 2). In all cases it is important that the standard is developed by a federation that represents organizational (types) residing in the domain, as well as basing the standard on open characteristics. This will give organizations a sense of ownership and makes the standard free to use, which is good for adoption. Furthermore the standard build should be modular whereby the modules should be based on best practice business processes, enabling organizations to only adopt those modules that are of importance for them. SDO organizations should produce standards in such manners that it fulfils the conditions that organizations have set and thus increase the

chance that the standard will be adopted. Following the conclusions made by van de Kaa [1] who has made a similar model describing important aspects for technical standards, the model described in Table 2 can be used by managers in order to ascertain a deeper insight into those aspects that are of influence for their organization and subsequently make decisions which standard their organization should support.

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